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Agrément Certificate
02/3943
Product Sheet 1

S AND B EXPANDED POLYSTYRENE INSULATION

S AND B EPS FLOORING INSULATION

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to S and B EPS Flooring Insulation, an expanded polystyrene board for insulating ground-supported or suspended concrete floors. The product may also be used on exposed or semi-exposed intermediate concrete floors and is used to reduce the thermal transmittance of new or existing floors of dwellings.

AGRÉMENT 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 thermal conductivity ($\lambda_{90/90}$ value) is between $0.038 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ and $0.030 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ depending upon the grade (see section 5).

Floor loading — the product when covered with a suitable overlay as specified in section 3.3 can support a design loading without undue compression deflection (see section 6).

Behaviour in relation to fire — the product will be contained within the floor by the overlay until the overlay itself is destroyed (see section 7).

Durability — the product is dimensionally stable and, when installed with the overlays specified in section 3.3, will remain effective as an insulating material for the life of the building in which it is incorporated (see section 10).

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

Sean Moriarty — Head of Approvals
Energy and Ventilation

Greg Cooper
Chief Executive

Date of First issue: 23 February 2012

Originally certificated on 16 August 2002

Certificate amended on 26 March 2013 to add a λ value to Table 2 and remove two insulation descriptions from Table 3b.

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, S and B EPS Flooring Insulation, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations:



The Building Regulations 2010 (England and Wales)

Requirement:	A1	Loading
Comment:		The product has adequate strength and stiffness. See section 6.2 of this Certificate.
Requirement:	C2(c)	Resistance to moisture
Comment:		The product can contribute to meeting this Requirement. See sections 8.1 and 8.3 of this Certificate.
Requirement:	L1(a)(i)	Conservation of fuel and power
Comment:		The product can contribute to satisfying this Requirement. See sections 5.1 and 5.3 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The product is acceptable. See section 10 and the <i>Installation</i> part of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)	Fitness and durability of materials and workmanship
Comment:		The product is acceptable. See section 10 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards – construction
Standard:	1.1(a)(b)	Structure
Comment:		The product has adequate strength and stiffness, with reference to clause 1.1.1 ⁽¹⁾ . See section 6.2 of this Certificate.
Standard:	3.15	Condensation
Comment:		The product can contribute to meeting this Standard, with reference to clauses 3.15.1 ⁽¹⁾ , 3.15.4 ⁽¹⁾ and 3.15.5 ⁽¹⁾ . See sections 8.1 and 8.4 of this Certificate.
Standard:	6.1(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		The product can contribute to satisfying clauses, or parts of, 6.1.2 ⁽¹⁾ , 6.1.6 ⁽¹⁾ , 6.2.1 ⁽¹⁾ , 6.2.7 ⁽¹⁾ , 6.2.9 ⁽¹⁾ , 6.2.11 ⁽¹⁾ , and 6.2.13 ⁽¹⁾ of these Standards. See sections 5.1 and 5.3 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The product can contribute to meeting 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 5.1 of this Certificate.
Regulation:	12	Building standards – conversions
Comment:		Comments made in relation to this 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) 2000 (as amended)

Regulation:	B2	Fitness of materials and workmanship
Comment:		The product is acceptable. See section 10 and the <i>Installation</i> part of this Certificate.
Regulation:	C5	Condensation
Comment:		The product can contribute to meeting this Regulation. See section 8.1 of this Certificate.
Regulation:	D1	Stability
Comment:		The product has adequate strength and stiffness. See section 6.2 of this Certificate.
Regulation:	F2(a)(i)	Conservation measures
Regulation:	F3(2)	Target carbon dioxide Emissions Rate
Comment:		The product can contribute to satisfying these Regulations. See sections 5.1 and 5.3 of this Certificate.

Construction (Design and Management) Regulations 2007

Construction (Design and Management) Regulations (Northern Ireland) 2007

Information in this Certificate may assist the client, CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

See section: 2 *Delivery and site handling* (2.1) of this Certificate.

Additional Information

NHBC Standards 2011

NHBC accepts the use of S and B EPS Flooring Insulation when installed and used in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 5.1 *Substructure and ground bearing floors*.

