CI/SfB

Rn7 (M2)

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Agrément Certificate No 07/4427

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

Designated by Government to issue European Technical Approvals

BALLYTHERM BTF, BTDL AND BTR

Isolation
Wärmedämmung

Product

- *THIS CERTIFICATE OF CONFIRMATION RELATES TO BALLYTHERM BTF, BTDL AND BTR. THESE PRODUCTS ARE CLOSED CELL, RIGID FOAM POLYISOCYANURATE CORE WITH EITHER FOIL OR KRAFT FACINGS.*
- *The products are manufactured and marketed by the Certificate holder.*

These Front Sheets must be read in conjunction with the accompanying Detail Sheets, which provide information specific to the particular boards and application.

Confirmation of Irish Certificate No 05/0220, issued by the Irish Agrément Board to Ballytherm Ltd, Annagh Industrial Park, Ballyconnell, Co Cavan, Ireland.

Regulations — Detail Sheet 1

1 The Building Regulations 2000 (as amended) (England and Wales)

The Secretary of State has agreed with the British Board of Agrément the aspects of performance to be used by the BBA in assessing the compliance of thermal insulation with the Building Regulations. In the opinion of the BBA, Ballytherm BTF, BTDL and BTR, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements.

Requirement:	A1	Loading
Comment:		Floors incorporating these products can meet this Requirement. See the tinted area of the *Floor loading* section of the relevant accompanying Detail Sheet.
Requirement:	B3(4)	Internal fire spread (structure)
Comment:		Cavities incorporating the products can meet this Requirement. See the tinted area of the *Behaviour in relation to fire* section of the accompanying Detail Sheets.
Requirement:	C2(a)(c)	Resistance to moisture
Comment:		Elements incorporating the products can meet this Requirement. See the relevant tinted areas of the *Condensation* section of the accompanying Detail Sheets.
Requirement:	L1(a)(i)	Conservation of fuel and power
Comment:		See relevant tinted areas of the *Thermal performance* sections of the accompanying Detail Sheets.

Requirement:	**Regulation 7**	Materials and workmanship
Comment:		The products are acceptable materials. See the tinted areas of the *Durability* section of the accompanying Detail Sheets.

2 The Building (Scotland) Regulations 2004

In the opinion of the BBA, Ballytherm BTF, BTDL and BTR, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Regulations and related Mandatory Standards as listed below.

Regulation:	**8**	**Fitness and durability of materials and workmanship**
Regulation:	8(1)	Fitness and durability of materials and workmanship
Comment:		The products can contribute to a construction satisfying this Regulation. See the *Durability* section and *Installation* part of the accompanying Detail Sheets.
Regulation:	**9**	**Building standards — construction**
Standard:	1.1(a)(b)	Structure
Comment:		Floors incorporating these products can satisfy this Standard, with reference to clauses 3.15.1[1], 3.15.3[1] and 3.15.4[1]. See the relevant tinted area of the *Floor loading* section of the relevant accompanying Detail Sheet.
Standard:	2.4	Cavities
Comment:		The products can contribute to satisfying this Standard, with reference to clauses 2.4.6[1] and 2.4.8[2]. See the tinted area of the *Behaviour in relation to fire* section of the accompanying Detail Sheets.
Standard:	3.15	Condensation
Comment:		The products can satisfy, or contribute to satisfy this Standard, with reference to clauses 3.15.1[1] to 3.15.4[1]. See the relevant tinted areas of the *Condensation* section of the accompanying Detail Sheets.
Standard:	6.2	Building insulation envelope
Comment:		The products can satisfy or contribute to satisfying this Standard, with reference to clauses 6.2.1[1][2] (Table 1) and 6.2.4[1][2]. See the relevant tinted areas of the *Thermal performance* section of the accompanying Detail Sheets.
Regulation:	**12**	**Building standards — conversions**
Comment:		All comments given for the insulation under Regulation 9, also apply to this Regulation, with reference to clauses 0.12.1[1][2] and Schedule 6[1][2].

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

3 The Building Regulations (Northern Ireland) 2000 (as amended)

In the opinion of the BBA, Ballytherm BTF, BTDL and BTR, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Building Regulations as listed below.

Regulation:	**B2**	Fitness of materials and workmanship
Comment:		The products are acceptable materials. See the tinted areas of the *Durability* section of the accompanying Detail Sheets.
Regulation:	**C5**	Condensation
Comment:		Elements incorporating the products can meet this Regulation. See the relevant tinted areas of the *Condensation* section of the accompanying Detail Sheets.
Regulation:	**D1**	Stability
Comment:		Floors incorporating these products can meet this Regulation. See the tinted area of the *Floor loading* section of the relevant accompanying Detail Sheet.
Regulation:	**E3**	Internal fire spread — Linings
Comment:		Cavities incorporating the products can meet this Regulation. See the tinted area of the *Behaviour in relation to fire* section of the accompanying Detail Sheets.
Regulation:	**F2(a)(i)**	Conservation measures
Comment:		See the relevant tinted areas of the *Thermal performance* section of the accompanying Detail Sheets.

4 Construction (Design and Management) Regulations 1994 (as amended)

Construction (Design and Management) Regulations (Northern Ireland) 1995 (as amended)

Information in this Certificate may assist the client, planning supervisor, designer and contractors to address their obligations under these Regulations.

See section: *5 Delivery, storage and site handling* (5.4) of these Front Sheets and the *General (Installation)* section of the relevant Detail Sheet.

Technical Specification

5 Delivery and site handling

5.1 Ballytherm BTF, BTDL and BTR boards are delivered to site in polyethylene shrink-wrapped packs containing a label bearing the manufacturer's trade name, product description, and the BBA identification mark incorporating the number of this Certificate.

5.2 Care must be taken to avoid damaging corners and edges.

5.3 The boards must be protected from prolonged exposure to sunlight and should be stored either under cover or protected with opaque polyethylene sheeting. Where possible, packs should be stored inside. If stored outside, the products should be stacked flat and raised above ground level, and not in contact with ground moisture.

5.4 The boards must not be exposed to open flame or other ignition sources.

Design Data

6 Proximity of flues and appliances

When installing Ballytherm BTF, BTDL and BTR boards in close proximity to certain flue pipes and/or heat-producing appliances, the relevant provisions of the national Building Regulations are acceptable:

England and Wales

Approved Document J

Scotland

Mandatory Standard 3.19

Northern Ireland

Technical Booklet L.

7 Materials in contact — wiring installations

The boards do not present a risk of reaction between them and PVC insulated electric cables when they are in contact. As with any other form of insulation, de-rating of electrical cables should be considered where the insulation restricts the air cooling of cables.

Conditions of Certification

8 Conditions

8.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is granted only to the company, firm or person named on the front page — no other company, firm or person may hold or claim any entitlement to this Certificate
- 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
- is copyright of the BBA
- is subject to English law.

8.2 References in this Certificate to any Act of Parliament, Statutory Instrument, Directive or Regulation of the European Union, British, European or International Standard, Code of Practice, manufacturers' instructions or similar publication, are references to such publication in the form in which it was current at the date of this Certificate.

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

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- remain covered by a valid Irish Agrément; and
- are reviewed by the BBA as and when it considers appropriate.

8.4 In granting this Certificate, the BBA is not responsible for:

- 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
- individual installations of the product/system, including the nature, design, methods and workmanship of or related to the installation
- the actual works in which the product/system is installed, used and maintained, including the nature, design, methods and workmanship of such works.

8.5 Any information relating to the manufacture, supply, installation, use and maintenance 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 and maintained. It does not purport in any way to restate the requirements of the Health & Safety at Work etc Act 1974, or of any other statutory, common law or other duty which may exist at the date 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. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the manufacture, supply, installation, use and maintenance of this product/system.

