

## Hytherm (Ireland) Ltd

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### Agrément Certificate

97/3417

Product Sheet 2

## HYTHERM WARM-R INSULATION

### WARM-R AND WARM-R PREMIUM UNDERFLOOR INSULATION

This Agrément Certificate Product Sheet<sup>(1)</sup> relates to Warm-R and Warm-R Premium Underfloor Insulation, rigid expanded polystyrene (EPS) boards, for use as thermal insulation in ground-bearing or suspended concrete ground floors or between the joists of suspended timber ground floors, in new and existing domestic 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 products have a thermal conductivity ( $\lambda_D$ ) value between 0.031 and 0.038 W·m<sup>-1</sup>·K<sup>-1</sup>, depending upon the grade (see section 6).

**Condensation risk** — the Warm-R/Warm-R Premium EPS 70 and Warm-R/Warm-R Premium EPS 100 products have water resistance factors ( $\mu$ ) of 20 to 40 and 30 to 70 respectively (see section 7).

**Behaviour in relation to fire** — the Certificate holder has declared No Performance Determined (NPD) for the reaction to fire classification to BS EN 13501-1 : 2007 (see section 8)

**Floor loading** — the products, when installed in accordance with this Certificate, can support a design loading for domestic applications (see section 9).

**Durability** — the products will have a life equivalent to that of the floor structure in which they are incorporated (see section 12).



The BBA has awarded this Certificate to the company named above for the products described herein. These products have been assessed by the BBA as being fit for their intended use provided they are installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of Second issue: 5 July 2019

John Albon  
Chief Scientific Officer

Claire Curtis-Thomas  
Chief Executive

Originally certificated on 29 October 1997

*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](http://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.*

*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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## Regulations

In the opinion of the BBA, Warm-R and Warm-R Premium Underfloor Insulation, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):



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

<b>Requirement:</b>	<b>A1</b>	<b>Loading</b>
Comment:	The products can contribute to satisfying this Requirement. See section 9.2 of this Certificate.	
<b>Requirement:</b>	<b>C2(c)</b>	<b>Resistance to moisture</b>
Comment:	The products can contribute to satisfying this Requirement. See sections 7.1 and 7.5 of this Certificate.	
<b>Requirement:</b>	<b>L1(a)(i)</b>	<b>Conservation of fuel and power</b>
Comment:	The products can contribute to satisfying this Requirement. See section 6 of this Certificate.	
<b>Regulation:</b>	<b>7</b>	<b>Materials and workmanship (applicable to Wales only)</b>
<b>Regulation:</b>	<b>7(1)</b>	<b>Materials and workmanship (applicable to England only)</b>
Comment:	The products are acceptable. See section 12 and the <i>Installation</i> part of this Certificate.	
<b>Regulation:</b>	<b>26</b>	<b>CO<sub>2</sub> emission rates for new buildings</b>
<b>Regulation:</b>	<b>26A</b>	<b>Fabric energy efficiency rates for new dwellings (applicable to England only)</b>
<b>Regulation:</b>	<b>26A</b>	<b>Primary energy consumption rates for new buildings (applicable to Wales only)</b>
<b>Regulation:</b>	<b>26B</b>	<b>Fabric performance values for new dwellings (applicable to Wales only)</b>
Comment:	The products can contribute to satisfying these Regulations, but compensating fabric/service measures may be required. See section 6.2 of this Certificate.	