CE marking

The Certificate holder has taken the responsibility of CE marking the product in accordance with harmonised standard BS EN 13163 : 2008. An asterisk(*) appearing in this Certificate indicates that data shown is given in the manufacturer's Declaration of Performance.

Technical Specification

1 Description

1.1 S and B EPS Flooring Insulation consists of rigid, expanded polystyrene boards, in seven grades, in accordance with BS EN 13163 : 2008.

1.2 The boards are supplied with the characteristics given in Table 1.

Table 1 Nominal characteristics

Characteristic (unit)	Grade				
	EPS 70	EPS 100, EPS 120 and EPS 150	EPS 100 – Low Lambda	Lambda-therm	
				EPS 70	EPS 90
Length ^{*(1)} (mm)	2400	2400	2400	2400	2400
Width ^{*(1)} (mm)	1200	1200	1200	1200	1200
Thickness ^{*(1)} (mm)	75 to 100	75 to 100	50 to 100	50 to 100	50 to 100
Water vapour diffusion resistance* factor (μ)	20 to 40	30 to 70	30 to 70	20 to 40	30 to 70
Water vapour permeability* [$\text{mg} \cdot (\text{Pa} \cdot \text{h} \cdot \text{m})^{-1}$]	0.018 to 0.036	0.010 to 0.024	0.010 to 0.024	0.018 to 0.036	0.010 to 0.024
Edge profile	square or rebated	square or rebated	square or rebated	square or rebated	square or rebated

(1) Other sizes can be supplied to order, with higher thicknesses to suit the requirement.

2 Delivery and site handling

2.1 The product is delivered to site in packs, wrapped in polythene. Each pack contains a label bearing the manufacturer's trade name, product description, board dimensions, number of boards and the BBA identification mark incorporating the number of this Certificate.

2.2 The product must be protected from prolonged exposure to sunlight and should be stored either under cover or protected with opaque light-coloured polythene. Care must be taken to avoid contact with solvents and bitumen products.

2.3 The product must be stored fully supported and flat on a firm, level, dry base, protected from the weather and raised above damp surfaces. The product must be discarded if damaged or wet.

2.4 The product must not be exposed to open flame or other ignition sources.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on S and B EPS Flooring Insulation.

Design Considerations

3 General

3.1 S and B EPS Flooring Insulation is effective in reducing the U value (thermal transmittance) of new or existing ground floors.

3.2 Ground-supported concrete and suspended ground floors incorporating the insulation must include a suitable damp-proof membrane (dpm) laid in accordance with the relevant Clauses of CP 102 : 1973, BS 8102 : 2009 and/or BS 8215 : 1991 or suitable ventilation of the sub floor as appropriate.

3.3 The overlay to the insulation should be:

- a cement-based floor screed laid in accordance with the relevant Clauses of BS 8204-1 : 2003 and/or BS 8204-2 : 2003, or
- the floor finish should be installed in accordance with EN 12871 : 2010
- a concrete slab.

4 Practicability of installation

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

5 Thermal performance



5.1 Calculations of the thermal transmittance (U value) of a floor construction should be carried out in accordance with BS EN ISO 6946 : 2007, BS EN ISO 13370 : 2007 and BRE Report (BR 443 : 2006) *Conventions for U-value calculations*, using the declared thermal conductivity ($\lambda_{90/90}$ value) as given in Table 2.

Table 2 Declared thermal conductivity ($\lambda_{90/90}$ values)

Grade	Thermal conductivity* (W·m ⁻¹ ·K ⁻¹)
EPS 70	0.038
EPS100	0.036
EPS 120	0.036
EPS 150	0.035
EPS 100 Low Lambda	0.034
EPS 70 Lambda-therm	0.032
EPS 90 Lambda-therm	0.030

5.2 Examples of U values achieved by different thicknesses of insulation used either in suspended or ground-supported floors are given in Tables 3(a) and 3(b).

