The Celotex Handy Guide

celotex.co.uk

Celotex
SAINT-GOBAIN

When you choose Celotex, you're choosing a unique level of service, support, online tools and aftercare.

In fact, some of that support is in your hands right now.

This little book will make your professional life a bit easier. It contains comprehensive information about our insulation solutions and the technical data you might need.

And if there's anything else you'd like to know, please get in touch.

It's what we call service.

It's different and it's better because it's ...by Celotex.

Contents

A bit about us

Celotex products protect countless buildings the length and breadth of the UK. Our solutions and product development continue to make a difference. We have formed relationships and partnerships throughout the world of construction. We have created a community. We are part of our industry in a way that very few businesses can claim to be.

Why Celotex PIR?

As a leading investor within the insulation sector, Celotex PIR has a considerable advantage over many other insulation providers. This is reflected through our high performance insulation solutions. Celotex PIR insulation offers:

- Products with a thermal conductivity as low as 0.021 W/mK offering even better U-values and some of the thinnest possible solutions
- Super low emissivity values within cavity air spaces with stucco foil facer products
- Better thermal efficiency per mm than many other insulation materials
- An A+ rating when compared to the BRE Green Guide
- A lower environmental impact than other typical PIR manufacturers
- Products with Class 0 fire performance
- The broadest range of PIR thicknesses from 12mm to 200mm
- An expansive product range suitable for pitched and flat roofs, walls and floors
- Product solutions for both new build and refurbishment projects
- Industry leading technical support via the Celotex Technical Centre

Celotex Technical Centre

With outstanding levels of technical expertise and personal assistance, the Celotex Technical Centre will provide you with:

- U-value calculations
- Condensation risk analysis

As well as providing technical advice on any of the following matters:

- Part L and Section 6
- Application and installation guidance
- Technical approvals
- Environmental and sustainability credentials

Find out more

To provide the maximum level of assistance, the Celotex Technical Centre is open from 8am to 5.15pm. For further information on any of the services contact the Centre via **celotex.co.uk** or call **01473 820850**.

Join us @celotex

Team up with us

Like us

Building regulations and U-values

New buildings

Designing a new build property requires the use of calculation software called SAP to calculate the CO_2 emissions and in the case of England, the energy demand of the proposed specification. Adopting a fabric first approach using low U-values within the walls, floors and roofs will give you the best route to compliance.

Guidance on the U-values and product solutions for complying with building regulations is available from the Celotex Technical Centre or by visiting **celotex.co.uk**.

Extensions and conversions

Building regulations state the U-value requirements of walls, floors and roofs when adding an extension to existing properties or carrying out conversion projects.

The U-values required for each application will vary by country and are outlined in the tables below.

England Part L 2013

Application	New thermal element (e.g. kitchen extensions)	Upgrading existing element (e.g. thermal upgrade to solid wall)
Walls	0.28	0.30
Floors	0.22	0.25
Pitched Roof (rafter)	0.18	0.18
Pitched Roof (ceiling)	0.16	0.16
Flat Roof	0.18	0.18

Scotland Section 6 2015

Application	New thermal element (e.g. kitchen extensions)	Conversion of heated buildings (e.g. thermal upgrade to solid wall)
Walls	0.17	0.30
Floors	0.15	0.25
Pitched Roof (rafter)	0.13	0.25
Pitched Roof (ceiling)	0.11	0.25
Flat Roof	0.13	0.25

Wales Part L 2014

Application	New thermal element (e.g. kitchen extensions)	Upgrading existing element (e.g. thermal upgrade to solid wall)
Walls	0.21	0.30
Floors	0.18	0.25
Pitched Roof (rafter)	0.15	0.18
Pitched Roof (ceiling)	0.15	0.16
Flat Roof	0.15	0.18

Product descriptions

Celotex FR5000

Celotex FR5000 is our best in class PIR solution. With a super low lambda of 0.021 W/mK and Class 0 fire performance throughout the entire product, FR5000 provides an ideal option for achieving better U-values and thinner solutions in pitched roof, wall and floor applications.

Providing super low emissivity values, Celotex FR5000 delivers high performance insulation that is over 100% more thermally efficient than many mineral fibre products. FR5000 achieves an A+ rating when compared to the BRE Green Guide delivering over 20% better environmental impact than typical PIR.

Always install Celotex FR5000 in accordance with the instructions supplied by Celotex.

Lambda
0.021 W/mK

Board size
1200 x 2400mm

Fire performance
Class 0 in accordance with BS 476 Parts 6 and 7

BBA certificates
95/3197 and 16/5364

BRE Green Guide rating
A+

Product code	Thickness (mm)	R-value (m^2K/W)
FR5050	50	2.35
FR5060	60	2.85
FR5070	70	3.30
FR5075	75	3.55
FR5080	80	3.80
FR5090	90	4.25
FR5100	100	4.75
FR5120	120	5.70
FR5150	150	7.10

Celotex RS5000

IMPORTANT: On 23 June 2017, in view of the focus on components of rainscreen cladding systems, Celotex stopped the supply of Celotex RS5000, pending further clarity. Material about the product is for information only. Celotex do not currently supply a solution for buildings over 18 metres.

Celotex RS5000 is a premium performance PIR solution for use in rainscreen cladding applications. With a super low lambda of 0.021 W/mK and Class 0 fire performance throughout the entire product, RS5000 is suitable for use in warm steel frame constructions or can be fixed directly to masonry for overcladding applications.

Celotex RS5000 represents an on-going commitment to product innovation and is the first PIR insulation board to meet the criteria set out in BR 135 and therefore is acceptable for use in buildings above 18m in height. RS5000 also features an A+ rating when compared to the BRE Green Guide delivering over 20% better environmental impact than typical PIR.

Always install Celotex RS5000 in accordance with the instructions supplied by Celotex.

Lambda
0.021 W/mK

Board size
1200 x 2400mm

Fire performance
Class 0 in accordance with BS 476 Parts 6 and 7

BRE Green Guide rating
A+

Product code	Thickness (mm)	R-value (m^2K/W)
RS5050	50	2.35
RS5060	60	2.85
RS5070	70	3.30
RS5075	75	3.55
RS5080	80	3.80
RS5090	90	4.25
RS5100	100	4.75
RS5120	120	5.70
RS5150	150	7.10

Celotex CG5000

Celotex CG5000 is our best in class PIR solution designed specifically for partial fill cavity wall applications. CG5000 offers a super low lambda of 0.021 W/mK delivering lower U-values with thinner solutions, simplifying compliance.

Providing super low emissivity values, Celotex CG5000 offers enhanced thermal performance in cavity air spaces. As insulation specialists pioneering thermal improvements in PIR, CG5000 has been developed with Class 0 fire performance throughout the entire product and achieves an A+ rating when compared to the BRE Green Guide.

Celotex CG5000 is a tried and tested partial fill cavity wall solution with third party approvals including BBA certification.

Always install Celotex CG5000 in accordance with the instructions supplied by Celotex.

Lambda
0.021 W/mK

Board size
1200 x 450mm

Fire performance
Class 0 in accordance with BS 476 Parts 6 and 7

BBA certificate
16/5343

BRE Green Guide rating
A+

Product code	Thickness (mm)	R-value (m^2K/W)
CG5050	50	2.35
CG5075	75	3.55
CG5085	85	4.00
CG5100	100	4.75

Celotex CF5000

Celotex CF5000 is a premium performance full fill cavity wall solution and is BBA certified. Making use of the whole cavity width, CF5000 optimises the thermal performance through the wall achieving a lower U-value without the requirement to widen the cavity.

Celotex CF5000 features a super low lambda of 0.021 W/mK helping you achieve compliance to UK building regulations and a U-value within the wall of 0.18 W/m^2K. CF5000 has been mechanically engineered with a rebated edge to eliminate the passage of moisture. Designed with installation efficiency in mind, CF5000 is easy to cut and comes in 1200 x 450mm dimensions to fit with standard cavity wall tie spacing.

Always install Celotex CF5000 in accordance with the instructions supplied by Celotex.

Lambda
0.021 W/mK

Board size
1200 x 450mm

Fire performance
Class 0 in accordance with BS 476 Parts 6 and 7

BBA certificate
16/5343

Product code	Thickness (mm)	R-value (m^2K/W)
CF5097	97	4.60

Product descriptions

Celotex FI5000

Celotex FI5000 is a premium performance flooring solution, suitable for concrete slab, beam and block, suspended timber and underfloor heating applications. FI5000 provides thermal performance benefits and has been designed with installation efficiency in mind. Featuring a super low lambda of 0.021 W/mK, FI5000 achieves compliance to UK building regulations with better U-values and thinner solutions.

Celotex FI5000 combines best in class PIR insulation with an innovative composite facer featuring a built-in vapour control layer (VCL), enabling direct screed (when the joints are taped), without the need for an additional separating layer. FI5000 features an enhanced compressive strength value of ≥175 kPa making it the ideal solution for a range of flooring applications.

Always install Celotex FI5000 in accordance with the instructions supplied by Celotex.

Lambda
0.021 W/mK

Board size
1200 x 2400mm

BBA certificate
'Pending'

BRE Green Guide rating
A

Product code	Thickness (mm)	R-value (m^2K/W)
FI5075	75	3.55
FI5100	100	4.75
FI5125	125	5.95

Celotex SL5000

Celotex SL5000 is a concrete soffit insulation board, utilising enhanced thermal performance properties of Celotex PIR insulation with calcium silicate providing additional fire performance. Featuring a super low lambda value of 0.021 W/mK, SL5000 ensures Regulatory Compliance can be achieved with minimal insulation thicknesses.

Celotex SL5000 provides on-site benefits by significantly reducing installation times due to the insulation and calcium silicate being supplied as one product. Delivering greater impact resistance compared to exposed insulation systems, SL5000 provides a decorative finish with no need for on-site decorating. SL5000 will provide reliable long term energy savings for buildings.

Always install Celotex SL5000 in accordance with the instructions supplied by Celotex.

Lambda
0.021 W/mK

Board size
1200 x 2400mm

Fire performance
Class 0 in accordance with BS 476 Parts 6 and 7 (insulation only)

BRE Green Guide rating
A+ (insulation only)

BBA certificate
'Pending'

Product code	Thickness (mm)	Combined R-value (m^2K/W)
SL5086	80 + 6	3.80
SL5096	90 + 6	4.25
SL5106	100 + 6	4.75

Product code includes 6mm calcium silicate board

Celotex US4000, insulation upstand, available now! Visit celotex.co.uk for more information.

Celotex GD5000

Celotex GD5000 is an all-in-one plasterboard thermal laminate comprising premium PIR insulation bonded to 12.5mm tapered edge plasterboard. Designed specifically for internal dry-lining, GD5000 can be used to upgrade internal solid walls or provide a second layer of insulation in timber frame constructions and between and under pitched and flat roof applications.

Featuring a super low lambda of 0.021 W/mK with foil/kraft paper facings, Celotex GD5000 is ideal for achieving better U-values and thinner solutions in adhesively bonded (dot and dab) applications. When compared to typical PIR, GD5000 offers up to 15% thinner solutions helping optimise internal space.

Always install Celotex GD5000 in accordance with the instructions supplied by Celotex.

Lambda
0.021 W/mK

Board size
1200 x 2400mm

Fire performance
Euroclass B-s1,d0 in accordance with BS EN 13501-1

BBA certificate
16/5357

Product code	Thickness (mm)	Combined R-value (m^2K/W)
GD5025	25 + 12.5	1.25
GD5040	40 + 12.5	1.95
GD5050	50 + 12.5	2.40
GD5060	60 + 12.5	2.90

Product code excludes 12.5mm plasterboard laminate

Celotex TB4000

With a breadth of thickness range unrivalled by any other PIR manufacturer, Celotex TB4000 offers high performance insulation available from as thin as 12mm. TB4000 can be used for overcoming thermal bridging and for use in two layer build ups including between and under rafters and over stud in timber frame wall lining applications.

High performance insulation featuring low emissivity foil facings and supported by BBA certificates, Celotex TB4000 is suitable for a range of roof, wall and floor applications. TB4000 also achieves an A+ rating when compared to the BRE Green Guide.

Always install Celotex TB4000 in accordance with the instructions supplied by Celotex.

Lambda
0.022 W/mK

Board size
1200 x 2400mm

Fire performance
Class 1 in accordance with BS 476 Part 7

BBA certificates
95/3197 and 16/5352

BRE Green Guide rating
A+

Product code	Thickness (mm)	R-value (m^2K/W)
TB4012	12	0.50
TB4020	20	0.90
TB4025	25	1.10
TB4030	30	1.35
TB4040	40	1.80

Product descriptions

Celotex GA4000

Celotex GA4000 has long been at the heart of Celotex product range. High performance insulation featuring low emissivity foil facings and supported by BBA certification, GA4000 is suitable for a range of roof, wall and floor applications.

Celotex GA4000 achieves an A+ rating when compared to the BRE Green Guide and offers enhanced thermal performance in cavity air spaces such as timber frame walls and in between and under pitched roof applications.

Always install Celotex GA4000 in accordance with the instructions supplied by Celotex.

Lambda
0.022 W/mK

Board size
1200 x 2400mm

Fire performance
Class 1 in accordance with BS 476 Part 7

BBA certificates
95/3197 and 16/5352

BRE Green Guide rating
A+

Product code	Thickness (mm)	R-value (m^2K/W)
GA4050	50	2.25
GA4060	60	2.70
GA4070	70	3.15
GA4075	75	3.40
GA4080	80	3.60
GA4090	90	4.05
GA4100	100	4.50

Celotex XR4000

Celotex XR4000 is a multi purpose insulation board enabling users to achieve lower U-values with a single layer of insulation than has previously been possible. Our 200mm thick product positions Celotex as the manufacturer of the broadest range of product thicknesses from 12–200mm.

Celotex XR4000 helps meet current and future building regulations and carbon reduction programmes including Part L and Section 6 and is supported by BBA certification.

Always install Celotex XR4000 in accordance with the instructions supplied by Celotex.

Lambda
0.022 W/mK

Board size
1200 x 2400mm

Fire performance
Class 1 in accordance with BS 476 Part 7

BBA certificates
95/3197 and 16/5352

BRE Green Guide rating
A+

Product code	Thickness (mm)	R-value (m^2K/W)
XR4110	110	5.00
XR4120	120	5.45
XR4130	130	5.90
XR4140	140	6.35
XR4150	150	6.80
XR4165	165	7.50
XR4200	200	9.05

Celotex PL4000

Celotex PL4000 comprises high performance PIR insulation bonded to tapered edge plasterboard. Available in a broad range of insulation thicknesses as thin as 15mm, PL4000 allows the user to install both the insulation and plasterboard in one operation thereby reducing installation times.

Supported by BBA certification and Ofgem approval, Celotex PL4000 is the perfect solution for internal solid wall upgrades and is certified for the broadest range of installation techniques including direct bonding ('dot and dab'). PL4000 can also be used as the underneath layer of insulation in pitched and flat roof between and under applications in both new build and refurbishment projects.

Always install Celotex PL4000 in accordance with the instructions supplied by Celotex.

Lambda
0.022 W/mK

Board size
1200 x 2400mm

Fire performance
Euroclass B-s1,d0 in accordance with BS EN 13501-1

BBA certificate
16/5357

BRE Green Guide rating
A+ (insulation only)

Product code	Thickness (mm)	Combined R-value (m^2K/W)
PL4015	15 + 12.5	0.70
PL4025	25 + 12.5	1.20
PL4040	40 + 12.5	1.85
PL4050	50 + 12.5	2.30
PL4060	60 + 12.5	2.75
PL4065	65 + 12.5	3.00

Product code excludes 12.5mm plasterboard laminate

Celotex CW4000

Celotex CW4000 provides a simple solution for partial fill cavity walls. High performance insulation featuring low emissivity foil facings, CW4000 offers enhanced thermal performance in cavity air spaces compared to typical PIR solutions. These enhanced values deliver thinner solutions to meet popular target U-values.