### The Building (Scotland) Regulations 2004 (as amended)

<b>Regulation:</b>	<b>8(1)</b>	<b>Durability, workmanship and fitness of materials</b>
Comment:	The products are acceptable. See section 12 and the <i>Installation</i> part of this Certificate.	
<b>Regulation:</b>	<b>9</b>	<b>Building standards applicable to construction</b>
<b>Standard:</b>	<b>1.1(b)</b>	<b>Structure</b>
	The products can contribute to satisfying this Standard, with reference to clause 1.1.1 <sup>(1)</sup> . See section 9.2 of this Certificate.	
<b>Standard:</b>	<b>3.15</b>	<b>Condensation</b>
Comment:	The products can contribute to satisfying this Standard, with reference to clauses 3.15.1 <sup>(1)</sup> , 3.15.4 <sup>(1)</sup> and 3.15.5 <sup>(1)</sup> . See sections 7.1 and 7.6 of this Certificate.	
<b>Standard:</b>	<b>6.1(b)</b>	<b>Carbon dioxide emissions</b>
<b>Standard:</b>	<b>6.2</b>	<b>Building insulation envelope</b>
Comment:	The products can contribute to satisfying clauses, or parts of clauses, 6.1.1 <sup>(1)</sup> , 6.1.6 <sup>(1)</sup> , 6.2.1 <sup>(1)</sup> , 6.2.3 <sup>(1)</sup> , 6.2.4 <sup>(1)</sup> , 6.2.5 <sup>(1)</sup> , 6.2.6 <sup>(1)</sup> , 6.2.7 <sup>(1)</sup> , 6.2.9 <sup>(1)</sup> , 6.2.10 <sup>(1)</sup> , 6.2.11 <sup>(1)</sup> and 6.2.13 <sup>(1)</sup> of these Standards. See section 6 of this Certificate.	
<b>Standard:</b>	<b>7.1(a)(b)</b>	<b>Statement of sustainability</b>
Comment:	The products 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 products can contribute to a construction meeting a higher level of sustainability as defined in this Standard, with reference to clauses 7.1.4 <sup>(1)</sup> [Aspects 1 <sup>(1)</sup> and 2 <sup>(1)</sup> ], 7.1.6 <sup>(1)</sup> [Aspects 1 <sup>(1)</sup> and 2 <sup>(1)</sup> ] and 7.1.7 <sup>(1)</sup> [Aspect 1 <sup>(1)</sup> ]. See section 6.1 of this Certificate.	

<b>Regulation:</b>	<b>12</b>	<b>Building standards applicable to conversions</b>
<b>Comment:</b>	Comments made in relation to these products under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1 <sup>(1)</sup> and Schedule 6 <sup>(1)</sup> .	
	(1) Technical Handbook (Domestic).	



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

<b>Regulation:</b>	<b>23</b>	<b>Fitness of materials and workmanship</b>
<b>Comment:</b>	The products are acceptable. See section 12 and the <i>Installation</i> part of this Certificate.	
<b>Regulation:</b>	<b>29</b>	<b>Condensation</b>
<b>Comment:</b>	The products can contribute to satisfying this Regulation. See section 7.1 of this Certificate.	
<b>Regulation:</b>	<b>30</b>	<b>Stability</b>
<b>Comment:</b>	The products can contribute to satisfying this Regulation. See section 9.2 of this Certificate.	
<b>Regulation:</b>	<b>39(a)(i)</b>	<b>Conservation measures</b>
<b>Regulation:</b>	<b>40(2)</b>	<b>Target carbon dioxide emission rate</b>
<b>Comment:</b>	The products can contribute to satisfying these Regulations. See section 6 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* (3.3) of this Certificate.

## Additional Information

### NHBC Standards 2019

In the opinion of the BBA, Warm-R and Warm-R Premium Underfloor Insulation, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards*, Chapters 5.1, *Substructure and ground bearing floors* and 5.2, *Suspended ground floors*.

### CE marking

The Certificate holder has taken the responsibility of CE marking the products in accordance with harmonised European Standard BS EN 13163 : 2012. An asterisk (\*) appearing in this Certificate indicates that data shown are given in the manufacturer's Declaration of Performance.

## Technical Specification

### 1 Description

1.1 Warm-R and Warm-R Premium Underfloor Insulation consists of rigid EPS boards, available in four grades. Warm-R is manufactured from white bead; Warm-R Premium is made from graphite/carbon enhanced bead.

