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**trading as Celotex**

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**Agrément Certificate**

**17/5405**

Product Sheet 2

**CELOTEX INSULATION**

**CELOTEX TB4000, GA4000 AND XR4000 PIR INSULATION BOARDS FOR FLOOR INSULATION**

This Agrément Certificate Product Sheet<sup>(1)</sup> relates to Celotex TB4000, GA4000 and XR4000 PIR Insulation Boards for Floor Insulation, comprising rigid polyisocyanurate (PIR) foam boards with foil-facings, for use as insulation in ground-bearing or suspended concrete ground floors or between the joists of suspended timber ground-floors and also for use with exposed or semi-exposed intermediate concrete or timber floors, in new or existing domestic or similar buildings.

(1) Hereinafter referred to as 'Certificate'.

**CERTIFICATION INCLUDES:**

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.

**KEY FACTORS ASSESSED**

**Thermal performance** — the products have a declared thermal conductivity ( $\lambda_D$ ) of  $0.022 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$  (see section 6).

**Condensation risk** — the products can contribute to limiting the risk of condensation (see section 7).

**Floor loading** — the products, when installed in accordance with this Certificate, can support a design loading for domestic applications (see section 9).

**Durability** — the products are durable, rot proof and sufficiently stable to remain effective as insulation for the life of the building (see section 12).



The BBA has awarded this Certificate to the company named above for the products described herein. These products have been assessed by the BBA as being fit for their intended use provided they are installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

*Claire Curtis-Thomas*

Date of Fourth issue: 20 November 2018

John Albon – Head of Approvals  
Construction Products

Claire Curtis-Thomas  
Chief Executive

Originally certificated on 20 March 2017

*The BBA is a UKAS accredited certification body – Number 113.*

*The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at [www.bbacerts.co.uk](http://www.bbacerts.co.uk)  
Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.  
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**British Board of Agrément**

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## Regulations

In the opinion of the BBA, Celotex TB4000, GA4000 and XR4000 Insulation Boards for Floor Insulation, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):



### The Building Regulations 2010 (England and Wales) (as amended)

<b>Requirement:</b>	<b>A1</b>	<b>Loading</b>
Comment:		The products can contribute to satisfying this Requirement. See section 9.2 of this Certificate.
<b>Requirement:</b>	<b>C2(c)</b>	<b>Resistance to moisture</b>
Comment:		The products can contribute to satisfying this Requirement. See sections 7.1 and 7.4 of this Certificate.
<b>Requirement:</b>	<b>L1(a)(i)</b>	<b>Conservation of fuel and power</b>
Comment:		The products can contribute to satisfying this Requirement. See section 6 of this Certificate.
<b>Regulation:</b>	<b>7</b>	<b>Materials and workmanship</b>
Comment:		The products are acceptable. See section 12 and the <i>Installation</i> part of this Certificate.
<b>Regulation:</b>	<b>26</b>	<b>CO<sub>2</sub> emission rates for new buildings</b>
<b>Regulation:</b>	<b>26A</b>	<b>Fabric energy efficiency rates for new dwellings (applicable to England only)</b>
<b>Regulation:</b>	<b>26A</b>	<b>Primary energy consumption rates for new buildings (applicable to Wales only)</b>
<b>Regulation:</b>	<b>26B</b>	<b>Fabric performance values for new dwellings (applicable to Wales only)</b>
Comment:		The products can contribute to satisfying these Regulations. See section 6 of this Certificate.



### The Building (Scotland) Regulations 2004 (as amended)

<b>Regulation:</b>	<b>8(1)</b>	<b>Durability, workmanship and fitness of materials</b>
Comment:		The products are acceptable. See section 12 and the <i>Installation</i> part of this Certificate.
<b>Regulation:</b>	<b>9</b>	<b>Building standards applicable to construction</b>
Standard:	1.1(b)	Structure
Comment:		The products can contribute to satisfying this Standard, with reference to clause 1.1.1 <sup>(1)</sup> . See section 9.2 of this Certificate.
Standard:	3.15	Condensation
Comment:		The products can contribute to satisfying this Standard, with reference to clauses 3.15.1 <sup>(1)</sup> , 3.15.4 <sup>(1)</sup> and 3.15.5 <sup>(1)</sup> . See sections 7.1 and 7.5 of this Certificate.
Standard:	6.1(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		The products can contribute to satisfying these Standards, with reference to clauses or parts of clauses 6.1.1 <sup>(1)</sup> , 6.1.6 <sup>(1)</sup> , 6.2.1 <sup>(1)</sup> , 6.2.3 <sup>(1)</sup> , 6.2.4 <sup>(1)</sup> , 6.2.6 <sup>(1)</sup> , 6.2.7 <sup>(1)</sup> , 6.2.9 <sup>(1)</sup> , 6.2.10 <sup>(1)</sup> , 6.2.11 <sup>(1)</sup> and 6.2.13 <sup>(1)</sup> . See section 6 of this Certificate.

