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Agrément Certificate
No 95/3212

PRODUCT SHEET 1 — CROWN DRITHERM CAVITY SLAB

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to Crown DriTherm Cavity Slab, a resin-bonded glass mineral wool cavity wall insulating material in slab form.

AGRÉMENT CERTIFICATION INCLUDES:

- factors relating to compliance with UK 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 product can be used to improve the thermal performance of a wall (see section 4).

Condensation risk — the performance of the product with regard to interstitial and surface condensation has been considered (see section 5).

Liquid water penetration — when the product is used in situations where it bridges the dpc in walls, dampness from the ground will not pass through to the inner leaf (see section 6).

Behaviour in relation to fire — The product does not prejudice the fire-resistance properties of the wall (see section 7).

Durability — the design life of the product under typical UK conditions has been considered and the product will remain effective as an insulant for the life of the building (see section 9).

The BBA has awarded this Agrément Certificate for Crown DriTherm Cavity Slab to Knauf Insulation Ltd as fit for its intended use provided it is installed, used and maintained as set out in this Agrément Certificate.

On behalf of the British Board of Agrément

Date of First issue: 14 February 1996

Date of Fourth issue: 16 January 2008

Greg Cooper: Chief Executive

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, Crown DriTherm Cavity Slab, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations:



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

Requirement:	B3(4)	Internal fire spread (structure)
Comment:		Walls incorporating the product can meet this Requirement. See sections 7.1 to 7.4 of this Certificate.
Requirement:	C2(a)(b)(c)	Resistance to moisture
Comment:		Walls incorporating the product can meet this Requirement. See sections 3.2, 5.1 and 5.3 of this Certificate. In addition the product may be used in situations where it bridges the dpc. See sections 6.1 and 6.2 of this Certificate.
Requirement:	L1(a)(i)	Conservation of fuel and power
Comment:		The product, used in wall, can contribute to a building meeting the Target Emission Rate. See sections 4.3 to 4.6 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The product is acceptable. See section 9 of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8	Fitness and durability of materials and workmanship
Regulation:	8(1)	Fitness and durability of materials and workmanship
Comment:		The product can contribute to a construction satisfying this Regulation. See section 9 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards – construction
Standard:	2.2	Separation
Comment:		The product is non-combustible and its use is unrestricted by this Standard, with reference to clauses 2.2.4 ⁽²⁾ and 2.2.7 ⁽¹⁾ . See section 7.1 of this Certificate.
Standard:	2.3	Structural protection
Comment:		The product is non-combustible and may be used in buildings of any purpose group, with reference to clauses 2.3.1 ⁽¹⁾ , 2.3.2 ⁽²⁾ and 2.3.4 ⁽¹⁾ . See section 7.1 of this Certificate.
Standard:	2.4	Cavities
Comment:		Cavity barriers are not required provided all the cavity is filled. For partial fill, cavities incorporating the product must comply with this Standard, with reference to clauses 2.4.1 ⁽¹⁾ , 2.4.2 ⁽¹⁾ , 2.4.7 ⁽¹⁾ and 2.4.9 ⁽²⁾ . See section 7.4 of this Certificate.
Standard:	3.4	Moisture from the ground
Comment:		The product may be used where it bridges the dpc, with reference to clause 3.4.5 ⁽¹⁾⁽²⁾ . See sections 6.1 and 6.2 of this Certificate.
Standard:	3.10	Precipitation
Comment:		Walls incorporating the product can satisfy this Standard, with reference to clause 3.10.3 ⁽¹⁾⁽²⁾ , provided they comply with sections 3.2, 6.1 and 6.2 of this Certificate.
Standard:	3.15	Condensation
Comment:		The product can contribute to satisfying this Standard, with reference to clauses 3.15.1 ⁽¹⁾ , 3.15.3 ⁽¹⁾ and 3.15.4 ⁽¹⁾ . See sections 5.2 and 5.3 of this Certificate.
Standard:	6.1(a)(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		The walls incorporating the product can satisfy or contribute to satisfying these Standards, with reference to clauses 6.1.1 ⁽¹⁾⁽²⁾ , 6.1.2 ⁽²⁾ , 6.1.6 ⁽¹⁾ , 6.2.1 ⁽¹⁾⁽²⁾ (Table 1), 6.2.3 ⁽¹⁾ , 6.2.4 ⁽¹⁾⁽²⁾ and 6.2.5 ⁽¹⁾ . See sections 4.3 to 4.6 of this Certificate. (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).



