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Agrément Certificate

18/5481

Product Sheet 1

BASF PLC CAVITY WALL INSULATION

BASF WALLTITE CV 100 CAVITY WALL INSULATION

This Agrément Certificate Product Sheet⁽¹⁾ relates to BASF WALLTITE⁽²⁾ CV 100 Cavity Wall Insulation, a rigid polyurethane foam injected in liquid form, for use in external masonry cavity walls up to and including 12 m in height with cavity widths not less than 40 mm, in new and existing domestic and non-domestic buildings. The product may also be used in walls above 12 m in height where a height-restriction waiver has been issued by the Certificate holder.

(1) Hereinafter referred to as 'Certificate'.

(2) WALLTITE is a registered trademark.

CERTIFICATION INCLUDES:

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



KEY FACTORS ASSESSED

Thermal performance — the product has a declared thermal conductivity (λ_D) of $0.026 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ (see section 6).

Water resistance — the product will resist the transfer of precipitation to the inner leaf (see section 7).

Condensation risk — the product will contribute to limiting the risk of surface condensation (see section 8).

Behaviour in relation to fire — the use of the product does not prejudice the fire properties of the wall (see section 9).

Durability — the product will have a life equivalent to that of the structure in which it is incorporated (see section 12).



The BBA has awarded this Certificate to the company named above for the product described herein. This product has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 9 February 2018

John Albon – Head of Approvals
Construction Products

Claire Curtis-Thomas
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, BASF WALLTITE CV 100 Cavity Wall Insulation, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):



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

Requirement:	B4(1)	External fire spread
Comment:		The product is not classified as of limited combustibility but may be used in buildings complying with Diagram 34 of this Requirement. See sections 9.1, 9.3 and 9.5 of this Certificate.
Requirement:	C2(a)	Resistance to moisture
Comment:		The product can contribute to satisfying this Requirement. See section 7.1 of this Certificate.
Requirement:	C2(b)	Resistance to moisture
Comment:		The product can contribute to satisfying this Requirement. See section 7.2 of this Certificate.
Requirement:	C2(c)	Resistance to moisture
Comment:		The product can contribute to satisfying this Requirement. See sections 8.1 to 8.3 of this Certificate.
Requirement:	L1(a)(i)	Conservation of fuel and power
Comment:		The product can contribute to satisfying this Requirement. See sections 6.1, 6.3 and 6.4 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The product is acceptable. See section 12 and the <i>Installation</i> part of this Certificate.
Regulation:	26	CO₂ emission rates for new buildings
Regulation:	26A	Fabric energy efficiency rates for new dwellings (applicable to England only)
Regulation:	26A	Primary energy consumption rates for new buildings (applicable to Wales only)
Regulation:	26B	Fabric performance values for new dwellings (applicable to Wales only)
Comment:		The product can contribute to satisfying these Regulations. See sections 6.1, 6.3 and 6.4 of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)	Durability, workmanship and fitness of materials
Comment:		The product is acceptable. See section 12 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	2.6	Spread to neighbouring buildings
Comment:		The product is not classified as non-combustible but may be used in walls of buildings in accordance with the exceptions permitted in this Standard, with reference to clauses 2.6.5 ⁽¹⁾ and 2.6.6 ⁽²⁾ . See sections 9.1, 9.4 and 9.5 of this Certificate.
Standard:	3.4	Moisture from the ground
Comment:		The product can contribute to satisfying this Standard, with reference to clauses 3.4.1 ⁽¹⁾⁽²⁾ and 3.4.5 ⁽¹⁾⁽²⁾ . See section 7.1 of this Certificate.
Standard:	3.10	Precipitation