<b>Standard:</b>	7.1(a)(b)	<b>Statement of sustainability</b>
<b>Comment:</b>		The products can contribute to satisfying the relevant requirements of Regulation 9, Standards 1 to 6, and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard. In addition, the products can contribute to a construction meeting a higher level of sustainability as defined in this Standard with reference to clauses 7.1.4 <sup>(1)</sup> [Aspects 1 <sup>(1)</sup> and 2 <sup>(1)</sup> ], 7.1.6 <sup>(1)</sup> [Aspects 1 <sup>(1)(2)</sup> and 2 <sup>(1)</sup> ] and 7.1.7 <sup>(1)</sup> [Aspect 1 <sup>(1)</sup> ]. See section 6.1 of this Certificate.
<b>Regulation:</b>	<b>12</b>	<b>Building standards applicable to conversions</b>
<b>Comment:</b>		Comments made in relation to these products under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1 <sup>(1)</sup> and Schedule 6 <sup>(1)</sup> .

(1) Technical Handbook (Domestic).



## The Building Regulations (Northern Ireland) 2012 (as amended)

<b>Regulation:</b>	<b>23</b>	<b>Fitness of materials and workmanship</b>
<b>Comment:</b>		The products are acceptable. See section 12 and the <i>Installation</i> of this Certificate.
<b>Regulation:</b>	<b>29</b>	<b>Condensation</b>
<b>Comment:</b>		The products can contribute to satisfying this Regulation. See section 7.1 of this Certificate.
<b>Regulation:</b>	<b>30</b>	<b>Stability</b>
<b>Comment:</b>		The products can contribute to satisfying this Regulation. See section 9.2 of this Certificate.
<b>Regulation:</b>	<b>39(a)(i)</b>	<b>Conservation measures</b>
<b>Regulation:</b>	<b>40(2)</b>	<b>Target carbon dioxide emission rate</b>
<b>Comment:</b>		The products can contribute to satisfying these Regulations. See section 6 of this Certificate.

### Construction (Design and Management) Regulations 2015

### Construction (Design and Management) Regulations (Northern Ireland) 2016

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

See section: *3 Delivery and site handling (3.4)* of this Certificate.

## Additional Information

### NHBC Standards 2018

In the opinion of the BBA, Celotex TB4000, GA4000 and XR4000 PIR Insulation Boards for Floor Insulation, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards*, Chapters 5.1 *Substructure and ground bearing floors* and 5.2 *Suspended ground-floors*.

### CE marking

The Certificate holder has taken the responsibility of CE marking the products in accordance with harmonised European Standard BS EN 13165 : 2012. An asterisk (\*) appearing in this Certificate indicates that data shown is given in the manufacturer's Declaration of Performance.

# Technical Specification

## 1 Description

Celotex TB4000, GA4000 and XR4000 PIR Insulation Boards for Floor Insulation comprise rigid polyisocyanurate (PIR) foam boards with foil-facings. The nominal characteristics of the products are given in Table 1 of this Certificate.

Table 1 Nominal characteristics

Product	Facings	Board size (mm)	Thickness range (mm)	Edge profile	Deviation from flatness (mm) (board length $\leq$ 2.5 m)
Celotex TB4000	Composite foil-facing both sides (printed on one side only) <sup>(1)</sup>	1200 x 2400	12 to 45	square edge	$\leq$ 10 (area $>$ 0.75 m <sup>2</sup> )
Celotex GA4000	Composite foil-facing both sides (printed on one side only) <sup>(1)</sup>	1200 x 2400	50 to 100	square edge	$\leq$ 10 (area $>$ 0.75 m <sup>2</sup> )
Celotex XR4000	Composite foil-facing both sides (printed on one side only) <sup>(1)</sup>	1200 x 2400	110 to 200	square edge	$\leq$ 10 (area $>$ 0.75 m <sup>2</sup> )

(1) See sections 4.5 and 13.11.