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

Regulation:	B2	Fitness of materials and workmanship
Comment:		The product is acceptable. See section 9 of this Certificate.
Regulation:	C4	Resistance to ground moisture and weather
Comment:		Walls incorporating the product can satisfy this Regulation. See sections 3.2, 6.1 and 6.2 of this Certificate. In addition, the product may be used where it bridges the dpc in either leaf.
Regulation:	C5	Condensation
Comment:		Walls incorporating the product can satisfy this Regulation. See sections 5.3 and 7.2 of this Certificate. In addition the product may be used in situations where it bridges the dpc. See section 7.2 of this Certificate.
Regulation:	E3	Internal fire spread – Structure
Comment:		Walls incorporating the product can meet this Regulation. See sections 7.1 to 7.4 of this Certificate.
Regulation:	F2(a)(i)	Conservation measures
Comment:		The product will enable a wall to satisfy or contribute to satisfying this Regulation. See sections 4.3 to 4.6 of this Certificate.

Construction (Design and Management) Regulations 2007
Construction (Design and Management) Regulations (Northern Ireland) 2007

In the opinion of the BBA, there is no information in this Certificate which relates to the obligations of the client, CDM co-ordinator or planning supervisor, designer and contractors under these Regulations.

Non-regulatory Information

NHBC Standards 2007

NHBC accepts the use of Crown DriTherm Cavity Slab, when installed and used in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 6.1 *External masonry walls*.

Zurich Building Guarantee Technical Manual 2007

In the opinion of the BBA, Crown DriTherm Cavity Slab, when installed and used in accordance with this Certificate, satisfies the requirements of the *Zurich Building Guarantee Technical Manual*, Section 4 *Superstructure*, Sub-section *External walls – Masonry external walls – Thermal insulation*.

General

This Certificate relates to Crown DriTherm Cavity Slab, a rigid glass mineral wool cavity wall insulation for use in buildings up to and including 25 m in height, subject to the conditions contained in the *Design Considerations* part of this Certificate. The product is installed during construction and is for use as full and partial fill slab to reduce the thermal transmittance of cavity walls with masonry inner and outer leaves.

Technical Specification

1 Description

1.1 Crown DriTherm Cavity Slab consists of layers of resin-bonded, water-repellent treated glass mineral wool formed into a resilient slab using a phenol formaldehyde resin binder.

1.2 The slabs are 1200 mm wide and 455 mm high in the thicknesses and nominal densities shown in Table 1.

Table 1 Slab characteristics and use

Slab thickness (mm)	Slab density (kgm ⁻³)	Permitted deviation in cavity width from slab thickness — full fill (mm)
50	24.0	50–60
55	18.5	55–65
60	18.5	60–70
65	16.8	65–75
65	18.5	65–75
65	28.0	65–75
65	32.0	65–75
75	16.8	75–90
75	28.0	75–90
75	32.0	75–90
85	16.8	85–100
85	28.0	85–100
85	32.0	85–100
90	16.8	90–105
95	16.8	95–110
100	16.8	100–115
100	28.0	100–115
100	32.0	100–115
125	16.8	125–140
130	16.8	130–145
150	16.8	150–170

1.3 Tests by the Certificate holder on the finished product comprise:

- density
- dimensional accuracy
- fibre diameter
- rigidity
- binder content
- thermal conductivity.

1.4 It should be noted that ties designed in accordance with BS DD 140-2 : 1987 or BS EN 845-1 : 2003, suitable for insulation retaining purposes must also provide appropriate structural stability in accordance with BS 5628-3 : 2005.

1.5 In partial fill applications, any insulation retaining clip approved by the BBA may be used. In addition the following clips may be used for insulation retention:

- Hilti IDP Insulation Fastener in conjunction with IZ-T plate
- Ancon Insulation Retainer
- HA Light retaining tie.

1.6 The following ties are acceptable for insulation retention and structural stability:

- Catnic BW2 and BW4 with retaining clip IRC 85
- Ensor Metal Products EN1 and EN2 and polypropylene retaining discs
- Vista Engineering VE2 and VE4 with V23 insulation retaining clip
- Hemax 90 retaining tie with Vertical twist ties to BS EN 845-1 : 2003
- Red Diamond retaining clip with Vertical twist ties to BS EN 845-1 : 2003.

1.7 In full fill applications, the following ties may be used:

- Vertical twist ties to BS EN 845-1 : 2003
- Powerplace PT1 and PT2
- Vista Engineering VE2 and VE4
- Catnic BW2 and BW4
- Ensor Metal Products EN1 and EN2
- Ancon RT2.

2 Delivery and site handling

2.1 The product is delivered to site in polyethylene packs. Each pack carries a label bearing the manufacturer's name, product description, essential instructions for installation, and the BBA identification mark incorporating the number of this Certificate.

2.2 Packages must be stored under cover until required for use.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Crown DriTherm Cavity Slab.

Design Considerations

3 General

3.1 Crown DriTherm Cavity Slab is effective in reducing the U value (thermal transmittance) of new external cavity walls with masonry inner and outer leaves (masonry includes clay and calcium silicate bricks, concrete blocks, natural and reconstituted stone blocks). It is essential that such walls are designed and constructed to incorporate the normal precautions to prevent moisture penetration.



