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Agrément Certificate

16/5352

Product Sheet 2

CELOTEX INSULATION

CELOTEX TB3000, GA3000, GA4000 and XR4000 PIR INSULATION BOARDS FOR TIMBER-FRAME DWELLINGS

This Agrément Certificate Product Sheet⁽¹⁾ relates to Celotex TB3000, GA3000, GA4000 and XR4000 PIR Insulation Boards for Timber-Frame Dwellings, comprising rigid polyisocyanurate (PIR) foam boards with foil-facings for use as insulation in walls of conventional timber-frame dwellings up to 18 m in height. The products may be installed between studding, or used as an insulated lining or insulated sheathing, or as part of a system incorporating any combination of these options.

(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

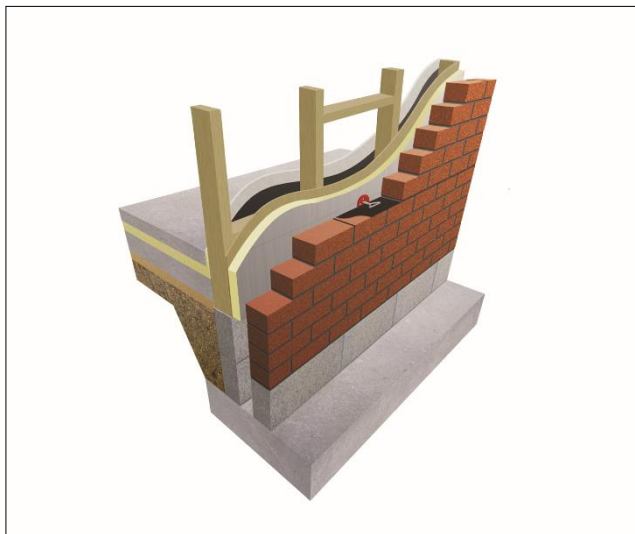
Thermal performance — the products have declared thermal conductivities (λ_D)* of $0.023 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ for Celotex TB3000 and GA3000, and $0.022 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ for Celotex GA4000 and XR4000 (see section 6).

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

Behaviour in relation to fire — walls incorporating the products have been tested to BS 476-21 : 1987 (see section 8).

Water resistance — the products will resist water transfer across the cavity (see section 10).

Durability — the products are durable, rot proof and sufficiently stable to remain effective as insulation for the life of the building (see section 14).



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

John Albon – Head of Approvals
Construction Products

Claire Curtis-Thomas
Chief Executive

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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
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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Regulations

In the opinion of the BBA, Celotex TB3000, GA3000, GA4000 and XR4000 PIR Insulation Boards for Timber-Frame Dwellings, 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)

Requirement:	B3(1)(4)	Internal fire spread (structure)
Comment:		The products can contribute to satisfying this Requirement. See sections 8.1, 8.2 and 8.4 of this Certificate.
Requirement:	C2(b)	Resistance to moisture
Comment:		The products can contribute to satisfying this Requirement. See section 10.1.
Requirement:	C2(c)	Resistance to moisture
Comment:		The products can contribute to satisfying this Requirement. See sections 7.1 and 7.5 of this Certificate.
Requirement:	L1(a)(i)	Conservation of fuel and power
Comment:		The products can contribute to satisfying this Requirement. See section 6 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The products are acceptable. See section 14 and the <i>Installation</i> part of this Certificate.
Regulation:	26	CO₂ emission rates for new buildings
Regulation:	26A	Fabric energy efficiency rates for new dwellings (applicable to England only)
Regulation:	26A	Primary energy consumption rates for new buildings (applicable to Wales only)
Regulation:	26B	Fabric performance values for new dwellings (applicable to Wales only)
Comment:		The products can contribute to satisfying these Regulations. See section 6 of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)	Durability, workmanship and fitness of materials
Comment:		The products are acceptable. See section 14 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	2.4	Cavities
Comment:		Use of the products is restricted under this Standard, with reference to clause 2.4.2 ⁽¹⁾ . See section 8.3 of this Certificate.
Standard:	2.6	Spread to neighbouring buildings
Comment:		Walls incorporating the products can contribute to satisfying this Standard, with reference to clause 2.6.1 ⁽¹⁾ . See sections 8.1 and 8.2 of this Certificate.
Standard:	3.10	Precipitation
Comment:		The products can contribute to satisfying this Standard, with reference to clauses 3.10.1 ⁽¹⁾ and 3.10.3 ⁽¹⁾ . See section 10.1 of this Certificate.
Standard:	3.15	Condensation
Comment:		The products can contribute to satisfying this Standard, with reference to clauses 3.15.1 ⁽¹⁾ , 3.15.4 ⁽¹⁾ and 3.15.5 ⁽¹⁾ . See sections 7.1 and 7.6 of this Certificate.