## 2 Manufacture

2.1 Celotex PIR insulation is manufactured by a lamination process, formed between aluminium foil-facings that are glued together in a continuous laminator, where the adhesive is a mixture of two primary chemicals, polyol and MDI. An added blowing agent causes the adhesive to expand into foam that hardens, which is then cut to its finished board size and packed.

2.2 As part of the assessment and ongoing surveillance of product quality, the BBA has:

- agreed with the Certificate holder/manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

2.3 The management system of Celotex has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 and BS EN ISO 14001 : 2015 by SGS UK Ltd (Certificates GB91/504 and GB11/83526).

## 3 Delivery and site handling

3.1 The products are delivered to site in polythene-wrapped packs. Each pack of boards contains a label with the manufacturer's name, board dimensions and the BBA logo incorporating the number of this Certificate.

3.2 The products must be protected from prolonged exposure to sunlight, and stored dry, flat and raised above ground level (to avoid contact with ground moisture). Where possible, packs should be stored inside. If stored outside, they should be under cover, or protected with opaque polythene sheeting.

3.3 The products are light and easy to handle and care should be exercised to avoid crushing the edges or corners. If damaged, the products should be discarded.

3.4 The products must not be exposed to open flame or other ignition sources, or to solvents or other chemicals.

## Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Celotex TB4000, GA4000 and XR4000 PIR Insulation Boards for Floor Insulation.

### Design Considerations

#### 4 Use

4.1 Celotex TB4000, GA4000 and XR4000 PIR Insulation Boards for Floor Insulation are suitable for use as floor insulation and are effective in reducing the thermal transmittance (U value) of ground-bearing or suspended concrete or timber ground-floors, and also exposed or semi-exposed intermediate concrete or timber floors, in new or existing domestic or similar buildings. The products can also be used on suitably designed beam-and-block floors incorporating Type R2 semi-resisting or resisting blocks to BS EN 15037-2 : 2009 and self-bearing beams to BS EN 15037-1 : 2008.

4.2 Ground-bearing floors should only be used where the depth of compacted fill is less than 600 mm and is defined as non-shrinkable. Shrinkable fills are defined as material containing more than 35% fine particles (silt and clay) and having a Plasticity Index of 10% or greater (shrinkable fills are susceptible to clay heave).

4.3 Ground-bearing concrete and suspended concrete ground-floors incorporating the products must include a suitable damp-proof membrane (dpm), laid beneath the insulation, in accordance with the relevant sections of CP 102 : 1973, and BS 8215 : 1991 (see sections 13.5 and 13.6 of this Certificate).

4.4 Suspended concrete or timber ground-floors incorporating the insulation boards must include suitable ventilation of the sub-floor void (minimum 150 mm void between the underside of the floor and the ground surface) or a dpm. For suspended floors in locations where clay heave is anticipated, an additional void of up to 150 mm may be required to accommodate the possible expansion of the ground below the floor. In such cases where the risk of clay heave has been confirmed by geotechnical investigations by a competent individual, a total void of up to 300 mm may be required.

4.5 When used as insulation in suspended timber ground-floors, for optimum thermal performance, the boards must be installed with the correct orientation of their printed foil-facings. See section 13.11 of this Certificate.

4.6 The overlay to the insulation boards should be:

- a vapour control layer (VCL) as required (see sections 4.3 and 7.3)

and:

- a cement-based floor screed of minimum 65 mm thickness<sup>(1)</sup>, laid in accordance with the relevant clauses of BS 8204-1 : 2003 and/or BS 8204-2 : 2003, and BS 8000-9 : 2003

or

- a wood-based floor, eg tongue-and-groove plywood to BS EN 636 : 2012, flooring grade particle board (Types P5 to P7) to BS EN 312 : 2010 or oriented strand board (OSB) of type OSB/3 or OSB/4 to BS EN 300 : 2006, of a suitable thickness (to be determined by a suitably qualified and experienced individual), installed in accordance with PD CEN/TR 12872 : 2014 and BS EN 12871 : 2013

or

- a concrete slab to BS EN 1992-1-1 : 2004.

