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Agrément Certificate

22/6048

Product Sheet 3

KINGSPAN GREENGUARD GG300 XPS INSULATION

KINGSPAN GREENGUARD GG300 XPS INSULATION FOR BASEMENTS

This Agrément Certificate Product Sheet⁽¹⁾ relates to Kingspan GreenGuard GG300 XPS Insulation for Basements, an extruded polystyrene board for use as thermal insulation of basement external walls and ground-bearing concrete basement floors, in new and existing domestic or similar buildings.

(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.

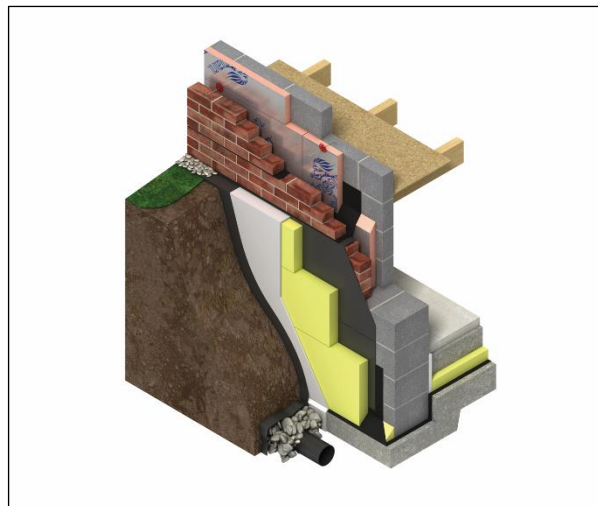
KEY FACTORS ASSESSED

Thermal performance — the product has a declared thermal conductivity value (λ_D) of $0.034 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$, and a design thermal conductivity value (λ_U), including moisture correction factor of $0.036 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ (see section 6).

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

Strength and stability — the product, when installed in accordance with this Certificate, can support a design loading for domestic applications (see section 10).

Durability — where installed in accordance with this Certificate the product will have a life equivalent to that of the construction in which it is incorporated. (see section 13).



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: 29 March 2022

Hardy Giesler
Chief Executive Officer

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 MUST check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA directly.

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

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Regulations

In the opinion of the BBA, Kingspan GreenGuard GG300 XPS Insulation for Basements, 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	Loading
Comment:	The product can contribute to satisfying this Requirement. See section 10.2 of this Certificate.	
Requirement:	C2(c)	Resistance to moisture
Comment:	The product can contribute to satisfying this Requirement. See sections 8.1 and 8.4 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 and 6.2 of this Certificate.	
Regulation:	7(1)	Materials and workmanship
Comment:	The product is acceptable. See section 13 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 and 6.2 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 13 and the <i>Installation</i> part of this Certificate.	
Regulation:	9	Building standards applicable to construction
Standard:	1.1(b)	Structure
Comment:	The product can contribute to satisfying this Standard, with reference to clause 1.1.1 ⁽¹⁾ . See section 10.2 of this Certificate.	
Standard:	3.15	Condensation
Comment:	The product can contribute to satisfying this Standard, with reference to clauses 3.15.1 ⁽¹⁾ 3.15.4 ⁽¹⁾ and 3.15.5 ⁽¹⁾ . See sections 8.1 and 8.5 of this Certificate.	
Standard:	6.1(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:	The product can contribute to satisfying these Standards, with reference to clauses, or parts of, 6.1.1 ⁽¹⁾ , 6.1.6 ⁽¹⁾ , 6.2.1 ⁽¹⁾ , 6.2.3 ⁽¹⁾ , 6.2.6 ⁽¹⁾ , 6.2.7 ⁽¹⁾ , 6.2.9 ⁽¹⁾ , 6.2.10 ⁽¹⁾ , 6.2.11 ⁽¹⁾ and 6.2.13 ⁽¹⁾ . See sections 6.1 and 6.2 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⁾ [Aspects 1 ⁽¹⁾ and 2 ⁽¹⁾], 7.1.6 ⁽¹⁾ [Aspects 1 ⁽¹⁾ and 2 ⁽¹⁾] and 7.1.7 ⁽¹⁾ [Aspect 1 ⁽¹⁾]. See section 6.1 of this Certificate.	