Standard:	6.1(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:	The products can contribute to satisfying this Standard, with reference to clauses, or parts of clauses, 6.1.6 ⁽¹⁾ , 6.2.1 ⁽¹⁾ , 6.2.3 ⁽¹⁾ , 6.2.9 ⁽¹⁾ and 6.2.11 ⁽¹⁾ . See section 6 of this Certificate.	
Standard:	7.1(a)	Statement of sustainability
Comment:	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 ⁽¹⁾ [Aspects 1 ⁽¹⁾ and 2 ⁽¹⁾], 7.1.6 ⁽¹⁾ [Aspects 1 ⁽¹⁾ and 2 ⁽¹⁾] and 7.1.7 ⁽¹⁾ [Aspect 1 ⁽¹⁾]. See section 6 of this Certificate.	
Regulation:	12	Building standards applicable to conversions
Comment:	All comments given for these products under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1 ⁽¹⁾ and Schedule 6 ⁽¹⁾ .	
(1) Technical Handbook (Domestic).		



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

Regulation:	23	Fitness of materials and workmanship
Comment:	The products are acceptable. See section 14 and the <i>Installation</i> part of this Certificate.	
Regulation:	28(b)	Resistance to moisture and weather
Comment:	The products can contribute to satisfying this Regulation. See section 10.1 of this Certificate.	
Regulation:	29	Condensation
Comment:	The products can contribute to satisfying this Regulation. See section 7.1 of this Certificate.	
Regulation:	35(1)(4)	Internal fire spread — Structure
Comment:	Walls incorporating the products can contribute to satisfying this Regulation. See sections 8.1, 8.2 and 8.4 of this Certificate.	
Regulation:	39(a)(i)	Conservation measures
Regulation:	40(2)	Target carbon dioxide emission rate
Comment:	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, and subject to a 50 mm minimum residual cavity being maintained, Celotex TB3000, GA3000, GA4000 and XR4000 PIR Insulation Boards for Timber-Frame Dwellings, if installed, used and maintained in accordance with this Certificate can satisfy or contribute to satisfying the relevant requirements, in relation to *NHBC Standards*, Chapter 6.2 *External timber framed walls*.

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 TB3000, GA3000, GA4000 and XR4000 PIR Insulation Boards for Timber-Frame Dwellings comprise rigid polyisocyanurate (PIR) foam boards with foil-facings. The nominal characteristics are given in Table 1 of this Certificate.

Table 1 Nominal characteristics

Product	Facings	Board size (mm)	Thickness range (mm)	Edge profile
Celotex TB3000 ⁽¹⁾	Composite foil-facing both sides (printed on one side only) ⁽²⁾	1200 x 2400	12 to 45	square edge
Celotex GA3000	Composite foil-facing both sides (printed on one side only) ⁽²⁾	1200 x 2400	50 to 95	square edge
Celotex GA4000	Composite foil-facing both sides (printed on one side only) ⁽²⁾	1200 x 2400	50 to 100	square edge
Celotex XR4000	Composite foil-facing both sides (printed on one side only) ⁽²⁾	1200 x 2400	110 to 200	square edge

..(1) Used as lining only.

..(2) See sections 4.9 and 15.4.

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 this 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 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 being 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 (Certificate GB91/504 and GB11/83526).

3 Delivery and site handling

3.1 The products are delivered to site in polythene-wrapped packs. Each pack 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; care should be taken when handling individual items 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 TB3000, GA3000, GA4000 and XR4000 PIR Insulation Boards for Timber-Frame Dwellings.

