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**Agrément
Certificate
No 97/3426**
*Third issue**

Designated by Government
to issue
European Technical
Approvals

ISOTHANE TECHNITHERM CAVITY WALL STABILISATION AND INSULATION SYSTEM

Système de stabilisation et d'isolation aux murs creux
Kerndämmung und Stabilieranlage

Product




Typical Isothane Technitherm installation

- THIS CERTIFICATE RELATES TO THE ISOTHANE TECHNITHERM, CAVITY WALL STABILISATION AND INSULATION SYSTEM, A RIGID POLYURETHANE FOAM CAVITY WALL STABILISATION AND THERMAL INSULATION SYSTEM.
- The product is for use in buildings up to and including 12 metres in height.
- The product is used to restore the structural stability and reduce the thermal transmittance of existing cavity walls, with masonry inner and outer leaves, in which the conventional wall ties have corroded.

Regulations

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 cavity wall insulation with the Building Regulations. In the opinion of the BBA, the Isothane Technitherm Cavity Wall Stabilisation and Insulation System, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements.

| | |
|----------------------------------|---|
| Requirement: A1 | Loading |
| Comment: | Tests carried out by the BBA indicate that a wall filled with the product can meet this Requirement. See section 7.1 of this Certificate. |
| Requirement: B3(4) | Internal fire spread (structure) |
| Comment: | Walls filled with the product can meet this Requirement. See sections 8.2 to 8.4 of this Certificate. |
| Requirement: C2(a)(b) | Resistance to moisture |
| Comment: | Walls incorporating the product can meet this Requirement. See sections 7.2 and 10.2 of this Certificate. In addition the product may be used in situations where it bridges the dpc. See sections 10.1 and 10.2 of this Certificate. |
| Requirement: L1(a)(i) | Dwellings |
| Comment: | The product can enable, or contribute to enabling, a wall to meet this Requirement. See sections 12.2 and 12.3 of this Certificate. |
| Requirement: Regulation 7 | Materials and workmanship |
| Comment: | The product is acceptable. See section 13.1 of this Certificate. |

continued

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continued

- *It is essential that the walls comply with the conditions set out in the Design Data and Installation parts of this Certificate.*

- *Installation must be carried out under the BBA Surveillance Scheme for Cavity Wall Insulation, by installers trained by the Certificate holder and approved jointly by the Certificate holder and the BBA.*

2 The Building (Scotland) Regulations 2004



In the opinion of the BBA, the Isothane Technitherm Cavity Wall Stabilisation and Insulation System, 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 product can contribute to a construction meeting this Regulation. See the <i>Installation</i> part of this Certificate. |
| Regulation: | 9 | Building standards — construction |
| Standard: | 1.1(a)(b) | Structure |
| Comment: | | Tests by the BBA indicate that a wall filled with the product can satisfy this Standard with reference to clause 1.1.1 ⁽¹⁾ . |
| Standard: | 2.3 | Structural protection |
| Comment: | | The product is combustible and its use is restricted by this Standard in buildings other than dwellings or shared residential accommodation with reference to clauses 2.3.1 ⁽¹⁾ , 2.3.2 ⁽¹⁾ and 2.3.4 ⁽¹⁾ . See section 8.1 of this Certificate. |
| Standard: | 2.4 | Cavities |
| Comment: | | Walls incorporating this product must comply with this Standard with reference to clauses 2.4.1 ⁽¹⁾ , 2.4.2 ⁽²⁾ , 2.4.7 ⁽¹⁾ and 2.4.9 ⁽²⁾ . See section 8.4 of this Certificate. |
| Standard: | 3.4 | Moisture from the ground |
| Comment: | | The product does not absorb water by capillary action and, therefore, may be used where it bridges the dpc of either leaf, with reference to clause 3.4.5 ⁽¹⁾⁽²⁾ . See sections 10.1 and 10.2 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 7.1, 7.2, 10.1 and 10.2 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 section 13.1 of this Certificate. |
| Standard: | 6.2 | Building insulation envelope |
| Comment: | | The product will enable a wall to satisfy or contribute to satisfying the requirements of this Standard, with reference to clauses 6.2.1 ⁽¹⁾⁽²⁾ (Table 1), 6.2.4 ⁽¹⁾⁽²⁾ and 6.2.5 ⁽¹⁾⁽²⁾ . See sections 12.2 and 12.3 of this Certificate. |

(1) Technical Handbook (Domestic).
(2) Technical Handbook (Non-Domestic).