1.2 The boards have the nominal characteristics shown in Table 1, below.

*Table 1 Nominal characteristics*

Characteristic (unit)	Warm-R EPS 70 (white)	Warm-R EPS 100 (white)	Warm-R Premium EPS 70 (grey) and EPS 100 (grey)
Width (mm)	600, 1200	600, 1200	600, 1200
Thickness <sup>*(1)</sup> (mm)	25 to 150 (in 5 mm increments)	25 to 150 (in 5 mm increments)	25 to 150 (in 5 mm increments)
Length	1200, 1800, 2400	1200, 1800, 2400	1200, 1800, 2400
Thermal conductivity* ( $\lambda_D$ ) values ( $W \cdot m^{-1} \cdot K^{-1}$ )	0.038	0.035	0.031
Edge profile	Square, tongue-and-groove, rebated	Square, tongue-and-groove, rebated	Square, tongue-and-groove, rebated

(1) Other thicknesses available on request.

1.3 Ancillary items for use with the products, but outside the scope of this Certificate, are:

- saddle clips
- galvanized nails
- pre-treated battens
- acrylic adhesive foil tape
- damp-proof membrane (dpm)
- vapour control layer (vcl).

## 2 Manufacture

2.1 Raw polystyrene beads are expanded with steam to the required density. An automated process cures and cuts the products to the required size.

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 Hytherm (Ireland) Ltd has been assessed and registered as meeting the requirements of BS EN ISO 9001: 2015 and BS EN ISO 14001: 2015 by the Loss Prevention Certification Board (Certificates 851 and EMS 851, respectively).

## 3 Delivery and site handling

3.1 The products are delivered to site in polythene shrink-wrapped packs containing a label bearing the manufacturer's trade name, product description, and the BBA logo incorporating the number of this Certificate.

3.2 The boards must be protected from prolonged exposure to sunlight and should be stored either under cover or protected with opaque polythene; where possible, packs should be stored inside. If outside, the boards should be raised above ground level, away from ground moisture. The boards must be discarded if damaged or wet.

3.3 The products must not be exposed to a naked flame or other ignition sources. Care must be taken to avoid contact with solvents and materials containing organic components.

## Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Warm-R and Warm-R Premium Underfloor Insulation.

### Design Considerations

#### 4 Use

4.1 Warm-R and Warm-R Premium Underfloor Insulation boards are for use on ground-supported or suspended concrete ground floors or between the joists of suspended timber ground floors, in new and existing dwellings.

4.2 The products are effective in reducing the thermal transmittance (U value) of new or existing ground floors. For improved thermal/carbon-emissions performance, the designer should consider additional/alternative fabric and/or services measures.

4.3 Ground-supported floors should only be used where the depth of compacted fill is less than 600 mm and defined as non-shrinkable. Shrinkable fills are defined as material containing more than 35% fine particles (silt and clay) with a plasticity index of 10% or greater (shrinkable fills are susceptible to clay heave).

4.4 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 BS 8215 : 1991. Suspended concrete ground-floors incorporating the insulation must include suitable ventilation of the sub-floor void or a dpm.

4.5 The overlay to the products should be:

- a vcl where necessary (see section 7.2)
- a cement-based floor screed of minimum 65 mm<sup>(1)</sup> thickness, laid in accordance with the relevant clauses of BS 8204-1 : 2003 and/or BS 8204-2 : 2003, and BS 8000-9 : 2003, or
- wood-based floor (eg tongue-and-groove plywood to BS EN 636 : 2012, flooring grade particle board [Type P4 or P7] to BS EN 312 : 2010 or oriented strand board [type OSB/3 to OSB/4] to BS EN 300 : 2006), of a thickness to be determined by a suitably qualified and experienced individual, and installed in accordance with PD CEN/TR 12872 : 2014 and BS EN 12871 : 2013, or
- a concrete slab to BS EN 1992-1-1 : 2004.

(1) NHBC only accept ground-supported floor slabs with at least 100 mm thick concrete including a monolithic screed

4.6 If present, mould or fungal growth should be treated prior to the application of the products.

4.7 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 13.9). 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.

4.8 A void of at least 150 mm deep for the system must be provided between the underside of the floor and the ground surface (for suspended floors).