Design Considerations

4 Use

4.1 Celotex TB3000, GA3000, GA4000 and XR4000 PIR Insulation Boards for Timber-Frame Dwellings are satisfactory for use as insulation fixed between the timber studding, a dry lining or insulated sheathing facing the cavity, and are effective in reducing the thermal transmittance (U value) of external walls of timber-frame dwellings up to 18 m in height. It is essential that such walls are designed and constructed to incorporate the precautions in this Certificate to prevent moisture penetration, including the use of a breather membrane over the timber sheathing.

4.2 Buildings subject to the national Building Regulations should be designed and constructed in accordance with the relevant recommendations of:

- BS EN 1995-1-1 : 2004, BS EN 1996-1-1 : 2005 and BS EN 1996-2 : 2006 and their respective UK National Annexes
- BS EN 351-1 : 2007.

4.3 Other new buildings not subject to these Regulations should also be built in accordance with the Standards given in section 4.2 of this Certificate.

4.4 Wall ties and fixings to BS EN 845-1 : 2013 should be used for structural stability in accordance with BS EN 1995-1-1 : 2004, BS EN 1996-1-1 : 2005 and BS EN 1996-2 : 2006.

4.5 Services which penetrate the dry lining (eg light switches, power outlets) must be kept to a minimum to limit damage to vapour checks. In addition, to preserve the fire resistance of the wall, any penetrations should be enclosed in plasterboard, stone mineral wool or a suitably tested proprietary fire-rated system.

4.6 This application requires a vapour control layer (VCL) behind the internal finish, which should be a minimum thickness of 0.125 mm (500 gauge) polyethylene, or plasterboard backed with a vapour control membrane or similar.

4.7 Installation must not be carried out until the moisture content of the timber frame is less than 20%.

4.8 When used as insulated sheathing, the products will not contribute to the structural performance of the timber frame.

4.9 For optimum thermal performance, the boards must be installed with the correct orientation of their printed foil-facings (see section 15.4).

4.10 Care must be taken in the overall design and construction of walls incorporating the products to ensure the provision of appropriate :

- cavity trays and damp-proof courses (dpc's)
- cavity barriers and fire dampers
- resistance to the ingress of precipitation, moisture and dangerous gases from the ground
- resistance to sound transmission when flanking separating walls and floors.

4.11 The use of cavity battens or boards is strongly recommended to prevent thermal bridging by mortar droppings.

Residual cavity width for insulated sheathing (buildings up to 18 metres high)

4.12 The minimum residual cavity width to be maintained during construction must be 25 mm. To achieve this, a greater nominal residual cavity width may need to be specified at the design stage (to allow for inaccuracies inherent in the building process). The specifier may either:

- design a nominal residual cavity width of 50 mm (a residual cavity nominally at least 50 mm wide will be required by the NHBC), or
- design a cavity width which takes into account the dimensional tolerances of the components which make up the wall (by reference to the British Standards relating to the bricks, blocks and boards, or by using the data from the respective manufacturers). Allowances may need to be made for the quality of building operatives and the degree of site supervision or control available. The limitations in respect of exposure of the proposed building as set out in Table 2 must also be observed.

Table 2 Maximum allowable total exposure factors of different constructions

Construction	Maximum allowable exposure factor $E^{(1)}$
All external masonry walls protected by: rendering (to BS EN 13914-1 : 2016), tile or slate hanging, or timber, plastic or metal weatherboarding or cladding	No restriction
One or more external masonry walls constructed from facing clay brickwork or natural stone, the porosity of which exceeds 20% by volume. Mortar joints must be flush pointed or weatherstruck	100
One or more external masonry walls constructed from calcium silicate bricks, concrete blocks, reconstituted stone, or natural stone, the porosity of which is less than 20% by volume, or any material with raked mortar joints	88

(1) To BS 5618 : 1985.

4.13 from ground level, the maximum height of continuous cavity walls must not exceed 12 metres; above 12 metres, the maximum height of continuous cavity walls must not exceed 7 metres. In both cases, breaks should be in the form of continuous horizontal cavity trays and weepholes discharging to the outside.