3 The Building Regulations (Northern Ireland) 2000



In the opinion of the BBA, the Isothane Technitherm Cavity Wall Stabilisation and Insulation System, 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 product is acceptable. See section 13.1 of this Certificate. |
| Regulation: | C4 | Resistance to ground moisture and weather |
| Comment: | | Walls incorporating the product can satisfy this Regulation. See sections 7.2 and 10.2 of this Certificate. In addition the product may be used in situations where it bridges the dpc. See section 10.1 of this Certificate. |
| Regulation: | D1 | Stability |
| Comment: | | Tests by the BBA indicate that a wall filled with the product will satisfy this Regulation. See section 7.1 of this Certificate. |
| Regulation: | E4 | Internal fire spread — Structure |
| Comment: | | Walls incorporating the product can satisfy this Regulation. See sections 8.2 to 8.4 of this Certificate. |
| Regulation: | F2 | Building fabric |
| Comment: | | The product can satisfy this Regulation. See sections 12.2 and 12.3 of this Certificate. |

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

See section:

6 *Delivery and site handling* (6.1, 6.2 and 6.3).

Technical Specification

5 Description


- 5.1 The Isothane Technitherm Cavity Wall Stabilisation and Insulation System is a cream coloured, polyurethane foam compound.
- 5.2 The raw materials are manufactured by the Certificate holder, who carries out regular quality control checks to maintain product quality.
- 5.3 The material is foamed in situ by mixing together isocyanate and resin components. The foam mix produced is soft and fluid but quickly expands and hardens to a rigid foam mass.
- 5.4 It is injected as a syrup from a hand gun into the wall through nominal 12 mm diameter holes spaced in a predetermined pattern.
- 5.5 Stainless steel anchors are installed at one metre horizontal centres at the upper floor level.
- 5.6 The product has a core density in the range of 30 kgm^{-3} to 40 kgm^{-3} .

6 Delivery and site handling

- 6.1 The two components of the system are delivered to site in separate metal drums. These are marked with the manufacturer's name, product name, batch code and the BBA identification mark incorporating the number of this Certificate.
- 6.2 The sealed drums should be stored inside, protected from frost and moisture.
- 6.3 The resin and isocyanate components are classified as 'Irritant' and 'Harmful', respectively under the Chemicals (Hazard Information and Packaging for Supply) Regulations 2002 (CHIP3) and the packaging bears the appropriate hazard warning labels. When fully cured, Isothane Technitherm does not constitute a hazard, under normal conditions.

Design Data

7 General

 7.1 The Isothane Technitherm Cavity Wall Stabilisation and Insulation System is satisfactory for use in restoring the structural stability of existing external cavity walls with masonry inner and outer leaves in which the conventional wall ties have corroded. Masonry includes clay and calcium silicate bricks, concrete blocks, natural and reconstituted stone blocks.

7.2 Walls should be suitable when assessed in accordance with BS 8208-1 : 1985.

7.3 The foam also substantially improves the U value (thermal transmittance) of the wall.

7.4 The product may not be used in walls that are bowed or distorted; however, it may be used in walls which have cracked along the line of the corroded wall ties. Such cracks should be repointed, prior to filling, to prevent rain penetration.


7.5 Whenever practicable all of the cavity space from ground level to the roof or gable copings should be filled. Partial filling is only allowed when separately insulating semi-detached or terraced properties.


7.6 The product may be installed only where there are no signs of dampness on the inner face of the cavity wall other than those caused solely by condensation.

7.7 Any cavity fill will cause the outer leaf to dry more slowly and, in certain conditions, may increase the risk of frost damage. Although this risk is slight, cavity filling must not be used when evidence of previous frost damage exists.

7.8 This Certificate covers the use of the product in any exposure zone subject to the above conditions being met.

8 Behaviour in relation to fire

 8.1 The use of the product does not prejudice the fire resistance properties of the wall. It is unlikely to become ignited within the cavity when used in the context of this Certificate. However, the directions contained in this Certificate relating to the sealing of an uncapped cavity and removing insulant present in the loft space after installation must be carefully followed.

 8.2 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 28

Northern Ireland

Technical Booklet E, Diagram 3.5.