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

In the opinion of the British Board of Agrément, Ballytherm BTF, BTDL and BTR, are fit for their intended use provided they are installed, used and maintained as set out in this Certificate. Certificate No 07/4427 is accordingly awarded to Ballytherm Ltd.

On behalf of the British Board of Agrément

Date of issue: 27th March 2007

Chief Executive

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BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

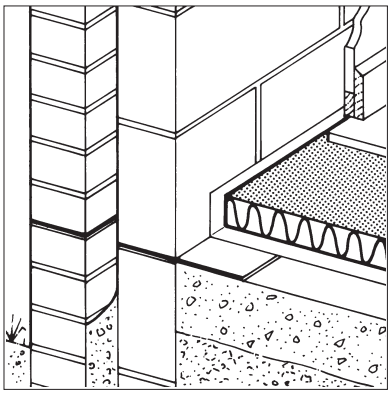
Ballytherm Ltd

Certificate No 07/4427

DETAIL SHEET 2

BALLYTHERM BTF FLOOR INSULATION

Product



- *THIS DETAIL SHEET RELATES TO BALLYTHERM BTF FLOOR INSULATION.*
- *The product is for use on ground-supported or suspended concrete or timber floors.*
- *The product is used to reduce the thermal transmittance of new or existing floors of dwellings or buildings of similar occupancy, type and condition.*
- *It is essential that the floors comply with the conditions set out in the* Design Data *and* Installation *parts of this Certificate.*

This Detail Sheet must be read in conjunction with the Front Sheets, which give the Conditions of Certification.

Technical Specification

1 Description

1.1 Ballytherm BTF Floor Insulation comprises a closed cell, rigid polyisocyanurate foam core, sandwiched with trilaminate foil facings on both sides. The foam is CFC and HCFC free and has zero ozone depletion potential (Zero ODP).

1.2 The boards are available in nominal characteristics of:

length (mm)	1200, 2400
width (mm)	600, 1200
thickness (insulation) (mm)(1)	25 to 200
compressive strength (kNm^{-2})	⩾70
nominal density (kgm^{-3})	35 to 45

(1) Other thicknesses available to special order.

1.3 The manufacturing specification of the boards is in accordance with EN 13165 : 2001, Section 4.2 and the relevant parts of Section 4.3.

1.4 Ancillary items include saddle clips, nails and pre-treated battens.

Design Data

2 General

2.1 Ballytherm BTF Floor Insulation is effective in reducing the U value (thermal transmittance) of new or existing concrete or timber floors.

2.2 Ground-supported concrete floors incorporating the boards must include a suitable damp-proof membrane laid in accordance with the relevant clauses of CP 102 : 1973, Section 11 (see section 7 of this Detail Sheet).

2.3 Suspended concrete or timber ground floors incorporating the boards must include suitable ventilation of the sub-floor void (see section 7 of this Detail Sheet).

2.4 The overlay to the boards should be:

- a cement-based floor screed (minimum 65 mm), laid in accordance with the relevant clauses of BS 8204-1 : 2003 and/or BS 8204-2 : 2003, or
- wood-based floor, eg tongue-and-groove, flooring grade, particle board (Type P4 to P7) to BS EN 312 : 2003 or oriented strand board of type OSB/2 to OSB/4 to BS EN 300 : 2006, 18 mm thick (minimum), installed in accordance with DD ENV 12872 : 2000, or
- a concrete slab.

3 Thermal performance

3.1 Calculations of the thermal transmittance (U value) of a floor construction should be carried out in accordance with BS EN ISO 6946 : 1997, BS EN ISO 13370 : 1998 and BRE report (BR 443 : 2006) *Conventions for U-value calculations* using the declared thermal conductivity ($\lambda_{90/90}$ *value*) of 0.022 $Wm^{-1}K^{-1}$.

3.2 The U value of a floor will depend on the thickness of the board, the perimeter/area ratio and the use of the product. Examples of U values for ground supported, suspended beam and block and suspended timber are given in Table 1.

Table 1 Floor values[1] ($Wm^{-2}K^{-1}$)

Floor type	Perimeter/ area ratio	Insulation thickness (mm)			
		25	50	70	75
Slab on ground supported	0.2	0.24	0.18	0.16	0.15
	0.4	0.34	0.24	0.20	0.19
	0.6	0.40	0.27	0.22	0.21
	0.8	0.44	0.29	0.23	0.22
	1.0	0.46	0.30	0.24	0.23
Suspended beam and block	0.2	0.25	0.19	0.16	0.16
	0.4	0.32	0.24	0.19	0.19
	0.6	0.36	0.26	0.21	0.20
	0.8	0.39	0.27	0.22	0.21
	1.0	0.41	0.28	0.22	0.21
Suspended timber	0.2	0.29	0.24	0.20	0.20
	0.4	0.38	0.30	0.25	0.24
	0.6	0.44	0.34	0.27	0.26
	0.8	0.47	0.36	0.28	0.27
	1.0	0.49	0.37	0.29	0.27

(1) Excluding edge insulation for the ground-supported floor system.

3.3 Subject to the selection of an appropriate insulation thickness, floor construction can improve on the U value of 0.25 $Wm^{-2}K^{-1}$ for a 'notional' building specified in Table R1 of Appendix R of *The Government's Standard Assessment Procedure for Energy Rating of Dwellings* (SAP 2005) or the Simplified Building Energy Model (SBEM), see Table 1. The product therefore, can contribute to enabling a building to meet the Target Emission Rate 'average' improvements of 20% (dwellings) and 23 to 28% (buildings other than dwellings).

England and Wales

Approved Documents L1A and L2A.

Northern Ireland

As specified in Technical Booklets F1 and F2.

3.4 The product can maintain, or contribute to maintaining, continuity of thermal insulation at junctions between the floor and other building elements. Guidance in this respect, and on limiting heat loss by air infiltration, can be found in:

England and Wales

Limiting thermal bridging and air leakage : Robust construction details for dwellings and similar buildings TSO 2002.

Northern Ireland

Accredited Construction Details (version 1.0).

3.5 Compliance with the guidance referred to in section 3.4 including airtightness measures, will allow the use of the default psi values from Table 3 of BRE Information Paper IP 1/06 *Assessing the effects of thermal bridging at junctions and around openings* and Table K1 of *The Government's Standard Assessment Procedure for Energy Rating of Dwellings*, SAP 2005, in Target Emission Rate calculations to SAP 2005 or the Simplified Building Energy Model (SBEM).

3.6 When installed in floors of existing buildings, the product can meet, or contribute to meet, the relevant requirements of the following guidance documents:

England and Wales

Approved Document L1B, section 2, L2B, section 3

Northern Ireland

As specified in Technical Booklets F1 and F2, section 3.

3.7 Subject to the selection of an appropriate insulation thickness, a floor can satisfy the Elemental target U value of 0.25 $Wm^{-2}K^{-1}$ specified in Table 1 to clause 6.2.1 of the Technical Handbooks.

3.8 The product can maintain, or contribute to maintaining, continuity of thermal insulation at junctions between floor and other building elements. Guidance in BRE report (BR 262 : 2002) *Thermal insulation : avoiding risks* is acceptable.

4 Condensation

Interstitial condensation

4.1 Floors will adequately limit the risk of interstitial condensation when they are designed and constructed in accordance with BS 5250 : 2002, Section 8.5 and Appendix D. The product has a water vapour resistivity exceeding 250 $MNsg^{-1}m^{-1}$.

4.2 When the product is used above the damp-proof course on a ground-supported floor, or on a beam-and-block floor, a vapour control layer is installed on the warm side of the insulation to inhibit the risk of interstitial condensation.

4.3 For a timber suspended ground floor, it is not necessary to introduce a vapour control layer as long as adequate sub-floor cross ventilation is provided.

Surface condensation

4.4 Floors will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 0.7 $Wm^{-2}K^{-1}$ at any point, and the junctions with walls are designed in accordance with the relevant requirements of TSO publication *Limiting thermal bridging and air leakage : Robust construction details for dwellings and similar buildings,* 2002 or BRE Information Paper IP 01/06.