4.14 An external render coat or other suitable finish should be applied in locations where such application would be normal practice; care should be taken to ensure that the residual cavity is not bridged by mortar.

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) should be carried out in accordance with BS EN ISO 6946 : 2017 and BRE Report BR 443 : 2006, using the following values:

Celotex TB3000 and GA3000

- PIR insulation core — declared thermal conductivity (λ_D)* of $0.023 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$
- composite foil-facings both sides, printed one side only — for unprinted facing, an aged emissivity (ϵ_D) (to BS EN 15976 : 2011) of 0.05.

Celotex GA4000 and XR4000

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

6.2 The U value of a completed wall will depend on the selected insulation thickness, the insulating value of the external substrate masonry and the internal wall finish. Calculated U values for example constructions are given in Table 3.

Table 3 Example U values — New-build timber-framed external cavity wall⁽¹⁾

Target U value ($\text{W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$)	Celotex TB3000, GA3000, GA4000 and XR4000 insulation thickness (mm)				
	Inter stud (140 mm)	Inter stud and dry-lining (140 mm studs)	Sheathing (140 mm studs)	Inter stud and sheathing (140 mm studs)	Dry-lining and sheathing (140 mm studs)
	(System 1)	(System 2)	(System 3)	(System 4)	(System 5)
0.18	—	110 ⁽⁴⁾ +12 ⁽¹⁾	100 ⁽³⁾	70 ⁽³⁾ +50 ⁽³⁾	50 ⁽³⁾ +50 ⁽³⁾
0.19	—	95 ⁽³⁾ +12 ⁽¹⁾	95 ⁽³⁾	60 ⁽³⁾ +50 ⁽³⁾	40 ⁽¹⁾ +50 ⁽³⁾
0.25	95 ⁽³⁾	60 ⁽³⁾ +12 ⁽¹⁾	70 ⁽²⁾ or 65 ⁽³⁾	60 ⁽³⁾ +50 ⁽³⁾	12 ⁽¹⁾ +50 ⁽³⁾
0.26	95 ⁽²⁾ or 90 ⁽³⁾	60 ⁽³⁾ +12 ⁽¹⁾	65 ⁽²⁾ or 60 ⁽³⁾	60 ⁽³⁾ +50 ⁽³⁾	12 ⁽¹⁾ +50 ⁽³⁾
0.27	90 ⁽²⁾ or 85 ⁽³⁾	60 ⁽³⁾ +12 ⁽¹⁾	60 ⁽²⁾ or 60 ⁽³⁾	60 ⁽³⁾ +50 ⁽³⁾	12 ⁽¹⁾ +50 ⁽³⁾
0.28	85 ⁽²⁾ or 80 ⁽³⁾	60 ⁽³⁾ +12 ⁽¹⁾	60 ⁽²⁾ or 55 ⁽³⁾	60 ⁽³⁾ +50 ⁽³⁾	12 ⁽¹⁾ +50 ⁽³⁾
0.30	75 ⁽²⁾ or 70 ⁽³⁾	60 ⁽³⁾ +12 ⁽¹⁾	50 ⁽²⁾ or 50 ⁽³⁾	60 ⁽³⁾ +50 ⁽³⁾	12 ⁽¹⁾ +50 ⁽³⁾
0.35	60 ⁽²⁾ or 60 ⁽³⁾	60 ⁽³⁾ +12 ⁽¹⁾	50 ⁽²⁾ or 50 ⁽³⁾	60 ⁽³⁾ +50 ⁽³⁾	12 ⁽¹⁾ +50 ⁽³⁾

(1) TB3000.

(2) GA3000.

(3) GA4000.

(4) XR4000.

(5) For system construction details, see Table 4 of this Certificate.