8.3 A summary of these provisions is given here:

England and Wales and Northern Ireland

- (1) The wall must consist of masonry inner and outer leaves, each at least 75 mm thick
- (2) The cavity must not be more than 100 mm wide (Northern Ireland only)

Northern Ireland

Technical Booklet E, Diagram 3.5.

8.3 A summary of these provisions is given here:

England and Wales and Northern Ireland

- (1) The wall must consist of masonry inner and outer leaves, each at least 75 mm thick
- (2) The cavity must not be more than 100 mm wide (Northern Ireland only)
- (3) The cavity must be closed at the top of the wall and at the top of any opening
- (4) 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.



8.4 For constructions not covered by sections 8.2 and 8.3 cavity barriers must be provided to comply with:

England and Wales

Approved Document B, Sections 10.2 to 10.4

Scotland

Mandatory Standard 2.4

Northern Ireland

Technical Booklet E, Paragraphs 3.27 to 3.30.

9 Proximity of flues and appliances

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

England and Wales

Approved Document J

Scotland

Mandatory Standard 3.19

Northern Ireland

Technical Booklet L.

10 Liquid water penetration



10.1 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 wall is detailed in accordance with the requirements and provisions of the national Building Regulations:

England and Wales

Approved Document C, Section 5 : *Walls*

Scotland

Mandatory Standard 3.4

Northern Ireland

Technical Booklet C, Section 1.6.

10.2 Constructions built in accordance with BS 5628-3 : 2001 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

Northern Ireland

Regulation C4.

11 Water vapour penetration

11.1 The product is not a water vapour barrier but it has a typical water vapour resistivity of $450 \text{ MNsg}^{-1}\text{m}^{-1}$ at 38°C and 88% RH.

11.2 If the product is to be used in external walls of rooms expected to have high humidities, care must be taken to provide adequate permanent ventilation in order to avoid possible problems with the formation of interstitial condensation in the internal wall leaf.

12 Thermal insulation

12.1 For the purpose of U value calculations to determine if the requirements of the Building (or other statutory) Regulations are met, the thermal conductivity (λ value) of the insulation may be taken as shown in Table 1.

Table 1 Thermal conductivity

| Thickness (mm) | Thermal conductivity ($\text{Wm}^{-1}\text{K}^{-1}$) |
|----------------|--|
| <80 | 0.028 |
| 80 to 120 | 0.026 |
| >120 | 0.025 |



12.2 The requirement for limiting heat loss through the building fabric can be satisfied if the U values of the building elements, including thermal bridging, do not exceed the maximum values in the relevant Elemental Methods given in the national Building Regulations. The effect of thermal bridging should be taken into account:

England and Wales

Approved Document L1

Scotland

Mandatory Standard 6.2

Northern Ireland

Technical Booklet F, Table 1.2 or 2.4.

12.3 Guidance is also given in these documents on selecting the thickness of insulation required to enable a wall to achieve the desired U value. Alternative approaches are also described which allow for some flexibility in design of U values for individual constructional elements.

13 Durability



13.1 The product stabilises the wall by adhering to the inner surfaces of the cavity and providing a continuous structural connection between the two leaves. It has the ability to form a good bond with surfaces that are unprepared and in a raw state.

13.2 The adhesive bond strength achieved is better than 60 kNm^{-2} which is generally in excess of the wind suction likely to occur on the wall.

13.3 Provided installation is carried out in accordance with the provisions of this Certificate, the product will remain effective as a replacement for wall ties for more than 25 years.

Installation

14 Site survey

14.1 An assessment is carried out on the Isothane Technitherm Cavity Wall Stabilisation and Insulation System prior to installation by a trained assessor (who may also be the installing technician) to ascertain the suitability of the property (or properties) for treatment, its dimensions (with a sketch) and the width and condition of the cavity. A complete assessment report is prepared and held at the installer's offices. Particular problems are specifically identified and any reasons for rejection of the work noted.

14.2 Quotations, tenders and invoices bear the BBA identification mark, incorporating the number of this Certificate.

15 Site preparation

15.1 The installing technician ensures that the property has been correctly surveyed and is suitable for insulating with the Isothane Technitherm Cavity Wall Stabilisation and Insulation System. Any problems encountered during drilling which prevent compliance with this Certificate are referred to the installation company before proceeding.

15.2 Essential ventilation openings such as those providing combustion air or underfloor ventilation and all flues in the cavity wall are checked. If adequate sleeving or other cavity closures are not present, installation must not proceed until these

openings have been sleeved or otherwise modified to prevent blockage by the insulant.

