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Agrément Certificate

20/5809

Product Sheet 1 Issue 2

R-WALL FORMWORK SYSTEMS

R-WALL INSULATING CONCRETE FORMWORK (ICF) SYSTEM

This Agrément Certificate Product Sheet⁽¹⁾ relates to the R-Wall Insulating Concrete Formwork (ICF) System, comprising grey extruded polystyrene (XPS) insulation leaves and plastic ties/rails, for use as permanent insulating formwork in the formation of loadbearing and non-loadbearing internal, external and separating walls in domestic and non-domestic buildings, subject to height restrictions.

(1) Hereinafter referred to as 'Certificate'.

The assessment includes

Product factors:

- compliance with Building Regulations
- compliance with additional regulatory or non-regulatory information where applicable
- evaluation against technical specifications
- assessment criteria and technical investigations
- uses and design considerations

Process factors:

- compliance with Scheme requirements
- installation, delivery, handling and storage
- production and quality controls
- maintenance and repair

Ongoing contractual Scheme elements†:

- regular assessment of production
- formal 3-yearly review

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

Date of Second issue: 26 January 2026

Originally certified 8 October 2020



KEY FACTORS ASSESSED

- Section 1. Mechanical resistance and stability
- Section 2. Safety in case of fire
- Section 3. Hygiene, health and the environment
- Section 4. Safety and accessibility in use
- Section 5. Protection against noise
- Section 6. Energy economy and heat retention
- Section 7. Sustainable use of natural resources
- Section 8. Durability

Hardy Giesler
Chief Executive Officer

This BBA Agrément Certificate is issued under the BBA's Inspection Body accreditation to ISO/IEC 17020. Sections marked with † are not issued under accreditation.

The BBA is a UKAS accredited Inspection Body (No. 4345), Certification Body (No. 0113) and Testing Laboratory (No. 0357).

Readers MUST check that this is the latest issue of this Agrément Certificate by either referring to the BBA website or contacting the BBA directly.

The Certificate should be read in full as it may be misleading to read clauses in isolation.

Any photographs are for illustrative purposes only, do not constitute advice and should not be relied upon.

British Board of Agrément

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SUMMARY OF ASSESSMENT AND COMPLIANCE

This section provides a summary of the assessment conclusions; readers should refer to the later sections of this Certificate for information about the assessments carried out.

Compliance with Regulations

Having assessed the key factors, the opinion of the BBA is that the R-Wall Insulating Concrete Formwork (ICF) 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 Building Regulations 2010 (England and Wales) (as amended)

Requirement:	B3(4)	Internal fire spread (structure)
Comment:		The system is restricted by this Requirement. See section 2 of this Certificate.
Requirement:	B4(1)	External fire spread
Comment:		The system is restricted by this Requirement. See section 2 of this Certificate.
Requirement:	C2(c)	Resistance to moisture
Comment:		The system can adequately limit the risk of surface condensation and contribute to minimising the risk of interstitial condensation. See section 3 of this Certificate.
Requirement:	L1(a)(i)	Conservation of fuel and power
Comment:		The system can contribute to satisfying this Requirement. See section 6 of this Certificate.
Regulation:	7(1)	Materials and workmanship
Comment:		The system is acceptable. See sections 8 and 9 of this Certificate.
Regulation:	7(2)	Materials and workmanship
Comment:		The system is restricted by this Regulation. See section 2 of this Certificate.
Regulation:	25B	Nearly zero-energy requirements for new buildings
Regulation:	26	CO₂ emission rates for new buildings
Regulation:	26A	Fabric energy efficiency rates (applicable to England only)
Regulation:	26A	Primary energy rates for new buildings (applicable to Wales only)
Regulation:	26B	Fabric performance values for new dwellings (applicable to Wales only)
Regulation:	26C	Target primary energy rates for new buildings (applicable to England only)
Regulation:	26C	Minimum energy efficiency rating (applicable to Wales only)
Comment:		The system can contribute to satisfying these Regulations. Section 6 of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)	Fitness and durability of materials and workmanship
Comment:		The system can contribute to a construction satisfying this Regulation. See sections 8 and 9 of this Certificate.
Regulation:	8(3)	Fitness and durability of materials and workmanship
Comment:		The system is restricted by this Regulation. See section 2 of this Certificate.

Regulation:	9	Building Standards – construction
Standard:	2.1	Compartmentation
Standard:	2.2	Separation
Standard:	2.3	Structural protection
Comment:		The system is restricted by these Standards in some cases, with reference to clauses 2.1.12 ⁽²⁾ , 2.2.4 ⁽²⁾ , 2.2.5 ⁽²⁾ , 2.2.6 ⁽¹⁾ , 2.2.7 ⁽¹⁾ , 2.2.8 ⁽¹⁾ and 2.3.2 ⁽¹⁾⁽²⁾ . See section 2 of this Certificate.
Standard:	2.4	Cavities
Comment:		The system is restricted by this Standard, with reference to clauses 2.4.2 ⁽¹⁾⁽²⁾ , 2.4.4 ⁽¹⁾ and 2.4.6 ⁽²⁾ . See section 2 of this Certificate.
Standard:	2.6	Spread to neighbouring buildings
Comment:		The system is restricted by this Standard, with reference to clauses 2.6.5 ⁽¹⁾ and 2.6.6 ⁽²⁾ . See section 2 of this Certificate.
Standard:	3.15	Condensation
Comment:		Walls can adequately limit the risk of surface condensation, with reference to clauses 3.15.1 ⁽¹⁾⁽²⁾ and 3.15.4 ⁽¹⁾⁽²⁾ of this Standard. Walls can contribute to minimising the risk of interstitial condensation, with reference to clauses 3.15.1 ⁽¹⁾⁽²⁾ and 3.15.5 ⁽¹⁾⁽²⁾ . See section 3 of this Certificate.
Standard:	6.1(b)(c)	Energy demand
Comment:		The system can contribute to satisfying this Standard, with reference to clauses 6.1.1 ⁽¹⁾ and 6.1.2 ⁽²⁾ . See section 6 of this Certificate.
Standard:	6.2	Building insulation envelope
Comment:		The system can contribute to satisfying this Standard, with reference to clauses 6.2.1 ⁽¹⁾⁽²⁾ , 6.2.3 ⁽¹⁾ and 6.2.4 ⁽²⁾ . See section 6 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. The system can also contribute to higher levels of sustainability as defined in this Standard, with reference to clauses 7.1.4 ⁽¹⁾ , 7.1.6 ⁽¹⁾⁽²⁾ , 7.1.7 ⁽¹⁾ , 7.1.9 ⁽²⁾ and 7.1.10 ⁽²⁾ . See section 6 of this Certificate.
Regulation:	12	Building standards – conversion
Comment:		Comments in relation to the system 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(1)(a)(i)	Fitness of materials and workmanship
Comment:	(iii)(b)(i)(ii)	The system is acceptable. See sections 8 and 9 of this Certificate.
Regulation:	23(2)	Fitness of materials and workmanship
Comment:		The system is restricted by this Regulation. See section 2 of this Certificate.
Regulation:	29	Condensation
Comment:		The system can contribute to minimising the risk of interstitial condensation. See section 3 of this Certificate.
Regulation:	35(4)	Internal fire spread – structure
Comment:		The system is restricted by this Regulation. See section 2 of this Certificate.