4.9 In locations where clay heave is anticipated (on the basis of geotechnical investigation analysed by a competent person), an additional void of up to 150 mm may be required to accommodate the possible expansion of the ground below the floor. In such cases, therefore, a total void of up to 300 mm may be required.

4.10 The external/internal load bearing walls must not be placed on the insulation.

#### 5 Practicability of installation

The products are designed to be installed by a competent general builder, or a contractor, experienced with these types of products.

## 6 Thermal performance



6.1 Calculations of the thermal transmittance (U value) should be carried out in accordance with BS EN ISO 6946 : 2017, BS EN ISO 13370 : 2017 and BRE Report BR 443 : 2006 using the thermal conductivity\* ( $\lambda_D$ ) values shown in Table 1 of this Certificate.

6.2 The U value of a floor will depend on the thickness of the product, the perimeter/area ratio and the floor type. U values of example floors are shown in Table 2, below.

Table 2 U values<sup>(1)</sup>

Floor type	Perimeter/area ratio	Product and insulation thickness			
		Warm-R Premium EPS 70 (grey) and EPS 100 (grey)		Warm-R EPS 70 (white)	
		50 mm	150 mm	50 mm	150 mm
Slab on ground support <sup>(2)</sup>	0.2	0.21	0.12	0.23	0.14
	0.4	(5)	0.15	(5)	0.17
	0.6	(5)	0.16	(5)	0.19
	0.8	(5)	0.17	(5)	0.20
	1.0	(5)	0.17	(5)	0.20
Suspended timber floor <sup>(2)(3)(4)</sup>	0.2	(5)	0.16	(5)	0.18
	0.4	(5)	0.19	(5)	0.21
	0.6	(5)	0.20	(5)	0.22
	0.8	(5)	0.21	(5)	0.23
	1.0	(5)	0.21	(5)	0.23
Suspended beam-and-block floor <sup>(2)(3)(4)</sup>	0.2	0.24	0.13	(5)	0.15
	0.4	(5)	0.15	(5)	0.18
	0.6	(5)	0.16	(5)	0.19
	0.8	(5)	0.16	(5)	0.19
	1.0	(5)	0.17	(5)	0.20

(1) Edge insulation not included.

(2) Wall thickness (w) 0.3 m.

(3) Supporting wall ( $U_w$ )  $1.5 \text{ W} \cdot \text{m}^{-2} \cdot \text{K}^{-1}$ .

(4) Ventilation area ( $\epsilon$ )  $0.0015 \text{ m}^2 \cdot \text{m}^{-1}$ .

(5) See section 4.2.

### Junctions

6.3 Care must be taken in the overall design and the 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 Condensation risk

### Interstitial condensation



7.1 Floors will adequately limit the risk of interstitial condensation when they are designed and constructed in accordance with BS 5250 : 2011 Annex F and the relevant guidance.

7.2 When the products are used above the dpm on a ground-bearing floor or a suspended concrete floor, 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.

7.3 For suspended ground floors, it is not necessary to introduce a vcl as long as adequate sub-floor cross ventilation is provided.

7.4 For the purposes of assessing the risk of interstitial condensation, the water vapour resistance factors for the products are given in Table 3, below.

<i>Table 3 Water vapour resistance</i>	
Product grade	Water vapour resistance ( $\mu$ )
Warm-R Premium EPS 70 and Warm-R EPS 70	20 to 40 <sup>(1)</sup>
Warm-R Premium EPS 100 and Warm-R EPS 100	30 to 70 <sup>(1)</sup>
(1) Value obtained from BS EN ISO 10456 : 2007.	

## Surface condensation



7.5 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 section 6.3.



7.6 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. Further guidance may be obtained from BRE Report BR 262 : 2002 and section 6.3 of this Certificate.

## 8 Behaviour in relation to fire

8.1 The products are not classified as non-combustible or of limited combustibility, and the Certificate holder has declared No Performance Determined (NPD) for their reaction to fire classification\* in accordance with BS EN 13501-1 : 2007.