Celotex CW4000 is supported by BBA certification, achieves an A+ rating when compared to the BRE Green Guide.

Always install Celotex CW4000 in accordance with the instructions supplied by Celotex.

Lambda
0.022 W/mK

Board size
1200 x 450mm

Fire performance
Class 1 in accordance with BS 476 Part 7

BBA certificate
16/5343

BRE Green Guide rating
A+

Product code	Thickness (mm)	R-value (m^2K/W)
CW4040	40	1.80
CW4050	50	2.25
CW4060	60	2.70
CW4075	75	3.40
CW4085	85	3.85
CW4100	100	4.50

Product descriptions

Celotex Crown-Bond

Celotex Crown-Bond is a purpose designed flat roofing insulation board for use in single ply bonded applications and is suitable for fully sealed metal, timber and concrete decks. Featuring cutting edge thinness with a low lambda value of 0.022 W/mK, Crown-Bond provides a quick and easy way to provide high thermal performance in flat roofing structures.

Celotex Crown-Bond features innovative composite facers on both sides, suitable for direct bond of single ply membranes, and has a high compressive strength ≥150 kPa giving it increased dimensional stability and added robustness. Available in a range of thicknesses from 50–140mm, Crown-Bond delivers better U-values and thinner solutions.

Always install Celotex Crown-Bond in accordance with the instructions supplied by Celotex.

Lambda
0.022 W/mK

Board size
1200 x 600mm

Product code	Thickness (mm)	R-value (m^2K/W)
Crown-Bond 50	50	2.25
Crown-Bond 100	100	4.50
Crown-Bond 120	120	5.45
Crown-Bond 140	140	6.35

Celotex Crown-Fix

Celotex Crown-Fix is a purpose designed flat roofing insulation board for use in mechanically fixed single ply applications and is suitable for fully sealed metal timber and concrete decks. Featuring cutting edge thinness with a low lambda value of 0.022 W/mK, Crown-Fix provides a quick and easy way to provide high thermal performance in flat roofing structures.

Celotex Crown-Fix features low emissivity aluminium facers on both sides and has a high compressive strength ≥150 kPa giving it increased dimensional stability and added robustness. Available in a range of thicknesses from 50–140mm.

Always install Celotex Crown-Fix in accordance with the instructions supplied by Celotex.

Lambda
0.022 W/mK

Board size
1200 x 2400mm

Product code	Thickness (mm)	R-value (m^2K/W)
Crown-Fix 50	50	2.25
Crown-Fix 100	100	4.50
Crown-Fix 110	110	5.00
Crown-Fix 120	120	5.45
Crown-Fix 140	140	6.35

Celotex Crown-Up

Celotex Crown-Up is a purpose designed flat roofing insulation board for use in built-up flat roofing applications. Celotex Crown-Up delivers excellent dimensional stability and added robustness in a built-up flat roofing system.

Celotex Crown-Up features coated glass tissue facer on both sides and has a high compressive strength ≥150 kPa and is available in thicknesses from 100–150mm.

Always install Celotex Crown-Up in accordance with the instructions supplied by Celotex.

Lambda
0.025–0.027 W/mK

Board Size
1200 x 600mm

Product code	Thickness (mm)	R-value (m^2K/W)
Crown-Up 100	100	3.80
Crown-Up 120	120	4.80
Crown-Up 150	150	6.00

For more information on all Celotex products, please visit **celotex.co.uk**

Accessories

Celotex Insulation Tape

For the sealing of joints when installing foil-faced Celotex PIR insulation boards. This three-in-one product prevents air leakage, completes the vapour control layer and maximises thermal performance. Celotex Insulation Tape is suitable for a range of applications, including walling systems and pitched and flat roofing applications.

Roll size
Width: 50mm
Length: 55m

Celotex Insulation Saw

When cutting Celotex PIR insulation boards, use the Celotex Insulation Saw. The saw is the only one on the market specifically for cutting PIR insulation boards. Featuring fine, hard point teeth, it dramatically reduces the amount of dust created when cutting Celotex insulation boards as well as reducing cutting time.

Physical properties
Saw length: 350mm
Saw weight: 225grams
Tooth Protector Clip included

Celotex Insulation Clips

The Celotex Insulation Clip has been designed to enable insulation boards to be installed between timber joists or rafters quickly and without the need for nails, screws or battens. They provide a permanent way of securing the Celotex insulation with as little fuss as possible. Using the clip ensures that the insulation will be held firmly in place once installed in the correct manner.

Floors

...by Celotex

Concrete slab floors

Use **Celotex GA4000** and **Celotex XR4000** high performance 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

U-value calculation: ground floor – concrete slab

	Perimeter / area ratio									
Celotex product	**0.1**	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1.0**
XR4200	0.07	0.08	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.10
XR4165	0.07	0.09	0.10	0.11	0.11	0.11	0.11	0.11	0.12	0.12
XR4150	0.08	0.10	0.11	0.11	0.12	0.12	0.12	0.12	0.13	0.13
XR4140	0.08	0.10	0.11	0.12	0.12	0.13	0.13	0.13	0.13	0.13
XR4130	0.08	0.11	0.12	0.13	0.13	0.14	0.14	0.14	0.14	0.14
XR4120	0.09	0.11	0.13	0.13	0.14	0.14	0.15	0.15	0.15	0.15
XR4110	0.09	0.12	0.13	0.14	0.15	0.15	0.16	0.16	0.16	0.16
GA4080	0.11	0.14	0.16	0.18	0.19	0.19	0.20	0.20	0.21	0.21
GA4060	0.12	0.17	0.20	0.21	0.23	0.24	0.24	0.25	–	–

Based on 65mm screed and 25mm insulation as perimeter upstand

Premium performance Celotex FI5000 available in this application. Visit **celotex.co.uk/FI5000** for more information.

Installation guidelines

Over slab

- Install a damp proof membrane below the Celotex. This can either be over the top of 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 0.75m^{2}K/W i.e. Celotex TB4025. 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 plaster and the skirting.
- Lay the insulation boards directly onto the prepared slab with all joints tightly butted.
- A minimum 500 gauge separating layer must be laid over the Celotex boards to prevent a reaction between the wet screed and foil facer, act as a VCL and prevent liquid screed migration between the board joints.
- Apply a sand/cement or self-levelling screed over the VCL and Celotex insulation boards to a minimum thickness of 65mm.

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

- 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 0.75m^{2}K/W i.e. Celotex TB4025. 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 the 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.

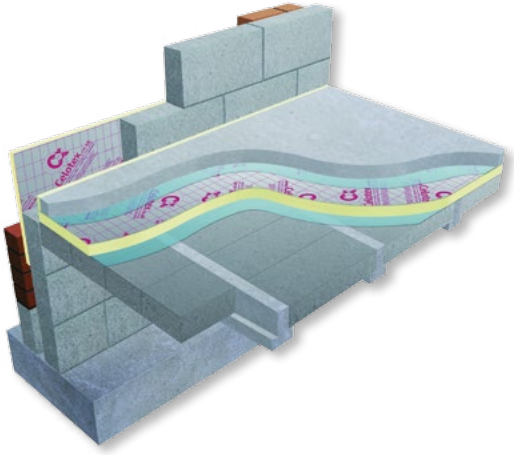
Provide a 10mm to 12mm gap at all perimeters and abutments to allow for expansion. This can be achieved by the use of temporary wedges.

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.

Beam and block floors

Use **Celotex GA4000** and **Celotex XR4000** high performance insulation in beam and block floor applications to minimise insulation thickness and give the following benefits:

- Easy-to-cut boards to fit in most spaces
- Provide reliable long term energy savings for buildings
- Excellent dimensional stability
- Optimised continuity with wall insulation
- Tightly butted joints for insulation continuity



U-value calculation: ground floor – beam and block

	Perimeter / area ratio									
Celotex product	**0.1**	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1.0**
XR4200	0.08	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.10
XR4165	0.09	0.10	0.11	0.11	0.11	0.11	0.11	0.12	0.12	0.12
XR4150	0.09	0.11	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.13
XR4140	0.10	0.11	0.12	0.13	0.13	0.13	0.13	0.13	0.13	0.14
XR4130	0.10	0.12	0.13	0.13	0.14	0.14	0.14	0.14	0.14	0.14
XR4120	0.11	0.13	0.14	0.14	0.15	0.15	0.15	0.15	0.15	0.15
XR4110	0.11	0.14	0.15	0.15	0.16	0.16	0.16	0.16	0.16	0.17
GA4080	0.13	0.17	0.18	0.19	0.20	0.20	0.21	0.21	0.21	0.21
GA4060	0.15	0.20	0.22	0.23	0.24	0.25	0.25	–	–	–

Based on 65mm screed and 25mm insulation as perimeter upstand

Premium performance Celotex FI5000 available in this application. Visit **celotex.co.uk/FI5000** for more information.

Installation guidelines

- If appropriate, install a damp proof membrane to the top surface of the beam and block floor.
- Level the surface of the floor; it should be smooth and free of projections. Use a thin layer of sand blinding 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 TB4025. 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 plaster and the skirting.
- Lay the insulation boards directly onto the prepared beam and block floor with all joints tightly butted.
- A minimum 500 gauge separating layer must be laid over the Celotex boards to prevent a reaction between the wet screed and foil facer, act as a VCL and prevent liquid screed migration between the board joints.
- Apply a sand/cement or self-levelling screed over the Celotex insulation boards to a minimum thickness of 65mm.

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

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.

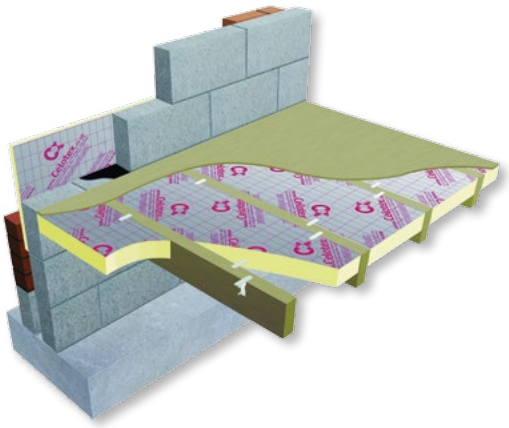
Provide a 10mm to 12mm gap at all perimeters and abutments to allow for expansion. This can be achieved by the use of temporary wedges.

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.

Suspended timber floors

Use **Celotex GA4000** or **Celotex XR4000** high performance insulation in suspended timber floors to minimise insulation thickness and give the following benefits:

- Quick and easy to install insulation between joists in one layer
- Boards permanently retained by Celotex insulation clip
- Minimise air leakage by friction fitting the insulation
- Provides reliable long-term energy savings for buildings
- Minimal load added to structure due to lightweight boards



U-value calculation: ground floor – suspended timber

	Perimeter / area ratio									
Celotex product	**0.1**	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1.0**
XR4200	0.10	0.12	0.13	0.13	0.13	0.14	0.14	0.14	0.14	0.14
XR4165	0.11	0.14	0.15	0.15	0.16	0.16	0.16	0.16	0.16	0.17
XR4150	0.12	0.14	0.16	0.16	0.17	0.17	0.17	0.18	0.18	0.18
XR4140	0.12	0.15	0.16	0.17	0.18	0.18	0.18	0.18	0.19	0.19
XR4130	0.13	0.16	0.17	0.18	0.19	0.19	0.19	0.20	0.20	0.20
XR4120	0.13	0.16	0.18	0.19	0.20	0.20	0.20	0.21	0.21	0.21
XR4110	0.14	0.17	0.19	0.20	0.21	0.21	0.22	0.22	0.22	0.23
GA4100	0.14	0.18	0.20	0.21	0.22	0.23	0.23	0.24	0.24	0.24
GA4090	0.15	0.19	0.21	0.23	0.24	0.24	0.25	0.25	–	–
GA4080	0.16	0.20	0.23	0.24	0.25	–	–	–	–	–
GA4075	0.16	0.21	0.24	0.25	–	–	–	–	–	–
GA4070	0.17	0.22	0.25	–	–	–	–	–	–	–
GA4060	0.17	0.23	–	–	–	–	–	–	–	–
GA4050	0.18	0.25	–	–	–	–	–	–	–	–

Based on timber joists @ 400 ctrs

Premium performance Celotex FI5000 available in this application. Visit **celotex.co.uk/FI5000** for more information.

Installation guidelines

- Install joists in the conventional manner, with solid or diagonal strut bracing as necessary. (NB: diagonal bracing may lead to thermal bridging).
- The Celotex Insulation Clip is designed to allow insulation boards to be installed between timber joists quickly and without nails or screws.
- Either fit the clips at one metre maximum centres along the edge of the insulation or fix battens to the sides of the joists to support the insulation.
- Use the Celotex Insulation Saw to cut the boards to achieve a tight fit, then push the boards firmly down between the joists. The insulation clip will ensure a friction fit.
- Insulate gaps between the joists and walls to prevent thermal bridging.
- Install either chipboard or softwood floor boarding directly onto the joists.
- Ensure that the void below the insulation is ventilated.

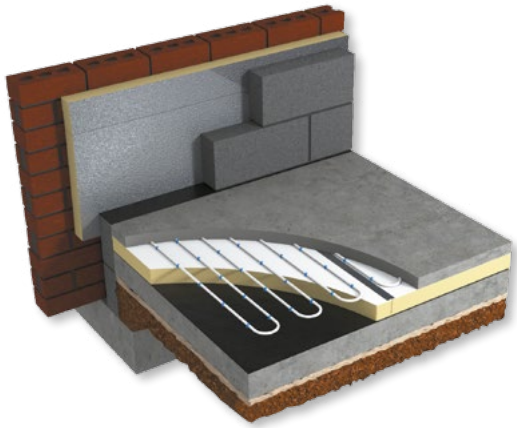
Exposed floors (other than ground)

- For exposed or semi-exposed floors, e.g. garage or car port ceilings, it may be easier to insulate from below.
- Fix Celotex insulation boards directly to the underside of the joists with galvanised clout nails at 400mm maximum centres. Finish with an appropriate fire protection board fixed to the soffit.
- An additional layer of 100mm mineral wool insulation can be installed between the joists, supported by the soffit lining, to provide acoustic insulation.

Underfloor heating

Use **Celotex FI5000** premium performance insulation with underfloor heating applications to minimise insulation thickness and give the following benefits:

- Minimal downward heat loss into the structure
- Easy-to-cut boards to fit in most spaces
- Has a highly resistant composite facer with a built-in vapour control layer which is suitable to receive a direct floor screed without the need for an additional separating membrane
- Pipe retaining clips may be inserted directly into the Celotex insulation
- Enhanced compressive strength value of ≥175 kPa



U-value calculation: ground floor – underfloor heating

	Perimeter / area ratio									
Celotex product	**0.1**	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1.0**
Concrete slab – based on 65mm screed and 25mm insulation as perimeter upstand										
FI5125	0.08	0.11	0.12	0.13	0.13	0.13	0.14	0.14	0.14	0.14
FI5100	0.09	0.12	0.14	0.15	0.16	0.16	0.16	0.17	0.17	0.17
FI5075	0.11	0.15	0.17	0.18	0.19	0.20	0.20	0.21	0.21	0.22
Beam and block – based on 65mm screed and 25mm insulation as perimeter upstand										
FI5125	0.10	0.12	0.13	0.13	0.13	0.14	0.14	0.14	0.14	0.14
FI5100	0.11	0.14	0.15	0.15	0.16	0.16	0.17	0.17	0.17	0.17
FI5075	0.13	0.16	0.18	0.19	0.20	0.20	0.21	0.21	0.21	0.21
Suspended timber floor – based on timbers @ 400 ctrs										
FI5125	0.12	0.15	0.17	0.18	0.19	0.19	0.19	0.20	0.20	0.20
FI5100	0.14	0.17	0.19	0.21	0.21	0.22	0.23	0.23	0.23	0.24
FI5075	0.15	0.20	0.23	0.24	0.26	0.27	0.27	0.28	0.28	0.29

Installation guidelines

Pre-installation for concrete slab floor applications only

- Install a damp proof membrane below the Celotex. This can either be over the top of 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, tampered slab to ensure that the insulation boards are continuously supported.