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

- BS 5628-3 : 2005. In particular, Clause 5.5 of the Code of Practice *Exclusion of water* should be followed in that the designer should select a construction appropriate to the local wind-driven rain index, paying due regard to the design detailing, workmanship and materials to be used⁽¹⁾
- BS 8000-3 : 2001.

(1) The construction and detailing should comply with good practice as described in BBA joint publication *Cavity Insulation of Masonry Walls – Dampness Risks and How to Minimise them*. They are particularly important in areas subject to severe driving rain.

3.3 Other buildings not subject to these Regulations should also be built in accordance with the Standards given in section 3.2.

3.4 The product is for use in any exposure zone in buildings up to 25 m in height, subject to the conditions of this Certificate being met. However, the use of the product does not preclude the need to apply any external render coat or other suitable finish in severe exposure zones where such application would be normal practice.

3.5 The use of cavity battens and/or boards during construction is strongly recommended to prevent bridging by mortar droppings.

3.6 As with any other form of cavity wall insulation, where buildings need to comply with *NHBC Standards 2007* or *Zurich Building Guarantee Technical Manual 2007*, Section 4 *Superstructure* specifiers should observe the requirements of these Standards.

3.7 It is recommended that installation is carried out to the highest level on each wall or that the top edge of the insulation is protected by a cavity tray.

Partial fill use

Buildings up to and including 12 m high

3.8 The minimum residual cavity width to be maintained during construction must be 25 mm. To achieve this requirement 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 cavity width by consideration of the dimensional tolerances of the components which make up the wall by reference to the British Standards relating to the bricks, blocks and insulation boards or use the data from their respective manufacturers. In addition allowance may need to be made for the quality of available building operatives and the degree of site supervision or control available, or
- design a nominal residual cavity width of 50 mm (a residual cavity nominally 50 mm wide will be required by the NHBC, where normal standards of tolerance and workmanship are adopted).

3.9 The size of residual cavity obtained in the processes described in section 3.8 is also subject to the following limitations in respect of exposure of the proposed building as set out in Table 2.

Table 2 Maximum allowable total exposure factor of different constructions

Construction	Maximum allowable exposure factor $E^{(1)}$
All external masonry walls protected by: rendering (to BS EN 13914 : 2005) tile hanging slate hanging 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) Based upon the approach in BS 5618 : 1985 and also outlined in BBA Information Sheet No 10.

Buildings over 12 m high and up to and including 25 m high

3.10 The width of residual clear cavity to be achieved is to be in excess of 50 mm, and the following requirements apply:

- from ground level the maximum height of continuous cavity walls must not exceed 12 m; above 12 m the maximum height of continuous cavity wall must not exceed 7 m. In both cases, breaks should be in the form of continuous horizontal cavity trays and weepholes discharging to the outside
- the specifier must take extra care when detailing to ensure that the introduction of the insulation does not affect the weather resistance of the wall. More than average site supervision is recommended during the installation of the product
- where, for structural reasons, the cavity width is reduced, eg by the intrusion of ring beams, a minimum residual cavity width of 25 mm must be maintained and extra care must be taken with fixings and weatherproofing, eg inclusion of cavity trays with weepholes.

Full fill use

Buildings up to and including 12 m high

3.11 The following design conditions should be followed:

- in full fill it should be ensured that the slabs fill the cavity and are built into the walls as construction proceeds
- the insulation thickness should remain constant where possible. Should any changes in thickness occur, vertically, a horizontal damp-proof cavity tray should separate each thickness change
- a minimum thickness of 50 mm should be maintained where possible. Where, for structural reasons, the insulation thickness is reduced by the intrusion of ring beams, a minimum thickness of 25 mm of insulation should be maintained and the manufacturer's advice on fixing and weatherproofing should be sought
- raked or recessed mortar joints should be avoided in high exposure areas
- exposure rating should not exceed 120 when calculated in accordance with BS 5618 : 1985.

Buildings over 12 m high and up to and including 25 m high

3.12 Where the walls of a building are between 12 m and 25 m high, the following requirements also apply:

- from ground level, the maximum height of continuous cavity must not exceed 12 m. Above 12 m, the maximum height of continuous cavity must not exceed 7 m
- the area to be insulated must not be an infill panel in a framed structure

- the Certificate holder in association with the architect shall carry out a detailed programme of assessment of the project including an examination of the quality of installation as work progresses. Above-average site supervision is recommended during installation
- Certification relates only to buildings where the Certificate holder has given written approval for use of the product in the specified building.

4 Thermal performance

4.1 Calculations of the thermal transmittance (U value) of specific external wall constructions should be carried out in accordance with BS EN ISO 6946 : 1997 and BRE⁽¹⁾ report (BR 443 : 2006) *Conventions for U-value calculations*, using the declared thermal conductivity ($\lambda_{90/90}$ value) given in Table 3.