4.5 Floors will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 1.2 $Wm^{-2}K^{-1}$ at any point. Guidance may be obtained from Section 8 of BS 5250 : 2002 and BRE report (BR 262 : 2002).

5 Floor loading

5.1 The design loadings for self-contained dwelling units, as defined in BS 6399-1 : 1996, are:

intensity of distributed load (kPa)	1.5
concentrated load (kN)	1.4

5.2 The insulation boards covered with timber-based board or screed can support these design loadings without undue deflection.

5.3 A BRE survey of imposed floor loading in domestic buildings (see BRE current paper No 2/77 *Floor loadings in domestic buildings — the results of a survey)* indicates that loadings in flats are commonly in the region of 0.6 kPa and loadings of 1.5 kPa are normally associated with fixed items.

5.4 Where the boards are used under a concrete slab, resistance to concentrated and distributed loads is a function of the slab specification.

6 Behaviour in relation to fire

6.1 The product achieved a Class 1 surface spread of flame rating when tested to BS 476-7 : 1997.

6.2 The boards do not prejudice the fire resistance properties of the floor.

6.3 When properly installed the boards will not add significantly to any existing fire hazard. The boards will be contained within the floor by the overlay until the overlay itself is destroyed and therefore will not contribute to the development of a fire or present a smoke or toxic hazard as the fire develops.

6.4 Where the boards are to be used in exposed or semi-exposed intermediate timber floors such as rooms above a garage, the other floor materials and overall design must be selected to achieve the period of fire performance required.

7 Moisture penetration

For floors subject to national Building Regulations, construction should be detailed or designed in accordance with:

England and Wales

Approved Document C, Section 4

Scotland

Mandatory Standard 3.4

Northern Ireland

Technical Booklet C, Section 1.

8 Durability

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

Installation

9 General

9.1 Installation of Ballytherm BTF Floor Insulation must be in accordance with the Certificate holder's installation instructions and the requirements of this Certificate.

9.2 Typical methods are shown in Figure 1. Reference should also be made to BRE report (BR 262 : 2002).

9.3 All concrete floor surfaces should be smooth, level and flat to within 5 mm when measured with a 2-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.

9.4 In ground-supported concrete floors, the concrete floor slab over which the boards are laid should be left for as long as possible to maximise drying out and dissipation of constructional moisture, in accordance with BS 8203 : 2001, Section 3.1.2.

9.5 Where the boards are used over ground-supported concrete floor slabs a suitable damp-proof membrane in accordance with CP 102 : 1973, Section 11, and BS 8204-1 or -2 : 2003, should be laid to resist moisture from the ground. If a liquid-type damp-proof membrane is applied to the slabs, it should be of a type compatible with the boards and be allowed to dry out fully before laying the boards.

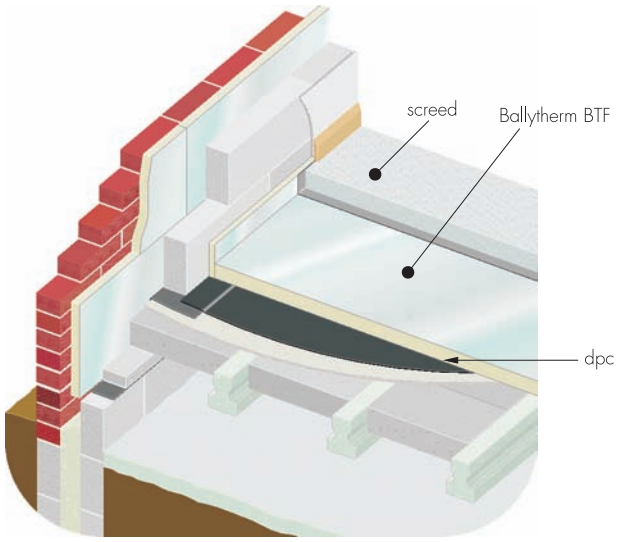
9.6 Where the boards are used on hardcore bases under ground-supported concrete slabs, the hardcore must be compacted and blinded with a thin layer of sand before application of the boards.

9.7 The boards can be used on beam and block suspended concrete floors, that are the subject of a current Agrément Certificate and installed in accordance with, and within the limitations imposed by that Certificate, or those designed and installed to the precast concrete and general loading codes, that have been assessed as suitable.

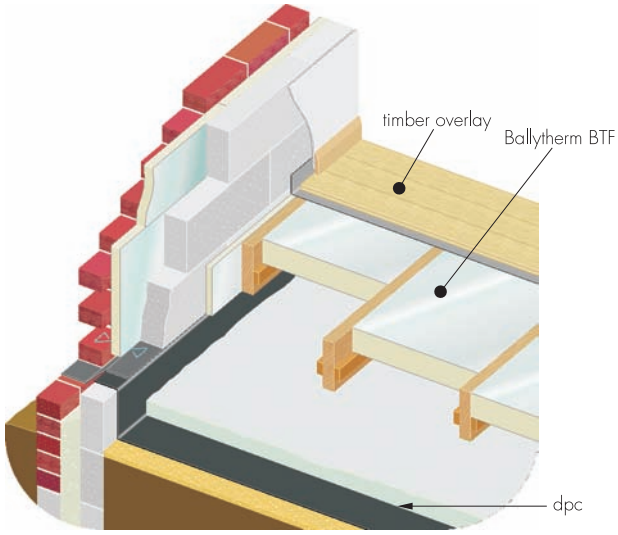
9.8 Where a screed or concrete slab is laid over the product, vertical upstands of insulation should be provided and be of sufficient depth to fully separate the screed or slab from the wall and provide a minimum thermal resistance of 0.75 m^2KW^{-1}. Alternatively, a suitable cavity or external wall insulation material can be extended below the damp-proof course and a minimum of 150 mm below the top of the floor insulation to provide edge insulation to the floor. In this case, vertical upstands of insulation may not be necessary.

9.9 In suspended timber floors, the insulation boards are installed between the floor joists.

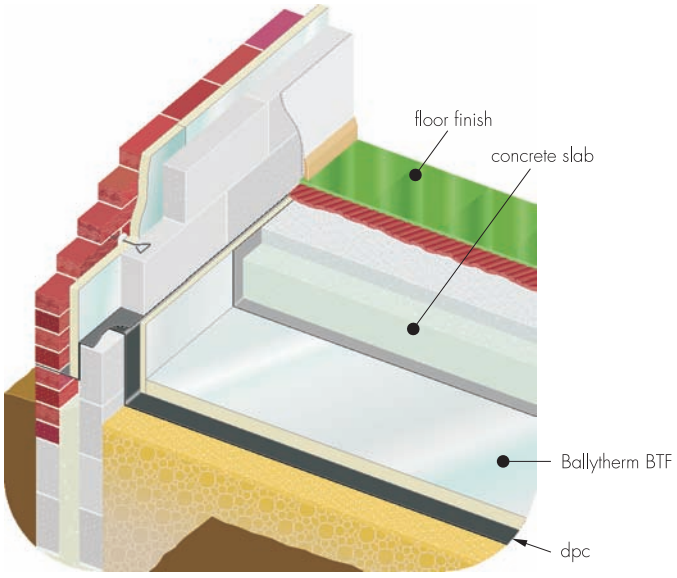
Figure 1 Typical installation



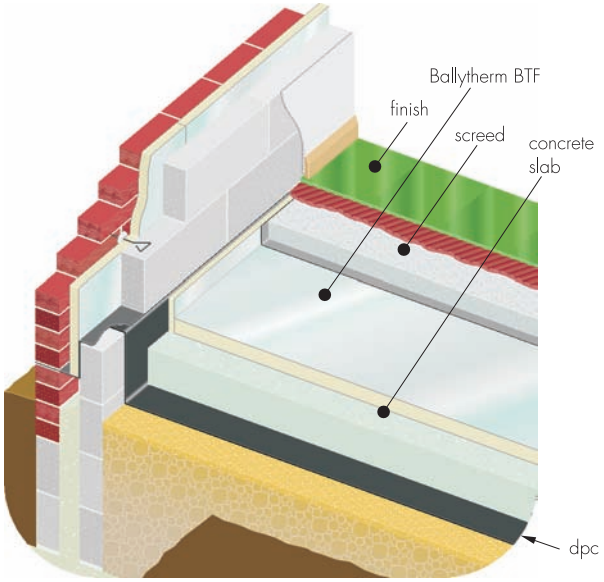
beam and block suspended concrete floor



suspended timber floor



under ground-supported concrete slab



over ground-supported floor slab

9.10 To limit the risk of damage from condensation and other sources of dampness, the boards and the overlay should only be laid after the construction is made substantially weathertight, eg after glazing. During construction the boards must also be protected from water spillage, plaster droppings and traffic.