Regulation:	36(a)	External fire spread
Comment:		The system is restricted by this Regulation. See section 2 of this Certificate.
Regulation:	39(a)(i)	Conservation measures
Comment:		The system can contribute to satisfying this Regulation. See section 6 of this Certificate.
Regulation:	40(2)	Target carbon dioxide emission rate
Regulation:	43B	Nearly zero-energy requirements for new buildings
Comment:		The system can contribute to satisfying these Regulations. See section 6 of this Certificate

Additional Information

NHBC Standards 2026

In the opinion of the BBA, the R-Wall Insulating Concrete Formwork (ICF) System, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards, Part 3 General, Chapter 3.1 Concrete and its reinforcement*.

The opinion of the BBA does not amount to any endorsement or approval by NHBC and does not in any way guarantee that NHBC will approve such product / system as compliant with the NHBC Technical Requirements and Standards.

Fulfilment of Requirements

The BBA has judged the R-Wall Insulating Concrete Formwork (ICF) System to be satisfactory for use as a permanent insulating formwork system as described in this Certificate. The system has been assessed as loadbearing and non-loadbearing internal, external and separating walls in domestic and non-domestic buildings, subject to height restrictions.

ASSESSMENT

Product description and intended use

The Certificate holder provided the following description for the system under assessment. The R-Wall Insulating Concrete Formwork (ICF) System consists of:

- R-Boards —XPS boards (see Table 1) forming the two leaves of the formwork. The formwork construction types are given in Table 2 and Figures 1 to 3
- R-Rails — comprising high strength thermoplastic material up to 2500 mm in length by 50 mm wide, profiled with double arrowhead on one side (see Figures 1 to 3) to key lock (snap-in) the horizontal connection with the R-ties, and connect the inner and outer XPS boards together
- R-Corner profiles — comprising high strength thermoplastic material of 50 mm wide by 156 mm long on each leg (see Figure 1)
- R-Ties — comprising high strength thermoplastic material, in nominal lengths of 105, 159, 212, 262 and 313 mm and spaced at 200 mm centres horizontally and 298 mm centres vertically. The ties have concave slots to accommodate horizontal steel reinforcement, where required, with 40 to 50 mm of cover from each face of the concrete core.

The XPS board has the nominal characteristics given in Table 1.

Table 1 XPS Nominal characteristics

Characteristic (unit)	Value
Average density (kg·m ⁻³)	33
Minimum compressive strength at 10% deformation (kPa)	> 300
Colour	Dark grey

