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Agrément Certificate

18/5604

Product Sheet 1

MONOLITH BRICK CLADDING SYSTEMS AND DECORATIVE STONES

BRICKPLUS PANEL SYSTEM

This Agrément Certificate Product Sheet⁽¹⁾ relates to the BrickPlus Panel System, comprising a facing layer of mortar-based lightweight limestone or glassfibre-reinforced concrete (GRC) brickslips factory bonded to an expanded polystyrene (EPS) slip and EPS panel, or directly onto the EPS panel. It is suitable for use on the outside of external walls of masonry including dense or no-fines concrete and insulated concrete forms (ICF) construction, on both new or existing domestic and non-domestic buildings, with no storey more than 18 metres above the ground.

(1) Hereinafter referred to as 'Certificate'.

CERTIFICATION INCLUDES:

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

KEY FACTORS ASSESSED

Strength and stability — the system can adequately resist wind loads and impact damage (see section 6).

Behaviour in relation to fire — the system has a B-s1, d0 reaction to fire classification to BS EN 13501-1 : 2007 and its use is restricted in some cases (see section 7).

Water resistance — the system will provide a degree of protection against rain ingress (see section 9).

Thermal performance — the system can be used to improve the thermal performance of external walls and can contribute to satisfying the requirements of the national Building Regulations (see section 10).

Risk of condensation — the system can contribute to limiting the risk of interstitial and surface condensation (see section 11).

Durability — when installed, used and maintained in accordance with the Certificate holder's recommendations and this Certificate, the system will remain effective for at least 30 years (see section 13).



The BBA has awarded this Certificate to the company named above for the system described herein. This system 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

Paul Valentine
Technical Excellence Director

Claire Curtis-Thomas
Chief Executive

Date of First issue: 12 March 2019

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, the Brickplus Panel System, 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: A1 Comment:	Loading The system can sustain and transmit wind loads to the structural frame. See sections 6.1 to 6.7 of this Certificate.
Requirement: B4(1) Comment:	External fire spread The system can satisfy or contribute to satisfying this Requirement. See sections 7.1 and 7.3 of this Certificate.
Requirement: C2(c) Comment:	Resistance to moisture The system provides a degree of protection against rain ingress. See section 9.1 of this Certificate.
Requirement: C2(b) Comment:	Resistance to moisture The system contributes to minimising the risk of interstitial and surface condensation. See sections 11.1, 11.2 and 11.4 of this Certificate.
Requirement: L1(a)(i) Comment:	Conservation of fuel and power The system can contribute to satisfying this Requirement. See section 10 of this Certificate.
Regulation: 7 Regulation: 7(1) Comment:	Materials and workmanship (applicable to Wales only) Materials and workmanship (applicable to England only) The system is acceptable. See section 13 and the <i>Installation</i> part of this Certificate.
Regulation: 7(2) Comment:	Materials and workmanship (applicable to England only) The system is restricted by this Regulation.
Regulation: 26 Regulation: 26A Regulation: 26A Regulation: 26B Comment:	CO₂ emission rates for new buildings Fabric energy efficiency rates for new dwellings (applicable to England only) Primary energy consumption rates for new buildings (applicable to Wales only) Fabric performance values for new dwellings (applicable to Wales only) The system can contribute to satisfying these Regulations. See section 10 of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation: 8(1)(2) Comment:	Durability, workmanship and fitness of materials The system can contribute to a construction satisfying this Regulation. See sections 12 and 13 and the <i>Installation</i> part of this Certificate.
Regulation: 9 Standard: 1.1 Comment:	Building standards applicable to construction Structure The system can sustain and transmit wind loads to the structural frame. See sections 6.1 to 6.7 of this Certificate.
Standard: 2.6 Comment:	Spread to neighbouring buildings The system is regarded as 'low risk' and therefore can satisfy this Standard, with reference to clauses 2.6.4 ⁽¹⁾⁽²⁾ , 2.6.5 ⁽²⁾ and 2.6.6 ⁽²⁾ . See sections 7.1 and 7.4 of this Certificate.

Standard:	2.7	Spread on external walls
Comment:		The system can satisfy the requirements of this Standard, with reference to clauses 2.7.1 ⁽¹⁾⁽²⁾ and 2.7.2 ⁽²⁾ . See sections 7.1 and 7.4 of this Certificate.
Standard:	3.10	Precipitation
Comment:		The system will contribute to a construction satisfying this Standard, with reference to clauses 3.10.1 ⁽¹⁾⁽²⁾ and 3.10.6 ⁽¹⁾⁽²⁾ . See section 9.1 of this Certificate.
Standard:	3.15	Condensation
Comment:		The system can satisfy the requirements of this Standard, with reference to clauses 3.15.1 ⁽¹⁾ , 3.15.4 ⁽¹⁾ and 3.15.5 ⁽¹⁾ . See sections 11.3 and 11.4 of this Certificate.
Standard:	6.1(b)	Carbon dioxide emissions
Standard:	6.2	Buildings insulation envelope
Comment:		The system can contribute to satisfying these Standards, with reference to clauses (or parts of) 6.1.1 ⁽¹⁾ , 6.1.2 ⁽¹⁾⁽²⁾ , 6.1.3 ⁽²⁾ , 6.1.5 ⁽²⁾ , 6.1.6 ⁽¹⁾ , 6.2.1 ⁽¹⁾ , 6.2.3 ⁽¹⁾ , 6.2.4 ⁽¹⁾ , 6.2.5 ⁽¹⁾⁽²⁾ and 6.2.10 ⁽²⁾ . See section 10 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The system 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 system 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 10 of this Certificate.
Regulation:	12	Building standards applicable to conversions
Comment:		All comments given for the system under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12 ⁽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 system is acceptable. See section 13 and the <i>Installation</i> part of this Certificate.
Regulation:	28(b)	Resistance to moisture and weather
Comment:		The system provides a degree of protection against rain ingress. See section 9.1 of this Certificate.
Regulation:	29	Condensation
Comment:		The system contributes to minimising the risk of interstitial condensation. See section 11.4 of this Certificate.
Regulation:	30	Stability
Comment:		The system can sustain and transmit wind loads to the structural frame. See sections 6.1 to 6.7 of this Certificate.
Regulation:	36(a)	External fire spread
Comment:		The system can satisfy or contribute to satisfying this Regulation. See sections 7.1 and 7.3 of this Certificate.
Regulation:	39(a)(i)	Conservation measures
Regulation:	40	Target carbon dioxide emission rate
Comment:		The system can enable a construction to satisfy the requirements of these Regulations. See section 10 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 sections: 3 *Delivery and site handling* (3.1 and 3.3) and 16 *Procedure* (16.12) of this Certificate.