Regulation:	12	Building standards applicable to conversions
Comment:	Comments in relation to the product under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1 ⁽¹⁾ and Schedule 6 ⁽¹⁾ .	
	(1) Technical Handbook (Domestic).	



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

Regulation:	23	Fitness of materials and workmanship
Comment:	The product is acceptable. See section 13 and the <i>Installation</i> part of this Certificate.	
Regulation:	29	Condensation
Comment:	The product can contribute to satisfying this Regulation. See section 8.1 of this Certificate.	
Regulation:	30	Stability
Comment:	The product can contribute to satisfying this Regulation. See section 10.2 of this Certificate.	
Regulation:	39(a)(i)	Conservation measures
Regulation:	40(2)	Target carbon dioxide emission rate
Comment:	The product can contribute to a building satisfying these Regulations. See sections 6.1 and 6.2 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* (3.4) of this Certificate.

Additional Information

NHBC Standards 2022

In the opinion of the BBA, Kingspan GreenGuard GG300 XPS Insulation for Basements, 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 5.4 Waterproofing of basements and other below ground structures .

CE marking

The Certificate holder has taken the responsibility of CE marking the product in accordance with harmonised European Standard BS EN 13164 : 2012.

Technical Specification

1 Description

1.1 Kingspan GreenGuard GG300 XPS Insulation for Basements, consists of rigid, extruded polystyrene (XPS) boards. The boards have the nominal characteristics given in Table 1.

Table 1 Nominal characteristics

Characteristic (unit)	Value	
Work size - length x width (mm)	2500 x 600	1250 x 600
Overall size (rebated option) – length x width (mm)	2515 x 615	1265 x 615
Thickness (mm)	30, 40, 50, 60, 70, 80, 100, 120, 140, 150, 180	
Edge profile	Straight or Rebated 15 mm on all 4 sides	
Minimum compressive stress at 10% deformation (kPa)	300	
Flatness (deviation from flatness mm/m)	6	
Colour	Light green	

1.2 Ancillary items for use with the product, but outside the scope of this Certificate :

- damp proof membrane (dpm) / tanking waterproofing system
- VCL (vapour control layer)
- drainage membrane (protection of basement wall insulation)
- geotextile membrane (protection of basement wall insulation)
- external drainage or drained cavity system (basement walls and floor slab).

2 Manufacture

2.1 The XPS insulation production process involves the use of blended General Purpose Polystyrene (GPPS) and blowing agents. The GPPS is then vacuum conveyed into an extruder.

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 system of the manufacturer has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 by CIBSE Certification Ltd (Certificate 0001QMS-1).

3 Delivery and site handling

3.1 The product is delivered to site in polythene shrink-wrapped packs incorporating a label with the Certificate holder's trade name, product description and characteristics, and the BBA logo incorporating the number of this Certificate.

3.2 The product must be stored flat, off the ground on a clean, level surface, and under cover or protected with opaque polythene, to protect it from prolonged exposure to sunlight.

3.3 The product is light and easy to handle, and care should be exercised to avoid crushing the edges or corners. If damaged, the product should be discarded.

3.4 The product must not be exposed to open flame or other ignition sources, or to solvents or other chemicals.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Kingspan GreenGuard GG300 XPS Insulation for Basements.

Design Considerations

4 Use

4.1 Kingspan GreenGuard GG300 XPS Insulation for Basements is satisfactory for use as insulation and is effective in reducing the thermal transmittance (U value) of external basement walls and ground-bearing basement concrete floors in new or existing domestic or similar buildings.

4.2 Kingspan GreenGuard GG300 XPS Insulation for Basements can be installed as a single layer, or multi-layer (double or triple layers) to suit the requirements. When using multiple layers the insulation board joints should be staggered / offset. The Certificate Holder should be contacted for further advice on multi-layering.