9.11 The boards can be cut using a sharp knife or fine-toothed saw to fit around service penetrations.

10 Procedure

10.1 The boards are cut to size, as necessary and laid with closely-butted, staggered cross-joints, ensuring that all spaces are completely filled.

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

Timber-based board overlays

10.3 Before laying the particle board or OSB overlays, pre-treated timber battens, in accordance with BS 1282 : 1999, are positioned at doorways, access panels and to support partitions. Adequate time should be allowed for CCA-based preservatives to be fixed and the solvents from solvent-based preservatives to evaporate.

10.4 A continuous vapour control layer with sealed joints of polyethylene sheet with a minimum thickness of 0.25 mm, is laid between the boards and the overlay board. The polyethylene sheet has 150 mm overlaps taped at the joints and is turned up 100 mm at the walls.

10.5 Tongue-and-groove 18 mm thick particle board (type P4 to P7), or OSB/3 or OSB/4 is laid with staggered cross-joints in accordance with DD ENV 12872 : 2000.

10.6 An expansion gap between the overlay board and the perimeter walls or abutments should be provided at the rate of 2 mm per metre run or a minimum of 10 mm, whichever is the greater.

10.7 Where there are long, uninterrupted lengths of floor, eg corridors, proprietary expansion joints should be installed at intervals on the basis of a 2 mm gap per metre run of overlay board.

10.8 Before the overlay boards are interlocked, a waterproof PVA adhesive is applied to the joints.

10.9 Once the overlay board is laid, temporary wedges are inserted between the walls and the floor to maintain tight joints until the adhesive has set.

10.10 When the wedges are removed and before the skirting boards are fixed, suitable compressible filler, eg foamed polyethylene, should be fitted around the perimeter of the floor between the overlay board and the walls.

10.11 Where there is a likelihood of regular water spillage, eg in rooms such as kitchens, bathrooms, shower and utility rooms, additional overlay board protection should be considered, eg by a continuous flexible vinyl sheet flooring, with welded joints and cove skirting.

Cement-based screed overlay

10.12 Perimeter edge pieces are cut and placed around the edges and all floor joints taped, or a 0.125 mm polyethylene sheet laid over before a properly-compacted screed of a minimum 65 mm thickness is laid in domestic and 75 mm in other buildings. The relevant clauses of BS 8204-1 : 2003 or BS 8204-2 : 2003 should be followed and *BRE Building Elements Floors & Flooring*, Chapter 4.2 should be consulted.

Concrete slab overlay (ground bearing only)

10.13 The boards are laid over the dpm and perimeter edge pieces are cut and placed around the edges and taped at joints. The vapour control layer or building paper is laid over the boards. The concrete slab is laid to the required thickness in accordance with BS 8000-9 : 2003 and BS 8204-1 : 2003.

Timber floors

10.14 Saddle Clips are placed at intervals not exceeding one metre along the timber floor joists. Where the boards are to be installed only on one side of a joist, twin clips can be cut into single clips and nailed into place with galvanized nails.

10.15 Alternatively, the boards may be retained by preservative-treated timber support beads or steel nails. Beads should be wide enough to retain the boards in place and secured with corrosion-protected nails at a depth that will accommodate the thickness of the insulation board and leave an air gap (minimum 25 mm) between the top of the insulation board and the underside of the flooring deck.

10.16 Boards are cut to fit tightly between joists and pushed down onto the spikes of the saddle clips, or onto the beads. Small gaps should be insulated with cut strips of insulation.

10.17 The boards are not suitable for laying over timber joists.

10.18 The void below the insulated, suspended timber floor should be well ventilated and the airflow should not be restricted by sleeper walls.

11 Incorporation of services

11.1 The maximum continuous working temperature of the boards is 100°C. De-rating of electrical cables should be considered where installation restricts air cooling of cables.

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

11.3 Flooring incorporating gas pipes should be designed and installed in accordance with the requirements of the Gas Safety (Installation and Use) Regulations 1998.

11.4 Where water pipes are installed below the insulation they should be pre-lagged. Generally, insulation will be relatively thin so it would not be possible to install pipes within the insulation. Pipes installed above the insulation will not require lagging, although some provision needs to be made for expansion and contraction.

11.5 Where the boards are installed on a floor of a suspended beam and block design, all services must be installed in accordance with the Agrément Certificate for that floor.

11.6 On overlay particle 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 DD ENV 12872 : 2000 without intermediate support. Services should be suitably fixed to the floor base and not to the insulation boards (see section 3.5 with regard to limiting heat loss).

11.7 On intermediate/exposed floors all the services should be incorporated beneath the existing floor and above the insulation if possible.

Technical Investigations

The following is a summary of the technical investigations carried out on Ballytherm BTF Floor Insulation.

12 Tests

Tests were carried out in accordance with EN 13165 : 2001 to determine:

- load deformation under elevated temperature and specified compressive load
- thermal conductivity (λ value)
- compressive strength
- flatness on one-sided wetting
- long-term water absorption by total immersion
- dimensional stability under specified temperature and humidity conditions.

13 Investigations

13.1 An examination was made of test data to EN 13165 : 2001 relating to:

- dimensions
- squareness
- density
- λ value (fresh and aged)
- diffusion tight property of facings.

13.2 A theoretical risk analysis of the hygrothermal behaviour of various installations was carried out.

Bibliography

BS 476-7 : 1997 *Fire tests on building materials and structures — Method of test to determine the classification of the surface spread of flame of products*

BS 1282 : 1999 *Wood preservatives — Guidance on choice, use and application*

BS 5250 : 2002 *Code of practice for control of condensation in buildings*

BS 6399-1 : 1996 *Loading for buildings — Code of practice for dead and imposed loads*

BS 8000-9 : 2003 *Workmanship on building sites — Code of practice for cement/sand floor screeds and concrete floor toppings*

BS 8203 : 2001 *Code of practice for installation of resilient floor coverings*

BS 8204-1 : 2003 *Screeds, bases and in-situ floorings — Concrete bases and cement sand levelling screeds to receive floorings — Code of practice*

BS 8204-2 : 2003 *Screeds, bases and in-situ floorings — Concrete wearing surfaces — Code of practice*

BS EN 300 : 2006 *Oriented Strand Boards (OSB) — Definitions, classification and specifications*

BS EN 312 : 2003 *Particleboards — Specifications*

BS EN ISO 6946 : 1997 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*

BS EN ISO 13370 : 1998 *Thermal performance of buildings — Heat transfer via the ground — Calculation methods*

CP 102 : 1973 *Code of practice for protection of buildings against water from the ground*

EN 13165 : 2001 *Thermal insulation products for buildings — Factory made rigid polyurethane foam (PUR) products — Specification*

DD ENV 12872 : 2000 *Wood-based panels. Guidance on the use of load-bearing boards in floors, roofs and walls*