Additional Information

NHBC Standards 2019

In the opinion of the BBA, the BrickPlus Panel System, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of *NHBC Standards*⁽¹⁾, Part 6 *Superstructure (excluding roofs)*, Chapter 6.9 *Curtain walling and cladding*, and Part 9 *Finishes*, Chapter 9.1 *A consistent approach to finishes*.

(1) There is a general requirement in NHBC Standards Chapter 6.9 for fire-retardant-treated insulation to be used with this system in accordance with BS EN 13163: 2012.

Technical Specification

1 Description

1.1 The BrickPlus Panel System (see Figures 1 and 2) comprises a facing layer of mortar-based lightweight limestone or GRC brickslips, factory bonded to a 10 mm thick EPS slip and a 20 or 40 mm thick EPS panel, or directly onto the EPS panel. The panels are secured to the external surface of the wall substrate using reinforced render adhesive, and finished with pointing mortar between the brickslips. The system is suitable for use on the outside of external walls of masonry, including dense or no-fines concrete and ICF construction, in new or existing domestic and non-domestic buildings.

1.2 The system comprises:

Render adhesive (for substrate)

- Maite Monocomposant — coloured or white cement-based micronised vinyl copolymer, calcareous and siliceous sands, mineral pigments and admixtures. Manufactured in powder form, to which water is added.
- Multi-flex — cement-based, polymer-modified, thin-bed adhesive, manufactured to comply with Type C Class 2FTE in accordance with BS EN 12004-1 : 2017. Available in grey and white

BrickPlus panel

- BrickPlus panel (straights and corners) — lightweight factory-made brickslips bonded an EPS panel. See Table 1 for characteristics, and below for components that make up the panel

Insulation panel

- EPS (EPS 100) insulation — with thicknesses of 20 or 40 mm, a minimum compressive strength of 100 kN·m⁻² and a class E reaction to fire classification complying with BS EN 13163 : 2012

Insulation slip

- EPS (EPS 150 white) insulation — with a thickness of 10 mm, a minimum compressive strength of 150 kN·m⁻² and a class E reaction to fire classification complying with BS EN 13163 : 2012

BrickSlip

- BrickSlips (straights and corners/pistols) — lightweight limestone or glassfibre-reinforced concrete (GRC) factory-made brickslips with thicknesses of 10 to 20 mm, available in different colours and textures, with the characteristics shown in Table 1.

Figure 1 The Brickplus Panel System



Table 1 The BrickPlus Panel System — characteristics

Type	Brickslip dimensions (mm)			EPS slip thickness (mm)	EPS panel thickness (mm)	BrickPlus panel size (mm)			Available shades
	Length	Height	Thickness			Length	Height	Thickness	
Metric	225	65	10	—	20/40	563	450	30/50	Beige Black Blue Brown Buff Grey Orange Red White Yellow
			15	—				35/55	
			20	—				40/60	
			10	10				40/60	
			15	10				45/65	
			20	10				50/70	
Imperial	228	75	10	—	20/40	595	516	30/50	
			15	—				35/55	
			20	—				40/60	
			10	10				40/60	
			15	10				45/65	
			20	10				50/70	

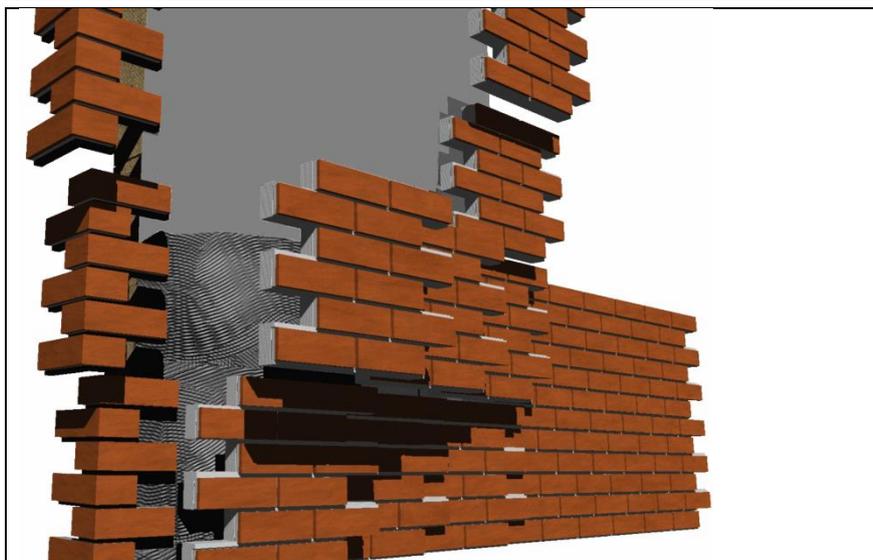
Pointing mortar

- Thermocromex Pointing Mortar — a pre-coloured water-repellent, frost-resistant, cementitious pointing mortar supplied in powder form, to which water is added
- Maite Monocomposant coloured or white cement-based micronised vinyl copolymer, calcareous and siliceous sands, mineral pigments and admixtures. Manufactured in powder form, to which water is added.