- Fixings for plasterboard to be 11 fully-penetrating steel ($\lambda = 50 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$) fixings per square metre (150 mm centres) with a cross-sectional area of 13.2 mm^2 (screw diameter 4.1 mm)
- Fixings for OSB to be 5.2 fully-penetrating steel ($\lambda = 50 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$) fixings per square metre (600 mm centres) with a cross-sectional area of 9.6 mm^2 (screw diameter 3.5 mm)
- Fixings for Celotex insulation sheathing to be 5.6 fully-penetrating steel ($\lambda = 50 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$) fixings per square metre with a cross-sectional area of 9.6 mm^2 (screw diameter 3.5 mm)
- Fixings for timber battens to be 5.6 fully-penetrating steel ($\lambda = 50 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$) fixings per square metre (600 mm centres) with a cross-sectional area of 13.2 mm^2 (screw diameter 4.1 mm)
- Timber frame wall ties to be 3.7 fixings per square metre with a cross-sectional area of 18 mm^2 ($\lambda = 50 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$) used in accordance with fixing manufacturer's instructions.

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.

7 Condensation risk

Interstitial condensation



7.1 Walls will adequately limit the risk of interstitial condensation when they are designed and constructed in accordance with BS 5250 : 2011, Annexes D and G, and the relevant guidance.

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

7.3 When used as insulated sheathing, the joints between the boards must not be taped.

7.4 If the products are to be used in the external walls of rooms expected to have high humidity, care must be taken to provide adequate permanent ventilation to avoid possible problems from the formation of interstitial condensation in the internal wall leaf.

Surface condensation



7.5 Walls 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 other elements are designed in accordance with section 6.3 of this Certificate.



7.6 For buildings in Scotland, walls 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, and the junctions with other elements are designed in accordance with the guidance referred to in BS 5250 : 2011 Annex G. 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 products are not classified as non-combustible or of limited combustibility and the Certificate holder has not declared a reaction to fire classification in accordance with BS EN 13501-1 : 2007. The products are therefore restricted to buildings up to 18 m in height.

8.2 A fire-resistance test was carried out in accordance with BS 476-21 : 1987 on a loadbearing, timber stud wall system. An assessment considered the likely fire-resistance of all systems (see Table 4 of this Certificate) as if they had been tested to BS 476-21 : 1987. The main points of the assessment highlighted that:

- all systems are suitable for applications where a fire resistance of up to 30 minutes is required against the loadbearing capacity, integrity and insulation criteria of BS 476-21 : 1987 [for fire exposure from the inside, when subject to a total imposed load of 60 kN (10 kN load per stud)]⁽¹⁾
- for loads greater than this, a qualified structural engineer can utilise the BS 476-21 : 1987 fire-resistance test report and its accompanying assessment, to alter the design of the timber frame to ensure that the residual timber after 30 minutes will be adequate. The Certificate holder should be contacted for these reports
- openings for doors and windows should be framed out and any exposed timber covered with at least one layer of plasterboard (see also section 4.5).

(1) Relates only to walls with a masonry outer leaf. Other weather-resistant claddings should be demonstrated by an appropriate test or assessment.

Table 4 System construction details

Component	Description	System				
		1	2	3	4	5
		Inter stud	Inter stud and dry-lining	Sheathing	Inter stud and sheathing	Dry-lining and sheathing
Plasterboard	12.5 mm ($\lambda = 0.25 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$)	yes	yes	yes	yes	yes
Batten	25 mm x 50 mm	—	yes	—	—	yes
Celotex insulation	Minimum 12 mm	—	yes	—	—	yes
Vapour control layer (VCL)*	500 gauge polythene (or plasterboard backed with a vapour control membrane – 0.15 mm) (1) Systems 2 and 5 – foil tape over joints of foil-facing to lining boards in place of separate VCL	yes	no ⁽¹⁾	yes	yes	no ⁽¹⁾
Timber frame	140 mm or 89 mm by 38 mm timber studs at maximum 600 mm centres, with cross noggings at 1200 mm centres, staggered by 600 mm between bays ($\lambda = 0.13 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ – 15% default fraction)	yes	yes	yes	yes	yes
Celotex insulation	Minimum 60 mm between studs	yes	yes	—	yes	—
Structural sheathing	9 mm OSB or plywood ($\lambda = 0.13 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$)	yes	yes	yes	yes	yes
Celotex Insulation	Minimum 50 mm	—	—	yes	yes	yes
Breather membrane		yes	yes	no	no	no
Cavity	50 mm	yes	yes	yes	yes	yes
Brick	102.5 mm ($\lambda = 0.77 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$)	yes	yes	yes	yes	yes



8.3 For buildings in Scotland, cavity barriers must be provided to comply with:

Mandatory Standard 2.4, clauses 2.4.1⁽¹⁾, 2.4.2⁽¹⁾ and 2.4.7⁽¹⁾.