Figure 1 R-Wall formwork components

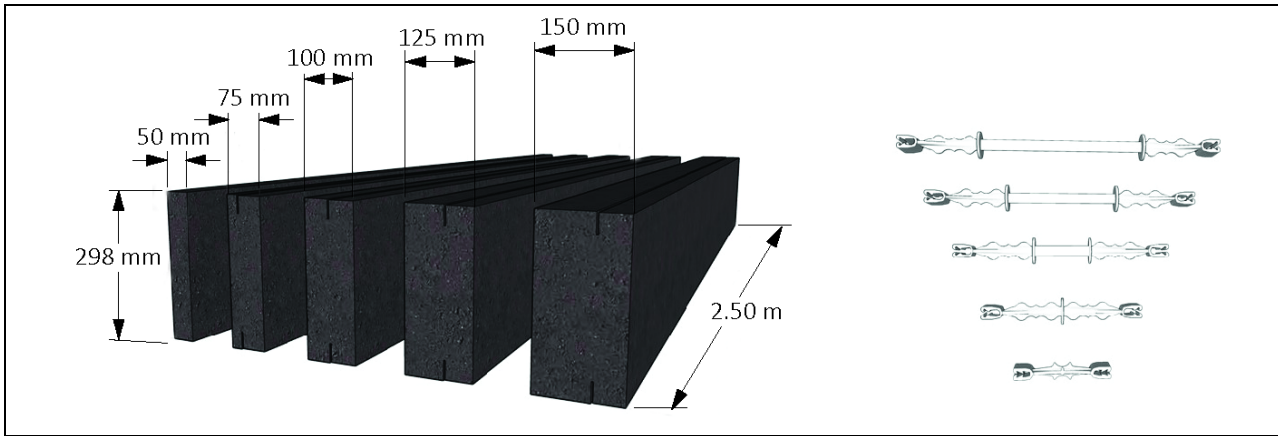


Figure 2 Concrete core tie options

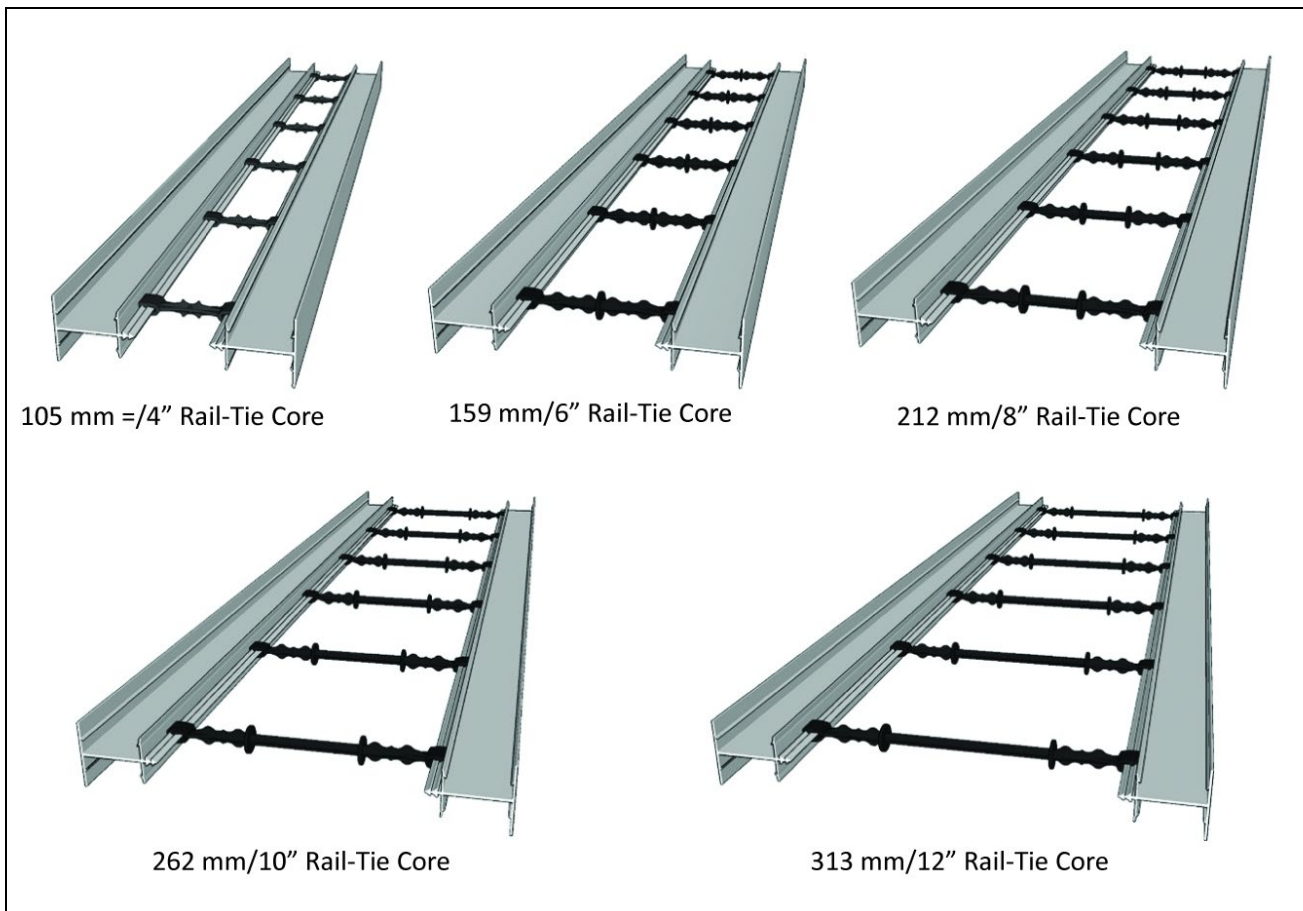


Table 2 R-Wall Formwork Construction types

Board types/wall construction	Length (mm)	Height (mm)	Nominal thickness (mm)		
			XPS inner	XPS outer	Concrete core
R-Wall Standard (75 mm)	2500	298	75	75	105, 159, 212,
R-Wall Supreme (100 mm)	2500	298	100	100, 125	262 and 313
R-Wall Superior (125 mm)	2500	298	125 – 150	125 – 150	
R-Wall Ultimate (150 mm)	2500	298	125 – 150	150	

Figure 3 Typical R-Wall Formwork



Ancillary Items

The Certificate holder recommends the following ancillary items for use with the system, but these materials have not been assessed by the BBA and are outside the scope of this Certificate:

- concrete core infill⁽¹⁾ — minimum concrete strength class C25/35, specified to BS 8500-1 : 2015 and BS EN 206-1 : 2013 as a typical mix with recommended aggregate size up to 10 mm (over-sanded) to a class (slump) S3 between 100 and 120 mm. See section 9.1.6 of this Certificate
- steel reinforcement — where required, should comply with BS 4449 : 2005
- external masonry — may be of brickwork or stonework, fixed in accordance with the provisions of BS EN 1996-2 : 2006 or BS 8298-1 : 2010, BS 8298-2 : 2010 and BS 8298-3 : 2010 as appropriate
- brickwork/stonework ties to BS EN 845-1 : 2013
- temporary bracing and alignment support system — as supplied by the Certificate holder
- waterproofing membrane, as required (see section 9 of this Certificate)
- external render — in accordance with BS EN 13914-1 : 2016 and suitable for use with the system
- brick slip systems with third-party certification — the Certificate holder's advice must be sought
- cladding — timber, cement board or metal sheet
- internal finish — typically 12.5 mm thick plasterboard or a dry-lined finish, with or without a plaster skim coat conforming to BS EN 1992-1-2 : 2004.

(1) Specific ready mixes are dependent on individual requirements and are outside the scope of this Certificate.

Product assessment – key factors

The system was assessed for the following key factors, and the outcome of the assessments is shown below. Conclusions relating to the Building Regulations apply to the whole of the UK unless otherwise stated.

1 Mechanical resistance and stability

See section 9.

2 Safety in case of fire

Data were assessed for the following characteristics.

2.1 Reaction to fire

2.1.1 The XPS component of the system has a reaction to fire classification E in accordance with BS EN 13501-1 : 2018.

2.1.2 The Certificate holder has not declared a reaction to fire classification for the other system components.

2.1.3 On the basis of data assessed, the system will be restricted under the documents supporting the national Building Regulations in the following circumstances:

2.1.4 In England, Wales and Northern Ireland, the system must not be used for external walls in buildings with a storey 18 m or more in height or, in England only, residential buildings with a storey 11 m or more in height.