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

Concrete slab, beam and block floor applications

- Use the Celotex Insulation Saw to cut and fit Celotex US4025 insulation upstand to floor perimeter, to meet a minimum R-value of 0.75 m^2K/W. 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 plaster and the skirting.
- Lay Celotex insulation boards across the damp proof membrane. They should be break bonded with board joints tightly butted and must be taped to ensure the composite facer maintains the continuous separating layer required. This will minimise the risk of interstitial condensation forming at the slab/insulation interface.
- Lay a proprietary underfloor heating system, generally comprising pipework in coils. Pipe retaining clips may be inserted directly into the Celotex insulation.
- Apply the screed over the Celotex insulation boards to a thickness recommended by the manufacturer of the underfloor heating system (normally 75mm).
- Compact the screed solidly when laid.
- Allow the screed to dry thoroughly before an impermeable surface, such as a vinyl floor finish, is applied. (Consult a specialist flooring contractor.)

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 specialist flooring contractor.

Suspended timber floor applications

- Install joists in the conventional manner, with solid or diagonal strut bracing as necessary. (NB: diagonal bracing may lead to thermal bridging).
- Fix battens to the sides of the joists to support the insulation and to form a cavity for the underfloor heating, between the insulation and floor boards.
- Use the Celotex Insulation Saw to cut the Celotex FI5000 insulation to achieve a tight fit, then push the boards firmly down between the joists.
- Insulate the gaps between the joists and wall to prevent thermal bridging.
- Lay a proprietary underfloor heating system within the cavity, generally comprising pipework in coils, to the manufacturer's guidelines.
- Install either chipboard or soft wood floor boarding directly onto the joists.

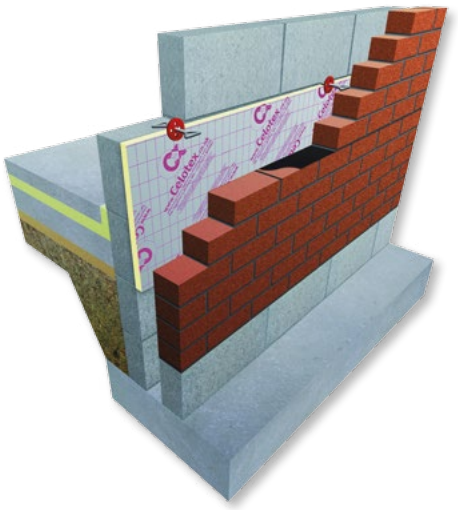
Walls

...by Celotex

Masonry partial fill cavity walls

Use **Celotex CW4000** high performance insulation in partial fill cavity wall applications to minimise insulation thickness and give the following benefits:

- Easy to fit between wall ties using cavity tie clips for retention
- Provides reliable long term energy savings for buildings
- Low emissivity foil facers give improved thermal insulation within cavity air spaces
- Excellent dimensional stability
- Conveniently sized boards for installation between cavity wall ties



U-value calculation: partial fill cavity wall with Celotex CW4000

Construction	103mm brick / Cavity / Celotex insulation / 100mm block (as below) / Plasterboard on dabs

	Blocktype (lambda)			
Product thickness (mm)	**Dense (1.13 W/mK)**	**Medium dense (0.59 W/mK)**	**Lightweight concrete (0.25 W/mK)**	**Aircrete (0.15 W/mK)**
CW4040	0.33	0.32	0.30	0.28
CW4050	0.28	0.28	0.26	0.25
CW4060	0.25	0.25	0.24	0.23
CW4075	0.22	0.21	0.20	0.20
CW4085	0.20	0.19	0.19	0.18
CW4100	0.17	0.17	0.17	0.16

Installation guidelines

- The wall ties used must be suitable for the structural requirements and incorporate a retaining clip to ensure that the insulation is held permanently in place. The insulation is fitted against the inner leaf of the wall.
- BBA approved wall ties and clips should be used wherever possible. The advice of the wall tie manufacturers should be followed, but Celotex does not consider butterfly ties to be suitable for use with partial fill cavity insulation.
- The first row of board-retaining wall ties should be installed at least one course below the damp proof course (DPC) and positioned at maximum 600mm centres horizontally, to provide a minimum support of two ties per 1200mm board.
- The second and subsequent rows of ties should be installed at 450mm centres vertically and maximum 900mm centres horizontally. Where required for structural purposes, it may be necessary to install ties at closer centres.
- Always ensure that each full or cut board is retained by no fewer than three ties around its perimeter.
- For optimum thermal performance, the unprinted foil surface should face the air cavity.
- Fit the boards between the wall ties, and secure in place with a retaining clip on each tie. Ensure that horizontal and vertical joints are tightly butted to minimise heat loss.
- At openings such as doors and windows, use a proprietary insulated cavity closer.
- Where necessary, cut the boards to size using the Celotex Insulation Saw and straight edge.
- Where the cavity is closed at or below DPC level by a methane barrier membrane, use mechanical fixings to secure the board to the brickwork above the DPC. Avoid puncturing the gas barrier membrane.

Cavity fire barriers

The requirements of the building regulations relating to fire spread in cavity walls can be met in buildings of all purpose groups without the need for cavity barriers, provided the construction complies with the provisions detailed in: Approved Document B, Volume 1, Diagram 13; and Volume 2, Diagram 34. For further information please refer to Celotex BBA certificate 16/5343.

Cavity obstructions

Unavoidable projections into the cavity, such as floor edge beams and steel columns, need careful detailing and may require a horizontal cavity tray.

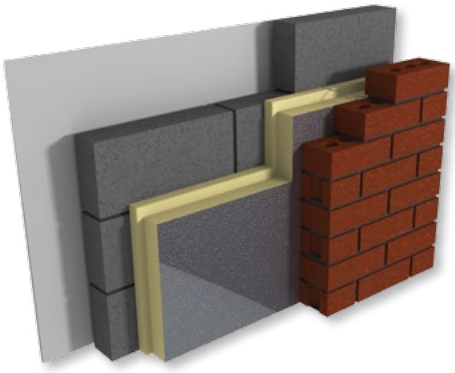
To comply with the requirement of the National House Building Council (NHBC) or Housing Association Property Mutual (HAPM), a minimum 50mm clear residual cavity should be provided.

For buildings up to 12m high, a minimum clear cavity width of 25mm may be acceptable, subject to exposure. The 25mm minimum constructed residual cavity width must be clear of all obstructions.

Masonry full fill cavity walls

Use **Celotex CF5000** premium performance insulation in full fill cavity wall applications to maximise thermal performance and give the following benefits:

- Simplifying building regulation compliance with a U-value of 0.18 W/m²K
- Ease of installation, designed with 1200 x 450mm dimensions to fit standard cavity wall tie spacing
- No requirement to widen the cavity improving plot efficiencies
- Eliminates the passage of moisture with a mechanically engineered rebated edge profile



Installation guidelines

- Build up the first section of the leading leaf to a course above the next row of wall ties. It is desirable that the outer leaf is constructed first to help minimise the number of brick cuts around openings and to clean mortar snots to reduce thermal bridging and contaminated wall ties. The use of a cavity board is important to prevent mortar build up at the bottom of the cavity.
- The first row of wall ties are positioned at a maximum of 600mm centres horizontally and provide a minimum support of two ties per 1200mm board.
- The first row of insulation is fitted against the leading leaf on to the first row of wall ties, so the rise of the thinner rebated edge faces away from the external leaf pointing upwards. These should be installed to a minimum depth of 150mm below the damp proof course (DPC) to provide edge insulation to the floor and reduce thermal bridging at this junction.
- The next board is then fitted tightly to the previous board by slotting the rebated edges together in a jigsaw effect. This is repeated for the first row of boards.
- Wall ties are then laid on to the top surface of the boards. A small cut should be made in to the top surface of the board to recess the wall tie so that it is sloping downwards to the outer leaf. The cut made should be no more than the depth of the rebated edge. Where a wall tie has a drip it can be positioned centrally. Care is taken to avoid damage to the board.
- The inner leaf is built up to the same level as the insulation. Continue to construct the cavity wall and install insulation following previous steps ensuring excess mortar is removed from the cavity face and a cavity board is used to prevent mortar dropping on the top edge of the insulation.

Openings

- Where the boards are required to be fitted around openings the rebated edge should be trimmed using a fine-tooth saw. The insulation should completely fill the gap for which it is intended. Suitable damp proofing should be used around openings. Care should be taken when fitting the extra wall ties around openings in to the rebated edge.

Corners

- At corner junctions the boards should be butt jointed by removing the rebated edge. It is important that the rebated edge is cut accurately ensuring all edges are butted tightly with no air gaps achieving continuity of the thermal envelope around the corners. Corner details should include a vertical DPC that is incorporated during construction.

Cavity fire barriers

The requirements of the building regulations relating to the fire spread in cavity walls can be met in buildings of all purpose groups without the need for fire barriers provided the construction complies with the provision detailed in:

England and Wales, Approved Doc B, volume 1, Diagram 13 and Vol2, Diagram 34. Northern Ireland Technical booklet E Diagram 3.5.

Scotland: Technical Handbook 2 (Domestic and Non-Domestic) – Mandatory standard 2.4, clause 2.4.1, 2.4.2, 2.4.7 and 2.4.9.

For further information please refer to BBA 16/5343.

Cavity obstructions

Unavoidable projections into the cavity, such as floor edge beams and steel columns will interrupt the continuity of Celotex CF5000. Extra care is required to both weatherproof the detail and address thermal bridging.

Where Celotex CF5000 stops below and above the projection, the rebated edge should be trimmed using a sharp blade. It is important the rebated edge is cut accurately so that a tight butt edge is formed with the obstruction. The use of a cavity tray with weep holes is recommended.

Where the continuity of Celotex CF5000 is interrupted, a flexible fibre insulation material suitable for full fill can be used around the projection to ensure the thermal envelope is continuous.

Where buildings are subject to a building warranty such as NHBC standards, the requirements of the warranty provider must be met.

Full guidelines are available at **celotex.co.uk**

U-value calculation: full fill cavity wall with Celotex CF5000

Construction 1	Brickwork outer leaf / Celotex CF5097 in a 100mm cavity / Blockwork inner leaf / Plasterboard on dabs + 3mm skim
Construction 2	Render / Blockwork outer leaf / Celotex CF5097 in a 100mm cavity / Blockwork (variable) inner leaf / Plasterboard on dabs + 3mm skim

	Blocktype (lambda)			
Construction type	**Dense (1.13 W/mK)**	**Medium dense (0.59 W/mK)**	**Lightweight Concrete (0.25 W/mK)**	**Aircrete (0.15 W/mK)**
Brickwork Outer (Construction 1)	0.19	0.19	0.18	0.18
Blockwork Outer (Construction 2)	0.19	0.19	0.18	0.18

Masonry partial fill cavity walls with plasterboard laminate

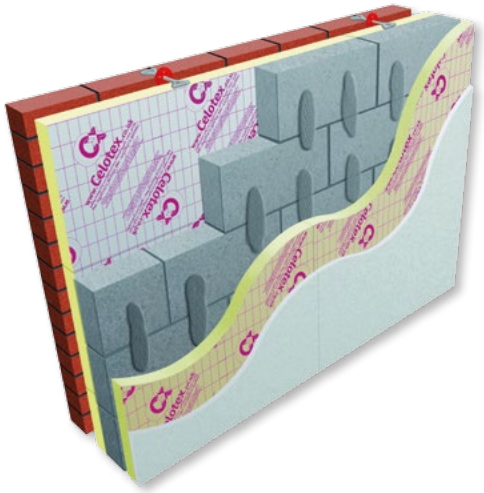
Celotex offers an alternative solution for partial fill cavity wall applications enabling traditional sized cavity wall widths to be maintained.

Celotex CW4000 provides the partial fill cavity wall solution utilising the product's low lambda value of 0.022 W/mK along with low emissivity aluminium foil facers which provide enhanced thermal performance within a cavity air space.

As a secondary insulation measure, Celotex plasterboard thermal laminate PL4000 can be installed on the warm side of the inner leaf, providing additional thermal performance and plasterboard as one product.

This combined solution minimises insulation thickness and offers the following benefits:

- Products with a lambda value of 0.022 W/mK providing some of the thinnest insulation solutions available today
- Allows for the traditional cavity space of 100mm to be maintained without changing construction methods and risking the loss of plot space
- Provides an alternative solution for meeting the improved U-values required for Part L 2013
- CW4000 includes low emissivity foil facers giving improved thermal insulation within cavity air spaces
- PL4000 provides insulation and plasterboard as one product helping reduce installation time and offering maximum flexibility to the installer



- PL4000 is suitable for both direct bonding (dot and dab) and mechanical fixing installations
- PL4000 provides a vapour control layer (VCL) when board joints are taped and jointed
- Provides reliable long term energy savings for buildings

Installation guidelines

Partial fill cavity walls

Guidelines for the installation of partial fill cavity wall insulation can be found on page 28 and 29 of this Handy Guide.

Internal walls using PL4000

Guidelines for the installation of Celotex PL4000 plasterboard thermal laminate can be found on page 40 and 41 of this Handy Guide.

U-value calculation: partial fill cavity wall with internal layer of Celotex PL4000

Construction 103mm brick or 100mm block / Cavity / 50mm Celotex CW4000 / 103mm brick or 100mm block / Celotex PL4000

All U-values shown below assume 50mm CW4000 as the partial fill cavity wall solution with a brick outer leaf (lambda 0.77 W/mK) and a 3mm plaster skim. Installing alternative thicknesses of CW4000 within the cavity wall will have an impact on achieved U-value. This solution is also possible using Celotex PL4000 mechanically fixed using battens. For further information and U-values, please visit our online U-value calculator or contact the Celotex Technical Centre.