1.3 Ancillary items used with the system, but outside the scope of this Certificate:

- brickwork substrate of designation F0, F1, F2 and S2. For S1, the consent and agreement of the brick manufacturer to retrofit to a system is required
- starter tracks and beading profiles
- end stops
- StonePlus Header and Sill — limestone mortar/EPS.

Figure 2 Typical masonry wall construction using the Brickplus Panel System



2 Manufacture

2.1 BrickPlus panels are manufactured from limestone mortar using various moulds and angles to produce different styles/surface finishes of brick-face. The wet mortar is factory bonded to an EPS slip and panel whilst in the mould.

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.

3 Delivery and site handling

3.1 The system is delivered to site in bespoke boxes stacked on pallets, with a polythene cover. Each pallet carries the product identification and batch number. The system components are available in the quantities and packaging listed in Table 2.

Table 2 Packaging and weights

Component	Mass (kg)	Packaging
Maite Monocomposant – adhesive and pointing mortar	30	Bags — 40 per pallet (1.2 tonnes per pallet)
Multi-flex — adhesive	20	Bags — 50 per pallet
BrickPlus panels		
– straights	3	88 (minimum) panels per pallet
– corners	1.8	112 (minimum) panels per pallet
Thermocromex Pointing Mortar	30	Bags — 49 per pallet (maximum) (1.47 tonnes per pallet)

3.2 Care must be taken when handling the panels to avoid damage. Damaged panels should not be used.

3.3 The boxed BrickPlus panels should be protected from rain and other moisture sources. Pallets must be stored flat in dry conditions; they must not be exposed to open flame or other ignition sources, and should be kept away from flammable material (eg paint and solvents).

3.4 Maite Monocomposant, Thermocromex Pointing Mortar and Multi-flex should be stored in a cool dry place and protected from moisture, frost and direct sunlight at all times. Bags of unopened adhesive have a shelf life of 12 months when stored correctly.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Brickplus Panel System.

Design Considerations

4 Use

4.1 The BrickPlus Panel System, when installed in accordance with this Certificate, is satisfactory for use in reducing the thermal transmittance (U value) of external masonry or concrete walls of new and existing buildings. It is essential that the detailing techniques specified in this Certificate are carried out to a high standard if the ingress of water into the insulation is to be avoided and the full thermal benefit obtained from treatment with the system (eg the insulation must be protected by an overhang, and window sills should be designed and installed so as to direct water away from the building).

4.2 For improved thermal/carbon-emissions performance of the structure, the designer should consider additional/alternative fabric and/or services measures.

4.3 The system is for application to the outside of external walls of masonry, normal weight concrete, lightweight concrete, autoclaved concrete or no-fines concrete construction and ICF construction on new or existing domestic and non-domestic buildings (with or without existing render), with no storey more than 18 m above the ground prior to the installation of the system, wall surfaces should comply with section 14.

4.4 The ICF should be designed in accordance with the relevant sections of BS EN 1991-1-1 : 2002, BS EN 1991-1-4 : 2005, BS EN 1992-1-1 : 2004 and BS EN 1992-1-2 : 2004, and certified by a qualified and experienced chartered structural engineer. The designer should also take account of disproportionate collapse in respect of building risk groups.

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

- BS EN 1992-1-1 : 2004 and its UK National Annex
- BS EN 1996-1-1 : 2005 and its UK National Annex
- BS EN 1996-2 : 2006 and its UK National Annex

- BS 8000-0 : 2014
- BS 8000-2.2 : 1990
- BS 8000-3 : 2001.

4.6 New walls not subject to regulatory requirements should also be built in accordance with the Standards identified in sections 4.4 and 4.5.

4.7 Movement joints should be incorporated into the system in line with existing movement joints in the building structure and in accordance with the Certificate holder's recommendations for the specific installation.

4.8 The system will improve the weather resistance of a wall and provide a decorative finish. However, for existing buildings, it should only be installed where there are no signs of dampness on the inner surface of the wall other than those caused solely by condensation.

4.9 The effect of the system on the acoustic performance of a construction is outside the scope of this Certificate.

4.10 The fixing of sanitary pipework, plumbing, rainwater goods, satellite dishes, clothes lines, hanging baskets and similar items to the system is outside the scope of this Certificate. See section 4.11.

4.11 External pipework and ducts should be removed before installation, and alterations made to underground drainage to accommodate repositioning of the pipework to the finished face of the system. The Certificate holder can advise on suitable fixing methods, but these are outside the scope of this Certificate.

4.12 It is essential that the system is installed and maintained in accordance with the conditions set out in this Certificate.

5 Practicability of installation

The system should be installed only by specialist contractors who have successfully undergone training and registration by the Certificate holder.