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

On behalf of the British Board of Agrément

Date of issue: 27th March 2007

Chief Executive

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CI/SfB
(22.9) Rn7 (M2)

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

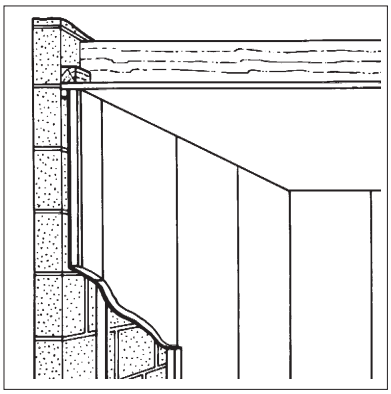
Ballytherm Ltd

BALLYTHERM BTDL DRY LINING BOARD INSULATION

Certificate No 07/4427

DETAIL SHEET 3

Product



- *THIS DETAIL SHEET RELATES TO BALLYTHERM BTDL DRY LINING BOARD INSULATION.*
- *The product is for use in conjunction with appropriate internal lining boards as an insulating dry lining system to improve the thermal insulation of existing and new, solid or cavity masonry walls of dwellings or buildings of similar occupancy, type and conditions.*
- *The product may also be used in locations where the insulated surface is inaccessible, eg existing ceilings of flat roofs.*

This Detail Sheet must be read in conjunction with the Front Sheets, which give the Conditions of Certification.

Technical Specification

1 Description

1.1 Ballytherm BTDL Dry Lining Board Insulation comprises a rigid polyisocyanurate closed cell foam core, sandwiched with kraft paper with a polyethylene membrane on both sides. The foam is CFC and HCFC free and has zero ozone depletion potential (Zero ODP). The insulation is bonded to tapered edge plasterboard for internal applications.

1.2 The insulation boards are available with nominal characteristics of:

length (mm)	2400
width (mm)	1200
thickness (mm)	20 to 80
compressive strength (kNm^{-2})	⩾70
density (kgm^{-3})	19 to 43

1.3 The manufacturing specification of the boards is in accordance with EN 13165 : 2001, Section 4.2 and the relevant parts of Section 4.3.

1.4 The boards are installed in conjunction with timber battens and appropriate lining boards, for example standard gypsum plasterboard to BS EN 520 : 2004.

1.5 Ancillary materials include large-headed nails, screws, washers, aluminium joint tape and sealant.

Design Data

2 General

2.1 Ballytherm BTDL Dry Lining Board Insulation will significantly improve the thermal insulation of new and existing, solid or cavity masonry walls (masonry includes clay and calcium silicate bricks, concrete blocks or natural and reconstituted stone blocks) or walls of dwellings and buildings of similar occupancy, type and condition.

2.2 The walls of new buildings should be designed and constructed in accordance with the relevant codes of practice, eg BS 5628-3 : 2005 and BS 8000-3 : 2001.

2.3 All walls must be in a good state of repair with no evidence of rain penetration, damp (other than surface condensation) or frost damage.

2.4 The surfaces of masonry walls should be sound and free from loose material; large projections should be removed and holes filled and levelled. A survey of the wall may be required to establish the extent of any packing that may be required to ensure a uniform plane for the boards to be fixed.

2.5 The installation of insulated dry lining systems requires careful detailing around doors and windows to achieve a satisfactory surface for finishing. In addition, every attempt should be made to minimise the risk of cold bridging at reveals and where heavy separating walls are attached to the external wall. In new work the construction must be designed to accommodate the thickness of the dry lining, particularly at reveals, heads, sills and in relation to ceiling height. On existing walls consideration should be given to lining the reveals with a thinner layer of insulation and lining board.

2.6 Services can be incorporated in the void formed between the insulation and the lining boards, making chasing of the wall unnecessary. Where the services have a greater depth than the void, the wall should be chased in preference to

the insulation. It is recommended that services penetrating the insulation or any vapour check lining board, eg light switches, power outlets, be kept to a minimum to limit possible penetration of water vapour.

2.7 When the system is to be installed in existing buildings it should be realised that a small reduction in room size will occur and that permanent fixtures, eg baths, will present difficulties.

3 Thermal performance

3.1 Calculations of the thermal transmittance (U value) of a specific wall construction using insulated dry lining should be carried out in accordance with BS EN ISO 6946 : 1997, and BRE report (BR 443 : 2006) *Conventions for U-value calculations*, using the declared ($\lambda_{90/90}$ *value*) thermal conductivity of 0.026 $Wm^{-1}K^{-1}$ for the dry lining, comprising a PIR board with Kraft paper facings. The U value of a typical wall construction will depend on the cavity width and the insulation value of the internal block leaf and finish. Example U values are given in Table 1.

3.2 Subject to the selection of an appropriate insulation thickness, wall construction can improve on the Elemental U value of 0.35 $Wm^{-2}K^{-1}$ for a 'notional' building as specified in Table R1 of Appendix R of *The Government's Standard Assessment Procedure for Energy Rating of Dwellings* (SAP 2005) or the Simplified Building Energy Model (SBEM), see Table 1. The product, therefore can contribute to enabling a building to meet the Target Emission Rate 'average' improvements of 20% (dwellings) and 23% to 28% (buildings other than dwellings):

England and Wales

As specified in Approved Documents L1A and L2A respectively

Northern Ireland

As specified in Technical Booklets F1 and F2.

3.3 The product can maintain, or contribute to maintaining, continuity of thermal insulation at junctions between the wall and other building elements. Guidance in this respect, and on limiting heat loss by air infiltration, can be found in

England and Wales

Limiting thermal bridging and air leakage : Robust construction details for dwellings and similar buildings TSO 2002

Northern Ireland

Accedited Construction Details (version 1.0).

3.4 Compliance with the guidance referred to in section 3.3 will allow the use of the default psi values from Table 3 of BRE Information Paper IP 1/06 *Assessing the effects of thermal bridging at junctions and around openings* and Table K1 of *The Government's Standard Assessment Procedure for Energy Rating of Dwellings* (SAP 2005), in Target Emission Rate calculations to SAP 2005 or the Simplified Building Energy Model (SBEM).

3.5 When installed in the wall of existing buildings, the product can meet, or contribute to meet, the relevant requirements of the following guidance documents:

England and Wales

Approved Document L1B, section 2, L2B, section 3

Northern Ireland

As specified in Technical Booklets F1 and F2, section 3.

3.6 Subject to the selection of an appropriate insulation thickness, walls can satisfy the Elemental Target U value of 0.30 $Wm^{-2}K^{-1}$ specified in Table 1 to clause 6.2.1 of the Technical Handbooks.

3.7 The product can maintain, or contribute to maintaining, continuity of thermal insulation at junctions between the wall and other building elements. Guidance in BRE report (BR 262 : 2002) *Thermal insulation : avoiding risks* is acceptable.

4 Condensation

Interstitial condensation

4.1 Walls and ceilings incorporating the product will adequately limit the risk of interstitial condensation when they are designed and constructed in accordance with BS 5250 : 2002, Section 8 and Appendix D.

Table1 U value ($Wm^{-2}K^{-1}$) of wall construction

Insulation thickness (mm)	Without cavity	Cavity wall construction[1][2]		
		Dense concrete block (λ = 1.13 $Wm^{-1}K^{-1}$) d = 1800 Kgm^{-3}	Medium concrete block (λ = 0.32 $Wm^{-1}K^{-1}$) d = 1300 Kgm^{-3}	Aerated concrete block (λ = 0.12 $Wm^{-1}K^{-1}$) d = 400 Kgm^{-3}
70	0.30	0.30	0.28	0.26
80	0.27	0.27	0.26	0.23

(1) Assuming Gypsum plasterboard thickness 12.5 mm (λ = 0.21 $Wm^{-1}K^{-1}$) as per BRE Report 443.

(2) Assuming air cavity to have a resistance of 0.18 m^2KW^{-1} as per BRE Report 443.