(1) Building Research Establishment.

Slab thickness (mm)	Slab density (kgm ⁻³)	Declared thermal conductivity (Wm ⁻¹ K ⁻¹)
65–100	32.0	0.032
65–100	28.0	0.034
50	24.0	0.035
55–65	18.5	0.036
65–150	16.8	0.037

4.2 The U value of a typical brick and block cavity wall construction will depend on the cavity width and the insulating value of the internal block leaf and finish and the board thickness.

4.3 The product can contribute to achieving the following design U values:



England and Wales and Northern Ireland

- 0.35 Wm⁻²K⁻¹ required for 'notional' dwellings in SAP 2005 and buildings other than dwellings in SBEM (see also section 4.2)
- 0.35 Wm⁻²K⁻¹ limit average specified in Approved Documents L1A (Table 2) and L2A (Table 4), and Technical Booklets F1 (Table 2.2) and F2 (Table 2.4) (see also section 4.2)
- 0.70 Wm⁻²K⁻¹ limit for an individual element specified in Approved Documents L1A (Table 2) and L2A (Table 4) and, Technical Booklets F1 (Table 2.2) and F2 (Table 2.4).

Scotland

- 0.20 Wm⁻²K⁻¹ required for the 'simplified approach – solid fuel package 6' 'notional' dwelling in Mandatory Standard 6.1, clause 6.1.6⁽¹⁾
- 0.25 Wm⁻²K⁻¹ required for 'notional' dwellings in SAP 2005 (for Scotland) and the 'simplified approach – packages 1 to 5' in Mandatory Standard 6.1, clause 6.1.6⁽¹⁾
- 0.30 Wm⁻²K⁻¹ limit average specified in Mandatory Standard 6.2, clause 6.2.1⁽¹⁾⁽²⁾
- 0.70 Wm⁻²K⁻¹ limit for an individual element specified in Mandatory Standard 6.2, clause 6.2.1⁽¹⁾⁽²⁾.

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

4.4 Where a proposed wall U value is not better than (or is greater than in Scotland) the relevant 'notional' value specified in section 4.3, additional energy saving measures will be required in the building envelope and/or services to achieve the required overall carbon dioxide emission rate reduction of about 20% in dwellings (18% to 25% in Scotland) and 23% to 28% in buildings other than dwellings.

4.5 Compliance with the guidance referred to in section 4.6 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) ('simplified approach' for Scotland).

4.6 The product can maintain or contribute to maintaining continuity of thermal insulation at junctions between the external wall and the 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: Accredited construction details for dwellings and similar buildings* TSO 2002

Scotland — Accredited Construction Details (Scotland).

Northern Ireland — Accredited Construction Details (version 1.0).

5 Condensation risk

Surface condensation



5.1 Walls will limit the risk of surface condensation adequately when the thermal transmittance (U value) does not exceed $0.7 \text{ Wm}^{-2}\text{K}^{-1}$ 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 : Accredited construction details for dwellings and similar buildings* TSO 2002 or BRE Information Paper IP 1/06.



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

Interstitial condensation



5.3 Walls 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 Annex D).

6 Liquid water penetration



6.1 When the product is used in situations where it bridges the dpc in walls, dampness from the ground will not pass through to the inner leaf provided the cavity wall is detailed in accordance with the requirements and provisions of the national Building Regulations:

England and Wales — Approved Document C2(a)

Scotland — Mandatory Standard 3.4, clause 3.4.5⁽¹⁾⁽²⁾

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

Northern Ireland — Technical Booklet C, Section 1.6.

6.2 Constructions incorporating the product and built in accordance with BS 5628-3 : 2005 will resist the transfer of precipitation to the inner leaf and satisfy the national Building Regulations:

England and Wales — Requirement C2(b)

Scotland — Mandatory Standard 3.10, clause 3.10.3⁽¹⁾⁽²⁾

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

Northern Ireland — Regulation C, Section 2.

6.3 In all situations and to prevent bridging of the cavity, it is particularly important to ensure during installation that:

- the dpc should not project into cavity at ground-floor level as it can lead to catching mortar droppings
- wall ties and fixings are installed correctly and are thoroughly clean
- excess mortar is cleaned from the cavity face of the leading leaf and any debris removed from the cavity
- mortar droppings are cleaned from the exposed edges of installed boards
- at lintel level, a cavity tray, stop ends and weepholes, must be provided
- installation is carried out to the highest level on each wall or the top edge of the insulation is protected by a cavity tray.

7 Behaviour in relation to fire



7.1 The product does not prejudice the fire resistance properties of the wall. The Certificate holder has declared the product is characterised as Class A1 'reaction to fire' when classified in accordance with BS EN 13501-1 : 2007.