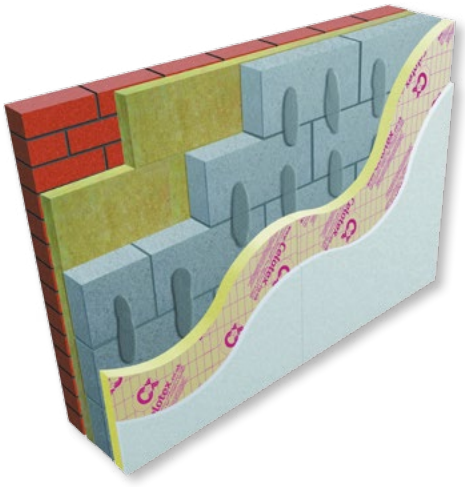
Block lambda (W/mK)		Dot and Dab			Mechanically fixed direct to wall		
		1.13	0.59	0.15	1.13	0.59	0.15
Variable layer	Thickness (mm)	U-value (W/m²K)	U-value (W/m²K)	U-value (W/m²K)	U-value (W/m²K)	U-value (W/m²K)	U-value (W/m²K)
Celotex PL4000	65 + 12.5	0.15	0.15	0.14	0.16	0.16	0.15
Celotex PL4000	60 + 12.5	0.16	0.16	0.15	0.16	0.16	0.15
Celotex PL4000	50 + 12.5	0.17	0.17	0.16	0.18	0.17	0.16
Celotex PL4000	40 + 12.5	0.19	0.18	0.17	0.19	0.19	0.18
Celotex PL4000	25 + 12.5	0.21	0.21	0.19	0.22	0.22	0.20
Celotex PL4000	15 + 12.5	0.24	0.23	0.21	0.25	0.24	0.22

Thickness includes PIR insulation board plus 12.5mm plasterboard laminate

Top up cavity walls

Use **Celotex PL4000** high performance insulation as a top up upgrade to existing cavity walls to deliver the following benefits:

- Upgrade existing walls to current building regulation compliance levels
- Suitable for multiple installation techniques
- Provides a vapour control layer when board joints are taped and jointed
- Provides reliable long term energy and cost savings
- Tapered edge plasterboard offers the installer maximum installation flexibility and installation speed



U-value calculation: top up cavity walls using plasterboard thermal laminate

Construction		50mm clear cavity	50mm cavity filled with mineral wool insulated to 0.60 (W/m²K)	Existing cavity wall insulated to 0.45 (W/m²K) (1995 Regs)	Existing cavity wall insulated to 0.35 (W/m²K) (2002 Regs)
Outside surface resistance		–	–	–	–
Brickwork		103	103	103	103
Cavity		50	50	–	–
Blockwork dense		100	100	100	100
Plaster dabs cavity		15	15	15	15
Variable layer		See below	See below	See below	See below
Board joints sealed to form VCL		–	–	–	–
Variable layer	**Thickness (mm)**	**U-value (W/m²K)**	**U-value (W/m²K)**	**U-value (W/m²K)**	**U-value (W/m²K)**
Celotex PL4000	65 + 12.5	0.27	0.21	0.18	0.17
Celotex PL4000	60 + 12.5	0.29	0.22	0.19	0.17
Celotex PL4000	50 + 12.5	–	0.24	0.21	0.19
Celotex PL4000	40 + 12.5	–	0.27	0.23	0.20
Celotex PL4000	25 + 12.5	–	–	0.28	0.24
Celotex PL4000	15 + 12.5	–	–	–	0.27

Thickness includes PIR insulation board plus 12.5mm plasterboard laminate

Installation guidelines

Internal lining systems using direct bonding

- Ensure that existing walls are permeable. Strip any gloss paint or vinyl wallpaper.
- Use the Celotex Insulation Saw to cut the 1200 x 2400mm Celotex PL4000 boards to fit the floor-to-ceiling height of the room.
- Ensure a continuous seal at skirting, ceiling level and at openings by applying a continuous band of gypsum adhesive. Gypsum adhesive at perimeter edges can be replaced with thin timber battens.
- Apply further dabs of gypsum adhesive. This should be in accordance with the adhesive manufacturer's instructions.
- Align sheets against the dabs and secure into correct position.
- Once the dabs are set, it is recommended that additional secondary fixings be applied to the Celotex PL4000. Exact fixing details should be in accordance with the recommendations of the fixing manufacturer.
- Joints between the boards must be tightly butted, taped and jointed using appropriate tape and jointing material to create the vapour control layer (VCL).
- Line window and door reveals with thinner Celotex PL4000 boards.
- Please note that to avoid the load being directly applied to the Celotex PL4000, suitable mechanical fixings should be used for other internal fittings. Advice on suitable fixings should be sought directly from the fixing manufacturer.
- Please note that where existing walls are subject to the ingress of excessive moisture, it is recommended that Celotex PL4000 should be installed using mechanical fixings rather than a direct bonding technique.

Internal lining systems using mechanical fixings

- Ensure that existing walls are permeable. Strip any gloss paint or vinyl wallpaper.
- Use the Celotex Insulation Saw to cut the 1200 x 2400mm Celotex PL4000 boards to fit the floor-to-ceiling height of the room.
- Secure Celotex PL4000 with suitable mechanical fixings. Fixing details should be in accordance with the fixing manufacturer's instructions.
- Joints between the boards must be tightly butted, taped and jointed using appropriate tape and jointing material to create the VCL.
- Line window and door reveals as for direct bonding technique in adjacent column.

Internal lining systems using mechanical fixings to timber battens

- Ensure that existing walls are permeable. Strip any gloss paint or vinyl wallpaper.
- Fix treated softwood timber battens to the masonry. They should be set out a maximum of 600mm vertical centres to coincide with the edges of the boards. As a minimum requirement, horizontal battens should be used to support the top and bottom of the board edges.
- Secure Celotex PL4000 with suitable mechanical fixings. Fixing details should be in accordance with the fixing manufacturer's instructions.
- Joints between the boards should be tightly butted and finished by taping and jointing using appropriate tape and jointing material to create the VCL.

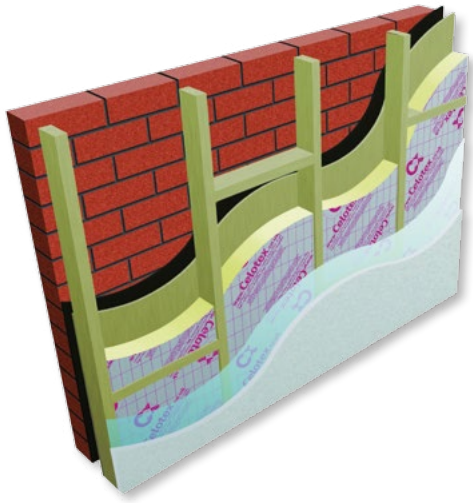
Internal lining systems using mechanical fixings to metal lining systems

- Celotex PL4000 boards can be fixed to a number of proprietary metal frame lining systems. The system should be fixed in accordance with the manufacturer's instructions.

Timber frame wall lining

Use **Celotex XR4000** high performance insulation in timber frame wall lining applications to minimise insulation thickness and give the following benefits:

- Offers the thinnest solution available
- Provides reliable long term energy savings for buildings
- Low emissivity foil facers give improved thermal insulation within cavity air spaces
- Reduces thermal bridging through studs and rails, when used in a two-layer system
- Provides cavity for services



U-value calculation: timber frame wall lining

Construction	Thickness (mm)	
Outside surface resistance	–	
Brick	103	
Cavity	50	
Plywood	9	
Variable layer	See below	
Cavity (low emissivity) between studs (15% brg)	5.0/10.0/15.0/20.0/25.0	
Polythene 1000 gauge, VCL	–	
Plasterboard	12.5	
Inside surface resistance	–	
Variable layer	**Thickness (mm)**	**U-value (W/m²K)**
Celotex XR4000 between 175 stud (15% brg)	165	0.19
Celotex XR4000 between 175 stud (15% brg)	150	0.20
Celotex XR4000 between 150 stud (15% brg)	140	0.22
Celotex XR4000 between 150 stud (15% brg)	130	0.22
Celotex XR4000 between 125 stud (15% brg)	120	0.25
Celotex XR4000 between 175 stud (15% brg)	110	0.25

U-value: for U-values see variable layer list

Installation guidelines

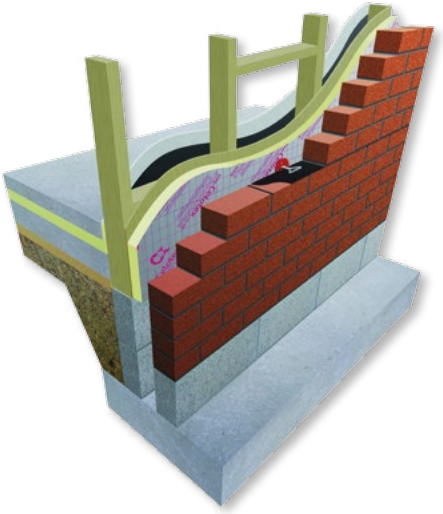
- Make sure all studs and rails are flush, with no projections, and that services are correctly installed.
- Use the Celotex Insulation Saw to cut the boards to fit tightly between all studs and rails.
- Insert insulation into framing and push back to plywood sheathing. Fit services into cavity if required.
- For optimum thermal performance, the unprinted foil surface should face the air cavity.
- Use the Celotex Insulation Saw to cut the boards for infill panels, using off-cuts where possible, making sure there are no gaps at wall abutments.
- Ensure that the wall insulation is continuous with the floor perimeter insulation.
- A vapour control layer (VCL) should be installed over the warm side of the studwork.
- Fix plasterboard lining over the VCL using plasterboard nails or screws.

  NB: Some building insurance companies may require additional third party approval when using insulation in timber frame applications. Advice should be sought from the relevant parties prior to specifying the insulation required. Celotex insulation is covered by BBA certificate number 16/5352.

Timber frame wall sheathing

Use **Celotex GA4000** high performance insulation in timber frame wall sheathing applications to minimise insulation thickness and give the following benefits:

- A warm construction that eliminates thermal bridging between timbers
- Provides reliable long term energy savings for buildings
- Low emissivity foil facers give improved thermal insulation performance within cavity air spaces
- Sheathing encapsulates the timber frame
- Minimal risk of interstitial condensation
- Voids between studs free for services



U-value calculation: timber frame wall sheathing

Construction	Thickness (mm)	
Outside surface resistance	–	
Brick	103	
Cavity (low emissivity)	50	
Variable layer	See below	
Plywood	9	
Cavity between studs	89	
Polythene 1000 gauge, VCL	–	
Plasterboard	12.5	
Inside surface resistance	–	
Variable layer	**Thickness (mm)**	**U-value (W/m²K)**
Celotex GA4000	100	0.17
Celotex GA4000	90	0.19
Celotex GA4000	80	0.20
Celotex GA4000	75	0.21
Celotex GA4000	70	0.22
Celotex GA4000	60	0.25
Celotex GA4000	50	0.28

Installation guidelines

- Make sure all studs and rails are flush, with no projections.
- Fix sheet of Celotex GA4000 to the external sheathing using galvanised clout nails at 400mm centres in the centre of the board and at 300mm centres around the perimeter.
- For optimum thermal performance, the unprinted foil surface should face the air cavity.
- Care must be taken to align the fixings with underlying studs, sole plates and head rails.
- Tightly butt boards together and use off-cuts to fill in around waist rails.
- Brickwork should be tied back to the timber framing using helical stainless steel wall ties, driven through the Celotex insulation into the studs.
- Insert ties approximately 10mm to 20mm above the brick course so that a slight 'crank' can be applied. This ensures that the tie slopes downward from the sheathing to the outer brickwork.
- Where cavity fire barriers are required by national building regulations, they should be installed in line with the manufacturer's instructions.

NB: Some building insurance companies may require additional third party approval when using insulation in timber frame applications. Advice should be sought from the relevant parties prior to specifying the insulation required. Celotex insulation is covered by BBA certificate number 16/5352.

Gable walls

At gable walls, it is recommended that the insulation be taken up to the underside of the roof verges. However, if a cold roof construction is intended, the cavity insulation should extend at least 250mm above the ceiling. The top edge of the insulation should be protected with a cavity tray.

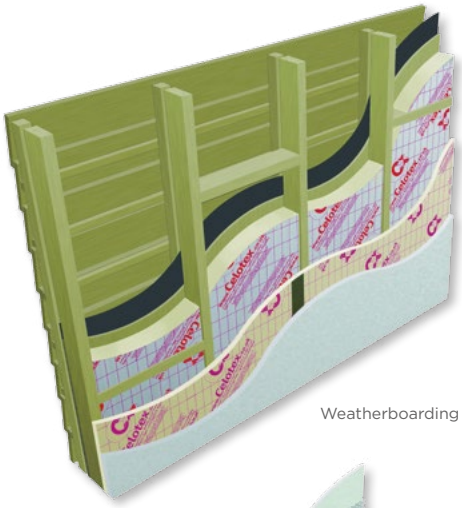
Other cladding

Tile hanging, render finish, weather boarding and other cladding types are all suitable for this application. In this situation, Celotex boards can be protected with a breather membrane. However, advice and information on the installation of these cladding systems should be sought from the manufacturer or provider of the cladding system.

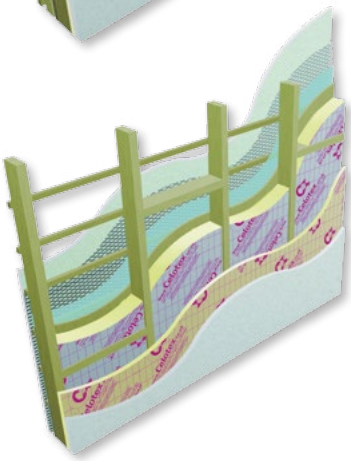
Single timber frame wall lining and dormer cheeks

Use a combination of **Celotex GA4000** with **Celotex PL4000** high performance insulation in single timber frame wall lining applications to minimise insulation thickness and give the following benefits:

- Provides both the over stud insulation and plasterboard in one product, helping reduce installation time
- Offers the installer maximum flexibility and installation speed due to the tapered edge plasterboard
- Deliver better U-values and thinner solutions compared to many other insulation materials
- Provides reliable long-term energy savings for buildings



Weatherboarding



Rendered

Installation guidelines

- Make sure all studs and rails are flush, with no projections, and that services are correctly installed.
- Fit Celotex insulation tightly in-between all studs and push up to plywood sheathing.
- For optimum thermal performance, the unprinted foil surface should face the air cavity within the studwork.
- Use the Celotex Insulation Saw to cut the boards for infill panels, using off-cuts where possible, making sure there are no air gaps at wall abutments.
- Install Celotex PL4000 insulation over the studs. Secure Celotex PL4000 with suitable mechanical fixings. Fixing details should be in accordance with the fixing manufacturer's instructions.
- Tightly butt edges of boards together, making sure there are no gaps and fix back to solid timber, both at stud lines and at top and bottom rails.
- Joints between the boards must be tightly butted, taped and jointed using appropriate tape and jointing material to create the vapour control layer (VCL).
- Vapour seal all perimeter abutments using sealant.
- Seal around all penetrations for electrical outlets and switch boxes.

  NB: Some building insurance companies may require additional third party approval when using insulation in timber frame applications. Advice should be sought from the relevant parties prior to specifying the insulation required. Celotex insulation is covered by BBA certificate number 16/5352.