4.3 For the purpose of insulating external basement walls, the product is installed against the outside face of the basement wall waterproofing membrane. The product must be protected against the external subsoil, using a drainage membrane, in conjunction with a geotextile membrane and drainage system, as required to suit the design and site conditions. The Certificate holder can advise whether a separation membrane is required between the product and the waterproof membrane, and provide further information on use of the product with drainage and geotextile membranes.

4.4 Structural basement retaining walls, foundations, and ground-bearing basement floor slabs must be designed by a suitably competent and experienced individual. External basement walls and concrete ground-bearing basement floors incorporating the insulation must include a suitable continuous waterproofing / tanking membrane system, with drainage as required to suit the site conditions, and constructed in accordance with the relevant clauses of CP 102 : 1973, BS 8102 : 2009, BS 8215 : 1991 and if relevant, the *NHBC Standards 2022*, Chapter 5.4 Waterproofing of basements and other below ground structures. The product should not be used where shrinkable soils are likely to impart lateral forces onto the wall without the added protection of a suitably compressible medium designed for this purpose and specified by a suitably competent and experienced individual.

4.5 Ground-bearing basement floors should only be used where the depth of compacted fill is less than 600 mm and is defined as non-shrinkable. Shrinkable fills are defined as material containing more than 35% fine particles (silt and clay) and having a plasticity Index of 10% or greater (shrinkable fills are susceptible to clay heave). Structural load-bearing basement slabs must be specifically designed for such cases by a suitably qualified and experienced individual.

4.6 The product should not be used under trench fill foundations for walls. The use of the product directly under structural raft slabs must be subject to specific design by a suitably qualified and experienced individual.

4.7 For basement floors, the overlay to the insulation boards should be :

- a vapour control layer (VCL) (see section 8.2)
- a concrete slab in accordance with BS EN 1992-1-1 : 2004
- a cement-based floor screed of minimum 65 mm thickness⁽¹⁾, laid in accordance with the relevant clauses of BS 8204-1 : 2003 and/or BS 8204-2 : 2003, and BS 8000-9 : 2003.

(1) NHBC only accept ground bearing floor slabs with at least 100 mm thick concrete including any monolithic screed.

4.8 Where a concrete screed or slab finish is laid directly over the product, a polyethylene separating layer/VCL must be installed between the insulation and the concrete to prevent seepage between the boards (see section 14.9). Any gaps between insulation boards or around service openings, visible prior to installing the concrete, must be filled with expanding foam or strips of insulation.

5 Practicability of installation

The product is designed to be installed by a competent general builder, or a contractor, experienced with this type of product.

6 Thermal performance



6.1 Calculations of the thermal transmittance (U value) of a wall or floor should be carried out in accordance with BS EN ISO 6946 : 2017, BS EN ISO 13370 : 2017 and BRE Report BR 443 : 2019, using the following conductivity values :

- for insulation above the basement floor dpm/tanking membrane ie dry conditions – use the declared thermal conductivity value (λ_D) value of $0.034 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$
- for insulation applied to basement external walls or insulation below the basement floor dpm/tanking membrane ie where subject to ground moisture – use the design thermal conductivity (λ_U) value of $0.036 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$. (which is the declared lambda λ_D with addition of a moisture correction).

6.2 The U value of a completed wall or floor will depend on the thickness of the product, and the perimeter/area ratio and the floor type. Calculated U values for example constructions are given in Tables 2 and 3.