Comment:		The product can contribute to satisfying this Standard, with reference to clauses 3.10.1 ⁽¹⁾⁽²⁾ and 3.10.3 ⁽¹⁾⁽²⁾ . See section 7.2 of this Certificate.
Standard:	3.15	Condensation
Comment:		The product can contribute to satisfying this Standard, with reference to clauses 3.15.1 ⁽¹⁾⁽²⁾ , 3.15.4 ⁽¹⁾⁽²⁾ and 3.15.5 ⁽¹⁾⁽²⁾ . See sections 8.1, 8.2 and 8.4 of this Certificate.
Standard:	6.1(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		The product can contribute to satisfying clauses, or parts of, 6.1.1 ⁽¹⁾ , 6.1.2 ⁽²⁾ , 6.1.6 ⁽¹⁾ , 6.2.1 ⁽¹⁾⁽²⁾ , 6.2.3 ⁽¹⁾ , 6.2.4 ⁽²⁾ , 6.2.5 ⁽²⁾ , 6.2.6 ⁽¹⁾ , 6.2.7 ⁽¹⁾ , 6.2.8 ⁽¹⁾⁽²⁾ , 6.2.9 ⁽¹⁾⁽²⁾ , 6.2.10 ⁽¹⁾⁽²⁾ , 6.2.11 ⁽¹⁾⁽²⁾ , 6.2.12 ⁽²⁾ and 6.2.13 ⁽¹⁾⁽²⁾ of these Standards. See sections 6.1, 6.3 and 6.4 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The product can contribute to satisfying the relevant requirements of Regulation 9, Standards 1 to 6, and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard. In addition, the product can contribute to a construction meeting a higher level of sustainability as defined in this Standard, with reference to clauses 7.1.4 ⁽¹⁾⁽²⁾ [Aspects 1 ⁽¹⁾⁽²⁾ and 2 ⁽¹⁾], 7.1.6 ⁽¹⁾⁽²⁾ [Aspects 1 ⁽¹⁾⁽²⁾ and 2 ⁽¹⁾] and 7.1.7 ⁽¹⁾⁽²⁾ [Aspect 1 ⁽¹⁾⁽²⁾]. See section 6.1 of this Certificate.
Regulation:	12	Building standards applicable to conversions
Comment:		All comments given for the product under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1 ⁽¹⁾⁽²⁾ and Schedule 6 ⁽¹⁾⁽²⁾ .
		(1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).



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

Regulation:	23	Fitness of materials and workmanship
Comment:		The product is acceptable. See section 12 and the <i>Installation</i> part of this Certificate.
Regulation:	28(a)(b)	Resistance to moisture and weather
Comment:		The product can contribute to satisfying this Regulation. See section 7 of this Certificate.
Regulation:	29	Condensation
Comment:		The product can contribute to satisfying this Regulation. See sections 8.1 and 8.2 of this Certificate.
Regulation:		External fire spread
Comment:	36(a)	The product is not classified as of limited combustibility but may be used in buildings complying with Diagram 4.5 of this Regulation. See sections 9.1, 9.3 and 9.5 of this Certificate.
Regulation:	39(a)(i)	Conservation measures
Regulation:	40(2)	Target carbon dioxide emission rate
Comment:		The product can contribute to satisfying these Regulations. See sections 6.1, 6.3 and 6.4 of this Certificate.

Construction (Design and Management) Regulations 2015

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

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

See section: 3 *Delivery and site handling* of this Certificate

Additional Information

NHBC Standards 2018

In the opinion of the BBA, other than in very severe exposure locations with fair-faced masonry, BASF WALLTITE CV 100 Cavity Wall Insulation, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards*, Chapter 6.1, *External masonry walls*.

CE marking

The Certificate holder has taken the responsibility of CE marking the product in accordance with harmonised European Standard BS EN 14318-1 : 2013. An asterisk (*) appearing in this Certificate indicates that data shown are given in the manufacturer's Declaration of Performance.

Technical Specification

Description

- 1.1 BASF WALLTITE CV 100 Cavity Wall Insulation is a purple-coloured, polyurethane foam compound.
- 1.2 The product is injected as a syrup from a hand gun into the wall through nominal 12 mm diameter holes spaced in a predetermined pattern.
- 1.3 The product has an installed density between 35 and 45 kg·m⁻³.

2 Manufacture

2.1 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.

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

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

2.3 The management systems of BASF Plc have been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 and BS EN ISO 14001 : 2004 by DQS (Certificate 099501 QM08).

3 Delivery and site handling

3.1 The two components are delivered to site in drums (up to 250 kg capacity) bearing the product name and batch number.

3.2 Drums should be stored in areas ideally above 10°C and away from possible ignition sources. The drums must be protected from frost.