4.2 The boards have a nominal water vapour resistivity exceeding 250 MNsgm^{-1} and provided all joints between boards are taped in accordance with the Certificate holder's literature can offer a significant resistance to water vapour transmission. When using the boards as vapour control layer, consideration must be taken of the overall installation to minimise and seal perforations by services.

Surface condensation

4.3 Walls and ceilings will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 0.7 Wm^{-2}K^{-1} and 0.35 Wm^{-2}K^{-1} respectively at any point and the junctions with other elements are designed in accordance with the relevant requirements of TSO publication *Limiting thermal bridging and air leakage : Robust construction details for dwellings and similar buildings* TSO 2002 or BRE Information Paper IP 01/06.

4.4 Walls and ceilings will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 1.2 Wm^{-2}K^{-1} at any point. Guidance may be obtained from Section 8 of BS 5250 : 2002 and BRE report (BR 262 : 2002).

4.5 As with other types of insulation applied to the inside of a wall, there may be a risk of cold bridging from the floors or ceilings, particularly in concrete slab construction. It has been demonstrated that use of coving at the wall ceiling joint will significantly reduce this risk.

4.6 Dry lining has been used successfully in the rehabilitation of buildings suffering from surface condensation of walls where the dampness has been caused by the lack of thermal insulation.

5 Infestation

The use of the system 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.

6 Behaviour in relation to fire

6.1 The boards have a Class 1 in accordance with BS 476-7 : 1997.

6.2 When properly installed, the insulation will be contained between the wall and internal lining board until one is destroyed. Therefore, the insulation will not contribute to the development of a fire or present a smoke or toxic hazard as the fire develops.

6.3 Recessed lighting must not be used in ceilings with this form of insulation.

7 Water penetration

7.1 The board's insulation component closed cell structure does not allow water uptake by capillary action.

7.2 The boards insulation component presents no significant risk of water penetration.

8 Impact resistance

Impact damage would be no greater than would be expected from the internal lining alone.

9 Wall-mounted fittings

The recommendations of the Certificate holder should be followed. Any object fixed to the wall, other than lightweight items, eg framed pictures, should be fixed through the lining board, timber battens and insulation into the wall behind, using recommended proprietary fixings. Ceiling fixtures will require longer screws to secure them to the structure.

10 Durability

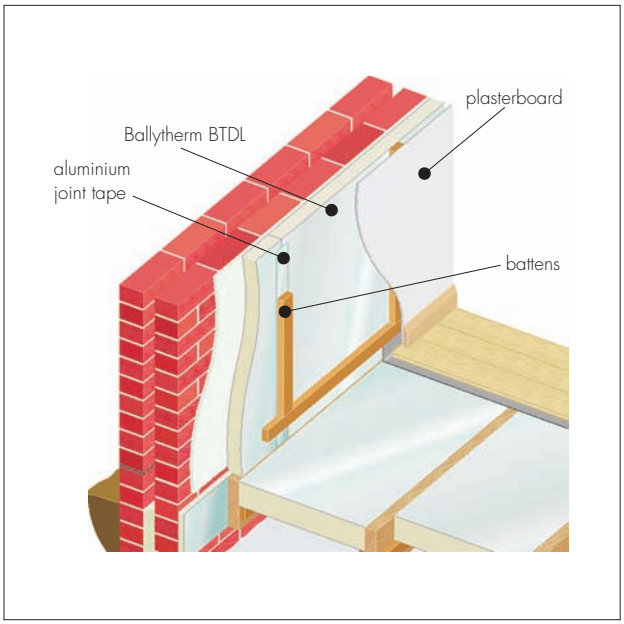
The boards are rot-proof, dimensionally stable and durable. Provided they are used in accordance with the Certificate holder's instructions, and are fixed to satisfactory stable and durable backgrounds should have a life equal to that of the building in which they are installed. Under normal conditions of occupancy, the wall lining is unlikely to suffer damage, but if damage does occur repairs can be carried out.

Installation

11 General

11.1 Ballytherm BTDL Dry Lining Board Insulation is for installation on internal walls and ceilings. A typical method is shown in Figure 1.

Figure 1 Ballytherm BTDL Dry Lining, mechanically fixed



11.2 Installation should be in accordance with good dry lining practice and the relevant parts of the Certificate holder's literature.

11.3 The boards can be cut using a sharp knife or fine-toothed saw, to fit around windows, doors, air bricks. It is essential that cut pieces completely fill the spaces for which they are intended and are adequately secured.

11.4 All installations of insulated dry lining require careful planning and setting out.

11.5 Before fixing the product, sufficient time must be allowed for damp-proofing treatments, where applied, to dry out (see also, BS 6576 : 2005 for dry lining in conjunction with a chemical dpc application).

12 Procedure

12.1 The wall is surveyed to establish its flatness and suitability for receiving the system (see section 2.4). This system may be used on any stable, dry walls capable of taking the fixings for the timber battens.

12.2 In existing walls, the wall surface is prepared to a smooth finish. Wallpaper, skirting, picture rails, gloss paint and projecting window boards are all removed.

12.3 The insulation boards are cut to fit and placed against the wall. Joints and perforations are sealed with aluminium tape. Pre-treated timber battens are mechanically fixed horizontally through the top, centre and bottom of the insulation into the wall substrate.

12.4 The battens must be of sufficient thickness (minimum 25 mm) and spacing (at maximum 600 mm centres) to provide adequate support to which the lining board can be fixed, and provide for any services that are to be incorporated into the void between the insulation board and lining board. Vertical battens are then fitted. Additional battens can be used around openings and to support heavy horizontal items.

12.5 To avoid thermal bridging, the boards should be used to line window reveals and around the perimeter of separating floors.

12.6 Jointing and finishing of the plasterboard lining is carried out in the appropriate manner. Timber skirting can be fixed into the horizontal batten at floor level.

Technical Investigations

The following is a summary of the technical investigations carried out on Ballytherm BTDL Dry Lining Board Insulation.

13 Tests

Tests were carried out in accordance with EN 13165 : 2001 to determine:

- thermal conductivity (λ value).

14 Investigations

An examination was made of test data to EN 13165 : 2001 relating to:

- squareness
- density
- dimensions
- vapour resistance
- flatness
- λ value.

15 Other investigations

A theoretical analysis of the hygrothermal behaviour of various installations was carried out.

Bibliography

BS 476-7 : 1997 *Fire tests on building materials and structures — Method of test to determine the classification of the surface spread of flame of products*

BS 5250 : 2002 *Code of practice for control of condensation in buildings*

BS 5628-3 : 2005 *Code of practice for the use of masonry — Materials and components, design and workmanship*

BS 6576 : 2005 *Code of practice for diagnosis of rising damp in walls of buildings and installation of chemical damp-proof courses*

BS 8000-3 : 2001 *Workmanship on building sites — Code of practice for masonry*

BS EN 520 : 2004 *Gypsum plasterboards — Definitions, requirements and test methods*

EN 13165 : 2001 *Thermal insulation products for buildings — Factory made rigid polyurethane foam (PUR) products — Specification*

BS EN ISO 6946 : 1997 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

On behalf of the British Board of Agrément

Date of issue: 27th March 2007

Chief Executive

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CI/SfB
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BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

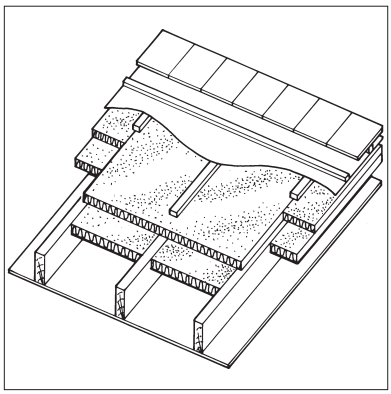
Ballytherm Ltd

BALLYTHERM BTR (PITCHED ROOF INSULATION)

Certificate No 07/4427

DETAIL SHEET 4

Product



- *THIS DETAIL SHEET RELATES TO BALLYTHERM BTR (PITCHED ROOF INSULATION).*
- *The product is for use as thermal insulation between or between and below rafters in tiled or slated pitched roofs designed and constructed in accordance with the relevant clauses of BS 5534 : 2003.*
- *The product is for use where the ceiling follows the pitch of the roof and encloses a habitable space, or where the ceiling is horizontal and encloses a loft space.*
- *The product must be used in conjunction with a suitable water vapour permeable roof tile underlay.*

This Detail Sheet must be read in conjunction with the Front Sheets, which give the Conditions of Certification.