15.3 All gaps and cracks in the inner and outer leaves and the tops of uncapped cavities are sealed where possible to limit any escape of the material during and after installation.

15.4 Corroding wall ties should be identified and if necessary, removed or isolated in accordance with BRE Digest 329 : 2000 *Installing wall ties in existing constructions*.

16 Approved installers

Installation of the product is carried out by the Certificate holder or their approved installers, an approved installer being a company which:

- is required to satisfy an initial site installation check by the BBA prior to approval by the Certificate holder and is subject to the BBA Surveillance Scheme
- is approved by the Certificate holder and the BBA to install the product
- has undertaken to comply with the Certificate holder's installation procedure
- is employing operatives who have been issued with appropriate identity cards by the Certificate holder. At least one member of each installation team must carry a card
- is subject to supervision by the Certificate holder, including unannounced site inspections.

17 Supervision

17.1 Installation should be carried out in accordance with the BBA Surveillance Scheme.

17.2 During installation, as an aid to determining that the installation conforms to the Certificated method, checks can be made to ensure that:

- the pattern of holes should comply with the description given in section 18.3
- the injection of the material should take place at each hole to complete the filling of the cavity space.

18 Procedure

18.1 When the product is used for the purpose of stabilisation and insulation, stainless steel anchors are installed as recommended in BRE Digest 329 : 2000 *Installing wall ties in existing constructions* and BS 7456 : 1991 (see also section 5.5 of this Certificate).

Injection equipment

18.2 The installer provides all necessary materials and equipment for installation, plus materials for making good the walls after installation of the product. Injection equipment comprises a proportioning unit of two, identical air-driven pumps, which are connected together and give an accurately metered supply of the isocyanate and resin components to the injection gun. Each air-driven pump supplies a separate component and has a fixed cross-

sectional area to give a 1:1 ratio by volume. Two different types of nozzle are used to inject the mixed components into the cavity. A stroke counter is fitted to the gun to monitor the correct number of strokes.

Injection holes

18.3 Holes of 12 mm diameter are drilled in the outer leaf at the intersections of mortar joints. In general, a staggered drilling pattern is used, with holes approximately 0.65 m (ie three bricks) apart horizontally, and 0.45 m (ie six bricks) apart vertically. At door and window frames, holes are drilled at 0.3 m (four bricks) vertical centres and approximately 0.2 m away from the frame. To minimise the risk of foam extrusion to the roof space, the highest row of holes is drilled at 0.4 m (two bricks) centres horizontally and 0.2 m below the design height of the insulation. When treating semi-detached or terraced houses, a vertical column of holes is drilled at 0.3 m (four bricks) centres, 0.3 m in from the party line between properties. Where necessary air bricks are removed and replaced with a sleeved type. Care must be taken during the