3.3 The Certificate holder has taken the responsibility of classifying and labelling the product under the *CLP Regulation (EC) No 1272 / 2008 on the classification, labelling and packaging of substances and mixtures*. Users must refer to the relevant Safety Data Sheet(s).

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on BASF WALLTITE CV 100 Cavity Wall Insulation.

Design Considerations

4 Use

4.1 BASF WALLTITE CV 100 Cavity Wall Insulation is satisfactory for use as an injected cavity wall insulation and is effective in reducing the thermal transmittance (U value) of external cavity walls with masonry inner and outer leaves (where masonry includes clay and calcium silicate bricks, concrete blocks, and natural and reconstituted stone blocks). The product is for use in new and existing domestic and non-domestic buildings up to and including 12 m in height (and above that height when the Certificate holder has issued a height-restriction waiver), with cavity widths not less than 40 mm or greater than 200 mm. It is essential that such walls are designed and constructed to incorporate the precautions given in this Certificate to prevent moisture penetration.

4.2 The suitability of walls for insulation must be assessed in accordance with BS EN 14318-2 : 2013.

4.3 This Certificate covers the use of the product in any exposure zone⁽¹⁾, subject to the following conditions being met, which are particularly important in areas which may experience severe or very severe driving rain:

- a site survey should be carried out prior to installation (see section 13)
- the minimum cavity width must be no less than 40 mm
- walls must be in a good state of repair and show no evidence of frost damage
- mortar joints must not show evidence of more than hairline cracking. Raked or recessed mortar joints should be avoided in very severe exposure areas.

(1) Exposure zones defined in BRE Report BR 262 : 2002.

4.4 As with other forms of cavity wall insulation, where buildings need to comply with *NHBC Standards 2018*, specifiers should observe the requirements of that document.

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

4.6 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.

Partial filling – omitted areas

4.7 Wherever practicable, all of the cavity space from ground level to the roof or gable copings should be filled, except:

- when separately insulating semi-detached or terraced properties
- up to the underside of a horizontal boundary, other than a roof, where that horizontal boundary is protected by a cavity tray or similar waterproof barrier
- when treating properties where the wall to be insulated is below a waterproof cladding (eg tile hung) and this cladding either extends up to the roof or is protected at the top by other means (eg window sills)
- when treating areas of wall where access for drilling may be limited by features such as carports and conservatories, as defined in sections 17.10 and 17.11.

Existing buildings

4.8 In an existing building, the product may be installed only:

- in walls that are in a good state of repair (not bowed or distorted) and show no evidence of frost damage
- where there are no signs of dampness on the inner face of the cavity wall, other than those caused solely by condensation, and

- where the cavity is not being used as a source of combustion air or as a flue for ventilation purposes.

New buildings

4.9 New buildings subject to the national Building Regulations should be constructed in accordance with the relevant recommendations of:

- BS 8000-3 : 2001
- BS EN 1996-1-1 : 2005, BS EN 1996-1-2 : 2005, BS EN 1996-2 : 2006 and BS EN 1996-3 : 2006 and their respective UK National Annexes.

4.10 New buildings not subject to regulatory requirements should also be built in accordance with the Standards identified in section 4.8.

4.11 In a new building where the product is to be installed:

- cavity battens or boards must be used to reduce the amount of mortar droppings left in the cavity
- injection of the product is to be left until the cavity is sealed from the weather, ie the roof is in place and the window and door openings are sealed.

5 Practicability of installation

The product must be installed by operatives trained and approved by the Certificate holder and subsequently approved by the BBA. The Certificate holder operates an Approved Installer Scheme⁽¹⁾ for this product under which the installers are approved, registered and regularly reviewed by the Certificate holder to demonstrate that they are competent to carry out installations of the product in accordance with this Certificate. Details of Approved Installers are available from the Certificate holder. Approved Installers are responsible for each installation of the product that they undertake (see section 16).

(1) The Certificate holder's records relating to their Approved Installer Scheme will be audited annually by the BBA as part of its programme of surveillance.