(1) NHBC only accept ground-bearing floor slabs with at least 100 mm thick concrete including monolithic screed.

4.7 Where a concrete screed or slab finish is to be laid directly over the product, a polyethylene separating layer/VCL must be installed between the insulation and the concrete to prevent chemical attack and seepage between the boards (see section 13.7). Any gaps between insulation boards or around service openings, visible prior to installing the concrete, must be filled with expanding foam or strips of insulation.

4.8 Loadbearing internal walls must not be built on the floor.

4.9 If present, mould or fungal growth should be treated prior to commencement of the installation of the products.

## 5 Practicability of installation

The products are designed to be installed by a competent general builder, or a contractor, experienced with these types of products.

## 6 Thermal performance



6.1 Calculations of the thermal transmittance (U value) of a floor should be carried out in accordance with BS EN ISO 6946 : 2017, BS EN ISO 13370 : 2017 and BRE Report BR 443 : 2006 using the following values:

- PIR insulation core — declared thermal conductivity( $\lambda_D$ )\* of  $0.022 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$
- composite foil-facings both sides, printed on one side only — for unprinted facing, an aged emissivity ( $\epsilon$ ) (to BS EN 15976 : 2011) of 0.05.

6.2 The U value of a completed floor will depend on the insulation thickness, the perimeter/area ratio and the floor type. Calculated U values for example constructions are given in Table 2.

Table 2 Example U values — ground-floor construction

Celotex TB4000, GA4000 and XR4000 Insulation thickness (mm)						
Floor Type	Target U value ( $\text{W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ )	P/A ratio				
		0.2	0.4	0.6	0.8	1.0
Ground-bearing concrete floor <sup>(4)(7)</sup>	0.13	90 <sup>(2)</sup>	120 <sup>(3)</sup>	130 <sup>(3)</sup>	140 <sup>(3)</sup>	140 <sup>(3)</sup>
	0.15	70 <sup>(2)</sup>	100 <sup>(2)</sup>	110 <sup>(3)</sup>	120 <sup>(3)</sup>	120 <sup>(3)</sup>
	0.20	40 <sup>(1)</sup>	65 <sup>(2)</sup>	75 <sup>(2)</sup>	80 <sup>(2)</sup>	85 <sup>(2)</sup>
	0.22	30 <sup>(1)</sup>	55 <sup>(2)</sup>	65 <sup>(2)</sup>	70 <sup>(2)</sup>	75 <sup>(2)</sup>
	0.25	20 <sup>(1)</sup>	45 <sup>(1)</sup>	55 <sup>(2)</sup>	60 <sup>(2)</sup>	65 <sup>(2)</sup>
Suspended concrete ground-floor <sup>(5)(7)</sup>	0.13	110 <sup>(3)</sup>	130 <sup>(3)</sup>	140 <sup>(3)</sup>	140 <sup>(3)</sup>	140 <sup>(3)</sup>
	0.15	90 <sup>(2)</sup>	110 <sup>(3)</sup>	120 <sup>(3)</sup>	120 <sup>(3)</sup>	120 <sup>(3)</sup>
	0.20	55 <sup>(2)</sup>	75 <sup>(2)</sup>	80 <sup>(2)</sup>	85 <sup>(2)</sup>	85 <sup>(2)</sup>
	0.22	45 <sup>(1)</sup>	70 <sup>(2)</sup>	70 <sup>(2)</sup>	75 <sup>(2)</sup>	75 <sup>(2)</sup>
	0.25	35 <sup>(1)</sup>	50 <sup>(2)</sup>	60 <sup>(2)</sup>	60 <sup>(2)</sup>	65 <sup>(2)</sup>
Suspended timber ground-floor <sup>(6)</sup>	0.13	200 <sup>(3)</sup>	200 <sup>(3)</sup>	—	—	—
	0.15	140 <sup>(3)</sup>	165 <sup>(3)</sup>	200 <sup>(3)</sup>	200 <sup>(3)</sup>	200 <sup>(3)</sup>
	0.20	75 <sup>(2)</sup>	110 <sup>(3)</sup>	120 <sup>(3)</sup>	130 <sup>(3)</sup>	130 <sup>(3)</sup>
	0.22	65 <sup>(2)</sup>	90 <sup>(2)</sup>	110 <sup>(3)</sup>	110 <sup>(3)</sup>	120 <sup>(3)</sup>
	0.25	45 <sup>(1)</sup>	75 <sup>(2)</sup>	85 <sup>(2)</sup>	90 <sup>(2)</sup>	95 <sup>(2)</sup>

(1) Celotex TB4000

(2) Celotex GA4000.