Table 3(a) Floor U values

Floor type	Insulation	Perimeter/ area ratio	Insulation thickness (mm)			
			75	100	150	175
Slab ground- supported	EPS 70	0.2	0.17	0.14	0.13	0.15
		0.4	-	0.22	0.17	0.17
		0.6	-	0.25	0.19	0.17
		0.8	-	-	0.20	0.18
		1.0	-	-	0.20	
	EPS 100 and EPS 120	0.2	0.19	0.17	0.13	0.12
		0.4	0.25	0.21	0.16	0.15
		0.6	-	0.24	0.18	0.16
		0.8	-	0.25	0.19	0.17
		1.0	-	-	0.19	0.17
	EPS150	0.2	0.19	0.17	0.13	0.12
		0.4	0.25	0.21	0.16	0.14
		0.6	-	0.23	0.18	0.16
		0.8	-	0.25	0.18	0.16
		1.0	-	-	0.19	0.17
	EPS 70	0.2	0.20	0.18	0.15	0.14
		0.4	0.25	0.22	0.18	0.16
		0.6	-	0.23	0.19	0.17
		0.8	-	0.24	0.19	0.17
		1.0	-	0.25	0.19	0.17
Suspended beam- and-block	EPS 100 and EPS 120	0.2	0.20	0.17	0.15	0.13
		0.4	0.24	0.21	0.17	0.15
	EPS 150	0.6	-	0.23	0.18	0.16
		0.8	-	0.24	0.18	0.16
		1.0	-	0.24	0.19	0.17
EPS 150	0.2	0.20	0.17	0.15	0.13	
	0.4	0.24	0.21	0.17	0.15	
	0.6	-	0.22	0.17	0.16	
	0.8	-	0.23	0.18	0.16	
	1.0	-	0.24	0.18	0.16	

Table 3(b) Floor U values

Floor type	Insulation	Perimeter/ area ratio	Insulation thickness (mm)				
			50	75	100	150	175
Slab ground- supported	EPS 100 — Low Lambda	0.2	0.22	0.19	0.16	0.13	0.12
		0.4	—	0.25	0.21	0.16	0.14
		0.6	—	—	0.23	0.17	0.15
		0.8	—	—	0.24	0.18	0.16
		1.0	—	—	0.25	0.18	0.16
		0.2	0.21	0.18	0.15	0.12	0.11
	EPS 90 Lambda-therm	0.4	—	0.23	0.19	0.14	0.13
		0.6	—	0.25	0.21	0.16	0.14
		0.8	—	—	0.22	0.16	0.14
		1.0	—	—	0.23	0.17	0.15
		0.2	0.23	0.19	0.17	0.14	0.13
		0.4	—	0.24	0.20	0.16	0.14
Suspended beam- and-block	Low Lambda	0.6	—	—	0.22	0.17	0.15
		0.8	—	—	0.23	0.18	0.16
		1.0	—	—	0.23	0.18	0.16
		0.2	0.23	0.19	0.17	0.13	0.12
		0.4	—	0.23	0.19	0.15	0.13
		0.6	—	0.25	0.20	0.16	0.14
	EPS 90 Lambda-therm	0.8	—	—	0.21	0.16	0.14
		1.0	—	—	0.22	0.16	0.14

Note: (1) Constructions and boundary conditions used for both tables are in accordance with Chapters 9.1 and 9.2 of BRE Report (BR 443 : 2006).

(2) Where a construction is used with the dpm above the insulation on a slab on the ground (see Figure 6), moisture correction factor should be considered for the thermal conductivity used, in accordance with BS EN ISO 10456.



5.3 The product can contribute to maintaining continuity of thermal insulation at junctions between elements. For Accredited Construction Details the corresponding psi values in BRE Information Paper IP 1/06 *Assessing the effects of thermal bridging at junctions and around openings*, Table 3 may be used in carbon emission calculations in Scotland and Northern Ireland. Detailed guidance for other junctions and on limiting heat loss by air infiltration can be found in:

England and Wales — Approved Documents to Part L and for new thermal elements to existing buildings, Accredited Construction Details (version 1.0). See also SAP 2009 *The Government's Standard Assessment Procedure for Energy Rating of Dwellings*, Appendix K and the *iSBEM User Manual* for new-build

Scotland — Accredited Construction Details (Scotland)

Northern Ireland — Accredited Construction Details (version 1.0).

6 Floor loading

6.1 The product is capable of sustaining the loadings for self-contained dwelling units, as defined in BS EN 1991-1-1 : 2002, BS EN 1991-1-7 : 2006 and their relevant UK National Annexes.