6 Thermal performance



6.1 Calculations of the thermal transmittance (U value) should be carried out in accordance with BS EN ISO 6946 : 2007 and BRE Report BR 443 : 2006, using the declared thermal conductivity (λ_D)* value of $0.026 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$.

6.2 Where an existing wall is subject to the national Building Regulations (for example, a material change of use), designers should take account of the relevant guidance relating to technical and economic feasibility and target U values in the documents supporting those Regulations.



6.3 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 finish. Calculated U values for sample constructions are given in Table 1 for existing buildings and in Table 2 for new buildings.

Table 1 Example cavity wall U values⁽¹⁾ – existing/retained walls

Cavity width / insulation thickness (mm)	U Values ($W \cdot m^{-2} \cdot K^{-1}$)	
	13 mm dense plaster ⁽²⁾ 100 mm dense block ⁽³⁾	Plasterboard on dabs 100 mm AAC block ⁽⁴⁾
40	0.54	0.37
50	0.45	0.33
75	0.32	0.26
100	0.25	0.21
125	0.20	0.17

(1) Assumes 102 mm thick brick outer leaf, mild steel double-triangle ties (12.5 mm²) at 2.5 per m² and 6.7% mortar (0.88 $W \cdot m^{-2} \cdot K^{-1}$) bridging inner block leaf.

(2) Dense plaster at 0.57 $W \cdot m^{-2} \cdot K^{-1}$.

(3) Dense block at 1.13 $W \cdot m^{-2} \cdot K^{-1}$.

(4) AAC block 0.12 $W \cdot m^{-2} \cdot K^{-1}$.

Table 2 Example cavity wall U values⁽¹⁾ – new buildings

U value requirement ($W \cdot m^{-2} \cdot K^{-1}$)	Insulation thickness (mm)	
	13 mm dense plaster ⁽²⁾ 100 mm dense block ⁽³⁾	Plasterboard on dabs 100 mm AAC block ⁽⁴⁾
0.18	130	115
0.19	125	105
0.25	95	75
0.26	90	70
0.27	85	65
0.28	85	65
0.30	75	55
0.35	65	45

(1) Assumes 102 mm thick brick outer leaf, stainless steel double-triangle ties (12.5 mm²) at 2.5 per m² and 6.7% mortar (0.88 $W \cdot m^{-2} \cdot K^{-1}$) bridging inner block leaf.

(2) Dense plaster at 0.57 $W \cdot m^{-2} \cdot K^{-1}$.

(3) Dense block at 1.13 $W \cdot m^{-2} \cdot K^{-1}$.

(4) AAC block 0.12 $W \cdot m^{-2} \cdot K^{-1}$.

Junctions



6.4 Care must be taken in the overall design and construction of junctions with other elements to minimise thermal bridges and air infiltration. Detailed guidance can be found in the documents supporting the national Building Regulations.

7 Water resistance



7.1 The product may be used in situations where it bridges the damp-proof course (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.

7.2 When the product is properly installed in accordance with this Certificate, it will resist the transfer of precipitation to the inner leaf and satisfy the requirements of the national Building Regulations.

8 Condensation risk

Interstitial condensation



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

8.2 For the purposes of assessing the risk of interstitial condensation, the insulation's vapour resistivity may be taken as $380 \text{ MN}\cdot\text{s}\cdot\text{g}^{-1}\cdot\text{m}^{-1}$.

Surface condensation



8.3 Walls will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed $0.7 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ at any point and the junctions with other elements are designed in accordance with the guidance referred to in section 6.4 of this certificate.



8.4 For buildings in Scotland, constructions will be acceptable where the thermal transmittance (U value) does not exceed $1.2 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ at any point and the walls are designed and constructed in accordance with the relevant parts of BS 5250 : 2011, Annex D and G. Further guidance may be obtained from BRE Report BR 262 : 2002 and section 6.4 of this Certificate.

9 Behaviour in relation to fire



9.1 The product is not classified as non-combustible or of limited combustibility, and the Certificate holder has not declared a reaction to fire classification in accordance with BS EN 13501-1 : 2007.

9.2 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. If fire does penetrate into the cavity, the amount of air present will be insufficient to support combustion. However, the instructions contained in this Certificate relating to the sealing of an uncapped cavity (see section 15.3) and the removal of insulant present in the loft space after installation (see section 17.9) must be carefully followed.