8.2 When properly installed, the products will not add significantly to any existing fire hazard. The products will be contained within the floor by the overlay until the overlay itself is destroyed. Therefore, the products will not contribute to the development stages of a fire or present a smoke or toxic hazard.

## 9 Floor loading

9.1 The compressive strengths\* of the products (at 10% deformation to BS EN 826 : 2013) are given in Table 4.

<i>Table 4 Compressive strengths</i>	
Product grade	Compressive strength* (kPa)
Warm-R EPS 70	70
Warm-R Premium EPS 70	70
Warm-R EPS 100	100
Warm-R Premium EPS 100	100



9.2 The products are suitable for the occupancies defined in this Certificate when covered with a suitable floor overlay (see section 4.5) and are capable of resisting a uniformly distributed load of  $1.5 \text{ kN}\cdot\text{m}^{-2}$  and 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 NA2. Further assessment is necessary in the case of duty walkways and floors subject to physical activities.

9.3 The performance of the floor construction will depend on the insulation properties and type of floor covering used (including thickness and strength). When the products are 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 coverings can be found in BS EN 13810-1 : 2002, DD CEN/TS 13810-2 : 2003, BS 8204-1 : 2003 and BS EN 312 : 2010, and from the flooring manufacturer.



## 10 Material in contact – wiring installation

10.1 Electrical cables that are likely to come in contact with the insulation must be protected by a suitable conduit or PVC-U trunking.

10.2 As with any other form of insulation, de-rating of electrical cables should be considered where the insulation restricts the air cooling of cables.

## 11 Maintenance

As the products are confined within the floor and have suitable durability (see section 12), maintenance is not required.

## 12 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.

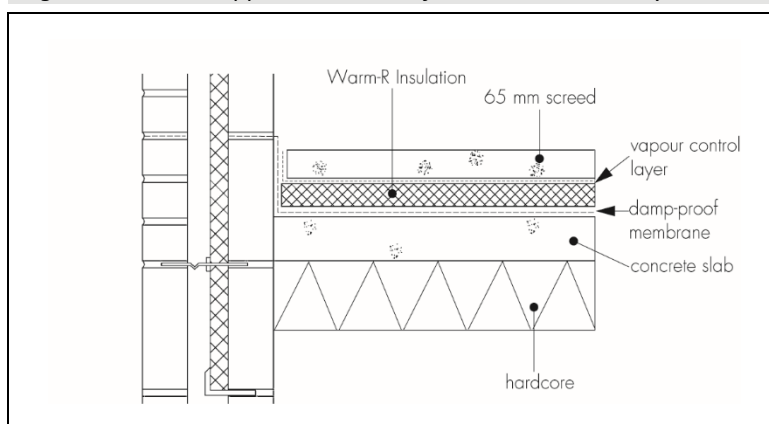
## Installation

### 13 General

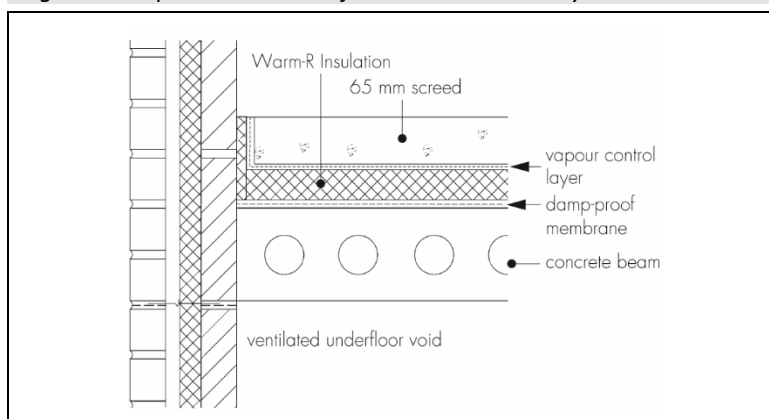
13.1 Installation of Warm-R and Warm-R Premium Underfloor Insulation must be in accordance with the Certificate holder's installation instructions and the requirements of this Certificate.