6 Strength and stability



6.1 The Certificate holder is ultimately responsible for the design of the system, and must verify that a suitably experienced and qualified individual (with adequate professional indemnity) establishes that:

- the wind loads on the different zones of the building's elevation for the specific geographical location have been calculated correctly (see section 6.2)
- the system and structure can adequately resist and safely transfer the calculated loads, accounting for all possible failure modes, to the substrate wall and supporting structure (see sections 6.2 to 6.5)
- the substrate wall and supporting structure has adequate strength and stability to resist the additional loads that may be applied as a result of installing the system, ignoring any positive contribution that may occur from the system
- the substrate wall will resist the loads based on serviceability deflection limits of height /360
- the design requirements of DCLG Advice Note 13 are satisfied.

6.2 The wind loads on the walls should be calculated, taking into account all relevant factors such as location and topography, in accordance with BS EN 1991-1-4 : 2005 and its UK National Annex. All of the factors affecting wind load on each elevation and specific zones of the building must be considered. In accordance with BS EN 1990 : 2002, a partial factor of 1.5 must be applied to the calculated characteristic wind load to establish the design wind load to be resisted by the system.

6.3 Installations correctly designed in accordance with this Certificate will safely accommodate the applied loads due to the self-weight of the system, wind and impact.

6.4 Positive wind load is transferred to the substrate wall directly via compression through the brickslips and insulation panel.

6.5 Negative wind load is transferred to the substrate wall via:

- the bond between the insulation and brickslip (see section 6.6)
- the tensile strength of the insulation (see section 6.7)
- the bond between the adhesive and the insulation interface
- the bond between the substrate and adhesive interface

6.6 The characteristic bond resistance between the insulation and brickslip interface derived from test results was $62 \text{ kN}\cdot\text{m}^{-2}$. The design resistance of the bond between the insulation and brickslip should be taken as the characteristic bond resistance divided by a partial factor of 9.

6.7 The tensile resistance of the insulation material may be taken as $100 \text{ kN}\cdot\text{m}^{-2}$ and should be divided by a partial material factor of 2.5 to establish the ultimate design resistance of the insulation.

Impact resistance

6.8 Hard body impact tests were carried out and confirmed that the system is suitable for all use in all Use Categories⁽¹⁾ as defined in ETAG 004 : 2013.

(1) Use Categories are defined in ETAG 004 : 2013 as:

- Category I — a zone readily accessible at ground level to the public and vulnerable to hard body impacts but not subjected to abnormally rough use
- Category II — a zone liable to impacts from thrown or kicked objects, but in public locations where the height of the system will limit the size of the impact; or at lower levels where access to the building is primarily to those with some incentive to exercise care
- Category III — a zone not likely to be damaged by normal impacts caused by people or by thrown or kicked objects.

7 Behaviour in relation to fire



7.1 The external surface of the BrickPlus Panel System has a reaction to fire classification of B-s1,d0⁽¹⁾ in accordance with EN 13501-1 : 2007. This relates to the full thickness, colour range and mounting methods referred to in section 1 of this Certificate.

(1) Designers should refer to EXOVA Warrington Fire Test Report No. 335685, available from the Certificate holder.

7.2 Designers should refer to the relevant national Building Regulations and guidance for alternative approaches and detailed conditions of use, particularly in respect of requirements for substrate fire performance, cavity barriers and combustibility limitations for other materials and components used in the overall wall construction (for example, thermal insulation).



7.3 In England, Wales and Northern Ireland the panels are not classified as non-combustible or of limited combustibility and may be used on buildings at any proximity to a boundary with no storey more than 18 m above the ground.



7.4 The panels are classified 'Low Risk' in Scotland, and may be used on buildings more than 1 m from a boundary and, on houses, 1 m or less from a boundary. In addition, the system may only be used on buildings with no storey more than 18 metres above the ground. With minor exceptions, the panels should be included in calculations of unprotected area, except on houses where the external wall behind has the appropriate fire resistance.

7.5 For application to second storey walls and above, it is recommended that the designer should consider the use of fire barriers in line with compartment walls and floors, as advised in BRE Report BR 135 : 2013.

8 Proximity of flues and appliances

When the insulation system is installed in close proximity to certain flue pipes, the relevant provisions of the national Building Regulations should be satisfied:

9 Water resistance



9.1 The system will provide a degree of protection against rain ingress. However, care must be taken to ensure that walls are adequately weathertight prior to its application. The system should only be installed where there are no signs of dampness on the inner surface of the substrate other than those caused solely by condensation.

9.2 Designers and installers must take particular care when detailing around openings, penetrations, panel joints and movement joints to minimise the risk of rain ingress.

9.3 The guidance given in BRE Report BR 262 : 2002 should be followed in connection with the watertightness of solid wall constructions. 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.

9.4 At the top of walls, the system should be protected by a coping, adequate overhang or other detail designed for use with this type of system.

10 Thermal performance



10.1 Calculations of thermal transmittance (U value) should be carried out in accordance with BS EN ISO 6946 : 2017 and BRE Report BR 443 : 2006 using the following insulation thermal conductivity (λ_D) values: 0.034 $W \cdot m^{-1} \cdot K^{-1}$ for the EPS panels (EPS 100); 0.035 $W \cdot m^{-1} \cdot K^{-1}$ for the EPS slips (EPS 150); and 0.54 $W \cdot m^{-1} \cdot K^{-1}$ for the brickslips.

10.2 The U value of a wall construction will depend on the selected BrickPlus panel system and the insulating value of the substrate masonry or ICF and its internal finish. Example U values are given in Tables 3 and 4.