9.3 The product is not classified as being of limited combustibility but the requirements of the national Building Regulations relating to fire spread in cavity walls can be met in buildings of all-purpose groups without the need for cavity barriers or height restriction, provided the construction complies with the provisions detailed in:

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

Northern Ireland — Technical Booklet E, Diagram 4.5.



9.4 The product is not classified as non-combustible but may be used without height restriction in a wall on, or less than 1 m from, a relevant boundary, provided it is installed in a cavity that is between two leaves of masonry at least 75 mm thick, and which has a cavity barrier around all openings in the wall and at the top of the wall head.



9.5 For constructions not covered by sections 9.2 and 9.3, the use of the product is restricted to 18 m in height and 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⁾ and 2.4.2⁽¹⁾⁽²⁾, 2.6.5⁽¹⁾ and 2.6.6⁽²⁾

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

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

10 Proximity of flues and appliances

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

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

Scotland — Mandatory Standard 3.19, clause 3.19.1⁽¹⁾⁽²⁾ to 3.19.9⁽¹⁾⁽²⁾

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

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

11 Maintenance

As the product is confined within the wall cavity and has suitable durability (see section 12), maintenance is not required.

12 Durability



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

Installation

13 Site assessment

Prior to the installation, an assessment must be carried out by a trained assessor, who may also be the installing technician, to ascertain the suitability of the property (or properties) for application of BASF WALLTITE CV 100 Cavity Wall Insulation. An assessment report is prepared, including sketch dimensions and the width and condition of the cavity, and held at the installer's offices. Particular problems must be specifically identified and any reasons for rejection of the work noted. At this stage the assessor and the party commissioning the work must identify, and agree in writing as appropriate, any areas of the wall that will not be filled (see sections 17.10 and 17.11) and any special requirements for making good (see section 17.8).

14 Site preparation

14.1 The installing operative must ensure that the property has been correctly assessed and is suitable for insulating with the product. Any problems encountered during installation which prevent compliance with this Certificate must be referred to the installation company before proceeding.

14.2 Essential ventilation openings, such as those providing combustion air or underfloor ventilation, and all flues in the cavity wall must be 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.

14.3 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 installation.

15 Approved installers

Installation of the product must be carried out by the Certificate holder or their approved installers. An approved installer is defined as a company:

- required to satisfy an initial site installation check by the BBA following approval by the Certificate holder and subject to the *BBA Assessment and Surveillance Scheme for Installation of Cavity Wall Insulation*
- approved by the Certificate holder and the BBA to install the product
- having undertaken to comply with the Certificate holder's installation procedure
- employing technicians who have been issued with appropriate identity cards by the Certificate holder; at least one member of each installation team must carry a card
- subject to inspections by the Certificate holder. The Certificate holder oversees the activities of approved installers operating under the BBA Surveillance Scheme for Cavity Wall Insulation. It is a requirement that the Certificate holder undertakes inspections of each card-carrying technician using their product and maintains records, as detailed in the *BBA Assessment and Surveillance Scheme for BBA Approved Installers of Cavity Wall Insulation*.

16 Supervision

16.1 Installation of the product should be carried out in accordance with the *BBA Assessment and Surveillance Scheme for Installation of Cavity Wall Insulation*.

16.2 During installation, the following simple checks can be made as an aid to determining that the installation conforms to the certificated method:

- the pattern of holes complies with the description given in section 17
- injection of the material takes place in each hole, to complete the filling of the cavity space.

17 Procedure

Injection equipment

17.1 The installer provides all the 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 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. A 10 mm diameter nozzle is used to inject the mixed components into the cavity. A stroke counter is fitted to the proportioning unit to monitor the correct number of strokes.