(1) Technical Handbook (Domestic).



8.4 Cavity barriers must be provided to comply with:

England and Wales — Approved Document B, Volume 1, Section 6

Northern Ireland — Technical Booklet E, paragraphs 4.36 to 4.39.

9 Proximity of flues and appliances

When installing the products in close proximity to certain flue pipes and/or heat-producing appliances, the following provisions to the national Building Regulations are applicable:

England and Wales — Approved Document J, sections 1 to 4

Scotland — Mandatory Standard 3.19, clauses 3.19.1⁽¹⁾ to 3.19.9⁽¹⁾

(1) Technical Handbook (Domestic).

Northern Ireland — Technical Booklet L, sections 1 to 6.

10 Water resistance



10.1 Constructions incorporating the products as insulated sheathing, and built in accordance with the Standards listed in section 4.2, will resist the transfer of precipitation to the inner leaf and satisfy the national Building Regulations.

10.2 In all situations, it is particularly important to ensure during installation that:

- wall ties are installed correctly and are thoroughly clean
- excess mortar is cleaned from the cavity face of the brick leaf and any debris removed from the cavity
- mortar droppings are cleaned from the exposed edges of installed boards
- insulation boards are properly installed and butt-jointed
- installation is carried out to the highest level on each wall, or the top edge of the insulation is protected by a cavity tray
- at lintel level, a cavity tray, stop ends and weep holes, are provided
- cavity battens and/or boards are used during construction to prevent bridging by mortar droppings
- dpc's at ground level do not project into the cavity as they can form a trap for mortar bridging
- raked or recessed mortar joints are avoided in very severe exposure areas.

11 De-rating of electrical cables

As with other insulation products, it may be necessary in some cases to de-rate electrical cables buried in insulation. In BS 7671 : 2008, it is recommended that where wiring is completely surrounded by insulation it may need to be de-rated to as low as half its free air current carrying capacity. Guidance should be sought from a qualified electrician.

12 Infestation

Use of the products does not in itself promote infestation. The creation of voids within the structure, ie gaps between the wall lining and the boards, may provide habitation for insects or vermin in areas already infested. Care should be taken to ensure, wherever possible, that all voids are sealed, as any infestation may be difficult to eradicate. There is no food value in the materials used.

13 Maintenance

As the products are confined behind the wall lining and have suitable durability (see section 14), maintenance is not required.