Table 3 Example U values ($W \cdot m^{-2} \cdot K^{-1}$)⁽¹⁾ — solid 215 mm wall

Brickslip thickness (mm)	EPS slip thickness (mm)	EPS panel thickness (mm)	Example U value $W \cdot m^{-2} \cdot K^{-1}$
10, 15, 20	—	20	0.84
10, 15, 20	—	40	0.56
10, 15, 20	10	20	0.68
10, 15, 20	10	40	0.49

(1) Solid wall construction: brickslip ($\lambda = 0.54 W \cdot m^{-1} \cdot K^{-1}$), EPS slip ($\lambda = 0.035 W \cdot m^{-1} \cdot K^{-1}$), EPS panel ($\lambda = 0.034 W \cdot m^{-1} \cdot K^{-1}$), 215 mm brick ($\lambda = 0.56 W \cdot m^{-1} \cdot K^{-1}$) with 13 mm dense plaster internal finish ($\lambda = 0.57 W \cdot m^{-1} \cdot K^{-1}$).

Table 4 Example U values ($W \cdot m^{-2} \cdot K^{-1}$)⁽¹⁾ — ICF wall

Brickslip thickness (mm)	EPS slip thickness (mm)	EPS panel thickness (mm)	Example U value $W \cdot m^{-2} \cdot K^{-1}$
10, 15, 20	—	20	0.21
10, 15, 20	—	40	0.19
10, 15, 20	10	20	0.20
10, 15, 20	10	40	0.18

(1) ICF wall construction: brickslip ($\lambda = 0.54 W \cdot m^{-1} \cdot K^{-1}$), EPS slip ($\lambda = 0.035 W \cdot m^{-1} \cdot K^{-1}$), EPS panel ($\lambda = 0.034 W \cdot m^{-1} \cdot K^{-1}$), 64 mm outer EPS wall ($\lambda = 0.034 W \cdot m^{-1} \cdot K^{-1}$) with 150 mm concrete infill ($\lambda = 1.75 W \cdot m^{-1} \cdot K^{-1}$) with 64 mm inner EPS wall ($\lambda = 0.034 W \cdot m^{-1} \cdot K^{-1}$) with 12.5 mm plasterboard internal finish ($\lambda = 0.25 W \cdot m^{-1} \cdot K^{-1}$).

10.3 The system can contribute to maintaining continuity of thermal insulation at junctions between elements. Detailed guidance on limiting heat loss and air infiltration can be found in the documents supporting the national Building Regulations.

11 Risk of condensation



11.1 Designers must ensure that an appropriate condensation risk analysis has been carried out for all parts of the construction, including openings and penetrations at junctions between the insulation system and windows, to minimise the risk of condensation. The recommendations of BS 5250 : 2011 should be followed.

Surface condensation



11.2 Walls will adequately limit the risk of surface condensation where 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 and openings comply with section 10.3.



11.3 Walls will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed $1.2 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ at any point. Guidance may be obtained from BS 5250 : 2011 (Section 8 and Annex D) and BRE Report BR 262 : 2002.

Interstitial condensation



11.4 The risk of interstitial condensation in the external walling is greatest when the building is drying out after construction. Guidance on preventing condensation is given in BRE Digest 369 : 1992 and BRE Report 262 : 2002.

11.5 The brickslip bonded with the EPS panel has an equivalent air layer of thickness (S_d) of 0.76 m; the EPS 100 and EPS 150 have a water diffusion resistance factor (μ) of 30 to 70⁽¹⁾⁽²⁾.

(1) μ value taken from BS EN 13163 : 2012.

(2) It is recommended that the lower figure is used when assessing the interstitial condensation risk

12 Maintenance and repair



12.1 Regular checks should be made on the installed system, including:

- visual inspection of the brickslips for signs of disbondment. Dislodged brickslips must be re-fixed using brickslip adhesive
- examination of the sealant around openings and service entry points
- visual inspection of architectural details designed to shed water to confirm that they are performing properly
- visual inspection to ensure that water is not leaking from external downpipes or gutters; such leakage could penetrate the BrickPlus panel
- necessary repairs effected immediately and the sealant joints at window and door frames replaced at regular intervals
- maintenance schedules, which should include the replacement and resealing of joints (for example, between BrickPlus panels and window and door frames)
- damaged BrickPlus panels removed and replaced with new ones, using the adhesive as supplied by the Certificate holder.

12.2 Damaged areas must be repaired using the appropriate components and procedures detailed in the Certificate holder's installation instructions.

13 Durability



The system will remain effective for at least 30 years, provided any damage is repaired immediately, and regular maintenance is undertaken as described in section 12.