2.1.5 In Scotland, the system must not be used in external walls 1 m or less from a relevant boundary or in buildings with a storey height of 11 m or more above the ground, or in separating walls.

2.2 Designers should refer to the relevant national Building Regulations and guidance for detailed conditions of use, particularly in respect of requirements for fire resistances of concrete, cavity closers and barriers, fire stopping of service penetrations and combustibility limitations for other materials and components used in the overall wall construction.

2.3 Resistance to fire

Where fire resistance is required by the documents supporting the national Building Regulations, the performance of wall constructions must be confirmed by a suitably experienced and competent individual or by a test from a suitably accredited laboratory.

3 Hygiene, health and the environment

Data were assessed for the following characteristics.

3.1 Water vapour permeability

The system was assessed for water vapour permeability to establish a water vapour resistance factor (μ). The result is given in Table 3.

Table 3 Water vapour resistance factor (μ)			
Component assessed	Assessment method	Requirement	Result (μ)
XPS board	BS EN 12086 : 2013	Declared value	100

3.2 Condensation

3.2.1 The system was assessed for risk of interstitial condensation.

3.2.2 On the basis of the data assessed, the system can adequately limit the risk of interstitial condensation when it is designed and constructed in accordance BS 5250 : 2021, using the water vapour resistance factor (μ) given in Table 3 of this Certificate.

4 Safety and accessibility in use

Not applicable.

5 Protection against noise

Not applicable.

6 Energy economy and heat retention

Data were assessed for the following characteristics.

6.1 Thermal conductivity

The XPS component of the system was assessed for thermal conductivity (λ_D) and the results are shown in Table 4.

Table 4 Declared thermal conductivity (λ_D)

R-Wall XPS Components	Assessment method	Requirement	Result
			Declared thermal conductivity (λ_D) ($\text{W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$)
R-Wall Standard	BS EN 13164 : 2012	Declared value	0.031
R-Wall Supreme			0.031
R-Wall Superior			0.031
R-Wall Ultimate			0.031

6.2 Thermal performance

6.2.1 The effect of the R-Rails partially bridging the XPS insulation was assessed, and the resulting U value corrections are shown in Table 5.

Table 5 R-rails thermal transmittance corrections (ΔU)⁽¹⁾⁽²⁾

System assessed	Thickness (mm)		Assessment method	Requirement	Result
	Inner	Outer			Thermal transmittance correction, ΔU ($\text{W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$) ⁽²⁾
R-Wall Standard	75	75	BS EN ISO 10211 : 2017	Value achieved	0.0052
	75	100			0.0039
	75	125			0.0029
	75	150			0.0023
R-Wall Supreme	100	100			0.0023
	100	125			0.0029
	100	150			0.0023
R-Wall Superior	125	125			0.0020
	125	150			0.0015
R-Wall Ultimate	150	150			0.0013

(1) Construction (Internal to external): 12.5 mm plaster ($\lambda = 0.57 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$), R-Wall ICF option with 159 mm concrete infill (maximum 1% steel reinforcement $\lambda = 2.3 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$), 8 mm render ($\lambda = 1.0 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$). The concrete core and finishes are outside the scope of this Certificate.

(2) ΔU correction $\leq 3\%$.

6.2.2 Calculations of thermal transmittance (U value) must be carried out in accordance with BS EN ISO 6946 : 2017 and BRE Report BR 443 : 2019, using the declared thermal conductivity (λ_D) values and the R-Rails transmittance corrections in Tables 4 and 5 of this Certificate respectively.

6.2.3 The U value of a completed wall will depend on the insulation thickness, the internal and external finishes and the fixings used. Example U values are given in Table 6.

Table 6 Thermal transmittance (U-value)⁽¹⁾⁽²⁾

System assessed	Thickness (mm)		Assessment method	Requirement	Result
	Inner	Outer			Thermal transmittance U-value (W·m ⁻² ·K ⁻¹)
R-Wall Standard	75	75	BS EN ISO 6946 : 2017, BS EN ISO 10211 : 2017 and BRE Report BR 443 : 2019	Value achieved	0.20
	75	100			0.16
	75	125			0.14
	75	150			0.13
R-Wall Supreme	100	100			0.14
	100	125			0.13
	100	150			0.12
R-Wall Superior	125	125			0.12
	125	150			0.11
R-Wall Ultimate	150	150			0.10

(1) Construction (Internal to external): 12.5 mm plaster ($\lambda = 0.57 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$), R-Wall ICF option with 159 mm concrete infill (maximum 1% steel reinforcement $\lambda = 2.3 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$), 8 mm render ($\lambda = 1.0 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$). The concrete core and finishes are outside the scope of this Certificate.

(2) ΔU correction $\leq 3\%$.

6.2.4 The system can contribute towards a construction satisfying the national Building Regulations in respect of energy economy and heat retention.

Junctions

6.3 The system can contribute to maintaining continuity of thermal insulation at junctions with other elements and minimise thermal bridges. Detailed guidance can be found in the documents supporting the national Building Regulations.

7 Sustainable use of natural resources

The system comprises XPS insulation and thermoplastic, both of which can be recycled.

8 Durability

8.1 The potential mechanisms for degradation and the known performance characteristics of the materials in the system were assessed.

8.2 Service life

Under normal service conditions, the XPS insulation boards and the R-components will have a service life in excess of 60 years, equivalent to the concrete wall structure in which they are incorporated, provided the system is designed in accordance with section 9 of this Certificate and installed and maintained in accordance with this Certificate and the Certificate holder's instructions.

PROCESS ASSESSMENT

Information provided by the Certificate holder was assessed for the following factors:

9 Design, installation, workmanship and maintenance

9.1 Design

9.1.1 The design process was assessed, and the following requirements apply in order to satisfy the performance specified in this Certificate.