(3) Celotex XR4000.

(4) Ground-bearing concrete floor construction (Celotex insulation on top of slab, under screed finish) 65 mm concrete screed  
 $\lambda = 1.15 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ , polyethylene separating layer, Celotex insulation, dpm, 100 mm concrete oversite, 150 mm sand-blinded hardcore.

(5) Suspended concrete ground-floor construction (Celotex insulation on top of beam and block, below screed finish) 65 mm concrete screed  
 $\lambda = 1.15 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ , polyethylene separating layer, Celotex insulation, beam and block floor (12%), beam  $\lambda = 2.00 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ , dense block infill  
 $\lambda = 1.13 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ , ventilated void.

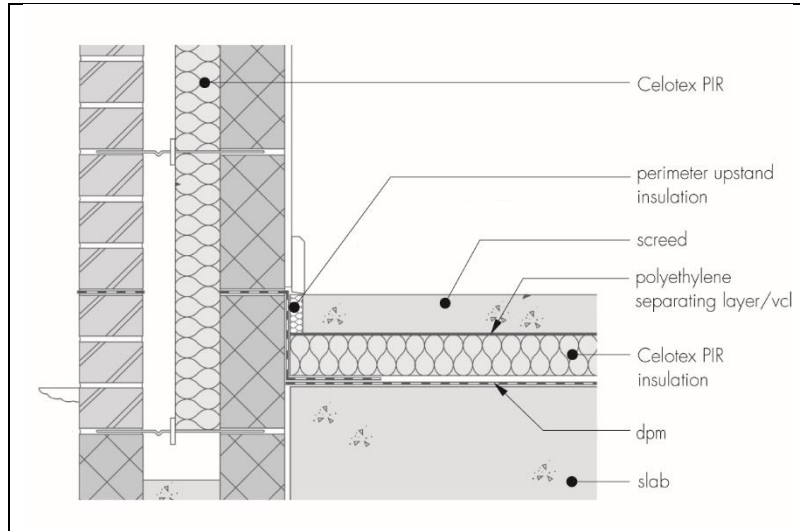
(6) Suspended timber ground-floor construction (Celotex between floor joists) – floor deck thermal resistance  $0.169 \text{ m}^2\cdot\text{K}\cdot\text{W}^{-1}$  (based on 22 mm chipboard  
 $\lambda = 0.13 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ ), Celotex insulation (87%) between 47 mm wide joists at 400 mm centres. The depth of the joists = 100 to 200 mm depending on  
the depth of insulation between floor joists (13%) based on BR 443 : 2006 (nogging every 3 metres at 38 mm wide).

(7) Edge insulation used, Celotex TB4020 (20 mm thick x 65 mm high).

### Junctions

6.3 Care must be taken in the overall design and construction of junctions with other elements and openings to minimise thermal bridges and air infiltration. Detailed guidance can be found in the documents supporting the national Building Regulations. An example of an acceptable junction detail is shown in Figure 1.

Figure 1 Junction between the wall and the floor



## 7 Condensation risk

### Interstitial condensation



7.1 Floors will adequately limit the risk of interstitial condensation when they are designed and constructed in accordance with BS 5250 : 2011 Annex F and the relevant guidance.

7.2 The foil-facings have a water vapour resistance of  $1000 \text{ MN}\cdot\text{s}\cdot\text{g}^{-1}\cdot\text{m}^{-1}$  and the insulation core has a water vapour resistivity of  $300 \text{ MN}\cdot\text{s}\cdot\text{g}^{-1}\cdot\text{m}^{-1}$  and, therefore, will provide a significant resistance to water vapour transmission.

7.3 When the products are used above the dpm on a ground-supported or a suspended floor, a VCL is installed on the warm side of the insulation to limit the risk of interstitial condensation, unless a risk assessment shows this is not necessary.

### Surface condensation



7.4 Floors will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed  $0.7 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$  at any point, and the junctions with walls are designed in accordance with section 6.3 of this Certificate.