14 Site survey and preliminary work

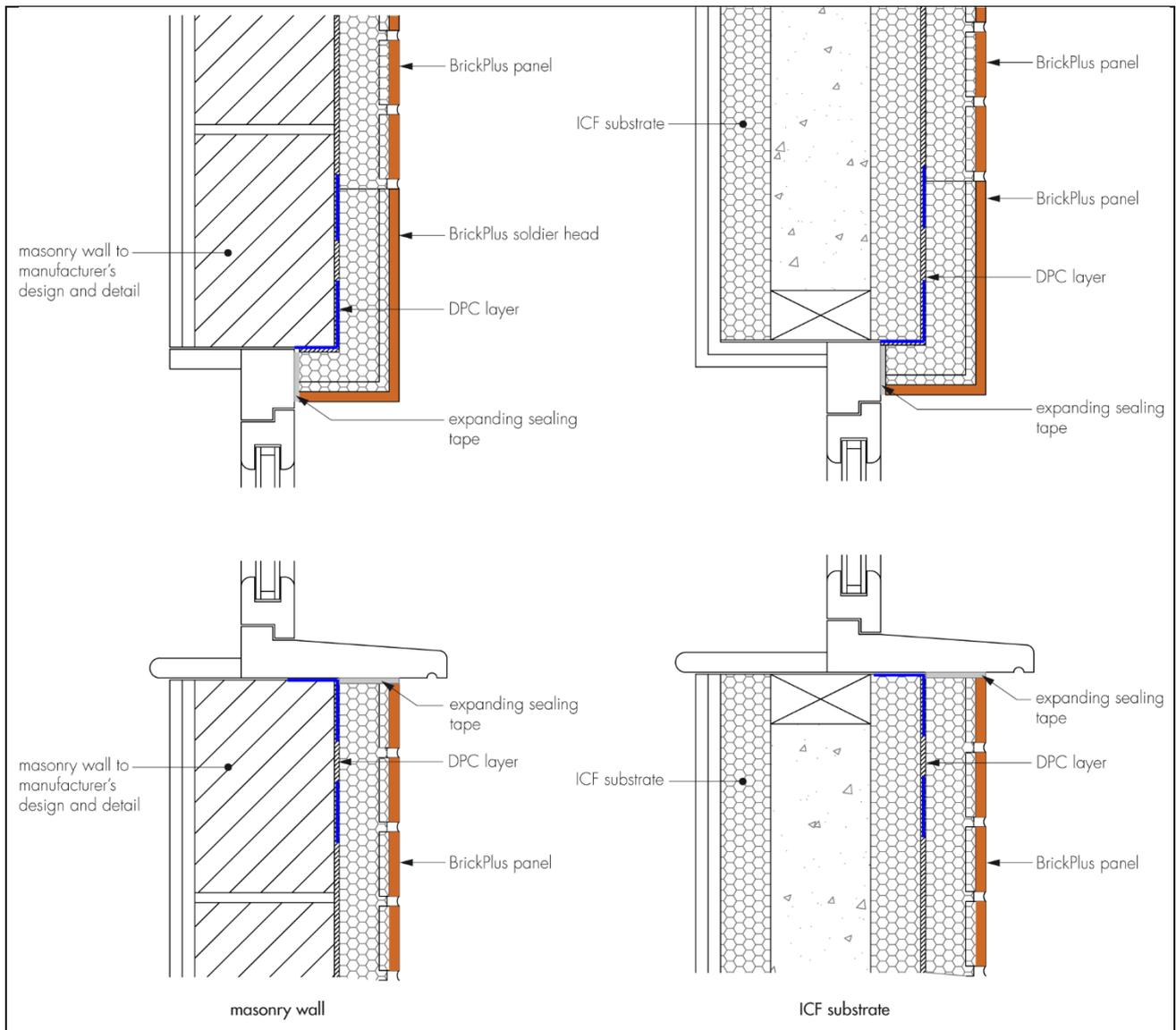
14.1 A pre-installation survey of the property must be carried out to determine suitability for treatment and the need for any necessary repairs to the building structure before application of the system. A specification is prepared for each elevation of the building indicating, for example:

- position of starter edge
- detailing around windows and doors and at eaves
- damp-proof course (dpc) level
- areas where suitable sealants must be used.

14.2 The survey should include tests conducted on the walls of the building by the Certificate holder or their approved installers to determine the bond strength between the adhesive and the substrate, and be satisfied that the bond strength resistance is equal or higher than the design wind load (see section 6.6). An assessment and recommendation should be made on the minimum bond strength required to withstand the building's expected wind loading based on calculations using the test site data in accordance with section 6.

14.3 On existing buildings, purpose-made window sills must be fitted to extend beyond the finished face of the system (see Figure 3). New buildings should incorporate suitably deep sills.

Figure 3 Window sill and header details



14.4 Design, preparation and application of the external rendering system should be in accordance with BS EN 13914-1-2016. Consideration should be given as to whether the background provides:

- adequate strength and rigidity for support of the render, and
- adequate and uniform key and suction for adhesion of the rendering.

14.5 Surfaces should be sound, clean and free from loose material. The flatness of surfaces must be checked; this may be achieved using a straight-edge tool spanning the storey height. Any excessive irregularities, ie greater than 5 mm in 2 m, must be made good prior to installation, to ensure that the system is installed with a smooth, in-plane finished surface.

14.6 Where surfaces are covered with an existing render, it is essential that the bond between the substrate and the render is adequate. All loose areas must be hacked off and reinstated.

14.7 Internal wet work, eg screeding or plastering, should be completed and allowed to dry prior to the application of the system.

14.8 All modifications and necessary repairs to the building must be completed before installation commences.

15 Approved installers

Application of the system, within the context of this Certificate, must be carried out by approved installers recommended or recognised by the Certificate holder. Such an installer is a company:

- employing operatives who have been trained and approved by the Certificate holder (or holder's agent) to install the system
- which has undertaken to comply with the Certificate holder's (or holder's agent) application procedure, containing the requirements for each application team to include at least one member-operative trained by the Certificate holder or holder's agent
- subject to at least one inspection per annum by the Certificate holder or holder's agent to ensure suitable site practices are being employed. This may include unannounced site inspections.

Installation

16 Procedure

General

16.1 Application of the system must be carried out in accordance with the Certificate holder's current installation instructions.

Marking out and adhesive application

16.2 The wall must be measured to determine the best brick coursing. Working from the ends or corners, the number of full bricks required is calculated and, if necessary, the arrangement of the brick cuts.