Table 2 Basement wall U values⁽¹⁾

value ($\text{W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$)	Insulation thickness (mm)
0.17	150 ⁽²⁾
0.18	140
0.20	120
0.21	110 ⁽²⁾
0.22	100
0.23	100
0.25	90 ⁽²⁾
0.26	80
0.27	80
0.28	70
0.30	60
0.35	50

- (1) The U value calculations are based on the following wall make up. Inside to outside :
 12.5 mm Plasterboard ($\lambda = 0.25 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$), 15 mm plaster dabs cavity ($R = 0.17 \text{ m}^2\cdot\text{K}\cdot\text{W}^{-1}$) and bridged with adhesive ($\lambda = 0.43 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$) @20%,
 300 mm concrete wall ($\lambda = 1.7 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$), 2 mm tanking membrane ($\lambda = 0.23 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$), Kingspan GreenGuard GG300 insulation, ($\lambda_U = 0.036 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$), drainage membrane (no thermal performance), geotextile membrane (no thermal performance), ground.
 P/A = 0.5, average basement depth = 2.5 m, ground conductivity ie Sand ($\lambda = 2.0 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$).
 Basement floor insulation = 200 mm Kingspan GreenGuard GG300 insulation, above dpm ($\lambda_D = 0.034 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$)
- (2) Made up of 2 thickness layers.

Table 3 Example U values – basement floor construction

Floor type	U value ($\text{W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$)	Insulation thickness (mm)				
		P/A ratio				
		0.2	0.4	0.6	0.8	1.0
Ground-bearing concrete floor ⁽¹⁾⁽³⁾ <i>Insulation above dpm</i> ($\lambda_D = 0.034 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$)	0.13	140	180	190 ⁽⁴⁾	200 ⁽⁴⁾	200 ⁽⁴⁾
	0.15	110 ⁽⁴⁾	150 ⁽⁴⁾	160 ⁽⁴⁾	160 ⁽⁴⁾	170 ⁽⁴⁾
	0.20	60	90 ⁽⁴⁾	100	110 ⁽⁴⁾	110 ⁽⁴⁾
	0.22	50	80	90 ⁽⁴⁾	100	100
	0.25	30	60	70	80	80
Ground-bearing concrete floor ⁽²⁾⁽³⁾ <i>Insulation below dpm</i> ($\lambda_U = 0.036 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$)	0.13	150 ⁽⁴⁾	190 ⁽⁴⁾	200 ⁽⁴⁾	210 ⁽⁴⁾	210 ⁽⁴⁾
	0.15	120	150 ⁽⁴⁾	170 ⁽⁴⁾	170 ⁽⁴⁾	180
	0.20	60	100	110 ⁽⁴⁾	120	120
	0.22	50	80	90 ⁽⁴⁾	100	110 ⁽⁴⁾
	0.25	30	60	80	80	90 ⁽⁴⁾

(1) Hardcore, sand blinding and concrete base - no thermal performance, dpm, GreenGuard 300 XPS Insulation, separating layer, 200 mm medium density concrete ($\lambda = 1.35 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$) and 65 mm screed ($\lambda = 1.15 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$).

(2) Hardcore, sand blinding and concrete base - no thermal performance, GreenGuard 300 XPS Insulation, dpm, 200 mm medium density concrete ($\lambda = 1.35 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$) and 65 mm screed ($\lambda = 1.15 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$).

(3) Average basement depth = 2.5 m and earth (sand or gravel) conductivity $\lambda = 2.0 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$

(4) Made up of 2 layers.

Junctions

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

7 Water resistance

Under normal service conditions, dampness from the ground will not pass through to the internal faces of the external basement walls and basement floor provided the basement walls and floor are protected by a continuous dpm/tanking waterproofing membrane system detailed in accordance with the requirements and provisions of the national Building Regulations.

8 Condensation

Interstitial condensation



8.1 Walls and floors will adequately limit the risk of interstitial condensation when they are designed and constructed in accordance with BS 5250 : 2021 and the relevant guidance.

8.2 When the product is used above the dpm membrane in a basement floor slab, a VCL is installed on the warm side of the insulation to inhibit the risk of interstitial condensation, unless a risk assessment shows this is not necessary.

8.3 For the purposes of assessing the risk of interstitial condensation, the product's water vapour resistivity value may be taken as $400 \text{ MN}\cdot\text{s}\cdot\text{g}^{-1}\cdot\text{m}^{-1}$.

Surface condensation



8.4 Walls and floors 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 section 6.3 of this Certificate.



8.5 For buildings in Scotland, walls and floors 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 6.3 of this Certificate.