U-value calculation: single timber frame wall

Construction		Weather-boarding Thickness (mm)	Tile hung Thickness (mm)	Rendered Thickness (mm)	Lead clad Thickness (mm)
Outside surface resistance		–	–	–	–
Weatherboard – Tiles – Rendered – Code 4 lead		any	any	20	1.8
Ventilated cavity batten air space		25	n/a	25	25
Breather membrane		–	–	–	–
Plywood		12	12	12	12†
Celotex GA4000 between 100mm studs @ 400 ctrs (11.7% brg)		60	60	60	60
Low E cavity between studs @ 400 ctrs (15% brg)		40	40	40	40
Variable layer (for over studs)		See below	See below	See below	See below
Inside surface resistance		–	–	–	–
Variable layer	**Thickness (mm)**	**U-value (W/m^2K)**	**U-value (W/m^2K)**	**U-value (W/m^2K)**	**U-value (W/m^2K)**
Celotex PL4000	65 + 12.5	0.17	0.17	0.17	0.17
Celotex PL4000	60 + 12.5	0.18	0.18	0.18	0.18
Celotex PL4000	50 + 12.5	0.19	0.19	0.19	0.20
Celotex PL4000	40 + 12.5	0.21	0.21	0.21	0.22
Celotex PL4000	25 + 12.5	0.25	0.25	0.25	0.26
Celotex PL4000	15 + 12.5	0.29	0.29	0.29	0.30

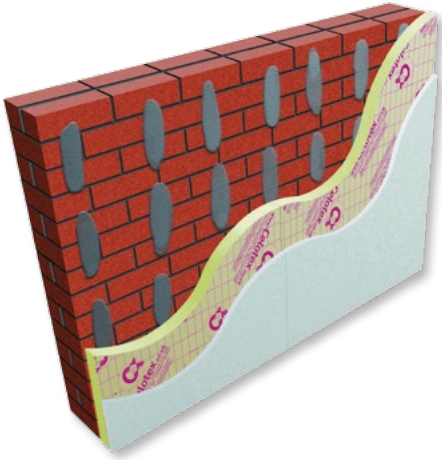
Low E = Low emissivity † When using lead clad, the plywood layer is moved to outside the ventilated batten airspace

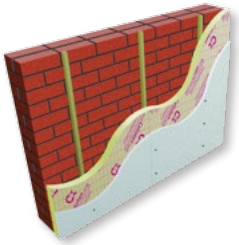
Upgrading internal solid walls

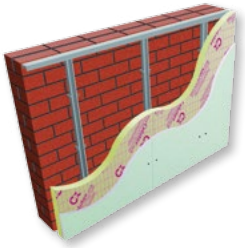
Internal insulation solutions

Use **Celotex PL4000** high performance insulation in solid masonry internal wall upgrades to deliver the following benefits:

- Deliver better U-values and thinner solutions compared to many other insulation materials
- Suitable for multiple installation techniques
- Provides a vapour control layer when board joints are taped and jointed
- Certified under BBA certificate number 16/5357
- Ofgem approved
- Provide reliable long term energy and cost savings
- Tapered edge plasterboard offers the installer maximum installation flexibility and installation speed







U-value calculation: internal solid walls

Construction		Dot and dab	Direct fix	Timber battens	Metal lining system
Outside surface resistance		–	–	–	–
Brick		215	215	215	215
Cavity		15	–	25	25
Variable layer		See below	See below	See below	See below
Board joints sealed to VCL		–	–	–	–
Inside surface resistance		–	–	–	–
Variable layer	**Thickness (mm)**	**U-value (W/m^2K)**	**U-value (W/m^2K)**	**U-value (W/m^2K)**	**U-value (W/m^2K)**
Celotex PL4000	65 + 12.5	0.28	0.29	0.27	0.28
Celotex PL4000	60 + 12.5	0.30	–	0.29	0.30

Thickness includes PIR insulation board plus 12.5mm plasterboard laminate

Installation guidelines

Internal lining systems using direct bonding

- Ensure that existing walls are permeable. Strip any gloss paint or vinyl wallpaper.
- Use the Celotex Insulation Saw to cut the 1200 x 2400mm Celotex PL4000 boards to fit the floor-to-ceiling height of the room.
- Ensure a continuous seal at skirting, ceiling level and at openings by applying a continuous band of gypsum adhesive. Gypsum adhesive at perimeter edges can be replaced with thin timber battens.
- Apply further dabs of gypsum adhesive. This should be in accordance with the adhesive manufacturer's instructions.
- Align sheets against the dabs and secure into correct position.
- Once the dabs are set, it is recommended that additional secondary fixings be applied to the Celotex PL4000. Exact fixing details should be in accordance with the recommendations of the fixing manufacturer.
- Joints between the boards must be tightly butted, taped and jointed using appropriate tape and jointing material to create the vapour control layer (VCL).
- Line window and door reveals with thinner Celotex PL4000 boards to reduce the risk of thermal bridging. Fix a batten around the edge of the opening and scribe the board to fit the reveal. Cut the dry lining to suit and mechanically fix into the masonry reveal using proprietary fixings. Finish using an angle fillet at the frame and an angle bead or scrim tape at external corners.
- Please note that to avoid the load being directly applied to the Celotex PL4000, suitable mechanical fixings should be used for other internal fittings. Advice on suitable fixings should be sought directly from the fixing manufacturer.
- Please note that where existing walls are subject to the ingress of excessive moisture, it is recommended that Celotex PL4000 should be installed using mechanical fixings rather than a direct bonding technique.

Internal lining systems using mechanical fixings

- Ensure that existing walls are permeable. Strip any gloss paint or vinyl wallpaper.
- Use the Celotex Insulation Saw to cut the 1200 x 2400mm Celotex PL4000 boards to fit the floor-to-ceiling height of the room.
- Secure Celotex PL4000 with suitable mechanical fixings. Fixing details should be in accordance with the fixing manufacturer's instructions.
- Joints between the boards must be tightly butted, taped and jointed using appropriate tape and jointing material to create the VCL.
- Line window and door reveals as for direct bonding technique in adjacent column.

Internal lining systems using mechanical fixings to timber battens

- Ensure that existing walls are permeable. Strip any gloss paint or vinyl wallpaper.
- Fix treated softwood timber battens to the masonry. They should be set out a maximum of 600mm vertical centres to coincide with the edges of the boards. As a minimum requirement, horizontal battens should be used to support the top and bottom of the board edges.
- Secure Celotex PL4000 with suitable mechanical fixings. Fixing details should be in accordance with the fixing manufacturer's instructions.
- Joints between the boards should be tightly butted and finished by taping and jointing using appropriate tape and jointing material to create the VCL.

Internal lining systems using mechanical fixings to metal lining systems

- Celotex PL4000 boards can be fixed to a number of proprietary metal frame lining systems. The system should be fixed in accordance with the manufacturer's instructions.


Celotex
Lady Lane Industrial Estate
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Pitched Roofing

...by Celotex

Pitched roof sarking

Use **Celotex GA4000** or **Celotex XR4000** high performance insulation in pitched roof sarking applications to minimise insulation thickness and give the following benefits:

- Provides reliable long term energy savings for buildings
- Low emissivity foil facers give improved thermal insulation performance within cavity air spaces
- Eliminates thermal bridging
- Optional single layer system
- Ideal for new build or major refurbishment projects
- Air-tight construction method

U-value calculation: pitched roof sarking

Construction	Thickness (mm)	
Outside surface resistance	–	
Tiling including batten space	–	
Breather membrane	–	
Cavity / counter batten	22	
Celotex TB4000 between 47 x 47 counter battens @ 400 ctrs	25	
Variable layer	See below	
Cavity (low emissivity) rafter space (11.7% brg)	150	
Polythene 1000 gauge, VCL	–	
Plasterboard	12.5	
Inside surface resistance	–	
Variable layer	**Thickness (mm)**	**U-value (W/m²K)**
Celotex XR4000 over rafter	200	0.09
Celotex XR4000 over rafter	165	0.10
Celotex XR4000 over rafter	150	0.11
Celotex XR4000 over rafter	140	0.12
Celotex XR4000 over rafter	130	0.12
Celotex XR4000 over rafter	120	0.13
Celotex XR4000 over rafters	110	0.14
Celotex GA4000 over rafter	100	0.15
Celotex GA4000 over rafter	90	0.16
Celotex GA4000 over rafter	80	0.17
Celotex GA4000 over rafter	75	0.18
Celotex GA4000 over rafter	70	0.19

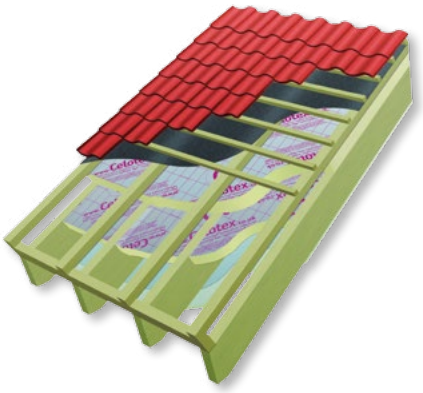
Installation guidelines

- Note that specific fixing requirements should be determined for each roof, taking into account roof design and location.
- Fix a treated timber stop batten equal in thickness to the Celotex insulation across the rafters at the eaves. Butt boards directly against this batten.
- Install Celotex insulation boards with the long sides parallel to the rafter lines with both edges supported by rafters.
- For optimum thermal performance, the unprinted foil surface should face the rafter air cavity.
- Cut the boards using the Celotex Insulation Saw to rake and splay at ridge and verges to ensure close butted joints.
- Use large headed nails to fix boards in place temporarily until permanently secured by counter battens.
- Position a preservative-treated timber counter batten (minimum 38 x 50mm) over the insulation on the line of each rafter. Nail the lower end of each counter batten directly into the stop batten.
- Calculate the length of the stainless steel helical spike fixings required by adding together the counter batten depth, the insulation thickness and depth of penetration required to the rafter (usually minimum 38mm).
- Stainless steel helical spikes have been specifically developed for 'warm' pitched roofs and are especially appropriate for use with pre-trussed rafter constructions, allowing a much thinner gauge of fastener to be used, thus reducing the risk of splitting timber battens or rafters.
- Fix at maximum 400mm centres along the counter batten. Pre-drill pilot holes in the counter battens to ensure ease of nailing and to reduce the possible splitting of the timber.
- If using a two layer system, cut a second layer of board with the Celotex Insulation Saw (the board should be at least 13mm less than the counter batten thickness allowing for the breather membrane to sag) to fit between the counter battens.
- Drape a breather membrane over the counter battens and secure with tile battens.
- Fix the tile battens to the counter batten at an appropriate gauge to suit the slates or tiles selected.
- A variety of eaves and verge details may be achieved with this system. Eaves and soffit ventilators are not generally required.
- A vapour control layer (VCL) should be installed to the underside of the rafters.
- Finish with plasterboard or other suitable sheet material fixed to the rafters.
- Where exposed rafters are required, plasterboard (or any other suitable decorative board) may be laid over the rafters before fixing the insulation. Select longer fasteners to suit. Plasterboard should be protected from rain during the installation. A polythene vapour control layer (VCL) must be installed directly over the plasterboard.

Insulation between and over rafters

Use **Celotex GA4000** or **Celotex XR4000** high performance insulation in pitched roof between and over rafter applications to minimise insulation thickness and give the following benefits:

- Ideal for use where headroom is limited
- Provides reliable long term energy savings for buildings
- Creates a warm, habitable roof space
- No need to insulate water pipes and tanks
- Suitable for new build and major refurbishment projects
- Minimised additional loading to the structure



U-value calculation: between and over rafters

Construction	Thickness (mm)	
Outside surface resistance	–	
Tiling including batten space	–	
Counter batten	38	
Breather membrane	–	
Variable layer	See below	
Celotex TB4000 between rafters @ 400 ctrs (11.7% brg)	40	
Cavity (low emissivity) rafter space	110	
Polythene 1000 gauge, VCL	–	
Plasterboard	12.5	
Inside surface resistance	–	
Variable layer	**Thickness (mm)**	**U-value (W/m²K)**
Celotex XR4000 over rafter	200	0.09
Celotex XR4000 over rafter	165	0.10
Celotex XR4000 over rafter	150	0.11
Celotex XR4000 over rafter	140	0.12
Celotex XR4000 over rafter	130	0.12
Celotex XR4000 over rafter	120	0.13
Celotex XR4000 over rafter	110	0.14
Celotex GA4000 over rafter	100	0.15
Celotex GA4000 over rafter	90	0.16
Celotex GA4000 over rafter	80	0.17
Celotex GA4000 over rafter	75	0.18
Celotex GA4000 over rafter	70	0.19

Installation guidelines

Insulation over the rafters

- Note that specific fixing requirements should be determined for each roof, taking into account roof design and location.
- Fix a treated timber stop batten equal in thickness to the Celotex insulation across the rafters at the eaves. Butt boards directly against this batten.
- Install Celotex insulation boards with both edges supported by the rafters.
- Cut the boards using the Celotex Insulation Saw to rake and splay at ridge and verges to ensure close butted joints.
- Use large headed nails to temporarily fix board in place, until permanently secured by counter battens.
- Install a breather membrane over the insulation.
- Position a preservative-treated timber counter batten (minimum 38 x 50mm) over the breather membrane and insulation on the line of each rafter. Nail the lower end of each counter batten directly into the stop batten.
- Calculate the length of the suitable fixings required by adding together the counter batten depth, the insulation thickness and depth of penetration required to the rafter (usually minimum 38mm).
- Fix at maximum 400mm centres along the counter batten. Pre-drill pilot holes in the counter battens to ensure ease of nailing and to reduce the possible splitting of the timber.
- Fix the tile battens to the counter battens at an appropriate gauge to suit the slates or tiles selected.

Insulation between the rafters

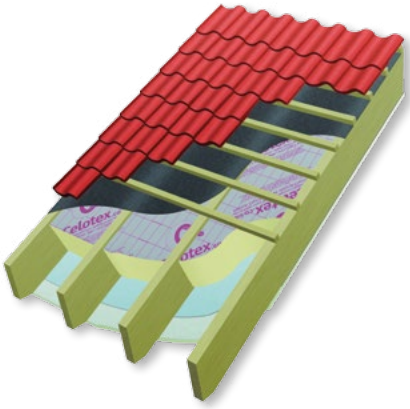
- For optimum thermal performance the unprinted foil surface should face the rafter air cavity.
- Accurately measure the width to be filled between the inside face of the rafters, prior to cutting the board.
- Use the Celotex Insulation Saw to cut the Celotex board at a slight angle, making the board width slightly oversized on one surface to achieve a ‘friction fit’.
- Push the board into the void between the rafters until it is tight against the underside of the first layer of insulation.
- To hold the boards in place, use battens along the side of the rafters.
- Tightly fit the insulation to the ridge plate and carry over and tightly butt the wall plate at eaves.
- A vapour control layer (VCL) should be installed to the underside of the rafters. A polythene sheet of higher vapour resistance is recommended for high humidity areas such as kitchens or bathrooms.
- Finish with plasterboard or other suitable sheet material, fixed to the rafters.

  NB: This solution is not suitable for exposed rafters. Where exposed rafters are required, please refer to the pitched roof sarking application on pages 44 and 45.