16.3 When working around window and door openings, it may be necessary to adjust the coursing above the feature in order to preserve proper coursing for the rest of the wall.

16.4 The BrickPlus panels are adhesively bonded to the wall using either Maite Monocomposant or Multi-flex adhesive. Maite Monocomposant is prepared by adding 5 to 5.5 litres of water to each 30 kg bag and mixing with a paddle mixer until smooth and lump free. Multi-flex is prepared by adding 5 litres of water to each 20 kg bag and mechanically stirring to give a soft, slump-free, easily worked mortar.

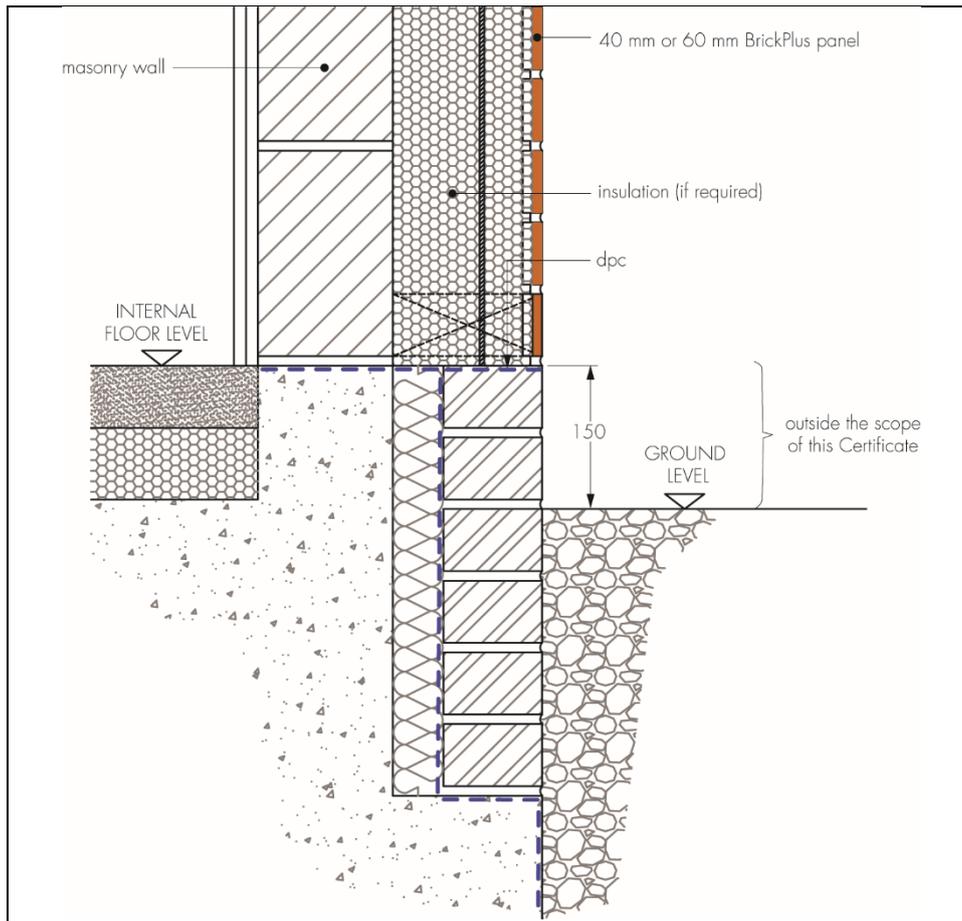
16.5 Weather conditions should be monitored to ensure correct application and curing conditions. Application of the basecoat must not be carried out at temperatures below 5°C or above 25°C, or if exposure to frost is likely, and the coating must be protected from rapid drying. Installation should not take place during rainfall or if rain is anticipated. In addition, cementitious-based renders must not be applied if the temperature will fall below 0°C within 72 hours of completion.

16.6 The adhesive is applied to the back of the panels over the entire face (100%), either by using a smooth edged trowel if using Maite Monocomposant, or a notched trowel if using Multi-flex, to an even coat thickness of 3.0 to 6.0 mm.

16.7 The adhesive will remain useable for approximately 20 minutes once applied, but may vary dependent on temperature/humidity. Adhesive and pointing mixes should not be used where the ambient temperature is below 5°C.

16.8 A temporary straight edge or guide batten is fixed to the wall at 600 mm centres (to act as a guide/support for the first row of BrickPlus panels positioned above the dpc – see Figure 4).

Figure 4 Typical sections of the base details



16.9 Using a spirit level and string or chalk line, a horizontal line is marked along the adhesive (on the wall) to act as the guideline for the panels, working from the ends or corners.

16.10 The first panel is firmly placed onto the substrate and pressure applied, to ensure all ends are secured to the adhesive. The panel should be checked to make sure it is level, and adjusted if necessary. Work continues along the wall; as panels are added, it must be ensured that they are interlocked correctly.

16.11 Once the bottom (first) course of panels has been completed, the panels must be held in place according to the Certificate holder's recommendations while the adhesive sets. When the adhesive has set, the guide battens are removed and the remaining area below filled in. It may be necessary to cut the lower panels to conform to the ground level profile.

16.12 The process is repeated for the second course, and continues until the wall is completed. The final course may require cutting to fit, using a hand saw or similar.