7.2 The requirements of the Building Regulations relating to fire spread in cavity walls, can be met in buildings of all purpose groups without the need for cavity barriers, provided the construction complies with the provisions detailed in:

England and Wales — Approved Document B, Diagram 13, Volume 1 and Volume 2, Diagram 34

Northern Ireland — Technical Booklet E, Diagram 3.5.

7.3 A summary of these provisions is given here:

England and Wales and Northern Ireland

- the wall must consist of masonry inner and outer leaves, each at least 75 mm thick
- the cavity must not be more than 300 mm wide (Northern Ireland only)
- the cavity must be closed at the top of the wall and at the top of any opening
- in addition to the insulation only the following should be placed in, or exposed to, the cavity:
 - timber lintels, window or door frames, or end of timber joists
 - pipe, conduit or cables
 - dpc, flashing, cavity closer or wall tie

- domestic meter cupboard, provided there are not more than two cupboards to a dwelling, the opening in the outer leaf is not more than 800 mm by 500 mm for each cupboard, and the inner leaf is not penetrated except by a sleeve not more than 80 mm by 80 mm, which is fire-stopped.



7.4 For constructions not covered by sections 7.2 and 7.3 cavity barriers must be provided to comply with:

England and Wales — Approved Document B, Volume 1, Section 6 and Volume 2, Section 9.

Scotland — Mandatory Standard 2.4, clauses 2.4.1⁽¹⁾, 2.4.2⁽¹⁾, 2.4.7⁽¹⁾ and 2.4.9⁽²⁾.

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

Northern Ireland — Technical Booklet E, Paragraphs 3.35 to 3.38.

8 Proximity of flues and appliances

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

England and Wales — Approved Document J

Scotland — Mandatory Standard 3.19

Northern Ireland — Technical Booklet L.

9 Durability



The product is stable, rot-proof and durable, and will remain effective as an insulation system for the life of the building.

Installation

10 General

10.1 The walls are constructed leading with either the inner or outer leaf with Crown DriTherm Cavity Slab fixed to the cavity face of the leading leaf. In partial fill use, it is recommended that the inner leaf be constructed ahead of the outer leaf and the slab fastened to the cavity face of the inner leaf. In full fill use, it is recommended that the external leaf be constructed ahead of the internal leaf so that any mortar protruding into the cavity space from the back of the external leaf can be cleaned off before installing the slab.

Supervision requirements for buildings over 12 m in height and up to 25 m in height — Full fill

10.2 To comply with this Certificate, the Certificate holder's specialists experienced in site practice and installation will attend the site to provide demonstrations to ensure correct installation from the outset.

10.3 Adequate supervision of the installation must be maintained and the Certificate holder's specialists must have right of access to site to ensure correct installation.

11 Procedure

Partial fill

11.1 The procedure for installing the product using wall ties acceptable for insulation retention and structural stability is:

- a section of the leading leaf is built with the first row of wall ties, at approximately 600 mm horizontal spacing, where the insulation is to begin. The first run of slabs may commence below damp-proof course level to provide some edge insulation for the floor (see Figure 1)
- the leading leaf is then built up to a minimum height of 675 mm, with a second row of wall ties at 450 mm vertical spacing. It is essential that all wall ties slope downwards towards the outer leaf. The slabs are then compressed slightly between the upper and lower wall ties, behind the retaining clips or wheels to form a closely butt-jointed run (see Figure 1).