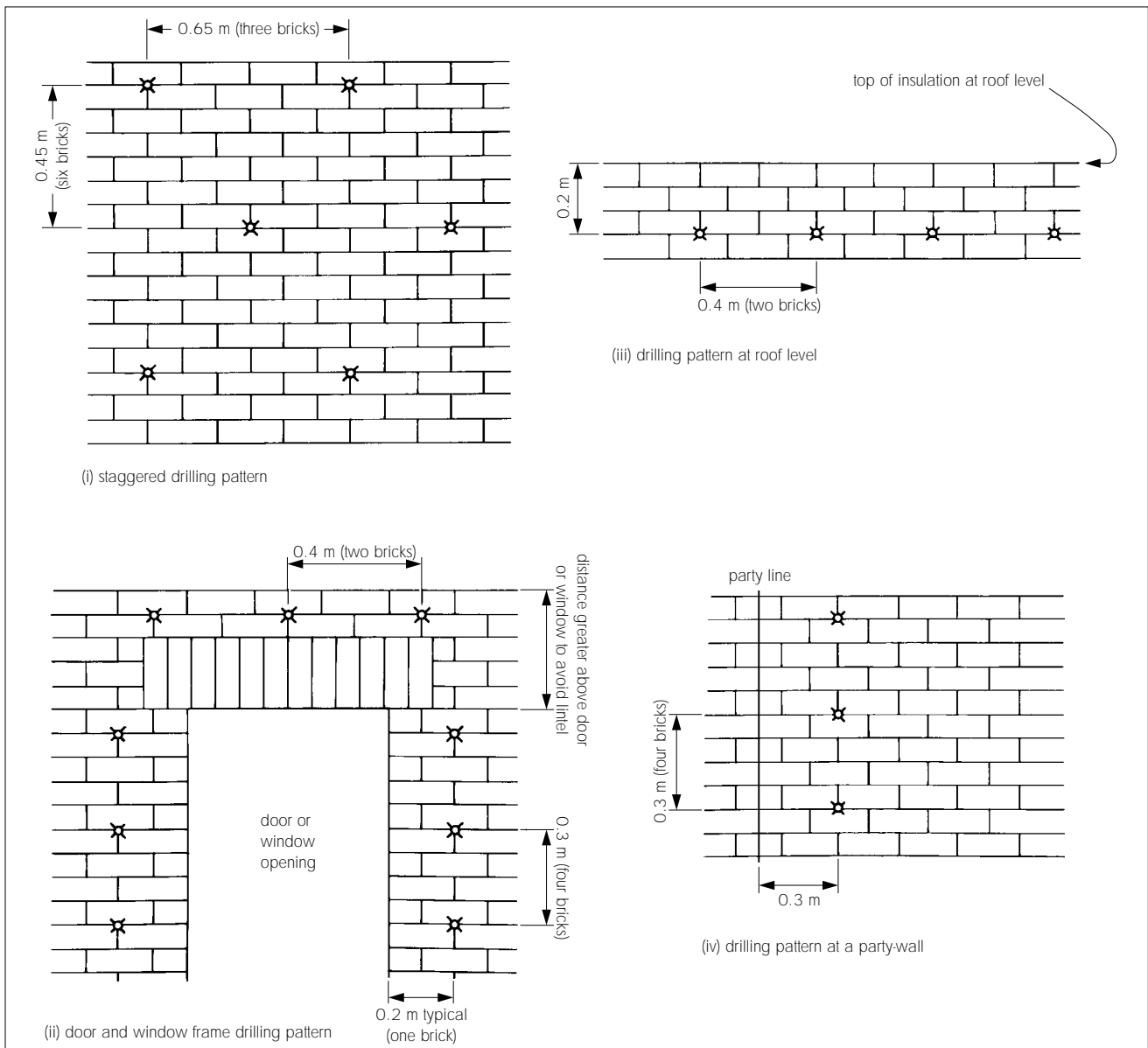
drilling process, to ensure that no damage is done to any dpc at the various building details, eg above windows (see Figure 1).

Pre-injection checks

18.4 The isocyanate and resin components are temperature conditioned before starting the machine.

18.5 The type A nozzle is attached to the mixing head and the primary heater and hose line temperatures are set. Higher temperatures increase foam reactivity and minimise sideways flow. Since reaction time is shorter, a bag test can be carried out in a small bag, as used in BS 5617 : 1985 Appendix B. The foam is injected into the transparent polythene bag for two strokes of the pump, the typical injection time into one hole for a boundary area. The mix reaction is timed as it enters the bag and a note made (in seconds) of the cream time, rise time and tack free time. Once the foam has set, it is examined for sticky patches which could indicate a component surge. If it is good, another shot is injected and the foam allowed to cure (for at least 15 minutes). It is then

Figure 1 Drilling patterns



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checked for surface wrinkling, cut in half and the internal cell structure checked for blow holes or splits. A large cube is then cut, weighed and measured to determine the approximate density. When the bag tests are satisfactory, the shrinkage is determined as outlined in BS 5617 : 1985, Appendix B, and should not be more than 1%.

18.6 A foam quality check for the major area would be carried out after injection of the boundary areas. The type B nozzle is fitted, the primary heater and hose line temperatures are set. The above bag tests are carried out in a larger bag, using five strokes of the pumps, with the typical injection time into one hole. Once the tests have again been carried out satisfactorily, the machine is set up to commence foam injection of the major area.

Note: The raw materials can be irritants and should be handled only by trained personnel.

Injection procedure

18.7 For a property with a party-wall the vertical line of holes next to the party line is injected first, working upwards from the base, using two or three strokes per hole. After each fill, a plastic indicator stick is inserted into each hole to show that injection has taken place and to mark the presence of the foam. When all party-wall lines have been filled, the heater and hose line temperatures are reset. The type B injection nozzle is fitted and the equipment allowed to cool down to the lower temperature. Injection of the major areas now begins, adjacent to a sealed end (eg a door frame or the band of foam at a party line) beginning at the lowest row of holes. The first hole should be approximately 0.2 m away from the sealed end.