9.1.2 Walls formed from the system subject to the national Building Regulations must be designed in accordance with the relevant recommendations of BS 8102 : 2022 and limit principles set out in BS EN 1990 : 2002 to loadings in BS EN 1991-1-1 : 2002, BS EN 1991-1-2 : 2002, BS EN 1991-1-3 : 2003, BS EN 1991-1-4 : 2005, BS EN 1991-1-5 : 2003, BS EN 1991-1-6 : 2005, BS EN 1991-1-7 : 2006, BS EN 1992-1-1 : 2004 and BS EN 1992-1-2 : 2004, and their UK National Annexes. A suitably competent and experienced individual, such as a Chartered Structural Engineer, must also ensure that the foundations (outside the scope of this Certificate) are adequate to support the intended loads.

9.1.3 Walls formed from the system which are not subject to the national Building Regulations must also be designed in accordance with the Standards listed in section 9.1.2.

9.1.4 The concrete is not easily examined after casting. Hence, as specified in BS EN 1992-1-1 : 2004, Sections 4 and 8, care must be taken to ensure full compaction. Compaction may be checked by removal, observation and replacement of a section of XPS board.

9.1.5 Storey height concrete walls are normally constructed in one continuous pour, progressing around the perimeter of the building in pour heights of 1 m using free-flowing, pumpable concrete mixes. Particular care is necessary to maintain alignment of concrete formwork during concrete filling to ensure checking between pours. Propping systems used in conjunction with the system, must be checked prior to and during concrete filling to ensure stability and alignment is maintained.

9.1.6 Particular attention must be paid to the type of concrete mix⁽¹⁾ used, to ensure segregation does not occur and that the wet concrete is allowed to flow freely around formed openings and through congested areas of reinforcement. It is recommended that a pumpable concrete of grade C25/35, and aggregate with a maximum size of 10 mm, is used. The Certificate holder can provide guidance on concrete strength and the water-cement ratio. Generally, slump class should be S3 for C28/35 and C20/25 in accordance with BS 8500-1 : 2015. The Certificate holder recommends the use of admixtures. If an admixture is used in concrete it must comply with BS EN 934-2 : 2009 to allow placement by free-flow without compaction, or with minimal compaction using vibrating poker.

(1) Sourced from suppliers who operate a full quality control scheme, such as the Quality Scheme for Ready-Mixed Concrete (QSRMC) or BSI Kitemark.

Heavy wall loads

9.1.7 All structural point loads such as heavy wall attachments or finishes, fixed either internally or externally, must be attached via support systems designed to take account of the applied load using suitable fixings or plates fixed or cast into the concrete core, and not to the R-Ties, R-Rails or formwork planks. Further guidance can be obtained from the Certificate holder's Installation Manual.

9.1.8 In specifying wall fixings carrying vertical loads, consideration must be given to the effect of bending between the face of the concrete core and outer edge of the XPS. The fixing of any items, including linings and claddings, to the R-Rails have not been assessed by the BBA and are outside the scope of this Certificate.

Restraint and propping

9.1.9 It is essential that effective bracing and propping of walls (see Figure 4) takes place during construction to ensure stability, level, straightness and plumb of walls. They must remain in place, and secured to cope with site conditions during concrete pouring and until the concrete has set.

9.1.10 Consideration should be given to additional bracing where stability could be compromised. Stability of the formwork is reduced by openings and therefore additional bracing must be introduced in these areas. Corner braces must always be used. Bracing and alignment systems must be fixed at a minimum distance of approximately 1.5 m and each side of door and window openings.