Insulation between rafters

Use **Celotex XR4000** high performance insulation in between rafter applications to minimise insulation thickness and give the following benefits:

- Optional single layer insulation reduces cutting
- Provides reliable long term energy savings for buildings
- Easy to dry line with plasterboard once installed
- Dimensionally stable
- No loss of internal headroom
- Ideal for loft conversions / room in roof applications



U-value calculation: unventilated between rafters

Construction	200mm deep rafters Thickness (mm)	175mm deep rafters Thickness (mm)	150mm deep rafters Thickness (mm)
Outside surface resistance	–	–	–
Tiling including batten space	–	–	–
Breather membrane	–	–	–
Low E cavity, remainder of rafter depth	Various	Various	Various
Variable layer (for between rafters)	See below	See below	See below
Polythene, 1000 gauge VCL	–	–	–
Plasterboard	12.5	12.5	12.5
Inside surface resistance	–	–	–

Variable layer	Thickness (mm)	U-value (W/m^2K)	U-value (W/m^2K)	U-value (W/m^2K)
Celotex XR4000 @ 400 ctrs	200	0.17*	–	–
Celotex XR4000 @ 400 ctrs	165	0.18	0.19*	-
Celotex XR4000 @ 400 ctrs	150	0.19	0.20	–
Celotex XR4000 @ 400 ctrs	140	0.20	–	–
Celotex XR4000 @ 600 ctrs	200	0.15*	–	–
Celotex XR4000 @ 600 ctrs	150	0.18	0.18	0.20*
Celotex XR4000 @ 600 ctrs	140	0.19	0.19	0.20*
Celotex XR4000 @ 600 ctrs	130	0.20	0.20	0.20*

* = Counter batten over membrane – see installation guidelines

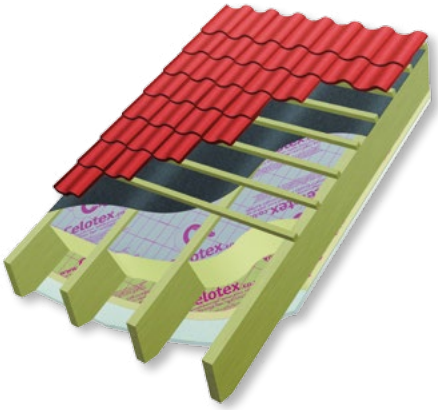
Installation guidelines

- Make sure there is enough rafter depth to accommodate not only the thickness of the Celotex insulation, but also a minimum 20mm drape space for the breathable membrane.
- For optimum thermal performance, the unprinted foil surface should face the air cavity.
- Fix battens to the inside face of the rafters, to ensure that the drape space is maintained.
- Alternatively, counter battens can be fixed over the breathable membrane to provide a channel for moisture run off. The whole depth of the rafter can then be filled with insulation.
- All details are to be in accordance with the membrane manufacturer's details.
- 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'.
- 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.
- Tightly fit the insulation to the ridge plate and carry over and tightly butt the wall plate at eaves.
- A vapour control layer (VCL) should be installed to the underside of the rafters. A polythene sheet of higher vapour resistance is recommended for high humidity areas such as kitchens or bathrooms.
- Complete the internal finish with plasterboard or other suitable sheet material.

Insulation between and under rafters

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

- Provides both the below rafter insulation and plasterboard in one product, helping reduce installation time
- 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



U-value calculation: unventilated between and under rafters

Construction		100mm deep rafters Thickness (mm)	125mm deep rafters Thickness (mm)	150mm deep rafters Thickness (mm)	175mm deep rafters Thickness (mm)
Outside surface resistance		–	–	–	–
Tiling including batten space		–	–	–	–
Breather membrane		–	–	–	–
Low E cavity between rafters (11.7% brg)		20	25	30	25
Celotex between rafters @ 400 ctrs (11.7% brg)		GA4080	GA4100	XR4120	XR4150
Variable layer (for below rafters)		See below	See below	See below	See below
Inside surface resistance		–	–	–	–
Variable layer	Thickness (mm)	U-value (W/m^2K)	U-value (W/m^2K)	U-value (W/m^2K)	U-value (W/m^2K)
Celotex PL4000	65 + 12.5	0.16	0.14	0.13	0.12
Celotex PL4000	60 + 12.5	0.16	0.15	0.13	0.12
Celotex PL4000	50 + 12.5	0.18	0.16	0.14	0.13
Celotex PL4000	40 + 12.5	0.19	0.17	0.15	0.14
Celotex PL4000	25 + 12.5	–	0.20	0.17	0.15
Celotex PL4000	15 + 12.5	–	–	0.19	0.17

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.

Unventilated

- For optimum thermal performance, the unprinted foil surface should face the air cavity.
- Install the breather membrane over the rafters. Fix battens to the side of the rafters to allow the membrane to sag between the rafters. Alternatively, fix 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.

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'.
- 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 PL4000 with suitable mechanical fixings. Fixing details should be in accordance with the fixing manufacturer's instructions.
- Joints between boards must be tightly butted, taped and jointed using appropriate tape and jointing material to create the vapour control layer.

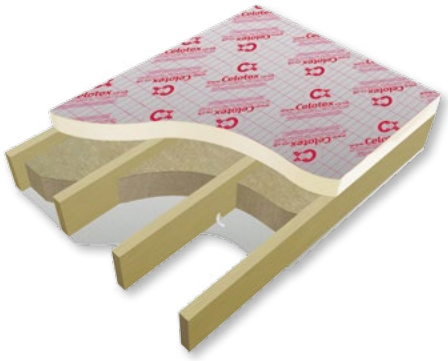
U-value calculation: ventilated between and under rafters

Construction		100mm deep rafters Thickness (mm)	125mm deep rafters Thickness (mm)	150mm deep rafters Thickness (mm)	175mm deep rafters Thickness (mm)
Outside surface resistance		–	–	–	–
Tiling including batten space		–	–	–	–
Sarking felt		–	–	–	–
Ventilated cavity		50	50	50	55
Celotex between rafters @ 400 ctrs (11.7% brg)		GA4050	GA4075	GA4100	XR4120
Variable layer (for below rafters)		See below	See below	See below	See below
Inside surface resistance		–	–	–	–
Variable layer	**Thickness (mm)**	**U-value (W/m^2K)**	**U-value (W/m^2K)**	**U-value (W/m^2K)**	**U-value (W/m^2K)**
Celotex PL4000	65 + 12.5	0.20	0.17	0.15	0.14
Celotex PL4000	60 + 12.5	–	0.18	0.16	0.14
Celotex PL4000	50 + 12.5	–	0.20	0.17	0.15
Celotex PL4000	40 + 12.5	–	–	0.19	0.17
Celotex PL4000	25 + 12.5	–	–	–	0.19

Insulating at ceiling level

Use **Celotex GA4000** or **Celotex XR4000** high performance insulation in top up joist upgrades to deliver the following benefits:

- Upgrade existing roof spaces to current building regulation compliance levels
- Provide energy efficient insulation measures without impacting on internal space
- Insulating over joists provides a lightweight storage solution when insulation fixed into joists
- Minimal load added to the structure due to lightweight boards



U-value calculation: insulating at ceiling level

Construction		100mm deep joists Thickness (mm)	150mm deep joists Thickness (mm)
Outside surface resistance		–	–
Tiling including batten space		–	–
Loft space		–	–
Variable layer over joists		–	–
Mineral wool between joists @ 400 ctrs		100	150
Polythene VCL		–	–
Plasterboard		12.5	12.5
Inside surface resistance		–	–
Variable layer	**Thickness (mm)**	**U-value (W/m²K)**	**U-value (W/m²K)**
Celotex XR4000	130	0.12	0.11
Celotex XR4000	120	0.13	0.11
Celotex XR4000	110	0.14	0.12
Celotex GA4000	100	0.14	0.13
Celotex GA4000	90	0.15	0.13
Celotex GA4000	80	–	0.14
Celotex GA4000	75	–	0.15
Celotex GA4000	70	–	0.15
Celotex GA4000	60	–	0.16

Installation guidelines

- Celotex can be used to top up insulation levels in a horizontal ceiling when mineral wool exists between the joists.
- Ensure the loft void is ventilated and eave vents are left clear.
- Ensure ceilings are strong enough to withstand loadings associated with installation.
- To minimise air leakage and heat loss around the loft hatch, seal the edges with draught seals and mechanically fix Celotex TB4020 to the inside of the hatch.
- Ensure existing insulation between joists is in good condition, with no signs of sagging.
- Celotex is laid directly over the joists as a continuous layer.
- For maximum strength Celotex should be laid in the opposite direction to that of the ceiling joists. Ensure boards are laid across a minimum of two joists.
- Board joints are tightly butted together correctly supported by the joists.
- Celotex is then mechanically fixed to the joists with suitable fixings.

For light storage only

- Lay 18mm of plywood over the Celotex and secure into the ceiling joists with suitable fixings.


Ron Cobb Hub

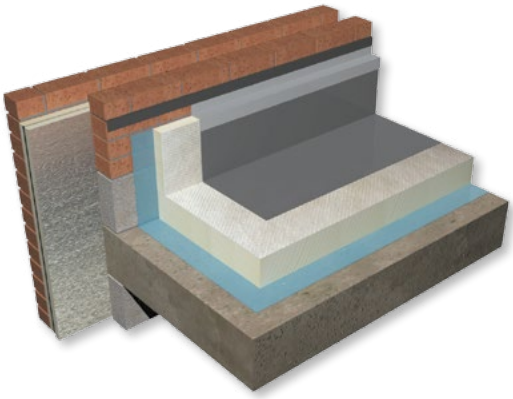
Flat Roofing

...by Celotex

Single ply membrane – bonded

Use **Celotex Crown-Bond** high performance insulation in bonded single ply flat roofing applications. The composite facer is suitable for direct bond of single ply membrane systems. Crown-Bond gives the following benefits:

- Achieves a lambda value of 0.022 W/mK providing high thermal performance in flat roofing applications
- Cutting edge thinness in a single layer with 50–140mm insulation board range, reducing installation time and costs
- Provides reliable long term energy savings for buildings
- An extensive package of online tools and aftercare, making assistance and support easily available.



U-value calculation: warm flat roof with a bonded single ply membrane

Construction		Concrete deck	Metal deck	Timber deck
Outside surface resistance		–	–	–
Single ply membrane		1.5	1.5	1.5
Variable layer		See below	See below	See below
Vapour Control Layer (VCL)		–	–	–
Concrete deck		250	n/a	n/a
Metal deck		n/a	1.5	n/a
Timber deck plywood		n/a	n/a	19
Cavity between joist @ 11.7% bridging		n/a	n/a	150
Plasterboard		n/a	12.5	12.5
Inside surface resistance		–	–	–
Variable layer	**Thickness (mm)**	**U-value (W/m²K)**	**U-value (W/m²K)**	**U-value (W/m²K)**
Crown-Bond	100	0.21	0.20	0.20
Crown-Bond	120	0.17	0.17	0.17
Crown-Bond	140	0.15	0.15	0.14

Installation guidelines

Vapour control layer
For single ply membranes, the vapour control layer should be compatible with the membrane system and installed prior to Celotex Crown-Bond, in accordance with the manufacturers guidelines.

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 from the manufacturer or provider of the weathering system type.

Laying pattern
It is recommended that boards are laid closely butted 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 EN 1991. The deck must be structurally sound, dry, clean and, where necessary, primed before application of the weathering and insulating system.

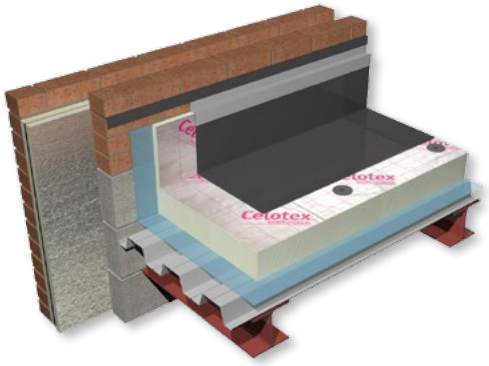
Trafficking
Celotex Crown-Bond is capable of withstanding the trafficking associated with normal roof laying work. However, roofs are generally designed for only occasional lightweight foot traffic or maintenance access. Where more frequent or heavier access is required, protected walkways should be provided. Under no circumstances should the roof be used as a working platform, either during or after the construction programme.

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 Crown-Bond contains no chemicals or solvents likely to damage a single ply membrane. When using adhesives, the installer should check the compatibility of the adhesive with the adhesive manufacturer.

Single ply membrane – mechanically fixed

Use **Celotex Crown-Fix** high performance insulation in mechanically fixed, single ply flat roofing systems where the higher compressive strength of the board gives improved resistance to site traffic during installation. Crown-Fix gives the following benefits:

- Achieves a lambda value of 0.022 W/mK providing high thermal performance in flat roofing applications
- Cutting edge thinness in a single layer with 50–110mm insulation board range, reducing installation time and costs
- Provides reliable long term energy savings for buildings
- An extensive package of online tools and aftercare, making assistance and support easily available.



U-value calculation: warm flat roof with mechanically fixed single ply membrane

Construction		Concrete deck		Metal deck		Timber deck	
		Metal fixing	Thermally broken fixing	Metal fixing	Thermally broken fixing	Metal fixing	Thermally broken fixing
Outside surface resistance		–	–	–	–	–	–
Single ply membrane		1.5	1.5	1.5	1.5	1.5	1.5
Variable layer		See below	See below	See below	See below	See below	See below
Polythene 1000 gauge, VCL		–	–	–	–	–	–
Concrete deck		250	250	n/a	n/a	n/a	n/a
Metal 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	12.5	12.5	12.5	12.5
Inside surface resistance		–	–	–	–	–	–
Variable layer	**Thickness (mm)**	**U-value (W/m²K)**		**U-value (W/m²K)**		**U-value (W/m² K)**	
Crown-Fix	100	0.22	0.21	0.22	0.20	0.21	0.20
Crown-Fix	110	0.20	0.19	0.20	0.19	0.19	0.18
Crown-Fix	120	0.19	0.17	0.18	0.17	0.18	0.17
Crown-Fix	140	0.16	0.15	0.16	0.15	0.15	0.14

Installation guidelines

Laying pattern

It is recommended that Celotex Crown-Fix boards are laid with joints break-bonded. When used on metal decks, the Celotex Crown-Fix boards should be laid with the long sides at right angles to the corrugations.

Single ply systems

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

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, Celotex Crown-Fix 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 should have a minimum 50mm head or plate washer diameter. Fixings should be installed between 50–150mm 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 BS6399: Part 2: 1997 Code of Practice for Wind Loads, or EN1991-1-4 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 sought from fixing manufacturers and in the BRUFMA information document on mechanical fixings for rigid PIR roof boards.

Trafficking

Celotex Crown-Fix boards are capable of withstanding the trafficking associated with normal roof laying work. However, flat roofs are generally only designed for occasional lightweight foot traffic for maintenance access. Where more frequent or heavier access is required, protected walkways should be provided. Under no circumstances should the roof be used as a working platform, either during or after the construction programme.

Vapour control layer (VCL)

The VCL should be minimum 1000 gauge polythene or reinforced aluminium foil. This should be fully sealed at all laps, prior to applying the insulation, using self-adhesive tape appropriate to the type of VCL used.

At perimeters and abutments the VCL should be turned up around the insulation board edges and a flap of approximately 300mm should be sealed and taped to the top face of the board. The VCL should be loose laid immediately prior to the installation of the roof insulation board.

Upstands

Where an insulated upstand is needed, Celotex TB4000, GA4000 and XR4000 are suitable to meet this requirement.

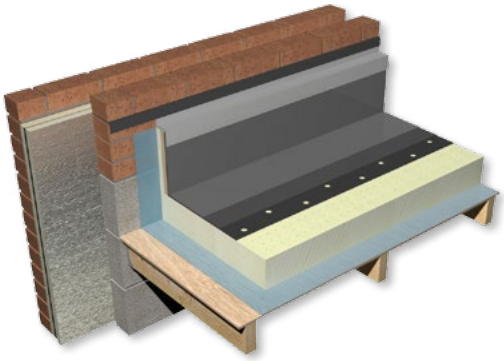
Supporting deck

The supporting deck must provide adequate support for the VCL and insulation board with joints being supported by the ridges of the deck. The deck must be structurally sound, dry, clean and where necessary, primed before application of the weathering and insulating system.

Built-up flat roofing

Use **Celotex Crown-Up** high performance insulation in built-up flat roofing applications. Crown-Up is suitable for use in built-up flat roofing systems. Crown-Up gives the following benefits:

- Achieves a lambda value of 0.025–0.027 W/mK providing high thermal performance in flat roofing applications
- Cutting edge thinness in a single layer with 100–150mm insulation board range, reducing installation time and costs
- Provides reliable long term energy savings for buildings
- An extensive package of online tools and aftercare, making assistance and support easily available.