9 Behaviour in relation to fire

The product has a Class F reaction to fire classification⁽¹⁾ in accordance with BS EN 13501-1 : 2018.

(1) FIW Munich Report No H.E-027e/20, 24 Feb 2020. Copies can be obtained from the Certificate holder.

10 Strength and stability

10.1 The compressive strength of the product (compressive stress at 10% deformation to BS EN 826 : 2013) is $\geq 300 \text{ kPa}$.



10.2 The product is suitable for the domestic occupancies defined in this Certificate when covered with a suitable floor overlay (see section 4.5), and is capable of resisting a uniformly distributed load of $1.5 \text{ kN} \cdot \text{m}^{-2}$ or a concentrated load of 2 kN for category A1 and A2 (domestic) situations as defined in BS EN 1991-1-1 : 2002, National Annex Table NA.2. Further assessment is necessary in the case of duty walkways and floors subject to physical activities.

10.3 The performance of the floor construction will depend on the insulation properties and type of floor covering used (including thickness and strength). When the product is used under a concrete slab, resistance to concentrated and distributed loads is a function of the slab specification. Further guidance on the suitability of floor overlays can be found in BS EN 13810-1 : 2002, and BS 8204-1 : 2003 and from the flooring manufacturer.

11 Incorporation of services

11.1 De-rating of electrical cables should be considered where the insulation restricts air cooling of cables; the product must not be used in direct contact with electrical heating cables or hot water pipes. Where underfloor heating systems are to be used, the advice of the Certificate holder should be sought.

11.2 Where possible, electrical conduits, gas and water pipes or other services should be contained within ducts or channels within the concrete slab of ground bearing floors. Where this is not possible, the services may be accommodated within the insulation, provided they are securely fixed to the concrete slab. Electrical cables that are likely to come into contact with the insulation must be protected by a suitable conduit or PVC-U trunking. With hot pipes, the insulation must be cut back to maintain an air space.

11.3 Where water pipes are installed below the insulation, they must be pre-lagged with close-fitting pipe insulation. Pipes installed above the insulation will not require lagging, although some provision needs to be made for expansion and contraction.

12 Maintenance

Where installed in accordance with this Certificate, the product has suitable durability (see section 13), and maintenance is not required.

13 Durability



The insulation is durable, rot proof, dimensionally stable and, when installed in accordance with this Certificate, will remain effective as an insulating material for the life of the construction in which it is incorporated.

14 General

14.1 Installation of Kingspan GreenGuard GG300 XPS Insulation for Basements must be in accordance with the Certificate holder's installation instructions and the requirements of this Certificate.

14.2 Kingspan GreenGuard GG300 XPS Insulation for Basements is laid in a brick bond pattern; it is essential that all joints between the boards are tight and that no gaps exist. The boards can be cut easily using a fine-toothed saw, sharp knife or a hot wire cutter. Where multi-layers are used the board joints should be staggered / offset (see section 4.2).

14.3 A typical method of installation is shown in Figure 1. Reference should also be made to BRE Report BR 262 : 2002, and to sections 4.3 to 4.6 of this Certificate for information relating to the structural design of basement walls, foundations and floor slabs, required to suit the specific design and site conditions.

14.4 Kingspan GreenGuard GG300 XPS Insulation is applied as external wall insulation against the basement wall waterproofing / tanking membrane, and is to be protected against the subsoil using a drainage membrane and geotextile membrane, used in conjunction with an external drainage system as required. Further information on this can be obtained from the Certificate holder (see sections 4.3 and 4.4 of this Certificate).

14.5 Where the insulation is used over ground-bearing concrete floor slabs, a suitable continuous waterproofing / tanking system in accordance with CP 102 : 1973 should be laid to resist moisture from the ground. If a liquid-type dpm is applied to the slabs, it should be of type compatible with the insulation product and allowed to dry out fully before the insulation is laid. The Certificate holder can advise on suitable materials for this purpose.

14.6 Where a screed or concrete slab is laid over the insulation, vertical upstands of insulation should be provided and be of sufficient depth to fully separate the screed or slab from the wall.