Injection holes

17.2 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 0.72 m apart horizontally (ie three bricks) and 0.48 m apart vertically (ie six bricks) for cavity widths between 40 and 150 mm, and approximately 0.48 m apart horizontally (ie two bricks) and approximately 0.40 m apart vertically (ie five bricks) for cavity widths greater than 150 mm. At door and window frames, extra holes must be drilled around these areas to ensure that they are completely filled. To minimise the risk of foam extrusion to the roof space, the highest row of holes is drilled approximately 0.24 m (three bricks) below the design height of the insulation and approximately 0.48 m apart horizontally (ie two bricks) for cavity widths between 40 and 150 mm, and approximately 0.36 m apart horizontally (ie one and a half bricks) for cavity widths greater than 150 mm. When treating semi-detached or terraced houses, a vertical column of holes is drilled at approximately 0.32 m (four bricks) centres for cavity widths between 40 mm and 150 mm, and approximately 0.24 m (three bricks) centres for cavity widths greater than 150 mm, 0.36 m (one and a half brick) 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 Figures 1 and 2).

Figure 1 Drilling patterns for cavity widths between 40 and 150 mm

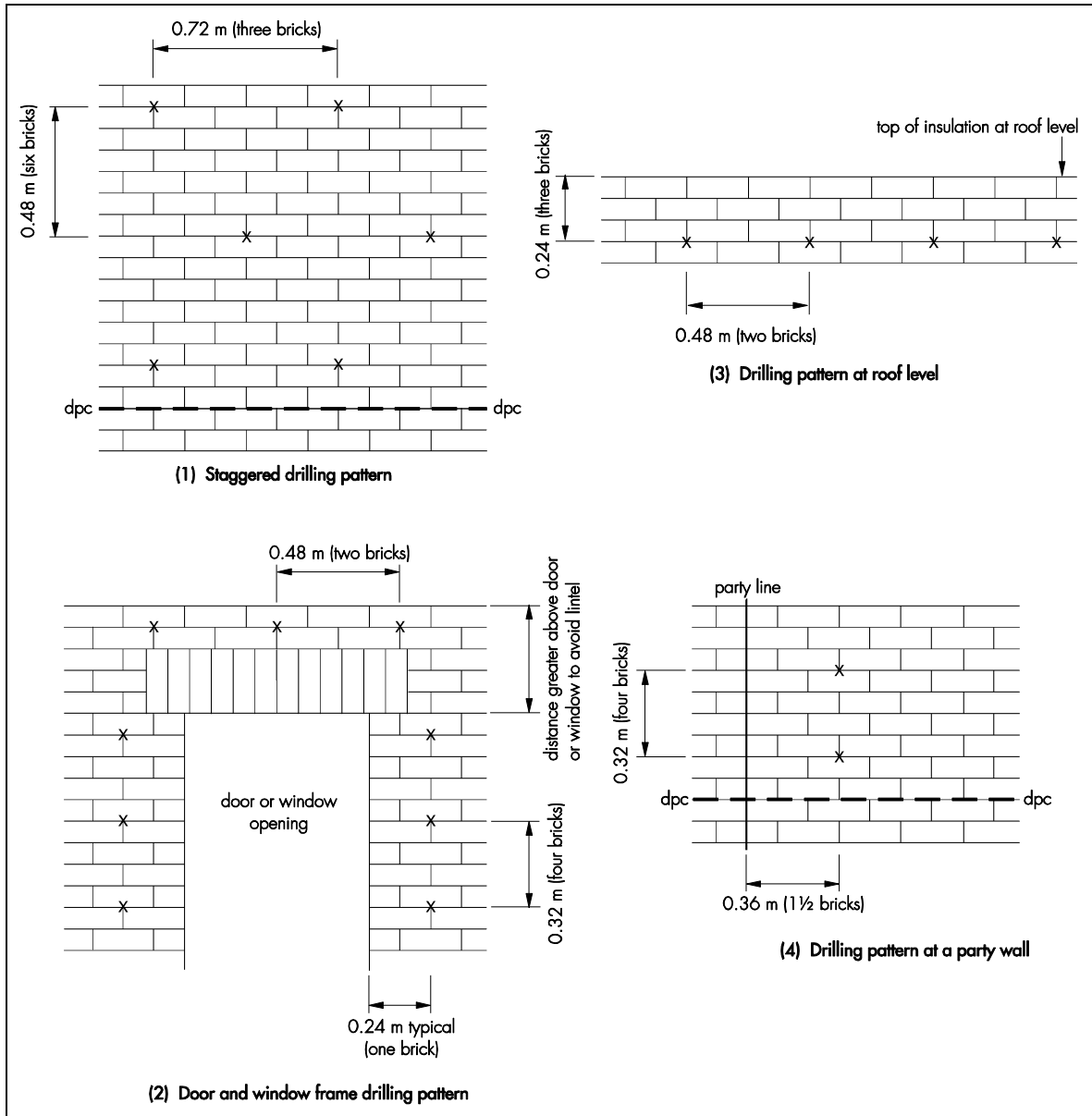
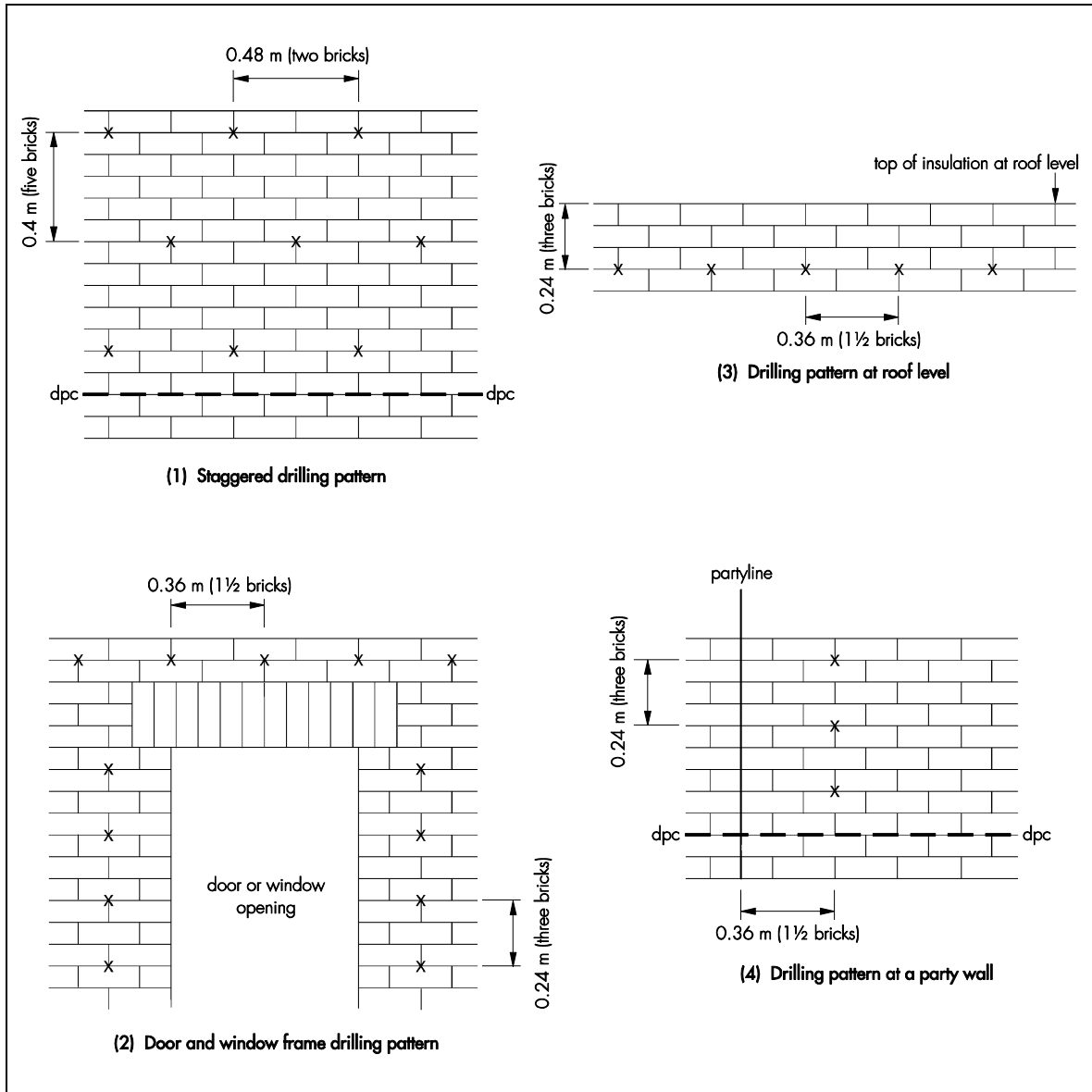