U-value calculation: warm flat roof in a built-up flat roofing system

Construction		Concrete deck	Metal deck	Timber deck
Outside surface resistance		–	–	–
Built-up roofing felt		12	12	12
Variable layer		See below	See below	See below
Vapour Control Layer (VCL)		–	–	–
Concrete deck		250	n/a	n/a
Metal deck		n/a	1.5	n/a
Timber deck plywood		n/a	n/a	19
Cavity between joist @ 11.7% bridging		n/a	n/a	150
Plasterboard		n/a	12.5	12.5
Inside surface resistance		–	–	–
Variable layer	**Thickness (mm)**	**U-value (W/m²K)**	**U-value (W/m²K)**	**U-value (W/m²K)**
Crown-Up	100	0.24	0.23	0.22
Crown-Up	120	0.19	0.19	0.18
Crown-Up	150	0.16	0.15	0.15

Installation guidelines

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 Crown-Up 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 Celotex Crown-Up.

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, Celotex Crown-Up 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 should have a minimum 50mm head or plate washer diameter. Fixings should be installed between 50–150mm 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 BS6399: Part 2: 1997 Code of Practice for Wind Loads, or EN1991-1-4 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 sought 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.

Trafficking

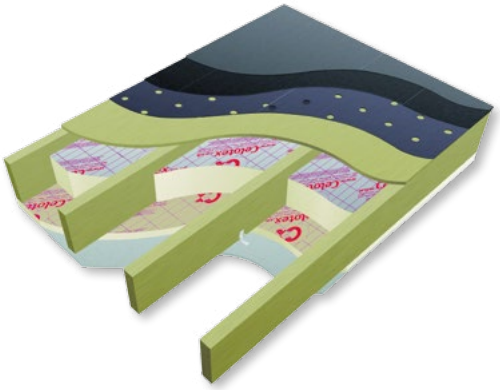
Celotex Crown-Up is capable of withstanding the associated foot traffic with normal roof laying work. However, roofs are generally designed for occasional lightweight foot traffic or maintenance access. Where more frequent or heavier access is required, protective walkways should be provided. Under no circumstances should the roof be used as a working platform, either during or after the construction programme.

Flat roof upgrades

Insulation between and under joists

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

- Celotex PL4000 provides both the below joist insulation and plasterboard in one product helping reduce installation time
- Offers the installer maximum flexibility and installation speed due to the tapered edge plasterboard
- A perfect solution to upgrade older buildings
- Provides reliable long term energy savings for buildings
- Ventilated cold roof construction
- The ideal renovation/conversion solution
- Helps to minimise any loss of internal headroom



U-value calculation: cold flat roof – between and under joists

Construction		100mm deep joists Thickness (mm)	125mm deep joists Thickness (mm)	150mm deep joists Thickness (mm)	175mm deep joists Thickness (mm)
Outside surface resistance		–	–	–	–
Weatherproofing 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		–	–	–	–
Variable layer	**Thickness (mm)**	**U-value (W/m^2K)**	**U-value (W/m^2K)**	**U-value (W/m^2K)**	**U-value (W/m^2K)**
Celotex PL4000	65 = 12.5	0.20	0.17	0.15	0.14
Celotex PL4000	60 + 12.5	–	0.18	0.16	0.14
Celotex PL4000	50 + 12.5	–	0.20	0.17	0.15
Celotex PL4000	40 + 12.5	–	–	0.19	0.17
Celotex PL4000	25 + 12.5	–	–	–	0.19

Installation guidelines

- 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 with suitable mechanical fixings. Fixing details should be in accordance with the fixing manufacturer's instructions.
- Joints between the boards must be tightly butted, taped and jointed using appropriate tape and jointing material to create the vapour control layer.

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.

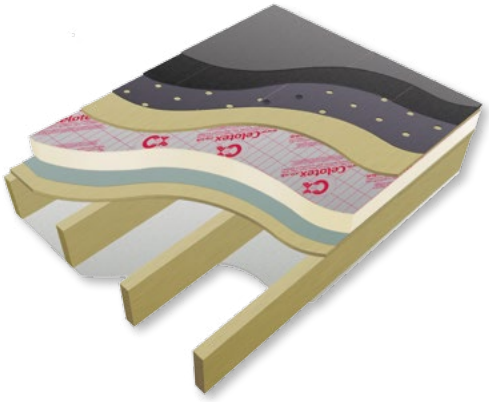
Ventilation must be provided above an insulated ceiling directly through the cold void. Failure to do so could result in serious condensation problems that may lead to decay and possible failure.

Balcony and terrace

Insulation between and under plywood

Use **Celotex GA4000** or **Celotex XR4000** high performance thermal insulation between 19mm plywood sheeting for use in warm flat roof deck balcony applications to minimise insulation thickness and give the following benefits:

- Warm roof construction due to over joist insulation
- Provides reliable long term energy savings for buildings
- Eliminates the need to insulate between joists
- Ventilation not required through roof void
- Robust deck structure copes with regular foot traffic
- Rapidly installed and weatherproofed



U-value calculation: flat roof insulating deck – balcony

Construction		Terrace Bur Thickness (mm)	Terrace SPM Thickness (mm)	Terrace BUR Ex-J Thickness (mm)
Outside surface resistance		–	–	–
Built-up roofing or single ply membrane		12	1.5	12
Plywood		19	19	19
Variable layer		See below	See below	See below
Polythene 1000 gauge, VCL		–	–	–
Plywood		19	19	19
Cavity between joists @ 400 ctrs – 11.7% bridging		150	150	n/a
Plasterboard		12.5	12.5	12.5
Plasterboard between joist – 11.7%		n/a	n/a	n/a
Inside surface resistance		–	–	–
Variable layer	**Thickness (mm)**	**U-value (W/m²K)**	**U-value (W/m²K)**	**U-value (W/m²K)**
Celotex GA4000	90	0.23	0.23	0.24
Celotex GA4000	100	0.21	0.21	0.22
Celotex XR4000	120	0.18	0.18	0.19
Celotex XR4000	130	0.17	0.17	0.18
Celotex XR4000	140	0.16	0.16	0.17
Celotex XR4000	150	0.15	0.15	0.16
Celotex XR4000	200	0.12	0.12	0.12

Terrace BUR = Built-up roofing Terrace SPM = Single ply membrane Terrace BUR EX-J = Built-up roofing, exposed joist

Installation guidelines

- Ensure the joist spacing is at no more than 600mm centres and that the dimension of the joist is sufficient to span and accept additional loads. If asphalt weathering is to be used, joists should be at no more than 400mm centres. Install firrings to give a fall of 1:80, or as appropriate to type of construction tolerance.
- Install 19mm plywood to top of joists/firrings and fit 1000g polythene vapour control layer (VCL).
- Install Celotex insulation to the required thickness and install secondary layer of 19mm plywood.
- Fix with corrosion-proof wood screws at a frequency to suit the design wind load. Refer to BS6399-2 Code of Practice for Wind Loads. As a guide, 16 fasteners per board will resist a wind load of 2.22 KN/m2 based on a design load of 0.4KN per fastener.
- Ensure that fixings are no less than 10mm in from the board edge or 50mm from each corner. They should be equally spaced along the supporting joists. Fixings should be long enough to penetrate at least 38mm into the supporting timber.
- Stagger opposing fixings where two board edges share the same joist.
- Built-up roofing (BUR). Always use a Type 3G felt to BS 747 as a vapour diffusion first layer when using BUR weathering systems.
- Single ply membrane (SPM). Please consult the manufacturer or supplier or relevant trade association for installation guidelines on all SPM weathering systems.
- Temporary protection must be provided for both the insulation and the waterproofing, if significant foot traffic is anticipated either during or after installation.

Additional installation guidelines for balconies

- Before commencement of works, consult with a structural engineer to ensure that the whole structure is adequate to take the additional loads of a balcony.
- The chosen weather proofing system should then be applied directly to the surface of the plywood and protected from foot traffic with promenade tiles, decking or a similar finish.

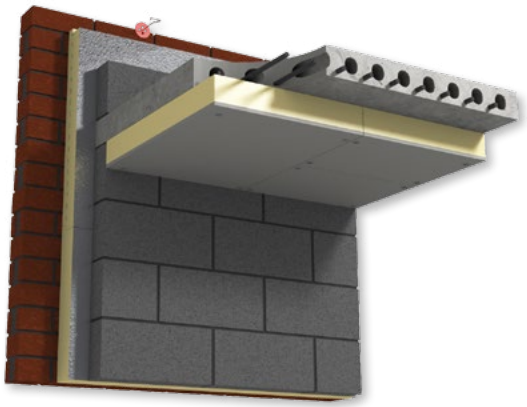
Concrete Soffit

...by Celotex

Concrete soffit liner

Use **Celotex SL5000** premium performance insulation in concrete soffit liner applications to minimise insulation thickness and give the following benefits:

- A super low lambda value of 0.021 W/mK ensuring regulatory compliance is achieved with minimal thickness
- Combining the PIR properties of Celotex insulation with calcium silicate providing additional fire performance
- Premium performance PIR insulation bonded to calcium silicate, reducing installation time
- Delivers greater impact resistance compared to exposed insulation systems
- Provides a decorative finish with no need for on-site decorating



U-value calculation: concrete soffit liner

Construction		Celotex SL5000 – Direct Thickness (mm)	Celotex SL5000 – Indirect Thickness (mm)
Inside surface resistance		–	–
Concrete dense		150	150
Cavity (low emissivity) 38 x 50mm timber battens @ 600 ctrs n/a		n/a	38
Outside surface resistance		–	–
Variable layer		See below	See below
Variable layer	**Thickness (mm)**	**U-value (W/m²K)**	**U-value (W/m²K)**
Celotex SL5086	86	0.24*	0.21*
Celotex SL5096	96	0.22*	0.19*
Celotex SL5106	106	0.20*	0.18*

† Thickness includes 6mm calcium silicate board
Direct = Directly fixing Celotex SL5000 to the concrete slab
Indirect = Indirectly fixing Celotex SL5000 to the concrete slab via treated timber battens

* U-value calculations above are achieved with stainless steel or thermally broken fixings. U-value may vary depending on the type of fixing specification. For project specific U-value calculations, please contact the Celotex Technical Centre.

Installation guidelines

Direct fixing

- Celotex SL5000 is intended for installation on the cold side of the construction.
- Ensure that the cavity wall insulation is continuous past the level of soffit insulation, avoiding thermal bridging.
- It is recommended that the Celotex insulation boards are tightly butted to minimise heat loss through insulation gaps, ensuring a professional finish is achieved. Continuity of butted insulation (including 6mm calcium silicate) is crucial in creating an effective fire barrier.
- Pre-drill Celotex SL5000 insulation and concrete to a depth as recommended by the fixings manufacturer, insert the fixing and screw tight to the line and level.
- Directly fix Celotex insulation to concrete soffit. Fixings should be installed 50mm (minimum) from the edge and corners of the board with a minimum of 12 fixings per 1200 x 2400mm board (see figure 1 for guidance).
- Fixings should comprise a screw type suitable for the concrete deck into which it is being driven, combined with a circular or rectangular plate washer having a diameter of no less than 25mm. Advice on suitable fixings should be sought directly from the fixing manufacturer.
- Care should be taken when applying fixings to eliminate hazards to yourself and structural damage to the construction build-up.

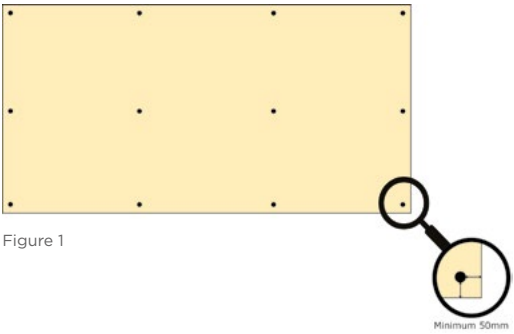


Figure 1

Indirect fixing

- Points one, two and three of direct fixing application, apply in the same way to indirect fixing. Please take note.
- Indirect soffit fix should use timber battens treated to BS 5268: Part 5.

Batten fixing

- Fix Celotex insulation to 38 x 50mm timber fixing battens treated timber battens.
- Battens should be fixed above the layer of SL5000. (Ensure that the timber fixing battens are secured at maximum 600mm centres and that the fixings through into the concrete soffit are at nominal 400mm centres).
- Insulation fixings should penetrate the timber battens by 30mm (see figure 1). Please refer to manufacturers recommendations.

Insulation fixing

- Fixings should be installed 50mm (minimum) from the edge and corners of the board (see figure 1 for guidance).
- Suitable fixings (a minimum of 12 fixings per 1200 x 2400mm board) installed at nominal centres, should comprise a suitable screw type, combined with a circular or rectangular plate washer having a diameter of no less than 25mm. Advice on suitable fixings should be sought directly from the fixing manufacturer.
- Care should be taken when applying fixings to eliminate structural damage to the construction build-up. The Celotex Technical Centre can provide technical guidance.

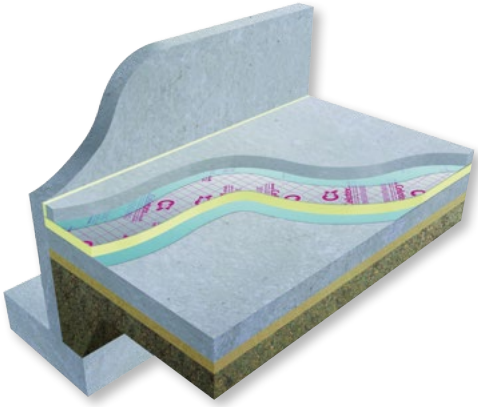
Conversions

...by Celotex

Basements

Use **Celotex TB4000**, **Celotex GA4000**, **Celotex XR4000** and **Celotex PL4000** high performance insulation in basement refurbishment projects to deliver the following benefits:

- Upgrade basements to current building regulation compliance levels
- Create additional, highly thermal efficient living space
- Tapered edge plasterboard offers the installer maximum installation flexibility and installation speed
- Provides reliable long term energy and cost savings



U-value calculation: basement floors

	Perimeter / area ratio									
Celotex product	**0.1**	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1.0**
XR4140	0.08	0.09	0.10	0.11	0.11	0.12	0.12	0.12	0.12	0.12
XR4130	0.08	0.10	0.11	0.11	0.12	0.12	0.12	0.13	0.13	0.13
XR4120	0.08	0.10	0.11	0.12	0.13	0.13	0.13	0.13	0.13	0.14
XR4110	0.08	0.11	0.12	0.13	0.13	0.14	0.14	0.14	0.14	0.16
GA4080	0.10	0.13	0.14	0.16	0.16	0.17	0.17	0.18	0.18	0.18
GA4060	0.11	0.15	0.17	0.18	0.19	0.20	0.20	0.21	0.21	0.22
TB4040	0.12	0.17	0.20	0.22	0.23	0.24	0.25	–	–	0.25
TB4030	0.13	0.19	0.22	0.24	–	–	–	–	–	–
TB4025	0.13	0.19	0.23	–	–	–	–	–	–	–
TB4020	0.14	0.20	0.25	–	–	–	–	–	–	–

Based on 65mm screed & 25mm insulation as perimeter upstand

Celotex requirement to meet target U-values for a basement floor are determined by a number of variable factors.

- Type of surrounding retaining soil. This can be clay/silt, sand/gravel or rock.
- The thickness of basement walls.
- The height of basement walls from finished floor level to ground level.
- The ratio of exposed floor perimeter to the total floor area (PA ratio).

In addition to the above, basement walls take into account the thermal performance of the basement floor. Please contact the Celotex Technical Centre to confirm which boards meet target U-values.