6.2 The product, covered with particle board or screed, can support the aforementioned design loadings as defined in BS EN 1991-1-1 : 2002, BS EN 1991-1-7 : 2006 and their relevant UK National Annexes, without undue compression deflection of the insulant.

6.3 Where the product is used under a concrete slab, resistance to concentrated and distributed loads is a function of the slab specification.

7 Behaviour in relation to fire

7.1 The product is classified as Class E in accordance with BS EN 13501-1 : 2007.

7.2 The product does not prejudice the fire resistance properties of the floor.

7.3 When properly installed, the product will not add significantly to any existing fire hazard. The product will be contained within the floor by the overlay until the overlay itself is destroyed. Therefore, the product will not contribute to the development stages of a fire or present a smoke or toxic hazard. Electrical cables running within the polystyrene should be separated from it by enclosing them within a suitable conduit, eg rigid PVC.

8 Condensation

Interstitial condensation



8.1 Floors will adequately limit the risk of interstitial condensation when they are designed and constructed in accordance with BS 5250 : 2011, Annex F and BS EN ISO 10456 : 2007.

8.2 When the product is used above the dpm on a ground-supported floor, or on a beam-and-block floor, a VCL is installed on the warm side of the insulation to inhibit the risk of interstitial condensation on the upper slab surface.

Surface condensation



8.3 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 walls are designed in accordance with the relevant requirements of *Limiting thermal bridging and air leakage : Robust construction details for dwellings and similar buildings* TSO 2002 or BRE Information Paper IP 1/06.



8.4 Floors 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 Annex F and, BRE Report (BR 262 : 2002) *Thermal insulation : avoiding risks*.

9 Maintenance

The product is confined within the floor and has suitable durability (see section 10), therefore maintenance is not required.

10 Durability



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

Installation

11 General

11.1 Installation of S and B EPS Flooring Insulation must be in accordance with the Certificate holder's installation instructions and the requirements of this Certificate.

11.2 Typical methods of installation are shown in Figures 1 to 6. Reference should also be made to BRE Report (BR 262 : 2002).

11.3 All floor surfaces should be smooth, level and flat to within 5 mm when measured with a two-metre straightedge. Irregularities greater than this must be removed. Minor irregularities (up to 10 mm deep) may be levelled with mortar or thin screed.

11.4 In ground-supported concrete floors (see Figures 1, 3, 5 and 6), the concrete floor slab over which the insulation is laid should be left for as long as possible to maximise drying out and dissipation of constructional moisture, in accordance with BS 8203 : 2001, Section 3.1.2.