7.5 Floors will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed  $1.2 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$  at any point. Guidance may be obtained from BS 5250 : 2011 Annex F. Further guidance may be obtained from BRE Report BR 262 : 2002 and section 6.3 of this Certificate.

## 8 Behaviour in relation to fire

8.1 The Certificate holder has declared a reaction to fire classification\* to EN 13501-1 : 2007 of Class E for the products.

8.2 When properly installed, the products will not add significantly to any existing fire hazard. The products will be contained within the floor by the overlay until the overlay itself is destroyed. Therefore, the products will not contribute to the development stages of a fire or present a smoke or toxic hazard.

## 9 Floor loading

9.1 The products have a compressive strength (compressive stress at 10% deformation\* to BS EN 826 : 2013) of /140KPa.



9.2 The products are suitable for domestic occupancies defined in this Certificate when covered with a suitable floor overlay (see section 4.6), and are capable of resisting a uniformly distributed load of  $1.5 \text{ kN}\cdot\text{m}^{-2}$  or a concentrated load of 2 kN for category A1 and A2 (domestic) situations as defined in BS EN 1991-1-1 : 2002 and National Annex Table NA.2. Further assessment is necessary in the case of duty walkways and floors subject to physical activities.

9.3 The performance of the floor construction will depend on the insulation properties and type of floor overlay used (including thickness and strength). When the products are used under a concrete slab, resistance to concentrated and distributed loads is a function of the slab specification. Further guidance on the suitability of floor overlays can be found in BS EN 13810-1 : 2002, DD CEN/TS 13810-2 : 2003, BS 8204-1 : 2003 and BS EN 312 : 2010, and from the flooring manufacturer.

## 10 Incorporation of services

10.1 De-rating of electrical cables should be considered where installation restricts air cooling of cables; the products must not be used in direct contact with electrical heating cables or hot water pipes. Where underfloor heating systems are to be used, the advice of the Certificate holder should be sought.

10.2 Where possible, electrical conduits, gas and water pipes or other services should be contained within ducts or channels within the concrete slab of ground-bearing floors. Where this is not possible, the services may be accommodated within the insulation, provided they are securely fixed to the concrete slab. Electric cables should be enclosed in a suitable conduit. With hot pipes, the insulation must be cut back to maintain an air space.

10.3 Where water pipes are installed below the insulation, they must be pre-lagged with close-fitting pipe insulation. Pipes installed above the insulation will not require lagging, although some provision needs to be made for expansion and contraction.

10.4 Where the products are installed on a floor of a suspended beam-and-block design, all services must be installed so as not to impair the floor performance.

10.5 On overlay board floors, in situations where access to the services is desirable, a duct may be formed by mechanically fixing to the floor, timber bearers of the same thickness as the insulation to provide support for a particle board cover. The duct should be as narrow as possible and not exceed 400 mm in width or the maximum particle board spans given in PD CEN/TR 12872 : 2014 without intermediate support. Services should be suitably fixed to the floor base and not to the insulation boards.

10.6 On intermediate/exposed floor, all the services should be incorporated beneath the existing floor, above the insulation if possible.

## 11 Maintenance

As the products are confined within the floor by the overlay and have suitable durability (see section 12), maintenance is not required.

## 12 Durability



The products are rot proof, dimensionally stable and, when installed with the overlays specified in this Certificate, will remain effective as an insulating material for the life of the building in which they are incorporated.