Technical Specification

1 Description

1.1 Ballytherm BTR (Pitched Roof Insulation) comprises a rigid polyisocyanurate closed cell, rigid foam core, sandwiched with low emissivity, composite aluminium foil facings on both sides. The foam is CFC and HCFC free and has zero ozone depletion potential (Zero ODP).

1.2 The boards are available in nominal characteristics(1) of:

length (mm)	2400
width (mm)	1200
thickness (mm)(1)	25 to 75
compressive strength (kNm^{-2})	⩾70
density (kgm^{-3})	35 to 45

(1) Other sizes may be available to special order.

1.3 The manufacturing specification of the boards is in accordance with EN 13165 : 2001, Section 4.2 and the relevant parts of Section 4.3.

1.4 The boards are installed in conjunction with an appropriate internal lining board, for example Ballytherm BTDL dry lining board (with λ = 0.026 $Wm^{-1}K^{-1}$). See Detail Sheet 3.

1.5 Ancillary products used with the boards are:

- roof tile underlay — fully-supported vapour permeable
- aluminium foil self-adhesive tape
- sarking clips
- stainless steel fixings
- galvanized slab nails or ring-shank nails
- pre-treated battens and tiling laths
- roofing slates or tiles
- sealant.

Design Data

2 General

2.1 Ballytherm BTR (Pitched Roof Insulation) board will improve the thermal insulation of new and existing pitched roofs and is satisfactory for use between, and or below roof rafters in conjunction with internal lining board, vapour permeable roof tile underlay, timber counter battens and tiling battens in tiled or slated, pitched roofs, designed and constructed in accordance with the relevant clauses of BS 5534 : 2003 for dwellings or other buildings with similar temperature and humidity conditions.

2.2 The boards are for use in pitched roofs where the ceiling follows the pitch of the roof and encloses a habitable space, or where the ceiling is horizontal and encloses a loft space.

2.3 Lateral restraint to roof members and overall roof stability should be provided by a suitable bracing system, ie no contribution from the insulation in this regard should be assumed.

2.4 During installation, care should be exercised to ensure that the insulation boards are not subjected to any construction, or foot traffic loads. Roof timbers of adequate strength should be used to support such loads.

2.5 It is essential that detailing and jointing of the boards achieves a convection-free envelope of high vapour resistance (see section 7.2). Any gaps should be filled, and/or taped. Ridges, abutments and penetrations should also be sealed. Flue pipes passing through the insulation should be suitably sleeved.

2.6 Moisture entering the roof can be minimised using a minimum of 125 µm polyethylene, with sealed vapour control layer gaps placed under the inclined ceiling between the insulation and the internal finish.

3 Strength

The boards, when installed in accordance with the Certificate holder's instructions, will resist the loads likely to be met during installation and in service, (see sections 2.4 and 11.2).

4 Structural stability

4.1 Wind uplift will depend largely on the building geometry and its geographical location and should be calculated in accordance with BS 6399-2 : 1997. Snow loadings should be calculated in accordance with BS 6399-3 : 1988.

4.2 When calculating the fixing spacing required to resist the calculated loadings the requirements of BS 5268-2 : 2002 should be followed where possible. When using proprietary fixings and improved nails, the Certificate holder can advise on the correct type and fixing capacity in accordance with BS 5268-2 : 2002.

5 Behaviour in relation to fire

5.1 The boards have a Class 1 spread of flame in accordance with BS 476-7 : 1997.

5.2 The boards must not be carried over junctions between roofs and walls required to provide a minimum period of fire resistance. The continuity of fire resistance must be maintained, for example as described in:

England and Wales

Approved Document B, paragraphs 9.28 to 9.31

Scotland

Mandatory Standard 2.2

Northern Ireland

Technical Booklet E, paragraph 3.15.

5.3 The use of the boards will not affect the rating obtained by tiled or slated roofs when assessed or tested to BS 476-3 : 1958.

5.4 When installed with an internal lining board, eg 12.5 mm thick plasterboard, the insulation will be contained between the roof and internal lining board until one is destroyed. Therefore, the insulation will not contribute to the development of a fire or present a smoke or toxic hazard as the fire develops.

5.5 Recessed lighting must not be used in ceilings with this form of insulation.

6 Thermal performance

6.1 Calculations of the thermal transmittance (U value), a specific roof construction should be carried out in accordance with BS EN ISO 6946 : 1997 and BRE report (BR 443 : 2006) *Conventions for U-value calculations*, using the declared thermal conductivity *($\lambda_{90/90}$ value)* of 0.022 $Wm^{-1}K^{-1}$. Examples U values are given in Table 1.

Table 1 Warm pitched roof with insulation between and below rafters

Insulation thickness of bridged layer	U value ($Wm^{-2}K^{-1}$) with different thicknesses for the continuous layer of insulation (mm)		
(mm)	25	50	75
25	0.37	0.26	0.20
50	0.28	0.21	0.17
70	0.23	0.18	0.15
75	0.22	0.18	0.15

Notes

- Assuming plasterboard thickness 12.5 mm and λ = 0.21 $Wm^{-1}K^{-1}$.
- Assuming the resistance of the unvented low emissivity air space to be 0.34 m^2KW^{-1} and forming a second bridged layer the timber rafter.
- Assuming the continuous layer to be the BTR insulation with λ = 0.022 $Wm^{-1}K^{-1}$.

6.2 Subject to the selection of an appropriate board thickness, a roof construction can achieve the U value of 0.16 $Wm^{-2}K^{-1}$ specified for the 'notional' building in Table R1 of Appendix R of *The Government's Standard Assessment Procedure for Energy Rating of Dwellings* (SAP 2005) or the Simplified Building Energy Model (SBEM) (see Table 1).

6.3 However, where the selected insulation thicknesses cannot achieve the U value as detailed in section 6.2, (see Table 1) the product can achieve the following:

- the limit average U value of 0.25 $Wm^{-2}K^{-1}$
- the limit U value of 0.35 $Wm^{-2}K^{-1}$ for the individual element.

6.4 For U values such as those shown in Table 1, additional energy saving measures will be required within the building envelope and/or services for a building to achieve the required overall carbon dioxide emission rate reduction of 'average' improvements of 20% (dwellings) and from 23% to 28% (buildings other than dwellings):

England and Wales

As specified in Approved Documents L1A and L2A

Northern Ireland

As specified in Technical Booklet F1.

6.5 The product can maintain, or contribute to maintaining, continuity of thermal insulation at junctions between the roof and other building elements. Guidance in this respect, and on limiting heat loss by air infiltration, can be found in

England and Wales

Limiting thermal bridging and air leakage : Robust construction details for dwellings and similar buildings TSO 2002

Northern Ireland

Accedited Construction Details (version 1.0).

6.6 Compliance with the guidance referred to in section 6.5 will allow the use of the default psi values from Table 3 of BRE Information Paper IP 1/06 *Assessing the effects of thermal bridging at junctions and around openings* and Table K1 of *The Government's Standard Assessment Procedure for Energy Rating of Dwellings* (SAP 2005), in Target Emission Rate calculations to SAP 2005 or the Simplified Building Energy Model (SBEM).