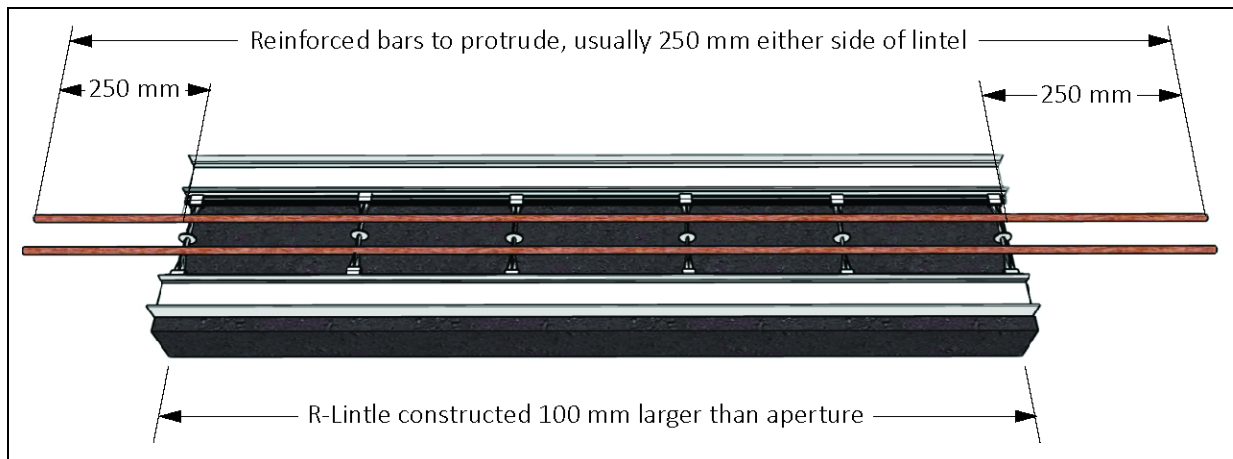
Figure 4 R-Wall Propping/support system



Reinforcement

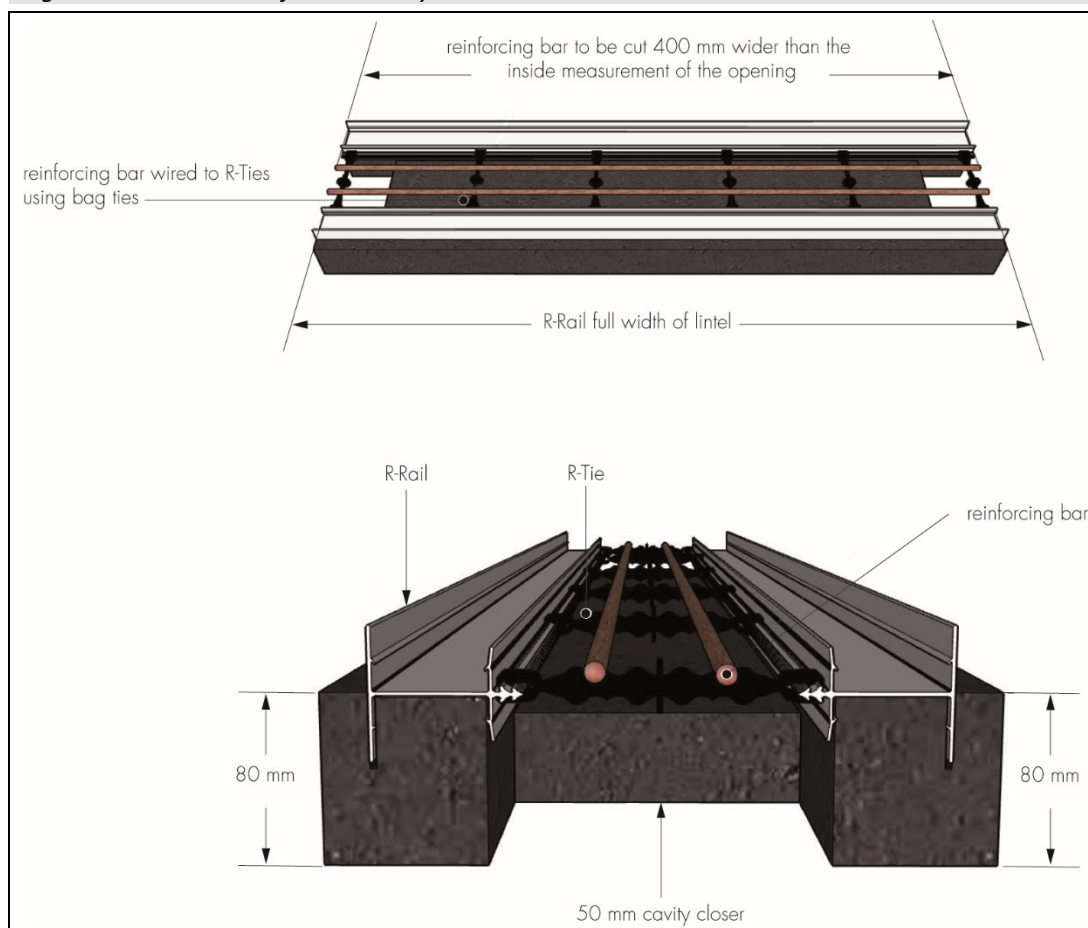
9.1.11 All reinforcement (see Figures 5 and 6) must be accurately positioned to ensure that the minimum required concrete cover is provided. Starter, dowel bars and bar lapping lengths, where required, must be to the engineer's design and in accordance with BS EN 1992-1-1 : 2004.

Figure 5 Typical reinforcement layout



9.1.12 The type and quantities of reinforcement placed within the system are dependent on design and detail requirements. Horizontal reinforcement bars can be secured to the concave centre of the R-Ties. Ties can be moved but must not be cut or modified when locating reinforcement. Vertical reinforcement can then be secured to horizontal reinforcement at the required centres, using standard fixing methods (cable ties/wires).

Figure 6 Horizontal reinforcement layout



9.1.13 The nominal concrete cover to reinforcement should be suitable for the environmental exposure conditions X01 and XC1 for the concrete, as described in BS EN 206-1 : 2013, Table 1, using the appropriate concave slot on the R-Tie connectors.

Fire resistance of concrete core

9.1.14 For reinforced concrete walls designed in accordance with BS EN 1992-1-1 : 2004, fire resistance values for various concrete wall thicknesses given in BS EN 1992-1-2 : 2002, Table 5.4, can be used, subject to cover and design load considerations (see Table 7 of this Certificate). For unreinforced walls acting as fire walls, the minimum thickness requirements set out in BS EN 1992-1-2 : 2002, clause 5.4.2, must be taken into account. This assessment does not take account of any additional protection provided by the internal and external finishes.

Table 7 Minimum concrete core thickness for loadbearing reinforced concrete walls⁽¹⁾

Standard fire resistance	Minimum dimensions (mm)			
	Wall thickness/axis ⁽²⁾			
	$\mu_{fi}^{(3)} = 0.35$		$\mu_{fi}^{(3)} = 0.7$	
	wall exposed on one side	wall exposed on two sides	wall exposed on one side	wall exposed on two sides
REI 30	100/10 ⁽⁴⁾	120/10 ⁽⁴⁾	120/10 ⁽⁴⁾	120/10 ⁽⁴⁾
REI 60	110/10 ⁽⁴⁾	120/10 ⁽⁴⁾	130/10 ⁽⁴⁾	140/10 ⁽⁴⁾
REI 90	120/20 ⁽⁴⁾	140/10 ⁽⁴⁾	140/25	170/25

(1) Taken from BS EN 1992-1-2 : 2002, Table 5.4.

(2) Centre of reinforcement to nearest exposed surface.

(3) The definition of μ_{fi} is given in BS EN 1992-1-2 : 2002, clause.3.2(3).

(4) Normally, the cover specified in BS EN 1992-1-1 : 2004 will control this distance.

Junctions

9.1.15 Care must be taken to ensure that all detailing at junctions, including internal wall/floor junctions, adequately maintains the required periods of fire resistance, any cavities formed in the completed walls or service entry points are appropriately fire stopped and detailing around any openings provide sufficient protection to the XPS. The XPS on the interior face must be discontinuous across wall/floor junctions.

Weathertightness

9.1.16 Resistance to rain ingress is provided by the external finishes but this has not been assessed by the BBA and is outside the scope of this Certificate. Care should be taken to ensure the design and construction complies with the relevant good practice described in the applicable codes and the Certificate holder's installation procedures.

Damp-proofing and waterproofing

9.1.17 The system's elements will not transmit moisture by capillary action. Concrete walls formed with the system must be constructed using the specified concrete recommended by the Certificate holder (see section 9.1.6).

9.1.18 Use of the system below ground to resist the effect of hydrostatic head or ground water ingress has not been assessed and is outside the scope of this Certificate.