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

*Figure 1 Ground-supported concrete floor — screed overlay*

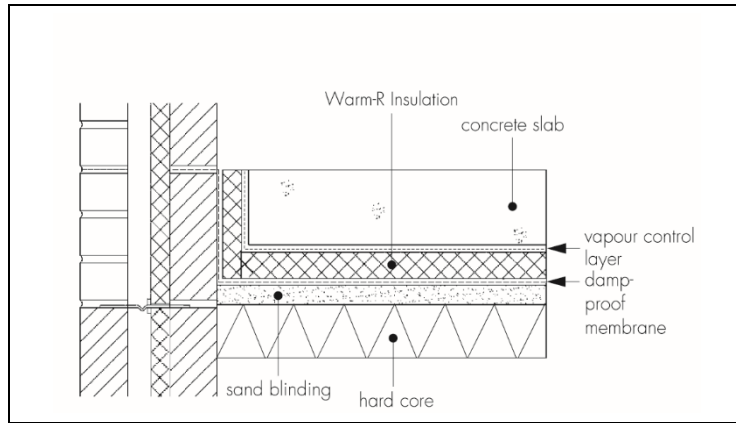


*Figure 2 Suspended concrete floor — screed overlay*

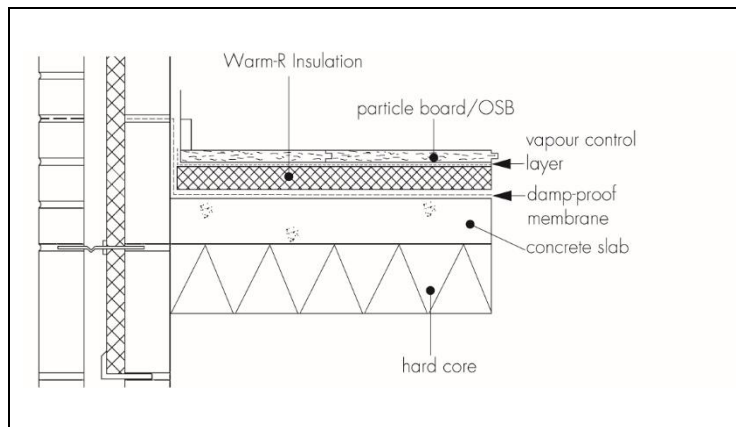




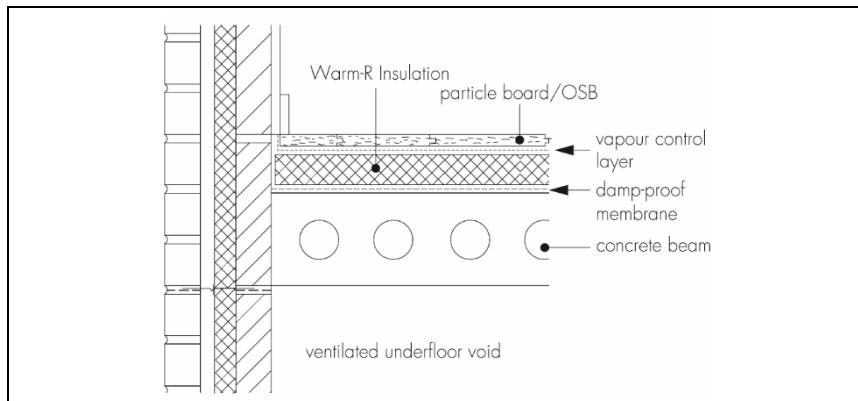
**Figure 3 Concrete slab overlay**



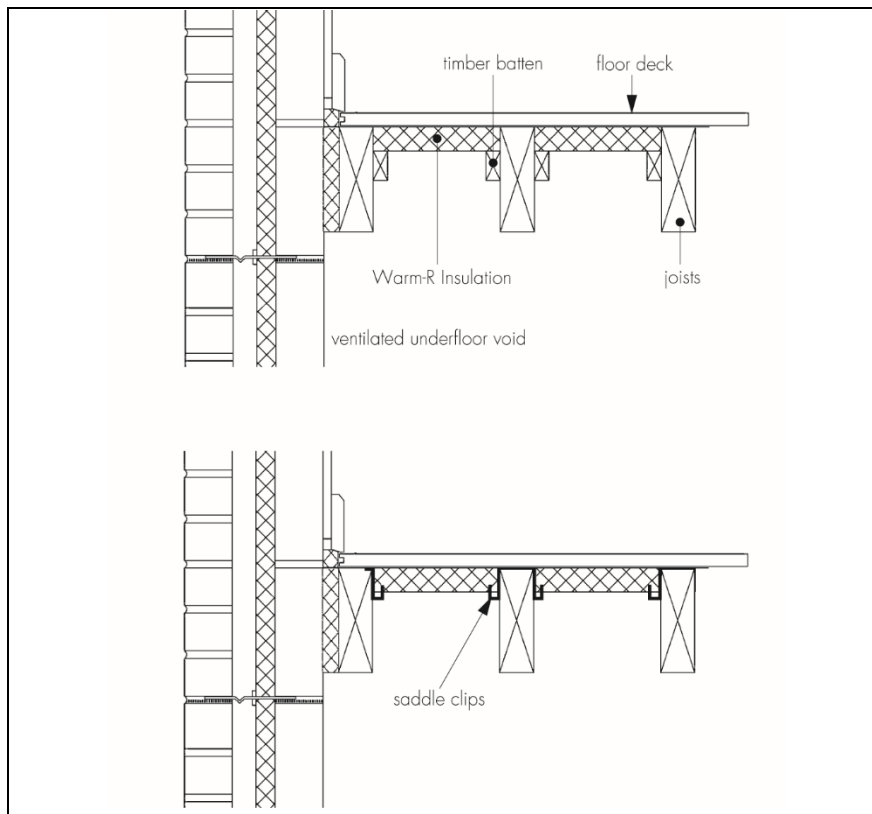
**Figure 4 Ground-supported concrete floor — board overlay**



**Figure 5 Suspended concrete floor — board overlay**



**Figure 6 Suspended timber floors**



13.3 All concrete floor surfaces should be smooth, level and flat to within 5 mm when measured with a 2 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.

13.4 In ground-bearing concrete floors, the concrete floor slab over which the products are laid should be left for as long as possible to maximise drying out and the dissipation of construction moisture, in accordance with BS 8203 : 2017, Section 3.1.2.

13.5 Additionally, where the insulation is used over ground-bearing concrete floor slabs, a suitable dpm 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 a type compatible with the insulation product and must be allowed to dry out fully before laying the insulation.

13.6 Where required, a suitable radon barrier should be installed. Such a barrier must be the subject of a current BBA Certificate and must be installed in accordance with, and within the limitations imposed by, that Certificate.

13.7 Where the insulation is used on hardcore bases beneath ground-bearing concrete slabs, the hardcore must be compacted and blinded with a thin layer of sand, before application of the dpm followed by the insulation boards.

13.8 Where a screed or concrete slab is laid over the insulation, vertical upstands of insulation should be used 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 should be extended below the damp-proof course (dpc) level to provide edge insulation to the floor.

13.9 A vcl is installed on the warm side of the insulation to inhibit the risk of interstitial condensation if necessary (see section 7.2). Where a concrete screed or slab finish is to be laid over the product, a polyethylene separating layer/vcl must be installed between the insulation and the concrete to prevent seepage between the boards.

13.10 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.

13.11 To fit around service penetrations, the boards can be cut using a sharp knife or fine-toothed saw.

## **14 Procedure**

14.1 The products are cut to size as necessary, and laid with closely butted, staggered cross-joints, ensuring that all spaces are completely filled.

14.2 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 products.

### **Timber-based board overlay**

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

14.4 When the dpc is laid below the slab, a polyethylene vcl with a of minimum thickness of 250 µm is laid between the product and the overlay boards. The polyethylene sheet must have 150 mm overlaps, taped at the joints and turned up 100 mm at the walls.