Figure 1 Ground-supported concrete floor — particle board overlay

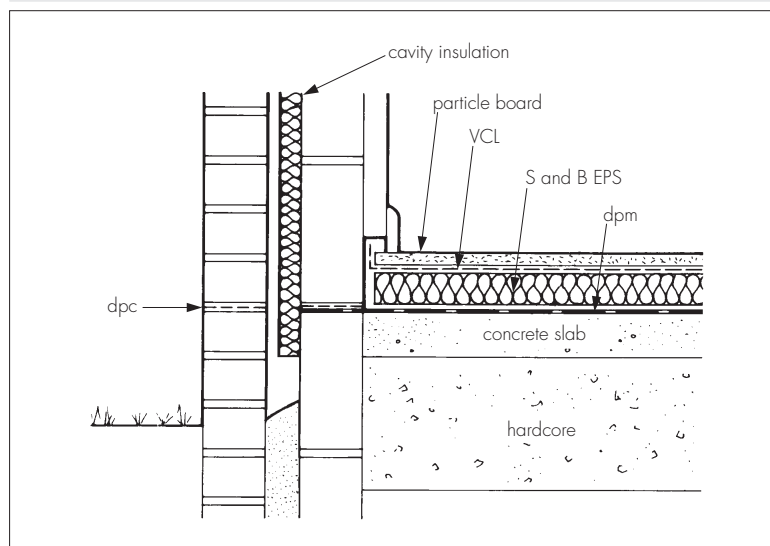


Figure 2 Suspended concrete floor — particle board overlay

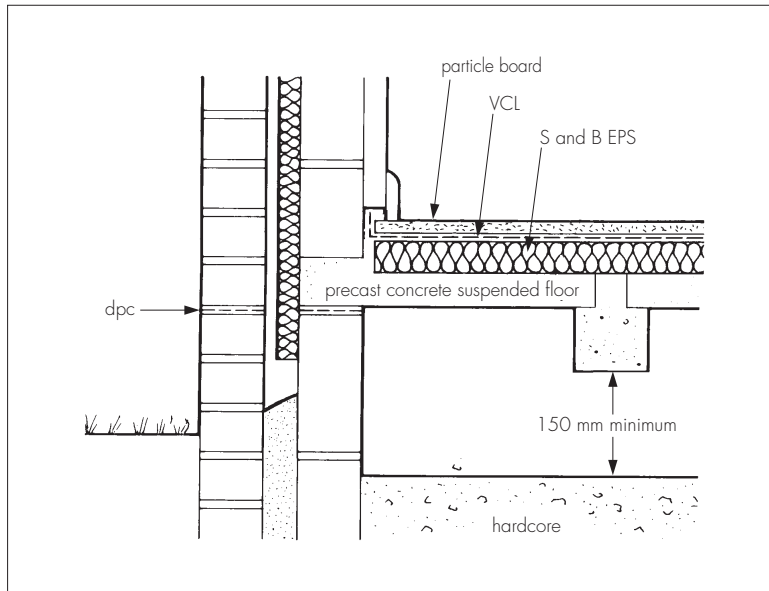


Figure 3 Ground-supported concrete floor — particle board overlay

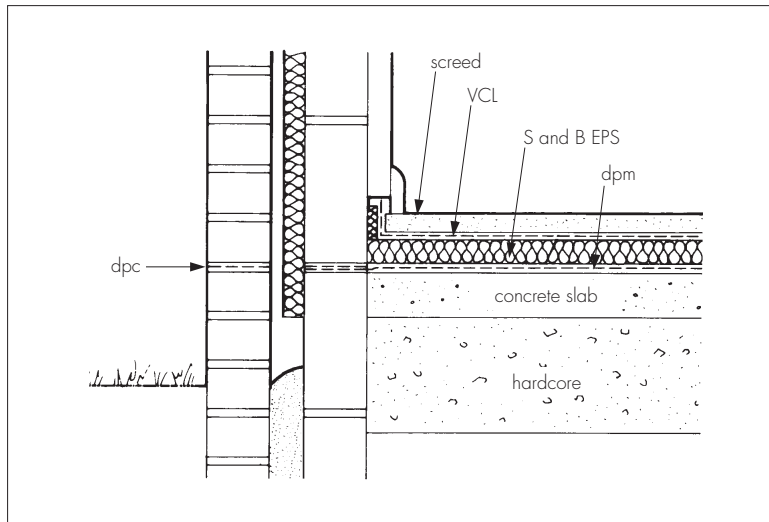


Figure 4 Suspended concrete floor — screed overlay

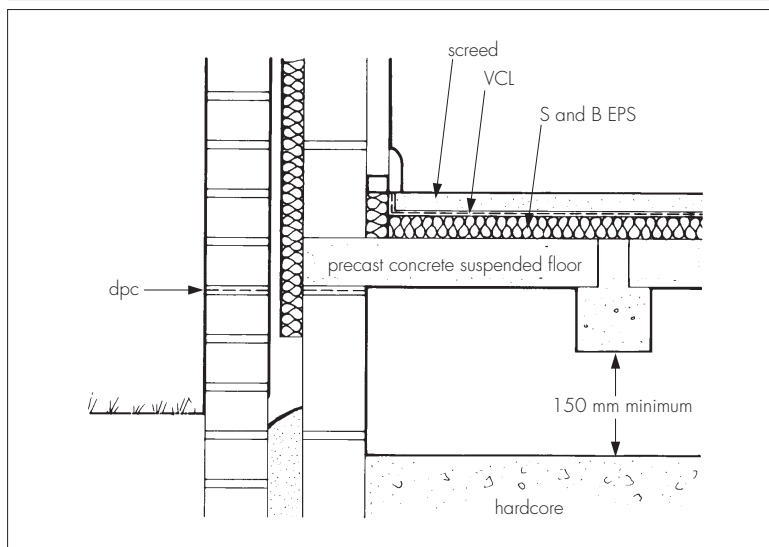


Figure 5 Particle board overlay — damp-proof membrane (dpm) under concrete slab

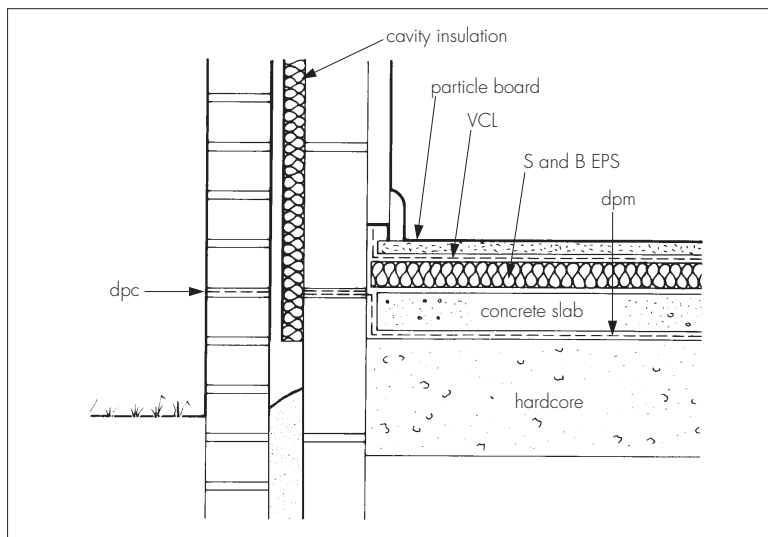
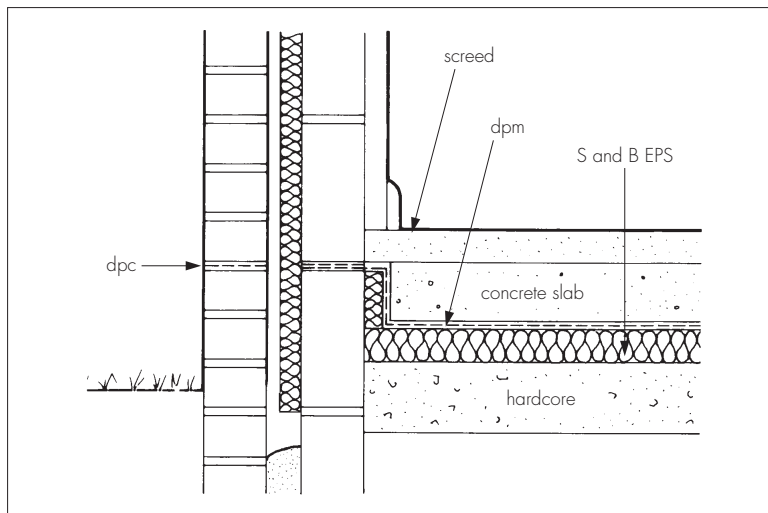


Figure 6 Concrete slab overlay



11.5 Where the insulation is used over ground-supported concrete floor slabs a suitable (dpm) in accordance with BS 8102 : 2009, should be laid to resist moisture from the ground. If a liquid-type dpm is applied to the slabs, it should be of a type compatible with expanded polystyrene and be allowed to dry out fully before laying the insulation.

11.6 Where the insulation is used on hardcore bases under ground-supported concrete slabs, the hardcore must be compacted and blinded before application of the insulation.

11.7 The insulation can be used on beam-and-block (see Figures 2 and 4) suspended concrete floors, that are the subject of a current Agrément Certificate and installed in accordance with, and within the limitations imposed by that Certificate, or those designed and installed to the precast concrete and general loading codes, that have been assessed as suitable.

11.8 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. If used, a suitable partial fill cavity wall insulation material can be extended below the damp-proof course (dpc) level to provide edge insulation to the floor.

11.9 During construction, the insulation and overlays must be protected from damage by traffic and moisture sources such as water spillage and plaster droppings.

12 Procedure

12.1 The insulation is cut to size, as necessary and laid with closely-butted, staggered cross-joints, ensuring that all spaces are completely filled. For rebate edged boards, one edge should be cut straight and laid next to the wall.

12.2 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 insulation.

Particle board and oriented strand board (OSB) overlays (Figures 1, 2 and 5)

12.3 Before laying the particle board or OSB overlays, preservative-treated battens, in accordance with BS 8417 : 2011, are positioned at doorways, access panels and to support partitions. Adequate time should be allowed for preservatives to be fixed and the solvents from solvent-based preservatives to evaporate.