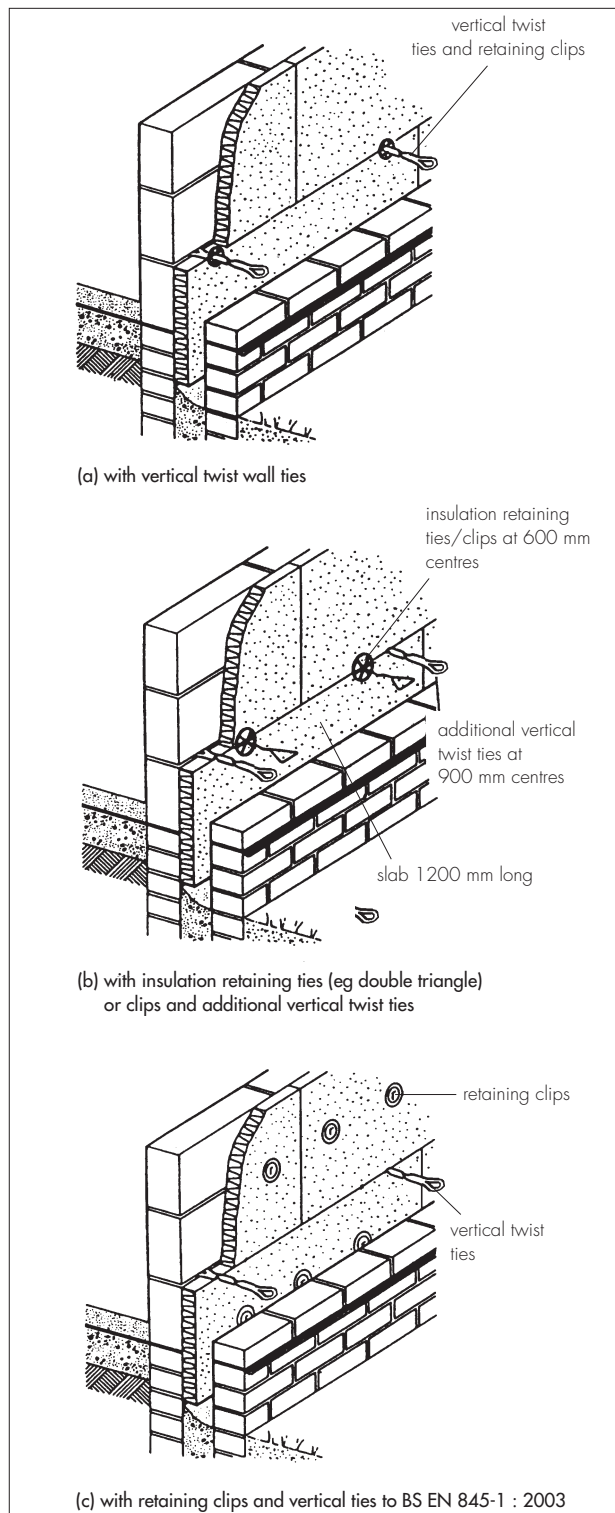
11.2 Horizontal spacing of wall ties should be determined as:

- where insulation retaining ties/clips are sufficient for structural purposes, horizontal spacing should be 450 mm or 600 mm depending on the thickness of the thinner leaf
- where additional vertical twist ties are required, insulation retaining ties/clips should be spaced at 600 mm horizontal centres to give adequate retention of the slabs whilst additional ties are spaced in accordance with BS 5628-3 : 2005 (see Figure 1).

11.3 The other leaf is then built up to the level of the top of the slabs.

11.4 Successive sections of wall incorporating approved wall ties are constructed and Crown DriTherm Cavity Slab installed as work proceeds up to the required height.

Figure 1 Partial fill fixing systems



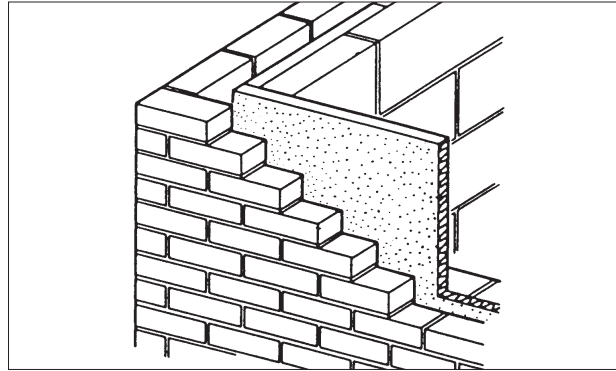
11.5 The procedure for installing the product using the penetration clip retaining system is:

- a section of the leading leaf is built with the first row of wall ties at approximately 600 mm horizontal spacing, where the insulation is to begin. The first run of slabs may commence below damp-proof course level to provide some edge insulation for the floor (see Figure 1)
- the leading leaf is built up to a minimum height of 675 mm with a second row of wall ties at 450 mm vertical spacing. The ties are positioned at a 450 mm or 900 mm horizontal spacing, depending on the thickness of the thinner leaf. The slabs are compressed slightly between the upper and lower wall ties to form a closely butt-jointed run. The slabs are then retained against the leading leaf by the insulation retaining clips (see Figure 1), which are pressed lightly through the insulation and located in the 'green mortar' bed joint, except at dpc level where the clips may be located in the perpend joints. It is important that the mortar should have the correct consistency; it should be stiff enough to retain the clip yet soft enough to avoid any hammering into place. Three clips per slab are required at approximately 400 mm centres.

11.6 Where additional ties are required, at less than 450 mm vertical spacing, the slabs must be cut and neatly fitted around them. Under no circumstances should they be impaled over ties.

11.7 The slabs should be close butted at corners (see Figure 2). It is recommended that whole slabs should be used at corners, but if this is not possible the edge butting faces should be factory cut.

Figure 2 Slabs butted at corners



Mortar droppings

11.8 After each section of the leading leaf is built, excess mortar should be removed from the cavity face and mortar droppings cleaned from exposed edges of the installed slabs before installation of the next run of the product. Use of a cavity board is recommended to protect slab edges and make cleaning easier. Also, a cavity batten will protect the installed slabs and help to keep a cavity clean as the following leaf is built (see Figure 3).