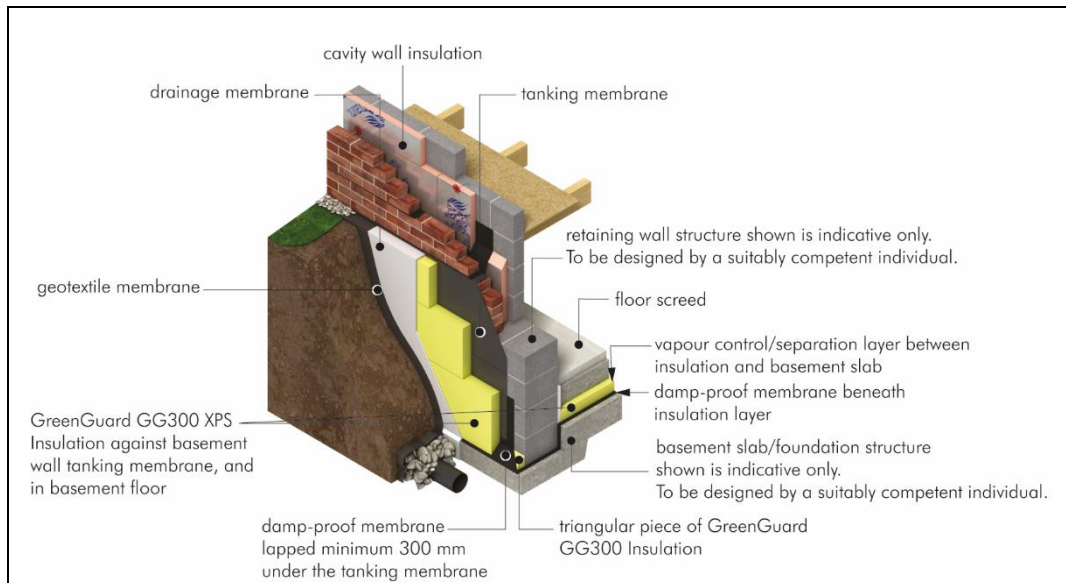
14.7 In ground-bearing concrete basement floors, the concrete floor slab over which the product is to be laid should be left for as long as possible to maximise drying out and dissipation of constructional moisture, in accordance with BS 8203 : 2017, section 3.1.2.

14.8 The concrete floor surface should be smooth, level and flat to within 5 mm when measured with a two metre straight-edge. Irregularities greater than this must be removed. Minor irregularities (up to 10 mm deep) may be levelled with mortar or thin screed.

14.9 A VCL is installed on the warm side of the insulation to inhibit the risk of interstitial condensation if necessary, see section 8.2. Where a concrete screed or slab finish is to be laid over the product, a polyethylene separating layer/VCL must be installed in between the insulation and the concrete to prevent seepage between the boards.

14.10 To limit the risk of condensation and other sources of dampness, the product and overlays should only be laid after the construction is made substantially weathertight, eg after glazing. During construction, the product and overlay must also be protected from damage by traffic and moisture sources such as water spillage and plaster droppings.

**Figure 1 Kingspan GreenGuard GG300 XPS Floor Insulation for Basements
- Basement walls and floor slab**



15 Procedure

Basement walls

15.1 The boards are cut to size (using a sharp knife or fine-toothed saw), as necessary, and laid with closely butted, staggered cross-joints, ensuring that all spaces are completely filled.

15.2 Kingspan GreenGuard GG300 XPS Insulation is laid against the vertical waterproofing /tanking membrane to the basement external walls, and is then covered using a drainage membrane and an outer geotextile membrane to protect it against the wet subsoil. Further guidance may be obtained from the Certificate holder.

Basement floors

15.3 The boards are cut to size (using a sharp knife or fine-toothed saw), as necessary, and laid with closely butted, staggered cross-joints, ensuring that all spaces are completely filled.