12.4 Where the insulation is laid on a dpm, a VCL of polythene sheet with a minimum thickness of 0.25 mm (1000 gauge), is laid between the insulation and the particle board. The polythene sheet has 150 mm overlaps taped at the joints and is turned up 100 mm at the walls.

12.5 Tongue-and-groove overlay boards, 18 mm thick, are laid with staggered cross-joints.

12.6 An expansion gap between the overlay board and the perimeter walls should be provided at the rate of 2 mm per metre run or a minimum of 10 mm, whichever is the greater.

12.7 Where there are long, uninterrupted lengths of floor, eg corridors, proprietary expansion joints should be installed at intervals on the basis of a 2 mm gap per metre run of overlay board.

12.8 Before the overlay boards are interlocked, a waterproof PVA adhesive is applied to the joints.

12.9 Once the overlay board is laid, temporary wedges are inserted between the walls and the floor to maintain tight joints until the adhesive has set.

12.10 When the wedges are removed and before the skirting boards are fixed, suitable compressible filler, eg pieces of polystyrene, should be fitted around the perimeter of the floor between the overlay board and the walls.

12.11 Where there is a likelihood of regular water spillage, eg in rooms such as kitchens, bathrooms, shower and utility rooms, additional particle board protection should be considered, eg by a continuous flexible vinyl sheet flooring, with welded joints, turned up at abutments and cove skirting.

Cement-based screed overlay (Figures 3, 4 and 6)

12.12 Perimeter edge pieces are cut and placed around the edges and all floor joints taped before a properly-compacted screed of a minimum thickness 65 mm is laid. The relevant Clauses of BS 8204-1 : 2003 should be followed and BRE Digest 224 : 1981 *Cellular Plastics for Buildings. Floors* and BRE Digest 104 : 1979 *Floor screeds* should be consulted.

Concrete slab overlay (ground bearing only) (Figure 6)

12.13 Perimeter edge pieces are cut and placed around the edges and taped at joints. The concrete slab is laid to the required thickness.

13 Incorporation of services

13.1 The insulation must not be used in direct contact with electrical heating cables or hot water pipes.

13.2 Where possible, electrical conduits, gas and water pipes or other services should, be contained in ducts or channels within the concrete slab of ground-supported 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 should be enclosed in a suitable conduit. With hot pipes, the insulation must be cut back to maintain an air space.

13.3 Where water pipes are installed, either within the slab or the insulation, they must be pre-lagged with close fitting pipe insulation, eg extruded polyethylene foam.

13.4 Where the boards are installed on a floor of a suspended beam-and-block design, all services must be installed so as not to impair the floor performance in accordance with the Agrément Certificate (where appropriate) for that floor.

13.5 For exposed/semi-exposed intermediate concrete floors, all services should be incorporated beneath the existing floor.

13.6 On overlay board floors, in situations where access to the services is desirable, a duct may be formed by mechanically fixing, to the floor, timber bearers of the same thickness as the insulation to provide support for a particle board cover. Services should be suitably fixed to the floor base and not to the insulation boards.

Technical Investigations

14 Tests

Tests were carried out by the BBA in accordance with BS EN 13163 : 2008 to determine:

- thickness
- compressive stress at 10% deformation
- long-term water absorption by immersion (total and partial)
- long-term water absorption by diffusion
- thermal conductivity (λ value)
- dimensional stability under constant normal laboratory conditions
- dimensional stability at specified temperature and humidity
- compressive creep
- freeze-thaw resistance.

15 Investigations

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

15.2 An examination was made of test data to BS EN 13163 : 2001 relating to:

- dimensions
- squareness
- flatness
- density
- thermal conductivity ($\lambda_{(90/90)}$ value)
- compressive strength at 10% compression
- bending strength.

Additional Information

The Certificate holder's declared designation codes, level or class to BS EN 13163 : 2008 are shown in Tables 4a and 4b.