Cut pieces

11.9 The slabs can be cut, using a sharp knife to fit around features such as windows, doors and air bricks. It is essential that cut pieces completely fill the spaces for which they are intended and that no gaps are left in the insulation.

Full fill

11.10 Walls are constructed in the conventional manner, with the first row of wall ties where the insulation is to begin, but not on the damp-proof course, and at approximately 600 mm horizontal spacing. The first run of slabs may commence below damp-proof course level to provide some edge insulation for the floor (see Figure 4).

11.11 A section of the wall leaf is built up to a course above the next row of wall ties which are placed at the usual spacing of 450 mm vertically and not more than 900 mm horizontally.

11.12 The slabs are compressed slightly and placed between the upper and lower wall ties to form a closely butted run (see Figure 4).

11.13 The drip on each of the upper wall ties is inserted into the top of the slabs. This is important to ensure that it functions correctly (see Figure 5).

11.14 The other leaf is built up to the same level as the slabs, with its inner face in contact with the slabs (see Figure 5).

11.15 Successive sections of wall, incorporating wall ties, are constructed and the slabs installed as work proceeds up to the required height.

11.16 After each section of the wall leaf is built, excess mortar should be removed and mortar droppings cleaned from exposed edges of the installed slab [see Figure 3(a)] before installation of the next section of slabs.

11.17 It is recommended that 50 mm to 75 mm thick slabs are bent around corners (see Figure 6). Thicker slabs should be close butted to avoid cold bridges.

11.18 Where openings such as doors and windows are in close proximity it is recommended that a continuous lintel is used. Individual lintels should have stop ends.

11.19 The slabs can be cut with a sharp knife to fit features such as windows, doors, apertures and air bricks.

11.20 It is essential that cut pieces completely fill the spaces for which they are intended and no gaps must be left in the insulation (see Figure 7).

11.21 Small pieces must be fitted with the fibre layer parallel to the plane of the wall.

11.22 The slabs should always be installed to the highest level of each wall.

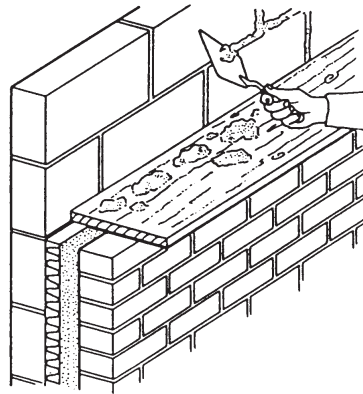
11.23 If installation of slabs is terminated at any other levels, the top edge of the insulation must be protected by a cavity tray and alternate perpend joints raked out to provide adequate drainage of water from this tray.

Protection

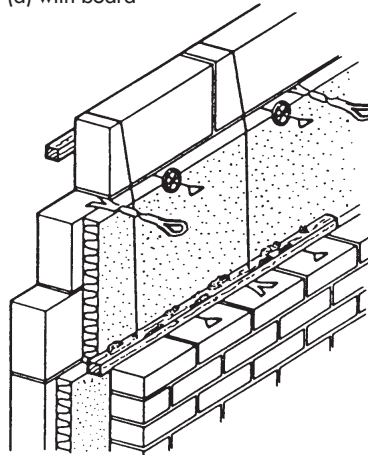
11.24 All building involving the slabs, particularly work which is interrupted, must conform to BS 5628-3 : 2005, sections A4.1.3.2, A4.1.3.9, A5.1.1.3 and A5.4.4.

Figure 3 Removal of excess mortar

Excess mortar must be cleaned off as shown, a cavity batten or board will protect the installed slabs and keep the cavity clear