15.4 The laying pattern should ensure that all cut edges are at the perimeter of the floor or some other feature, eg mat wells, thresholds or access ducts. Spreader boards should be used to protect the product.

Cement-based screed overlay

15.5 Perimeter edge pieces are cut and placed around the edges. A polyethylene VCL, at least 0.125 mm thick (500 gauge), is laid over the insulation. The VCL should have 150 mm overlaps, taped at the joints and be turned up 100 mm at the walls. A properly compacted screed of a minimum 65 mm thickness is then laid over. The relevant clauses of BS 8204-1 : 2003 should be followed.

Concrete slab overlay

15.6 Perimeter edge pieces are cut and placed around the edges. A polyethylene VCL, at least 0.125 mm thick (500 gauge), is laid over the insulation. The VCL should have 150 mm overlaps, taped at the joints, and be turned up 100 mm at the walls. The concrete slab is laid to the required thickness accordance with BS 8000-9 : 2003 and BS 8204-1 : 2003.

16 Tests

Results of tests were assessed, to determine:

- thermal conductivity
- compressive strength
- water vapour permeability
- long-term water absorption by diffusion
- water absorption by total immersion
- resistance to freeze-thaw of the thermal insulation
- deformation under specified compressive load and temperature
- dimensional stability
- dimensional accuracy.

17 Investigations

17.1 Data on durability and properties in relation to fire were evaluated.

17.2 A calculation was undertaken to confirm the declared (λ_D) and design (λ_U) thermal conductivity values .

17.3 A series of U value calculations was carried out.

17.4 A condensation risk analysis was carried out.

17.5 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.

Bibliography

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

BRE Report BR 443 : 2019 *Conventions of U-value calculations*

BS 5250 : 2021 *Management of moisture in buildings — Code of practice*

BS 8000-9 : 2003 *Workmanship on building sites — Cementitious levelling screeds and wearing screeds — Code of practice*

BS 8102 : 2009 *Code of practice for protection of below ground structures against water from the ground*

BS 8203 : 2017 *Code of practice for installation of resilient floor coverings*

BS 8204-1 : 2003 + A1 : 2009 *Screeds, bases and in-situ floorings — Concrete bases and cement sand levelling screeds to receive floorings — Code of practice*

BS 8204-2 : 2003 + A2 : 2011 *Screeds, bases and in-situ flooring — Concrete wearing surfaces — Code of practice*

BS 8215 : 1991 *Code of practice for design and installation of damp-proof courses in masonry construction*

BS EN 826 : 2013 *Thermal insulating products for building applications — Determination of compression behaviour*

BS EN 1991-1-1 : 2002 *Eurocode 1 — Actions on structures — General actions — Densities, self-weight, imposed loads for buildings*

NA to BS EN 1991-1-1 : 2002 *UK National Annex to Eurocode 1 — Actions on structures — General actions — Densities, self-weight, imposed loads for buildings*

BS EN 1992-1-1 : 2004 + A1 : 2014 *Eurocode 2 — Design of concrete structures — General rules and rules for buildings*

NA to BS EN 1992-1-1 : 2004 + A1 : 2014 *UK National Annex to Eurocode 2 — Design of concrete structures — General rules and rules for buildings*

BS EN 13164 : 2012 + A1 : 2015 *Thermal insulation products for buildings — Factory made extruded polystyrene foam (XPS) products*

BS EN 13501-1 : 2018 *Fire classification of construction products and building elements — Classification using test data from reaction to fire tests*

BS EN 13810-1 : 2002 *Wood-based panels — Floating floors — Performance specifications and requirements*

BS EN ISO 6946 : 2017 *Building components and building elements — Thermal resistance and thermal transmittance Calculation methods*

BS EN ISO 9001 : 2015 *Quality management systems — Requirements*

BS EN ISO 13370 : 2017 *Thermal performance of buildings — Heat transfer via the ground — Calculation methods*

CP 102 : 1973 *Code of practice for protection of buildings against water from the ground*

18 Conditions

18.1 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.

18.2 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.

18.3 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.

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

18.5 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.

18.6 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.