9.1.19 The damp-proofing of the wall constructed from the system must be continuous with the damp-proof membrane (DPM) provided in the floor and must achieve continuity with any membrane or damp-proof course (DPC) provided in the external wall.

Surface condensation

9.1.20 In England and Wales, 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 3 of this Certificate.

9.1.21 For buildings in Scotland, wall constructions will be acceptable when 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 junctions with other elements are designed in accordance with the guidance referred to in BS 5250 : 2021. Further guidance may be obtained from BRE Report BR 262 : 2002 and section 6 of this Certificate.

Airtightness and watertightness

9.1.22 The system is not designed to be airtight or watertight. However, the exterior finishes (outside the scope of this Certificate) to be used on the system must be weathertight and reasonably airtight, to satisfy the requirements of the relevant national Building Regulations and Standards.

9.2 Installation

9.2.1 Installation instructions provided by the Certificate holder were assessed and judged to be appropriate and adequate.

9.2.2 Installation must be carried out in accordance with this Certificate and the Certificate holder's instructions. A summary of instructions and guidance is provided in Annex A of this Certificate.

Erection of Insulated Concrete Formwork boards

9.2.3 The forms may be readily cut or trimmed using a hot knife, fine-toothed saw or other appropriate saw as specified in the Certificate holder's Installation Manual. The line of wall is established and an XPS board is cut to a height of 80 mm from the foundation and secured to the foundation using a mechanical fixing and polyurethane glue.

9.2.4 Where the specified elevation height is not a multiple of the standard form height, adjustment may be made by cutting the bottom course of the forms or trimming the top off the highest course of forms as described in the Certificate holder's Installation Manual.

9.2.5 Working from the corners to the centre of the walls, the pre-constructed R-Ties on R-Rails are inserted by pushing firmly into the pre-cut profiled groove within the XPS board, ensuring walls are in line and level. This is continued with subsequent boards and rails, creating courses. As work progresses, care should be taken to ensure that vertical joints do not coincide. Any reinforcement required for structural design purposes must be inserted as erection of the formwork proceeds. The sequence of erection of the forms and recommendations on joints are given in the Certificate holder's Installation Manual.

9.2.6 Pieces of XPS board must be inserted into any open sides to form a closer, adding reinforcement where required. If structural steel reinforcement is used, this is laid along the R-Ties. The forms must be suitably restrained and sealed on the footing/slab in accordance with the Certificate holder's Installation Manual.

9.2.7 Consideration should be given at the design stage to the incorporation of wall fixings, support brackets, service entry points, ducting, pipework and other building elements, to minimise post-construction cutting out or chasing of the concrete core. Other detailing can also be incorporated in the construction of the formwork subject to the Certificate holder's recommendations. In carrying out any cutting of, or modifications to, the system, care must be taken not to damage or weaken the formwork elements that could result in the loss of integrity or overall stability of the temporary construction. Cold bridging effects must also be considered where any services pass through the wall construction.

9.2.8 To achieve structurally stable formwork during the construction process, the system must be braced sufficiently to resist the loads imparted on the system by wet concrete, wind loads and other construction loads acting on both faces of the wall. The Certificate holder recommends a specific propping/support system (similar to the one shown in Figure 4) that is designed to give lateral support during the pouring of the concrete and at the curing stage. The Certificate holder can provide a bracing system that allows for adjustment both prior to and immediately following pouring operations.

Concrete placement

9.2.9 Prior to the concrete pour, a check should be carried out on the system to ensure conformity with design and layout, correct alignment, and that bracings and props are secured. Reinforcements must be checked for correct cover distance and rigidity. Horizontal joints should also be protected for concrete overspill.

9.2.10 The concrete mix and slump must be checked to ensure they are to specification, in accordance with normal practice. A pre-pour checklist is set out in the Certificate holder's Installation Manual.

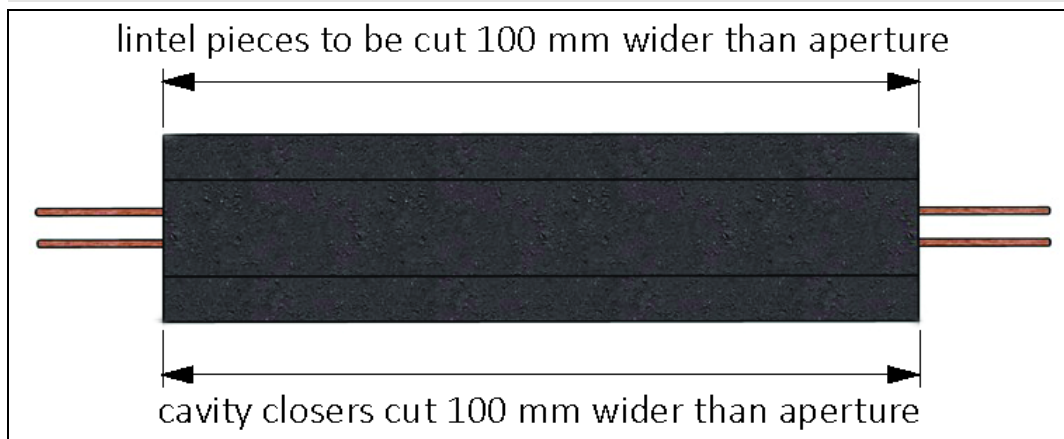
9.2.11 Concrete placement should start away from corners, directing the concrete around the walls of the building in a 900 to 1200 mm pour height, allowing concrete to free-flow into corners and below window openings until it reaches the plastic rail level. Each layer of concrete should be compacted by using a small diameter vibrating poker, in accordance with the Certificate holder's Installation Manual.

9.2.12 In general, concrete is placed by pump using concrete from a batching plant. Small volumes can also be placed by hand or skip with adapted neck or pump, if necessary. The first pour is allowed to stiffen before placing the second pour of concrete. The next traverse proceeds in the same manner until the first storey-height has been reached. Typically, storey heights should be placed in two to three pours. At window and door openings, concrete should be poured either side of each opening up to sill level and the concrete allowed to begin its initial set before the next pour is commenced.