Figure 2 Drilling patterns for cavity widths between 150 and 200 mm



Pre-injection checks

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

Party line

17.4 When dealing with the dividing line of an attached property which is not being insulated, it is essential to leave a vertical boundary of polyurethane foam adjacent to the neighbouring cavity. The 10 mm diameter straight 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 satisfactory, another shot is injected and the foam allowed to cure. It is then checked for surface wrinkling and cut in half, and the internal cell structure checked for blow holes or splits. When the bag tests are satisfactory, the product density is measured.

Main sections of the wall

17.5 A foam quality check for the major area is carried out after injection of the boundary areas. A 10 mm flexible nozzle with a 45-degree end is used; the primary heater and hose line temperatures are set. The above bag tests are repeated, with an appropriate number of strokes of the pump. Once the tests have again been carried out satisfactorily, the machine is set up to commence foam injection of the major area. The foam should not be injected into a hole for more than its cream time.

Injection procedure

17.6 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 strokes per hole. After each fill, an 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 45 degree flexible 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.

17.7 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.) The next row is injected, once the tack-free time elapses, 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

17.8 After injection, the drill holes are fully filled with mortar of a similar type, colour, texture and weathertightness to that of the existing wall. Where a wall requires a high degree of colour matching, the level of finish-matching should be agreed in writing during the site assessment. All trunked air vents, eg those providing underfloor ventilation and combustion air for heating appliances, must be checked and any obstructions cleared. All flues must be carefully checked by an appropriate test (eg a smoke test) to verify that they are clear and unobstructed.

17.9 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.

Omitted areas

17.10 In some circumstances, access for drilling injection holes and filling with insulation may be limited by features such as carports, conservatories, cladding or tiling. The practicability of safely accessing and making good these areas, or installing the insulation through the inner leaf, may outweigh the benefits of insulating these areas.

17.11 It is permissible to omit such areas only when:

- a full justification detailing the reasons to omit areas is included in the survey report
- the assessor obtains written consent for omitting any areas of the wall from the party commissioning the work. The assessor must verify that 'heat loss' through uninsulated areas will not be reduced, and that they will also be subject to a slightly higher risk of condensation.

Technical Investigations

18 Tests

Results of tests were assessed to determine:

- thermal conductivity
- adhesion between foam and masonry
- foam density

- water vapour permeability of the foam
- shear strength
- dimensional stability
- compressive strength
- resistance to penetration of liquid water
- adequacy of fill of a cavity space.

19 Investigations

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

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

19.3 A condensation risk analysis was carried out.

19.4 A calculation was undertaken to confirm the declared thermal conductivity.

19.5 A series of U value calculations was carried out.

Bibliography

BRE Report BR 262 : 2002 *Thermal insulation: avoiding risks*

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

BS 5250 : 2011 + A1 : 2016 *Code of practice for control of condensation in buildings*

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

BS EN 1996-1-1 : 2005 + A1 : 2012 *Eurocode 6 — Design of masonry structures — General rules for reinforced and unreinforced masonry structures*

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BS EN 1996-1-2 : 2005 *Eurocode 6 — Design of masonry structures — General rules — Structural fire design*

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BS EN 14318-1 : 2013 *Thermal insulating products for buildings — In-situ formed dispensed rigid polyurethane (PUR) and polyisocyanurate (PIR) foam products — Specification for the rigid foam dispensed system before installation*

BS EN 14318-2 : 2013 *Thermal insulating products for buildings — In-situ formed dispensed rigid polyurethane (PUR) and polyisocyanurate (PIR) foam products — Specification for the installed insulation products*

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BS EN ISO 9001 : 2008 *Quality management systems — Requirements*

BS EN ISO 14001 : 2004 *Environmental management systems — Requirements with guidance for use*

20 Conditions

20.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page – no other company, firm, organisation or person may hold claim that this Certificate has been issued to them
- is valid only within the UK
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