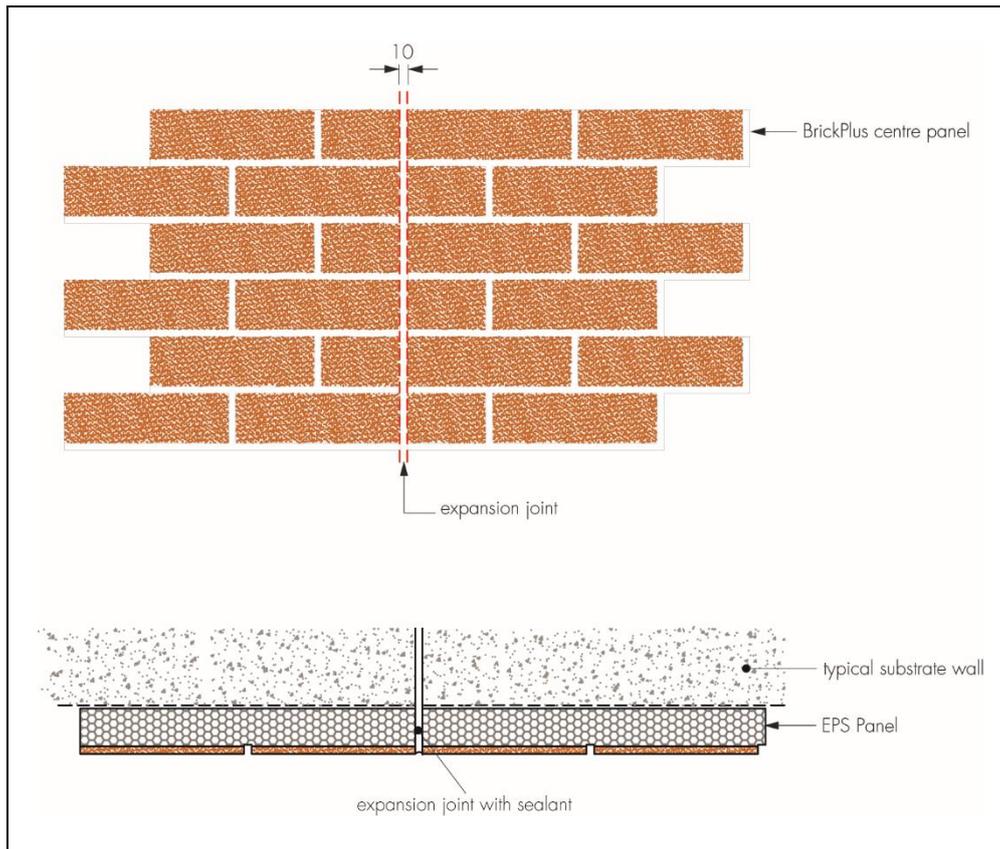
16.13 On completion or when work has been stopped at any point, all unused, exposed adhesive should be removed from the substrate by scraping off with a trowel.

Movement joints (see Figure 5)

16.14 Where movement joints are provided, they should:

- align with expansion joints incorporated in the substrate, be no more than 15 metres on continuous lengths and must be replicated through the system
- be made weathertight with an appropriate sealant
- not align with openings such as windows, doors or meter boxes.

Figure 5 Typical movement joint



Pointing

16.15 Pointing mortar is applied in accordance with the Certificate holder's instructions. Pointing must be carried out in dry conditions although not in direct sunlight.

16.16 Thermocromex Pointing Mortar is prepared by thoroughly mixing, with a paddle mixer, a 30 kg bag with approximately 5.5 to 6.0 litres of water, to give a soft, slump-free, easily worked mortar. Maite Monocomposant is prepared as per section 16.4.

16.17 For colour variations, a colour pigment pack is thoroughly mixed with each 30 kg bag of mortar (the pigment powder must be dry-mixed prior to use).

16.18 Mortar is applied to the vertical joints (perps) first, followed by the horizontal joints (beds). As a normal practice, work should start from the bottom up using a pointing gun.

16.19 Joints must be completely filled with mortar and slightly raised above the brick face. The mortar should be left for 1.5 to 2 hours to become semi-dry.

16.20 Depending on the required pointing style, either the pointing tool or trowel should be used to remove excess pointing mortar from the joints. The mix should be pressed firmly into the joints to ensure that there are no holes behind.

16.21 Pointing should begin with the perpendicular joints followed by the bed joints, completing a small section at a time, and starting with the area where mortar was first applied.

16.22 Once completed, the area should be lightly brushed (using a soft brush) to remove any loose mortar. Fresh pointing should be protected from rain and frost for at least 24 hours wherever possible.

16.23 Relevant seals are positioned and installed at all openings (for example windows and doors), overhanging eaves, gas and electric meter boxes, wall vents or where the panel abuts any other building material or surface.

16.24 Care should be taken in the detailing of the system around such features as openings, projections and at eaves, to ensure adequate protection against water ingress and to limit the risk of water penetrating the system.

16.25 On completion of the installation, external fittings, eg rainwater goods, are securely fixed to timber grounds or extended fixings that have been built into the system during installation.

Technical Investigations

17 Tests

Tests were carried out on the BrickPlus Panel System and the results assessed to determine:

- water absorption
- water vapour permeability
- frost resistance
- bond strength
- effect of heat/spray and freeze thaw
- resistance to hard body
- horizontal point load.

18 Investigations

18.1 An assessment was made of data relating to:

- reaction to fire
- thermal conductivity
- the risk of condensation.

18.2 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.

18.3 The practicability of installation and the effectiveness of detailing techniques were assessed.

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19 Conditions

19.1 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 or claim that this Certificate has been issued to them
- 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.

19.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

19.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and 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.

19.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

19.5 In issuing this Certificate the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- 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
- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

19.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal 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, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue 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.