14.5 Timber-based overlay boards as specified in section 4.5 of this Certificate are laid with staggered cross-joints in accordance with PD CEN/TR 12872 : 2014 and BS EN 12871 : 2013.

14.6 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.

14.7 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.

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

14.9 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.

14.10 When the wedges are removed and before the skirting boards are fixed, a suitable compressible filler, eg foamed polyethylene, should be fitted around the perimeter of the floor between the overlay board and the walls.

14.11 Where there is a likelihood of regular water spillage (eg in kitchens, bathrooms, shower and utility rooms), additional overlay 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**

14.12 Perimeter edge pieces are cut and placed around the edges and all floor joints taped. A polythene 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 turned up 100 mm at the walls. A properly compacted screed of a minimum 65 mm thickness is then laid. Guidance given in the relevant clauses of BS 8204-1 : 2003 should be followed.

### **Concrete slab overlay (ground-bearing only)**

14.13 Perimeter edge pieces are cut and placed around the edges and taped at joints. A polythene 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 turned up 100 mm at the walls. The concrete slab is laid to the required thickness in accordance with BS 8000-9 : 2003 and BS 8204-1 : 2003.

### **Suspended timber floors**

14.14 Saddle clips are placed at intervals not exceeding one metre along the timber floor joists. The products are to be installed only on one side of a joist; twin clips can be cut into single clips and nailed into place with galvanized nails.

14.15 If saddle clips are not used, the products may be retained using preservative-treated timber battens. Battens should be wide enough to retain the products in place and secured with corrosion-protected nails at a depth that will accommodate the thickness of the products.

14.16 The products should be cut to fit tightly between joists and pushed down onto the spikes of the saddle clips, or onto the beads. Small gaps should be insulated with cut strips of the products.

## 15 Incorporation of services

15.1 De-rating of electrical cables should be considered where the insulation restricts air cooling of cables; the products 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.

15.2 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 should be enclosed in a suitable conduit. With hot pipes, the product must be cut back to maintain an air space.

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

15.4 Where the products are to be installed on a floor of a suspended beam and block design, all services must be installed in accordance with the BBA Certificate for that floor and/or with the relevant codes of practice.

15.5 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. The duct should be as narrow as possible and not exceed 400 mm in width or the maximum particle board spans given in PD CEN/TR 12872 : 2014 without intermediate support. Services should be suitably fixed to the floor base and not to the product (see section 6.3 with regards to limiting heat loss).

## Technical Investigations

## 16 Tests

Tests were carried out and the results assessed to determine:

- density
- water vapour resistance
- dimensional accuracy
- dimensional stability
- thermal conductivity
- dimensions
- squareness
- flatness
- density
- compressive strength at 10% compression.

## 17 Investigations

17.1 An assessment was made of typical constructions which achieve the design U values.

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

## Bibliography

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- BRE Report BR 443 : 2006 *Conventions for U-value calculations*
- BS 5250 : 2011 + A1 : 2016 *Code of practice for control of condensation in buildings*
- BS 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 cementitious levelling screeds to receive floorings — Code of practice*
- BS 8204-2 : 2003 + A2 : 2011 *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 : 2011 + A1 : 2014 *Preservation of wood – Code of practice*
- BS EN 300 : 2006 *Oriented Strand Boards (OSB) Definitions, classification and specifications*
- BS EN 312 : 2010 *Particleboards — Specifications*
- BS EN 636 : 2012 + A1 : 2015 *Plywood — Specifications*
- 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*
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- 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 method*
- BS EN ISO 9001 : 2015 *Quality management systems. Requirements*
- 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 : 2017 *Thermal Performance of Buildings — Heat Transfer via the Ground - Calculation Methods*
- BS EN ISO 14001 : 2015 *Environmental management systems. Requirements with guidance for use*
- CP 102 : 1973 *Protection of Buildings Against Water from the Ground*
- PD CEN/TR 12872 : 2014 *Wood-based panels — Guidance on the use of load-bearing boards in floors, walls and roofs*
- DD CEN/TS 13810-2 : 2003 *Wood-based panels - Floating floors - Part 2: Test methods*

### 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.