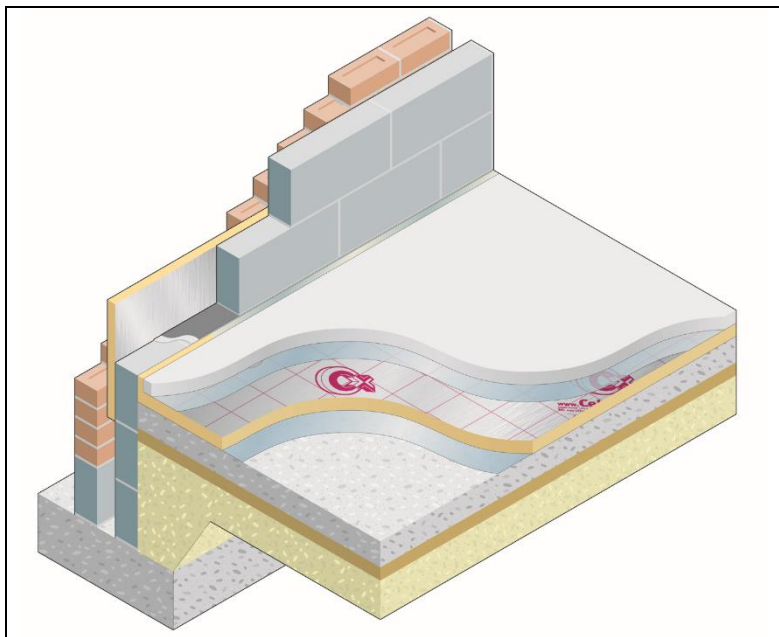


### 13 General

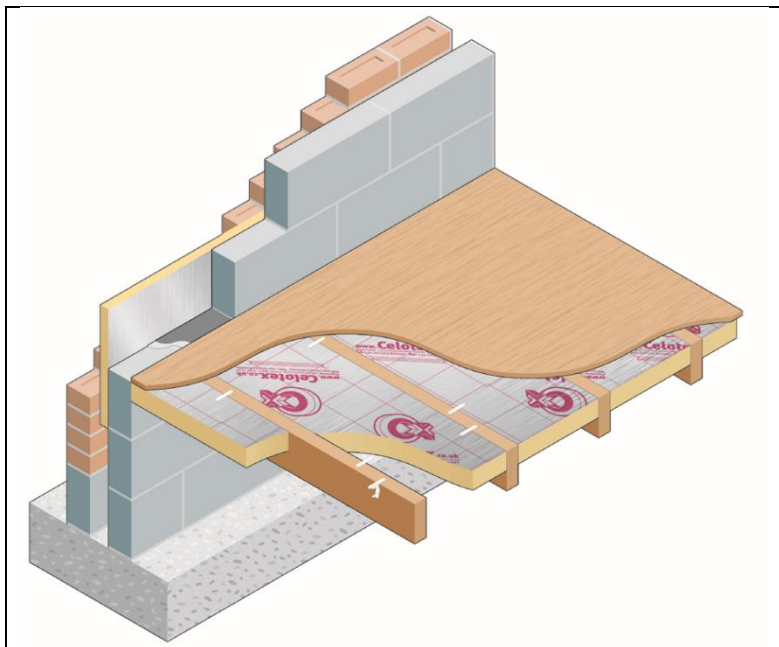
13.1 Installation of Celotex TB4000, GA4000 and XR4000 PIR Insulation Boards for Floor Insulation must be in accordance with the Certificate holder's instructions and the requirements of this Certificate.

13.2 Typical methods of installation are shown in Figures 2 and 3. Reference should also be made to BRE Report BR 262 : 2002.

*Figure 2 Over a ground-bearing concrete floor slab*



*Figure 3 Between the joists in a suspended timber floor*



13.3 In ground-bearing concrete floors (see Figure 2), the concrete floor slab over which the boards are to be laid should be left for as long as possible to maximise drying out and dissipation of constructional moisture, in accordance with BS 8203 : 2017, section 3.1.2.

13.4 The concrete floor surface should be smooth, level and flat to within 5 mm when measured with a two-metre straight-edge. Irregularities greater than this must be removed. Minor irregularities (up to 10 mm deep) may be levelled with mortar or thin screed.

13.5 Where the insulation is used over ground-bearing concrete floor slabs, a suitable dpm in accordance with CP 102 : 1973, should be laid to resist moisture from the ground. If a liquid-type dpm is applied to the slabs, it should be of a type compatible with the products and allowed to dry out fully before laying the insulation.

13.6 Where the insulation is used on hardcore bases beneath ground-bearing concrete slabs, the hardcore must be compacted and blinded with a thin layer of sand, before application of the dpm followed by the insulation boards.

13.7 A VCL is installed on the warm side of the insulation to inhibit the risk of interstitial condensation if necessary (see section 7.3). Where a concrete screed or slab finish is to be laid directly over the product, a polyethylene separating layer/VCL must be installed between the insulation and the concrete to prevent chemical attack and seepage between the boards.

13.8 The insulation can be used on suitable beam-and-block suspended concrete floors (see section 4.1).

13.9 Where a screed or concrete slab is laid over the insulation, vertical upstands of insulation should be provided and be of sufficient depth to fully separate the screed or slab from the wall. If used, a suitable cavity wall insulation material should be extended below the dpc level to provide edge insulation to the floor.