Table 4(a) Declared designation codes/level or class — BS EN 13163

	Grade			
	EPS 70	EPS 100	EPS 120	EPS 150
Length*	L1	L1	L1	L1
Width*	W1	W1	W1	W1
Thickness*	T1	T1	T1	T1
Squareness*	S1	S1	S1	S1
Flatness*	P2	P2	P2	P2
Compressive stress* at 10% deformation	CS(10)70	CS(10)100	CS(10)120	CS(10)150
Dimensional stability* at 23°C/50% RH	DS(N)2	DS(N)2	DS(N)2	DS(N)2
Dimensional stability* at 23°C/90% RH	DS(23,90)1	DS(23,90)1	DS(23,90)1	DS(23,90)1
Water absorption* by immersion ⁽¹⁾				
total (%)	WL(T)3	WL(T)3	WL(T)5	WL(T)5
partial (kg·m ⁻²)	0.12	0.1	0.08	0.09
Water absorption* by diffusion	WD(V)10	WD(V)10	NPD	WD(V)10
Compressive creep* (0.25 σ_c)	CC(1.5/1/10)70	CC(1.5/1/10)100	CC(1.5/1/10)120	CC(1.5/1/10)150
Bending strength*	BS115	BS150	BS170	BS200
Thermal conductivity* ($\lambda_{90/90}$ value) (W·m ⁻¹ ·K ⁻¹)	0.038	0.036	0.036	0.035
Freeze/thaw* (%)				
wet	-1.06	-5.45	-1.54	-3.80
dry	-1.06	-1.82	-4.62	-6.33

(1) For 50 mm thickness.

Table 4(b) Declared designation codes/level or class — BS EN 13163

	EPS 100 Low Lambda	Lambda-therm	
		EPS 70	EPS 90
Length* (mm) ⁽¹⁾	L1	L1	L1
Width* (mm) ⁽¹⁾	W1	W1	W1
Thickness* (mm) ⁽¹⁾	T1	T1	T1
Dimensional stability* at 23°C/50% RH	DS(N)2	DS(N)2	DS(N)2
Dimensional stability* at 23°C/90% RH	DS(23,90)1	DS(23,90)1	DS(23,90)1
Water absorption* by immersion ⁽²⁾			
total (%)	WL(T)5	WL(T)3	WL(T)3
partial (kg·m ⁻²)	0.20	0.15	0.22
Water vapour diffusion resistance* factor (μ)	30 to 70	20 to 40	30 to 70
Compressive strength* at 10% deformation	CS(10)100	CS(10)70	CS(10)90
Bending strength* (kPa)	BS150	BS115	BS150

(1) Other sizes can be supplied to order, with higher thicknesses to suit the requirement.

(2) For 50 mm thickness.

Bibliography

- BS 5250 : 2011 *Code of practice for control of condensation in buildings*
- BS 8102 : 2009 *Code of practice for protection of below ground structures against water from the ground*
- BS 8203 : 2001 *Code of practice for installation of resilient floor coverings*
- BS 8204-1 : 2003 *Screeds, bases and in-situ floorings — Concrete bases and cement sand levelling screeds to receive floorings — Code of practice*
- BS 8204-2 : 2003 *Screeds, bases and in-situ floorings — Concrete wearing surfaces — Code of practice*
- BS 8215 : 1991 *Code of practice for design and installation of damp-proof courses in masonry construction*
- BS 8417 : 2001 *Preservation of wood — Code of practice*
- 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 1991-1-7 : 2006 *Eurocode 1 : Actions on structures — General actions — Accidental actions*
- NA to BS EN 1991-1-7 : 2006 *UK National Annex to Eurocode 1 : Actions on structures — General actions — Accidental actions*
- BS EN 13163 : 2008 *Thermal insulation products for buildings — Factory made products of expanded polystyrene (EPS) — Specification*
- BS EN 13501-1 : 2007 *Fire classification of construction products and building elements. Classification using test data from reaction to fire tests*
- BS EN ISO 6946 : 2007 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*
- BS EN ISO 10456 : 2007 *Building materials and products — Hygrothermal properties — Tabulated design values and procedures for determining declared and design thermal values*
- BS EN ISO 13370 : 2007 *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*
- EN 12871 : 2010 *Wood-based panels — Performance specifications and requirements for load bearing boards for use in floors, walls and roofs*

16 Conditions

16.1 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.

16.2 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.

16.3 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.

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

16.5 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
- individual 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.

16.6 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.