6.7 When installed in the roof of existing buildings, the product can meet, or contribute to meet, the relevant requirements of the following guidance documents:

England and Wales

Approved Document L1B, section 2, L2B, section 3

Northern Ireland

As specified in Technical Booklets F1 and F2, section 3.

6.8 Subject to the selection of an appropriate insulation thickness and installed between rafters, a roof can satisfy the Elemental target U value of 0.25 $Wm^{-2}K^{-1}$ specified in Table 1 to clause 6.2.1 of the Technical Handbooks.

6.9 The product can maintain, or contribute to maintaining, continuity of thermal insulation at junctions between roof and other building elements. Guidance in BRE report (BR 262 : 2002) *Thermal insulation : avoiding risks* is acceptable.

7 Condensation

Interstitial condensation

7.1 Roofs will adequately limit the risk of interstitial condensation when they are designed and constructed in accordance with BS 5250 : 2002, Section 8.4 and Appendix D.

7.2 The boards have a water vapour resistivity exceeding 250 $MNsg^{-1}m^{-1}$, and when installed with tightly-butted and taped joints, in a continuous layer can provide a convection-free envelope of high vapour resistance. In these circumstances, or where a vapour control layer is used, a suitable vapour permeable roof tile underlay may be laid over the insulation boards without a ventilated air space. Where high vapour resistance roof tile underlays are used, ventilation to the air space should be considered in accordance with the recommendations of BS 5250 : 2002 or relevant BBA Certificate for the roof tile underlay.

7.3 The risk of interstitial condensation is greatest when the building is drying out after construction. Guidance on preventing condensation from this and other sources is given in BRE Digest 369 *Interstitial condensation and fabric degradation* and BRE report (BR 262) : 2002.

Surface condensation

7.5 Roofs will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 0.35 $Wm^{-2}K^{-1}$ at any point and the junctions with walls are designed in accordance with the relevant requirements of TSO publication *Limiting thermal bridging and air leakage : Robust construction details for dwellings and similar buildings,* 2002 or BRE Information Paper IP 1/06.

7.6 Roofs will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 1.2 $Wm^{-2}K^{-1}$ at any point. Guidance may be obtained from Section 8 of BS 5250 : 2002 and BRE report (BR 262 : 2002).

8 Resistance to moisture

The boards will not be adversely affected by rain showers during installation, nor by wind-driven snow or rain penetrating the tiling in service. Water absorption is low and its influence on the λ value is minimal.

9 Maintenance and repair

Damaged boards can be replaced prior to the installation of counter battens.

10 Durability

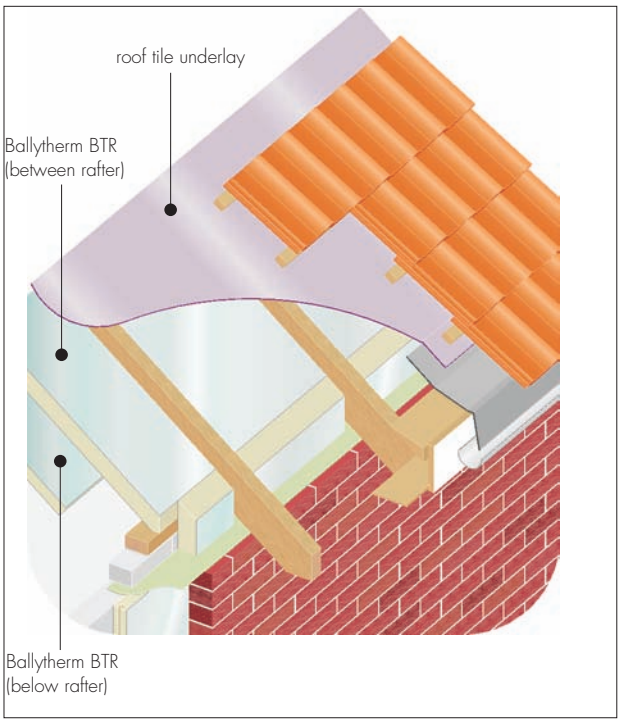
The boards are rot-proof, dimensionally stable, and when installed as specified, will have a life equivalent to that of the roof structure in which they are incorporated.

Installation

11 General

11.1 Installation of Ballytherm BTR (Pitched Roof Insulation) must be in accordance with the relevant Clauses of BS 5534 : 2003 and the Certificate holder's instructions, and can be carried out in all conditions normal to roof work. Typical methods are shown in Figure 1.

Figure 1 Ballytherm BTDL Dry Lining, mechanically fixed



11.2 The boards are light to handle but some handling difficulties may be experienced in windy conditions. Once laid the boards will not support the weight of operatives, appropriate care must be taken during installation and tiling in accordance to *Work at Height Regulations* : 2004.

11.3 The boards can be cut using a sharp knife or fine-toothed saw but care must be taken to prevent damage particularly to edges. Damaged boards should not be used. Small areas of damaged facer may be repaired with self-adhesive aluminium foil tape.

11.4 It is important to ensure a tight fit between the boards and rafters, boards at the ridge and roof/wall junctions

11.5 Gaps and joints in the insulation envelope (see section 2.5) should be filled/sealed with flexible sealant or expanding foam.

11.6 When applying roof tiles or slates to a warm roof construction, the recommendations of the tile/slate manufacturer should be followed.

12 Procedure

Between and under rafter insulation

12.1 The boards are cut to fit tightly between rafters flush with the bottom and retained to ensure a 50 mm ventilation gap (if required) between the roof tile underlay and the boards using stop bead or timber battens fixed to the side of the rafters.

12.2 The second layer of boards are fixed flush, across the underside of the rafters using broad head clout nails. All board joints are sealed using metallized tape.

12.3 The internal finish is fixed through the insulation to the rafters.

12.4 Where the rafter depth cannot accommodate the required thickness of insulation 50 mm by 50 mm timber battens can be attached to the underside of the rafter to increase the available depth.

12.5 Where the insulation thickness makes securing of the internal lining panels impractical, timber battens 25 mm deep may be nailed through to the rafters and the panels secured to the battens.

Finishing

12.6 Counter battens are fixed through the insulation into the rafters at approximate centres. Tiling battens and roof tiles or slates are installed in accordance with the relevant clauses of BS 5534 : 2003. The batten space must be adequately vented.

12.7 The vapour control layer and internal lining boards appropriate to the application and required decoration are applied.

Technical Investigations

The following is a summary of the technical investigations carried out on Ballytherm BTR (Pitched Roof Insulation).

13 Tests

Tests were carried out in accordance with EN 13165 : 2001 to determine:

- dimensional stability at specified temperature and humidity conditions
- flatness under one-sided wetting
- thermal conductivity (λ value)
- deformation under elevated temperature and specified compressive load
- long-term water absorption by total immersion
- compressive strength.

14 Investigations

An examination was made of test data to EN 13165 : 2001 relating to:

- dimensions
- squareness
- λ value
- vapour resistance
- density
- diffusion light property of facings.

15 Other investigations

A theoretical analysis of the hygrothermal behaviour of various installations was carried out.

Bibliography

BS 476-3 : 1958 *Fire tests on building materials and structures — External fire exposure roof test*

BS 476-7 : 1997 *Fire tests on building materials and structures — Method of test to determine the classification of the surface spread of flame of products*

BS 5250 : 2002 *Code of practice for control of condensation in buildings*

BS 5268-2 : 2002 *Structural use of timber — Code of practice for permissible stress design, materials and workmanship*

BS 5534 : 2003 *Code of practice for slating and tiling (including shingles)*

BS 6399-2 : 1997 *Loading for buildings — Code of practice for wind loads*

BS 6399-3 : 1988 *Loading for buildings — Code of practice for imposed roof loads*

BS EN ISO 6946 : 1997 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*

EN 13165 : 2001 *Thermal insulation products for buildings — Factory made rigid polyurethane foam (PUR) products — Specification*

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

On behalf of the British Board of Agrément

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Chief Executive

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