Installation guidelines

Basement floors – above concrete slab

- The surface of the slab should be smooth, flat and free from projections. If required use a thin layer of sand blinding on a rough slab to ensure the insulation boards are continuously supported.
- Ensure the basement floor is protected from external ground water penetrating the floor with a suitable waterproof system.
- A minimum 500 gauge separating layer must be laid over the Celotex boards to prevent a reaction between the wet screed and foil facer, act as a VCL and prevent liquid screed migration between the board joints.
- 25mm TB4000 is positioned around the exposed perimeter as an upstand. It is usually the depth of the screed.
- Apply a 65mm sand cement screed in accordance with manufacturers instructions.

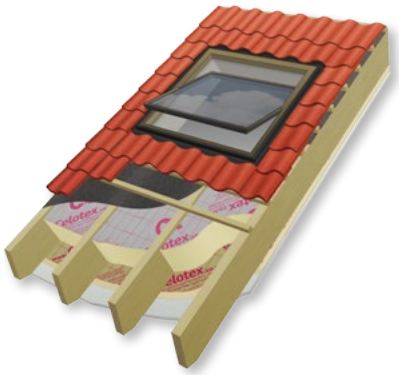
Basement walls

- Ensure the basement wall is protected from external ground water penetrating the wall with a suitable waterproof system.
- Following manufacturer guidelines to maintain waterproof seal, fix 25 x 47mm battens to the masonry at 600mm vertical centres to coincide with the board edges with suitable fixings.
- Secure Celotex PL4000 with suitable mechanical fixings. Fixing details should be in accordance with the fixing manufacturer's instructions.
- Joints between the boards should be tightly butted and finished by taping and jointing using appropriate tape and jointing material to create the VCL.

Loft conversions

Use **Celotex GA4000** and **Celotex PL4000** high performance insulation in loft conversion projects to deliver the following benefits:

- Upgrade lofts to current building regulation compliance levels
- Create additional, highly thermal efficient living space
- Provide reliable long term energy and cost savings
- Deliver multiple energy efficient measures within one project



U-value calculation: attic walls

Construction	Thickness (mm)	
Outside surface resistance	–	
Tiling including batten space	–	
Breathable membrane	–	
Roof void	–	
Celotex GA4000	80	
Cavity (low emissivity) between studwork	20	
Variable layer	See below	
Board joints sealed to form vapour barrier	–	
Inside surface resistance	–	
Variable layer	**Thickness (mm)**	**U-value (W/m²K)**
Celotex PL4000	65 + 12.5	0.16
Celotex PL4000	60 + 12.5	0.17
Celotex PL4000	50 + 12.5	0.18
Celotex PL4000	40 + 12.5	0.20
Celotex PL4000	25 + 12.5	0.23
Celotex PL4000	15 + 12.5	0.26

Installation guidelines

- For optimum thermal performance, the unprinted foil surface should face the air cavity.
- Celotex GA4000 is cut and friction fitted between timber frame flush with the back of the studwork leaving a 20mm gap in front for services.
- Secure Celotex PL4000 with suitable mechanical fixings. Fixing details should be in accordance with the fixing manufacturer's instructions.
- Joints between the boards should be tightly butted and finished by taping and jointing using appropriate tape and jointing material to create the VCL.

Between and under rafters

For installation guidelines please see pages 50 and 51.

U-value calculation: horizontal ceiling

Construction		100mm joists	150mm joists
Outside surface resistance		–	–
Tiling including batten space		–	–
Loft space		–	–
Celotex between joists @ 400 ctrs		GA4090	XR4140
Variable layer		See below	See below
Board joints sealed to form vapour barrier		–	–
Inside surface resistance		–	–
Variable layer	**Thickness (mm)**	**U-value (W/m²K)**	**U-value (W/m²K)**
Celotex PL4000	60 + 12.5	–	0.13
Celotex PL4000	50 + 12.5	–	0.14
Celotex PL4000	40 + 12.5	–	0.15

Installation guidelines

- Celotex GA4000 or XR4000 is cut and friction fitted between horizontal ceiling joists which form the flat ceiling of the new loft room.
- Secure Celotex PL4000 with suitable mechanical fixings. Fixing details should be in accordance with the fixing manufacturer's instructions.
- Joints between the boards should be tightly butted and finished by taping and jointing using appropriate tape and jointing material to create the VCL.

Garage conversions

Use **Celotex GA4000**, **Celotex XR4000** and **Celotex PL4000** high performance insulation in garage conversion projects to deliver the following benefits:

- Upgrade to current building regulation compliance levels
- Create additional, highly thermal efficient living space
- Provide reliable long term energy and cost savings
- Deliver multiple energy efficient measures within one project

U-value calculation: concrete slab floor

	Perimeter / area ratio									
Celotex product	**0.1**	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1.0**
XR4200	0.07	0.08	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.10
XR4165	0.07	0.09	0.10	0.10	0.11	0.11	0.11	0.11	0.11	0.12
XR4150	0.08	0.10	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.13
XR4140	0.08	0.10	0.11	0.12	0.12	0.13	0.13	0.13	0.13	0.13
XR4130	0.08	0.11	0.12	0.13	0.13	0.13	0.14	0.14	0.14	0.14
XR4120	0.09	0.11	0.12	0.13	0.14	0.14	0.15	0.15	0.15	0.15
XR4110	0.09	0.12	0.13	0.14	0.15	0.15	0.16	0.16	0.16	0.16
GA4080	0.10	0.14	0.16	0.18	0.19	0.19	0.20	0.20	0.21	0.21
GA4060	0.12	0.17	0.19	0.21	0.22	0.23	0.24	0.25	0.25	–
GA4050	0.12	0.18	0.21	0.23	0.25	–	–	–	–	–

Based on 18mm tongue and groove chipboard

Installation guidelines

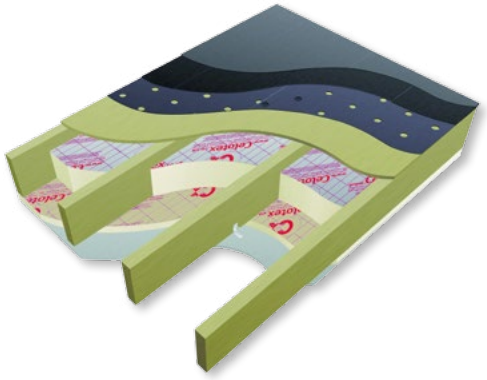
Upgrading concrete slab floor

For installation guidelines please see page 16 and 17.

Installation guidelines

Upgrading flat roofs

For full installation guidelines please see pages 62 and 63. Please note that Celotex also offer solutions if the existing weatherproof cover is being replaced. For further information please contact the Celotex Technical Centre.



U-value calculation: flat roof garage conversion

Construction		Joist depth 100mm	Joist depth 125mm	Joist depth 150mm	Joist depth 175mm
Outside surface resistance		–	–	–	–
Weatherproofing 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		–	–	–	–
Variable layer	**Thickness (mm)**	**U-value (W/m^2K)**	**U-value (W/m^2K)**	**U-value (W/m^2K)**	**U-value (W/m^2K)**
Celotex PL4000	60 + 12.5	–	0.18	0.16	0.14
Celotex PL4000	50 + 12.5	–	0.20	0.17	0.15
Celotex PL4000	40 + 12.5	–	–	0.19	0.17
Celotex PL4000	25 + 12.5	–	–	–	0.19

GA = GA4000 XR = XR4000

General information

Storage

- Celotex insulation boards should be stored dry, flat and clear of the ground. Only as much material as can be installed during a single working period should be removed from storage at any one time. If boards are stored under tarpaulins, care should be taken to prevent rope damage to boards.

Installation

- Always install Celotex insulation boards in accordance with the instructions supplied by Celotex.
- Celotex insulation boards should not be installed when the temperature is at or below 4°C and falling.
- For optimum thermal performance, the unprinted foil surface should face the air cavity.
- Where possible, cut the product using the Celotex Insulation Saw to minimise dust creation.
- When cutting Celotex insulation, dust extraction equipment, eye protection and face masks should be provided. Dust or particles in the eyes should be washed out with liberal quantities of water. If skin is sensitive to fibre irritation, apply a barrier cream to exposed areas before handling.

Handling

- Care should also be taken to ensure that packs are not dropped on to corners or edges.
- Aluminium foil edges may be sharp. Gloves must be worn at all times when handling Celotex insulation boards.

For a downloadable copy of our Health & Safety guidelines, please visit the website at **celotex.co.uk**

Waste management and recycling

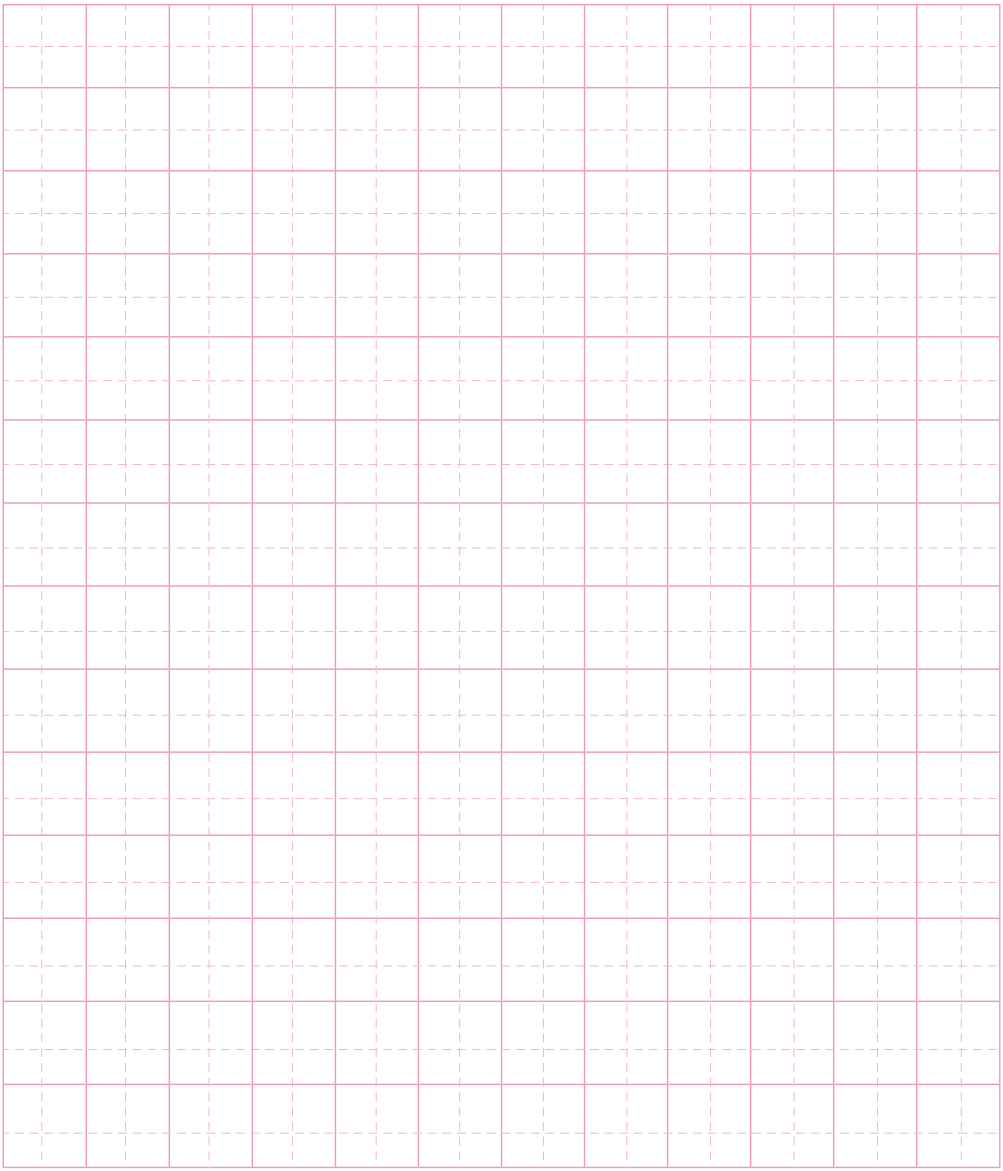
Celotex continually monitors the levels of waste from its activities and drives and implements procedures which reduce the amount of waste produced. The company ensures that all employees are aware of the importance of reducing waste in all activities.

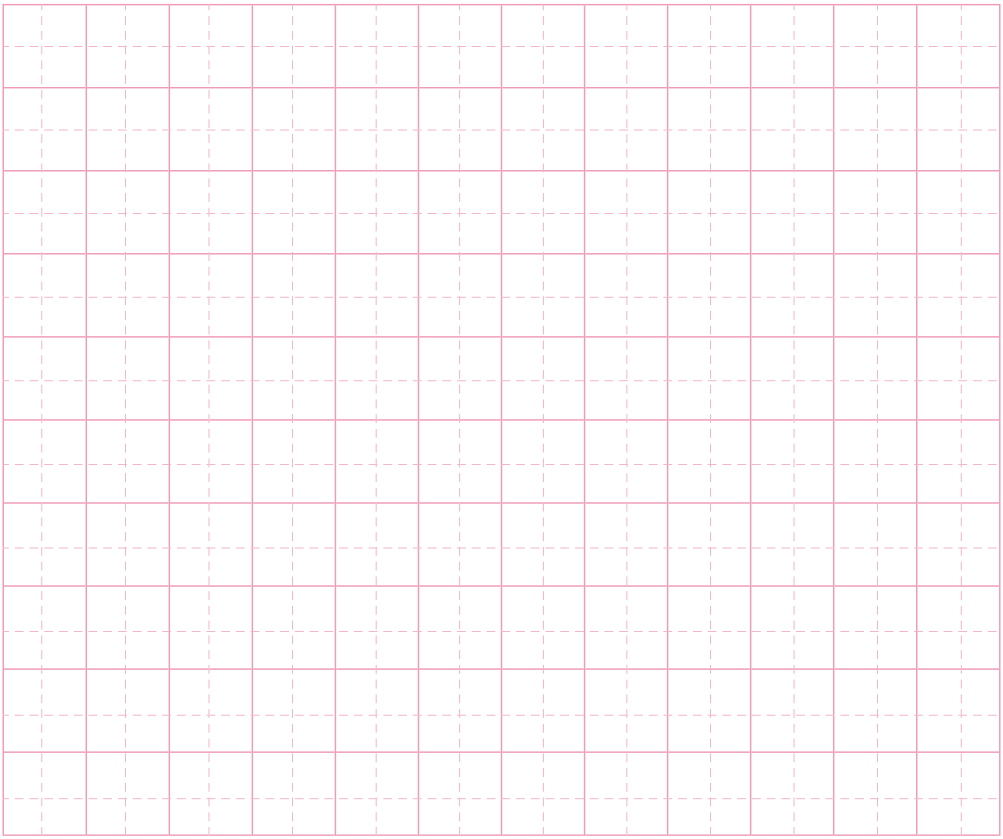
The majority of Celotex products are packaged without the requirement for shrink wrap and instead use recyclable materials such as cardboard banding.

Waste PIR is inert and landfill safe with no known effect on ground water. Glass fibre used as core reinforcement in certain products is made up almost entirely from recycled waste glass.

Celotex's environmental impact has been assessed via a BRE Environmental Profile. This profile drives our A+ Green Guide rating and considers the full 'cradle to grave' impact including raw material extraction, manufacture, transportation, performance in use and disposal.

For further information on the Sustainability credentials of Celotex including a copy of our Environmental & Sustainability Statement, please visit the 'Sustainability' pages of celotex.co.uk





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2. The liability of Celotex in respect of any damage caused by a defect to the extent that such comes within the relevant provisions of the Consumer Protection Act 1987.

Lines are open Monday–Friday from 8am–5.15pm. Details and pricing are correct at date of publication – August 2017.


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