18.8 Six full strokes are injected as being typical for a 65 mm cavity; any adjustment to the number of strokes needed is then made. The complete row is then injected, with the indicator sticks being inserted and any 'topping-up' necessary being carried out at the same time. (A typical 'top-up' shot is two strokes). A minimum of two minutes is allowed to elapse before beginning the next row up, starting in the hole directly above the last one filled. This procedure continues until the total area (starting and finishing at a sealed end) has been filled to the required height. At the top row of holes, the number of injection strokes is reduced, to avoid intrusion of foam against the roof structure. Smaller shots may also be required around windows, door frames and ducts. When filling has been completed, the total number of strokes recorded on the counter is noted, plus the total weight of chemical used. This will enable an approximate check to be made on foam density.

Finishing

18.9 After injection of the product, all holes are made good to match the existing wall finish as closely as possible. All air vents are cleared and sleeved to provide underfloor ventilation. Checks

on flues (for heating appliances) are carried out as detailed in BS 7456 : 1991.

18.10 If the cavity is uncapped, any insulant which has expanded over the top of the cavity into the loft space is removed. The top of the insulant is then, where possible, isolated from the roof structure by suitably shaped plugs of mineral wool.

Technical Investigations

The following is a summary of the technical investigations carried out on the Isothane Technitherm Cavity Wall Stabilisation and Insulation System.

19 Tests

Tests were carried out to determine:

- the effect of foaming on the stability of a wall during and after treatment
- quality of adhesion between foam and bricks and between foam and lightweight concrete blocks
- foam density
- water vapour permeability of the foam
- water absorption of the foam
- resistance to penetration of liquid water
- effect on the water resistance of a cavity wall
- adequacy of fill of a cavity space.

20 Investigations

20.1 An examination was made of data relating to:

- thermal properties
- toxicity
- properties in relation to fire
- bond strength of the product
- suitability of the stainless steel anchor system.

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

20.3 Site visits were carried out to ensure that the installation procedure is satisfactory.

20.4 The company's training arrangements were examined and approved.

Bibliography

BS 5617 : 1985 *Specification for urea-formaldehyde (UF) foam systems suitable for thermal insulation of cavity walls with masonry or concrete inner and outer leaves*

BS 5628-3 : 2001 *Code of practice for use of masonry — Materials and components, design and workmanship*

BS 7456 : 1991 *Code of practice for stabilisation and thermal insulation of cavity walls (with masonry or concrete inner and outer leaves) by filling with polyurethane (PUR) foam systems*

Conditions of Certification

21 Conditions

21.1 This Certificate:

- (a) relates only to the product that is named, described, installed, used and maintained as set out in this Certificate;
- (b) is granted only to the company, firm or person identified on the front cover — no other company, firm or person may hold or claim any entitlement to this Certificate;
- (c) is valid only within the UK;
- (d) has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective;
- (e) is copyright of the BBA;
- (f) is subject to English law.

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

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

- (a) are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA;

(b) continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine; and

(c) are reviewed by the BBA as and when it considers appropriate.

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

- (a) the presence or absence of any patent, intellectual property or similar rights subsisting in the product or any other product;
- (b) the right of the Certificate holder to market, supply, install or maintain the product; and
- (c) the actual works in which the product is installed, used and maintained, including the nature, design, methods and workmanship of such works.

21.5 Any recommendations relating to the use or installation of this product which are contained or referred to in this Certificate are the minimum standards required to be met when the product is used. They do 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 or in the future; nor is conformity with such recommendations to be taken as satisfying the requirements of the 1974 Act or of any present or future 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 installation and use of this product.



In the opinion of the British Board of Agrément, the Isothane Technitherm Cavity Wall Stabilisation and Insulation System is fit for its intended use provided it is installed, used and maintained as set out in this Certificate. Certificate No 97/3426 is accordingly awarded to Isothane Ltd.

On behalf of the British Board of Agrément

Date of Third issue: 17th January 2006

A handwritten signature in black ink, appearing to read 'G. A. Cooper'.

Chief Executive

**Original Certificate issued on 15th December 1997. This amended version includes reference to updated thermal conductivity values, revised national Building Regulations and addition of new Conditions of Certification.*