14 Durability



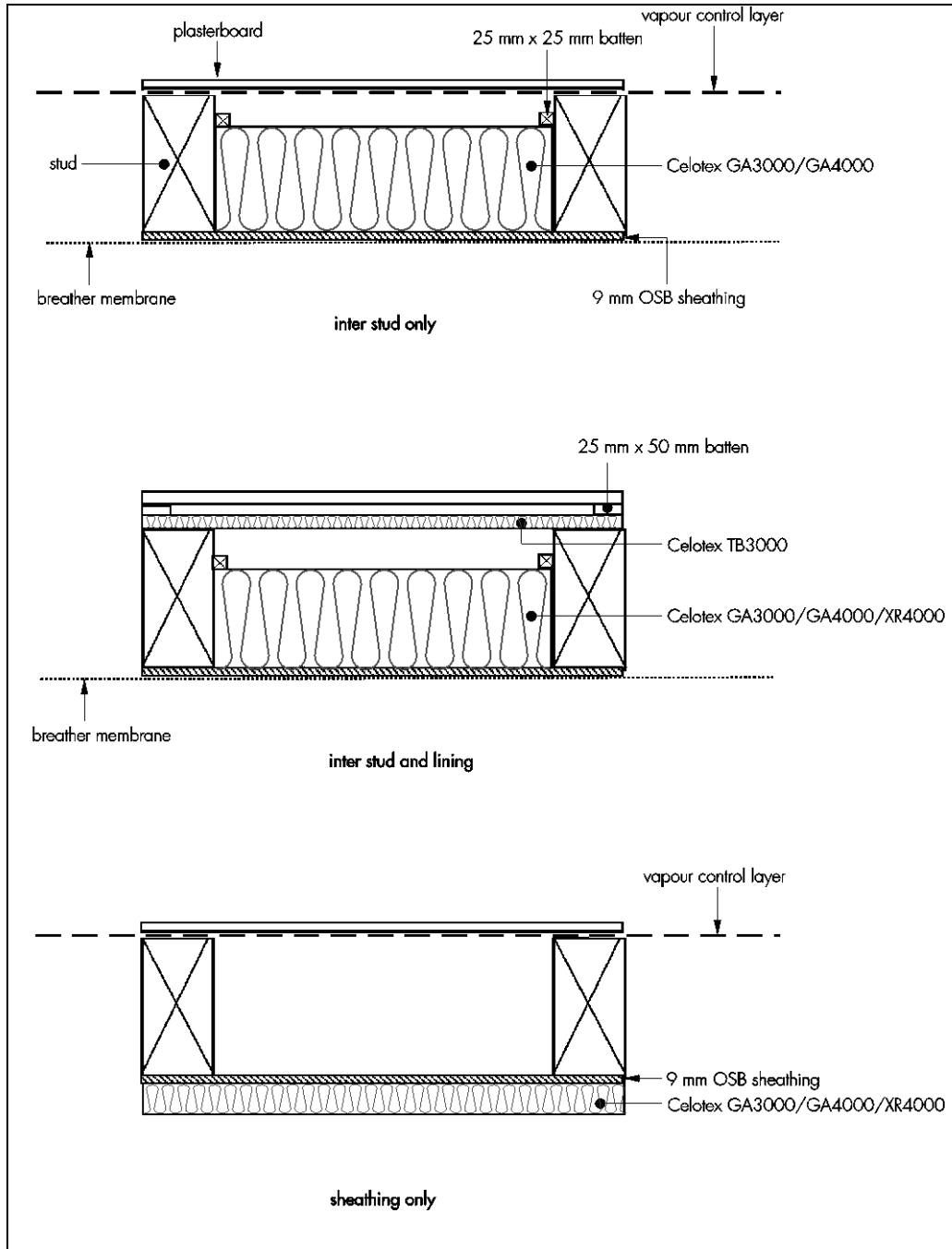
The products are unaffected by the normal conditions in a wall and are durable, rot-proof, water resistant and sufficiently stable to remain effective as insulation for the life of the building.

15 General

15.1 Installation of the Celotex Range of PIR Insulation Boards for Timber-Frame Dwellings must be in accordance with the relevant clauses of the Standards noted in section 4.2 of this Certificate and the Certificate holder's instructions.

15.2 The boards may be installed in between the timber studs (inter stud), as an internal lining, as an outer sheathing, and also as a combination of these (see Table 3 for construction details of the five systems). Typical installation details are shown in Figure 1.

Figure 1 Typical installation details



15.3 The products are light to handle and can be cut easily using a fine-toothed saw, and care must be taken in handling to prevent damage, particularly at edges. Damaged boards should not be used; small areas of damaged faces may be repaired with self-adhesive aluminium foil-tape.

15.4 The products have printed logos applied to the outer foil-facing on one side only. To ensure optimum thermal performance, these boards must be installed with the unprinted foil-face always facing the cavity side.

16 Procedure

Inter stud

16.1 The products should be cut to fit tightly between the timber studding and positioned against the inner face of sheathing board. Any gaps should be filled with expanding insulation foam. The insulation should be held in place by nails or timber battens to the warm side of the insulation.

16.2 The void created by space between the inner surface of the products and the dry lining can be utilised as an insulated service duct.

16.3 A sealed polyethylene VCL with a minimum thickness of 0.125 mm (500 gauge) with lapped and sealed joints is placed over the stud face before applying the internal finish.

Lining

16.4 Insulation boards should be butted tightly against each other to prevent gaps. To satisfy the requirements of the NHBC Standards, a VCL should be placed on the warm side of the wall insulation. However, where a foil-faced lining board is used, taping the joints with aluminium foil/reinforced tape provides an effective VCL and air permeability barrier, and a separate VCL may be omitted. To achieve an adequate bond, the boards should be thoroughly clean and free from any contamination. The insulation is sealed at all service penetrations.