(a) with board



(b) with cavity batten

Figure 4 Building in the first row of slabs

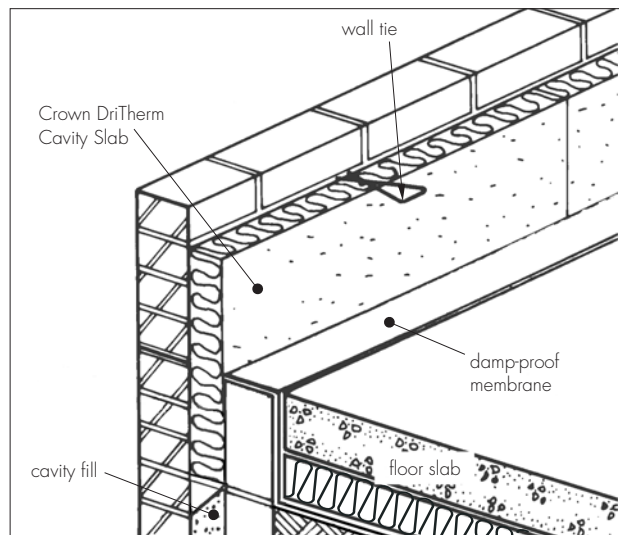


Figure 5 Wall tie drips positioned in centre of slabs

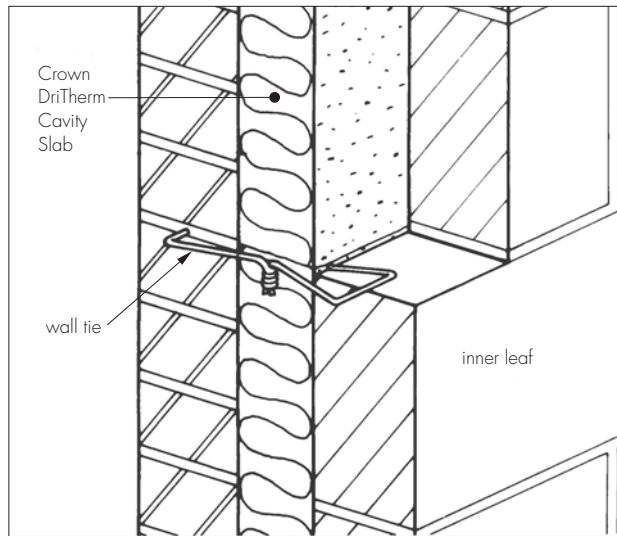


Figure 6 Slabs bent around corners

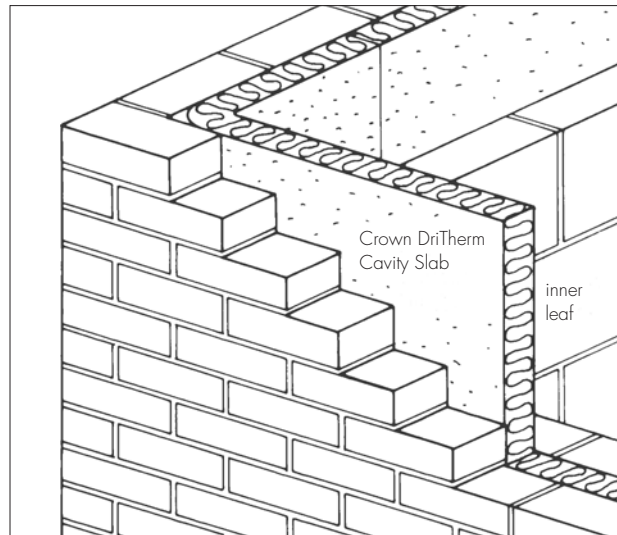
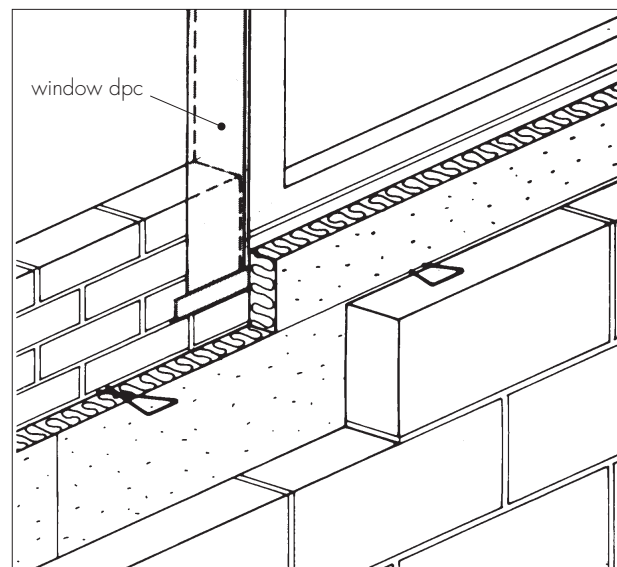


Figure 7 Use of cut pieces in/around gaps



12 Tests

Tests were carried out to determine:

- density
- water uptake at saturation
- dimensional accuracy
- effect on the water resistance of the cavity wall with the slabs installed (full fill).
- resistance to water penetration
- water absorption at high relative humidity
- efficiency of fixing the system

13 Investigations

13.1 Regular factory inspections have been carried out to ensure that quality is being maintained.

13.2 Failure of the product in use has not been reported to the BBA.

Bibliography

BS 5250 : 2002 *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 5628-3 : 2005 *Code of practice for use of masonry — Materials and components, design and workmanship*

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

BS DD 140-2 : 1987 *Wall ties — Recommendations for design of wall ties*

BS EN 845-1 : 2003 *Specification for ancillary components for masonry — Ties, tension strips, hangers and brackets*

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 : 2005 *Design, preparation and application of external rendering and internal plastering — External rendering*

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

BS EN ISO 13788 : 2002 *Hygrothermal performance of building components and building elements — Internal surface temperature to avoid critical surface humidity and interstitial condensation — Calculation methods*

14 Conditions

14.1 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.

14.2 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.

14.3 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
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

14.4 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.

14.5 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.