Windows and doors

9.2.13 Window and door openings are formed during construction of the formwork with XPS board cavity closers (see Figure 7), cut and inserted into the void soffit, sill and reveals located around openings to seal them during concrete pouring. All openings and lintels formed should be braced adequately and supported in accordance with the Certificate holder's Installation Manual.

Figure 7 Frame closer to openings



Construction of T-junctions

9.2.14 At T-junctions (see Figure 8), additional pressure is applied where the wall formworks intersect at right angles to another. For construction of a T-junction, additional bracing is required. The XPS boards and rails are cut away to create a gap within the wall. Then, the abutting wall is built around the gap and secured on either side with a timber batten to keep the walls plumb. The Certificate holder can provide information on party wall construction details to satisfy fire and sound Regulations. Further details can be found in the Certificate holder's Installation Manual.

Figure 8 T-junctions in formwork



Foundation

9.2.15 The foundation must be level, smooth finished and within a tolerance of ± 10 mm in any direction. Any out-of-tolerances must be made good prior to placement of formwork.

9.2.16 A DPM is laid through the wall (depending on the detailing) to prevent the ingress of damp during the construction process. The external detail must be such that protection is provided to at least 150 mm above the external ground level. For ground bearing floors, the slab DPM should link to the wall DPC to provide complete protection and eliminate the possibility of capillary action between the slab and wall.

9.3 Workmanship

Practicability of installation was assessed by the BBA, on the basis of the Certificate holder's information and a virtual site visit to witness an installation in progress. To achieve the performance described in this Certificate, installation of the R-Wall Insulating Concrete Formwork (ICF) System must be carried out by trained operatives experienced with this type of system, in accordance with the Certificate holder's Installation Manual, or by installers who have been trained by the Certificate holder.

9.4 Maintenance and repair

Minor repairs to the formwork can be carried out prior to concrete pouring using plywood strapping, or suitable expanded foam, to reduce leakage of wet concrete and maintain the thermal integrity of the XPS board.

10 Manufacture

10.1 The production processes for the product have been assessed, and provide assurance that the quality controls are satisfactory according to the following factors:

10.1.1 The manufacturer has provided documented information on the materials, processes, testing and control factors.

10.1.2 The quality control operated over batches of incoming materials has been assessed and deemed appropriate and adequate.

10.1.3 The quality control procedures and product testing to be undertaken have been assessed and deemed appropriate and adequate.

10.1.4 The process for management of non-conformities has been assessed and deemed appropriate and adequate.

10.1.5 An audit of each production location was undertaken, and it was confirmed that the production process was in accordance with the documented process, and that equipment has been properly tested and calibrated.

† 10.2 The BBA has undertaken to review the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturers are being maintained.

11 Delivery and site handling

11.1 The Certificate holder stated that the system components are supplied in shrink wrapped protective polythene and delivered to site on pallets, with packaging bearing manufacturer's name, type marking and the BBA logo incorporating the number of this Certificate.

11.2 Delivery and site handling must be performed in accordance with the Certificate holder's instructions and this Certificate, including:

11.2.1 Good site practice must be observed to prevent damage to the formwork elements.

11.2.2 The system components must be stored upright, on flat ground protected from damage and UV light.

11.2.3 Care must be taken when handling the XPS elements to avoid damage and contact with solvents or materials containing volatile organic components such as newly treated timber. The elements must not be exposed to open flame or other ignition sources.

Supporting information in this Annex is relevant to the product but has not formed part of the material assessed for the 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.

CE marking

The manufacturer of the XPS component has taken the responsibility of CE marking the system, in accordance with harmonised European Standard EN 13164 : 2012.

Management Systems Certification for production

The management system of the manufacturer of the XPS component has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 by BSI (Certificate Q710649).

The management system of the manufacturer of the R-rails, R-ties and R-corner components has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 by BSI (Certificate FS570336).

Additional Guidance

Proximity of flues and appliances

A.1 When installing the system in close proximity to certain flue pipes and/or heat-producing appliances, the guidance in the relevant supporting documents of the national Building Regulations is acceptable.

Additional information on installation

General

A.2 The preparation, installation and support of the system and application of any specified finishes must be in accordance with the Certificate holder's Installation Manual.

Backfilling

A.3 Backfilling around the bottom layers of formwork to the ground floor should not take place until the concrete has reached sufficient design strength.

Electrical and plumbing installation

A.4 Electrical and plumbing services can be fixed within the formwork or into the concrete core by cutting chases into the XPS using a router, knife, saw or hot-wire knife. Any services introduced should conform to the national Building Regulations and Health and Safety requirements. Further details on fixing methods can be obtained from the Certificate holder's Installation Manual.

Wall penetrations

A.5 Openings or ducts for service penetrations can be positioned within the formwork prior to concrete pouring.

Internal finishes

A.6 A range of internal finishes (outside the scope of this Certificate) can be applied or fixed directly to the system. These should be screw-fixed into the rails or glued to the XPS using compatible adhesive.

A.7 Penetrations through the concrete, such as pipe entries or formwork ties, must also be securely sealed to maintain watertightness. The advice of the Certificate holder should be sought on suitable details.

External finishes

A.8 External cladding systems are outside the scope of this Certificate. Further details of suitable systems can be obtained from the Certificate holder.

Bibliography

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BS 8298-1 : 2010 *Code of practice for design and installation of natural stone cladding and lining — General*

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BS 8500-1 : 2015 + A1 : 2019 *Concrete — Complementary British Standard to BS EN 206-1 — Method of specifying and guidance for the specifier*

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Conditions

1 This Certificate:

- relates only to the product 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
- 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
- and any matter arising out of or in connection with it or its subject matter (including non-contractual disputes or claims) is governed by and construed in accordance with the law of England and Wales.
- the courts of England and Wales shall have exclusive jurisdiction to settle any matter arising out of or in connection with this Certificate or its subject matter (including non-contractual disputes or claims).

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.

3 This Certificate will be displayed on the BBA website, and the Certificate Holder is entitled to use the Certificate and Certificate logo, provided that the product 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.

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

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

6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product which is contained or referred to in this Certificate is the minimum required to be met when the product 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.