13.10 To limit the risk of condensation and other sources of dampness, the insulation and overlays should only be laid after the construction is made substantially weathertight, eg after glazing. During construction, the insulation and overlay must be protected from damage by traffic and moisture sources, such as water spillage and plaster droppings.

13.11 The products may be installed between timber floor joists using Celotex insulation clips or timber stop beads. The products have printed logos applied to the outer foil-facing on one side only. To ensure optimum thermal performance, the products must be installed with the unprinted foil-face always facing the cavity side. Tongue-and-groove particle board flooring or softwood floor boarding is then installed in the conventional manner.

## 14 Procedure

14.1 The product is cut to size (using a sharp knife or fine-toothed saw), as necessary, and laid with closely butted, staggered cross-joints, ensuring all spaces are completely filled.

14.2 The laying pattern should ensure that all cut edges are at the perimeter of the floor or some other feature, eg matwells, thresholds or access ducts. Spreader boards should be used to protect the insulation.

### Cement-based screed overlay (Figure 2)

14.3 Perimeter edge pieces are cut and placed around the edges and taped at joints. A polyethylene VCL, at least 0.125 mm thick (500 gauge), is laid over the insulation. The VCL should have 150 mm overlaps, taped at the joints, and turned up 100 mm at the walls. A properly compacted screed of minimum thickness 65 mm is then laid over. The relevant clauses of BS 8204-1 : 2003 should be followed.

### Timber-based board overlay

14.4 Before installing the overlay, preservative-treated timber battens, in accordance with BS 8417 : 2011, are positioned at doorways and access panels. Adequate time should be allowed for preservatives to be fixed, and the solvents from solvent-based preservatives to evaporate.

14.5 A polyethylene VCL of at least 0.125 mm (500 gauge) thickness is laid between the insulation and the timber board overlay. The VCL should have 150 mm overlaps, taped at the joints, and turned up 100 mm at the walls.

14.6 Timber based overlay boards as specified in section 4.6 are laid with staggered cross-joints, in accordance with PD CEN/TR 12872 : 2014 and BS EN 12871 : 2013.

## Concrete slab overlay (ground-bearing only)

14.7 Perimeter edge pieces are cut and placed around the edges and taped at the joints. A polyethylene VCL, minimum 0.125 mm thick (500 gauge), is laid over the insulation. The VCL should have 150 mm overlaps, taped at the joints and turned up 100 mm at the walls. The concrete slab is laid to the required thickness in accordance with BS 8000-9 : 2003 and BS 8204-1 : 2003.

## Suspended timber floor (Figure 3)

14.8 Insulation boards can be supported between timber joists using either Celotex insulation clips or timber beads. Where timber beads are used, a void may be incorporated above the insulation to accommodate services, if required. For correct orientation of the products, see section 13.11.

14.9 The product is cut to size to fit tightly between the joists. The saddle clip spikes are pressed into the long edges of the insulation board, ensuring the flange sits flat on the face of the board. Clips should be fitted at one metre intervals. The insulation board is then pushed into place until the clip is level with the surface of the joist. For additional security, the clip can be fixed to the joist with a small flat-head nail driven through the flange of the clip.

14.10 Where a service void is required above the insulation, preservative-treated timber beads may be used to retain the insulation boards. Beads should be wide enough to retain the insulation boards in place and secured with corrosion-protected fixings at a depth that will accommodate the thickness of the insulation board and leave a suitable depth void (minimum 25 mm) between the top of the insulation and the underside of the flooring deck. The product is cut to fit between the joists and pushed down onto the beads.

## Technical Investigations

### 15 Tests

- load compression characteristics
- effect of cyclic loading
- thermal conductivity
- compressive strength.

### 16 Investigations

16.1 An examination was made of data relating to:

- dimensional accuracy
- dimensional stability
- water vapour resistance
- diffusion-tight property of facings
- compressive strength at 10% deformation
- density.

16.2 A condensation risk analysis was carried out.

16.3 A series of U value calculations was carried out

16.4 The manufacturing process was examined, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

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BRE Report (BR 443 : 2006) *Conventions for U-value calculations*

### 17 Conditions

17.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page – no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document – it may be misleading and will be incomplete to be selective
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17.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

17.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

17.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

17.5 In issuing this Certificate the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

17.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.