16.5 The insulation boards are temporarily fixed to the inner face of the timber studding, ensuring that the insulation makes contact or overlaps with ceiling and floor insulation.

16.6 The line of the timber studs is marked on the insulation boards to allow fixing of plasterboard.

16.7 The plasterboard is fixed over the board on battens and secured with drywall screws at nominal 150 mm centres, and finished as normal.

Sheathing

16.8 The insulation boards should be installed on the outside of any wood, OSB or board sheathing, closely butted with joints staggered and restrained using galvanized clout nails or screws at 300 mm centres around the board perimeters, and at 400 mm centres for intermediate timbers within the board area.

16.9 It is essential that nails locate the studs; this can be achieved by either using a plumb line from the top of the studs or by marking the stud positions on the boards (or substrate timber sheathing) as the boards are being offered into position.

16.10 The use of self-adhesive foil-tape is not recommended.

16.11 A sealed vapour control layer VCL with a minimum thickness of 0.125 mm (500 gauge) with lapped and sealed joints is placed between the plasterboard and the timber frame.

16.12 Ties securing the external leaf are fixed through the insulation board to the studs and the sheathing is held in place by the retaining discs on the wall ties.

16.13 Internal finishes are applied as normal.

17 Investigations

17.1 An examination was made to analyse:

- thermal conductivity
- dimensional accuracy
- compressive strength
- water vapour transmission
- dimensional stability with temperature and humidity
- density.

17.2 A condensation risk analysis was carried out.

17.3 A series of U value calculations were carried out.

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

Bibliography

- BS 476-21 : 1987 *Fire tests on building materials and structures — Methods for determination of the fire resistance of loadbearing elements of construction*
- BS 5250 : 2011 *Code of practice for control of condensation in buildings*
- BS 5618 : 1985 *Code of practice for thermal insulation of cavity walls (with masonry or concrete inner and outer leaves) by filling with urea-formaldehyde (UF) foam systems*
- BS 7671 : 2008 *Requirements for electrical installations — IEE Wiring Regulations. Seventeenth Edition*
- BS EN 351-1 : 2007 *Durability of wood and wood-based products — Preservative-treated solid wood — Classification of preservative penetration and retention*
- BS EN 845-1 : 2013 *Specification for ancillary components for masonry — Wall ties, tension straps, hangers and brackets*
- BS EN 1995-1-1 : 2004 *Eurocode 5 : Design of timber structures — General — Common rules and rules for buildings*
NA to BS EN 1995-1-1 : 2004 *UK National Annex to Eurocode 5 : Design of timber structures — General — Common rules and rules for buildings*
- BS EN 1996-1-1 : 2005 *Eurocode 6 : Design of masonry structures — General rules for reinforced and unreinforced masonry structures*
NA to BS EN 1996-1-1 : 2005 *UK National Annex to Eurocode 6 : Design of masonry structures — General rules for reinforced and unreinforced masonry structures*
- BS EN 1996-2 : 2006 *Eurocode 6 : Design of masonry structures — Design considerations, selection of materials and execution of masonry*
NA to BS EN 1996-2 : 2006 *UK National Annex to Eurocode 6 : Design of masonry structures — Design considerations, selection of materials and execution of masonry*
- BS EN 13165 : 2012 *Thermal insulation products for buildings — Factory made rigid polyurethane foam (PU) products — Specification*
- BS EN 13501-1 : 2007 *Fire classification of construction products and building elements — Classification using test data from reaction to fire tests*
- BS EN 13914-1 : 2016 *Design, preparation and application of external rendering and internal plastering. External rendering*
- BS EN 15976 : 2011 *Flexible sheets for waterproofing — Determination of emissivity*
- BS EN ISO 6946 : 2017 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*
- BS EN ISO 9001 : 2015 *Quality management systems — Requirements*
- BS EN ISO 14001 : 2015 *Environmental Management systems — Requirements with guidance for use*
- BRE Report (BR 262 : 2002) *Thermal insulation: avoiding risks*
- BRE Report (BR 443 : 2006) *Conventions for U-value calculations*

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