



NSAI

Agrément

IRISH AGRÉMENT BOARD CERTIFICATE NO. 21/0427

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Spantherm Insulated Precast Concrete Ground Floor System

NSAI Agrément (Irish Agrément Board) is designated by Government to issue European Technical Approvals.

NSAI Agrément Certificates establish proof that the certified products are '**proper materials**' suitable for their intended use under Irish site conditions, and in accordance with the **Building Regulations 1997 to 2019**.



SCOPE

This Certificate relates to the Spantherm Insulated Precast Concrete Ground Floor System consisting of precast concrete and expanded polystyrene (EPS) insulation composite elements for use in conjunction with a non-structural sand/cement screed, timber floor battens or other suitable applied floor finishes, as a ground floor in domestic and residential buildings.

The product is used as a pre-insulated ground floor system, comprising ribbed floor elements of precast concrete and EPS insulation. It is designed to be installed by contractors/builders experienced with this type of flooring system.

In the opinion of NSAI, the Spantherm Insulated Precast Concrete Ground Floor System, as described in this Certificate, complies with the requirements of the Building Regulations 1997 to 2019.

MANUFACTURE AND MARKETING

The products are manufactured and marketed by:

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Buildings incorporating the Spantherm system can be designed to meet the requirements of the following clauses of the Building Regulations 1997 to 2019:

Part D – Materials and Workmanship

D3 – Proper Materials

D1 – Materials and Workmanship

The Spantherm Insulated Precast Concrete Ground Floor System is comprised of 'proper materials' i.e. materials which are fit for their intended use and for the conditions in which they are to be used.

Part A - Structure

A1 – Loading

A2 – Ground Movement

Part B – Fire

B3 – Internal Fire Spread (Structure)

Part C – Site Preparation and Resistance to Moisture

C4 – Resistance to Weather and Ground Moisture

Part F – Ventilation

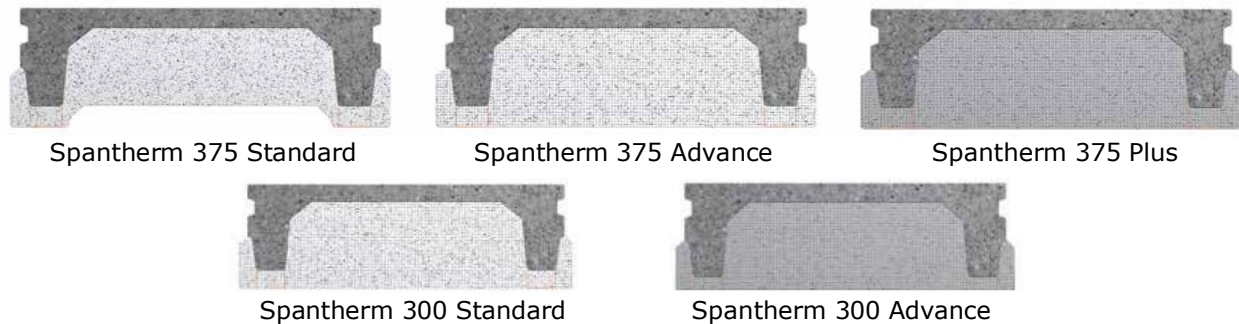
F1 – Means of Ventilation

Part J – Heat Producing Appliances

J3 – Protection of Building

Part L – Conservation of Fuel and Energy

L1 – Conservation of Fuel and Energy


Figure 1: Product Selection

2.1 PRODUCT DESCRIPTION

The Spantherm Insulated Precast Concrete Ground Floor System is a pre-insulated ground floor system comprising ribbed floor elements of precast concrete and EPS insulation. There are five element types: Spantherm 375 Deep (3 elements); Standard, Advance, and Plus and Spantherm 300 Deep (2 elements); Standard and Advance (depending on the overall depth of insulation and grade of polystyrene used).

Length	<7500mm
Standard width (nominal)	1200mm
Alternative widths	900, 600, 400mm
Structural depth of ribs	250, 225mm
Minimum rib depth dimension	90mm
Clear width between ribs	794, 496, 196mm
Top slab depth	50mm
Height of support bearings along length	125, 75mm
Mass per square metre of floor	
Spantherm 375 Deep	
• 1200mm elements	225kg/m ²
• 900mm elements	250kg/m ²
• 600mm elements	315kg/m ²
• 400mm elements	335kg/m ²
Spantherm 300 Deep	
• 1200mm elements	213kg/m ²
• 900mm elements	233kg/m ²
• 600mm elements	293kg/m ²
• 400mm elements	306kg/m ²

Table 1: Product Range

- The specifications for the product are as follows:
- Insulation: EPS70, moulded to rigid board, Class F grade, available in two types: white and graphite enhanced.
 - Concrete: minimum compressive strength grade C40/50 to IS EN 206^[1].
 - Steel reinforcement: certified to BS 4449^[2] and BS 5896^[3].
 - Polymer macro-fibres to IS EN 14889-2^[4].

- Joint filling: Concrete or sand-cement mortar with strength class C25/30 and maximum aggregate size 10mm – concrete must comply with BS 8500-1^[5].

Ancillary items that can form part of the overall floor construction but which are outside the scope of this Certificate include:

- concrete floor screed – typically between 25 and 100 mm thick;
- self-levelling compound with 10 mm average nominal thickness;
- timber battens – to receive floor finishes;
- other suitable non-structural applied floor finishes;
- damp-proof courses, damp-proof membranes, vapour control layers and radon membranes – all of these must be compatible with EPS.

Concrete compressive strength*	50N/mm ²
Ultimate tensile strength for reinforcing*	650N/mm ²
Tensile yield strength for reinforcing steel*	500N/mm ²
Ultimate tensile strength of prestressing steel*	1770N/mm ²

Table 2: Essential characteristics

2.2 MANUFACTURE

The concrete components of the elements are manufactured in accordance with the requirements of IS EN 13224^[6].

The moulded EPS component is manufactured in accordance with IS EN 13163^[7].

2.2.1 Quality Control

Quality control checks are carried out on the incoming raw materials, during production and on the finished product. These checks include board dimensions, density, and compressive strength.

The management system of Creagh Concrete Products Ltd has been assessed and registered as meeting the requirements of IS EN ISO 9001^[8] and IS EN ISO 14001^[9].

2.3 DELIVERY, STORAGE AND MARKING

When the system is delivered to site, each floor element is marked with the Certificate holder's product reference, and if requested, the customer's own reference code.

The units should be handled with care during offloading, storage and installation. Creagh Concrete delivery trucks are fitted with bespoke lifting equipment for offloading and placing the panels.

The floor elements should be stacked on a flat base and protected from direct sunlight and high winds.

The EPS component must not be exposed to flame or ignition; careful consideration should be given to the management of fire risk when in storage. Contact with solvents and organic-based materials should also be avoided.

2.4 INSTALLATION

2.4.1 General

Typical installation details used in the design of floors incorporating the Spantherm Insulated Concrete Ground Floor System are shown in Figures 2 and 3.

The ground floor beneath the floor system should be free of topsoil and vegetation. Oversite concrete or other surface seal is not required, but materials added to bring to an even surface must be hard and dry.

If required, a damp-proof and/or radon resistant membrane can be installed over the whole ground area beneath the floor in accordance with the membrane manufacturer's instructions. A continuous DPC should be laid along the support wall below the floor in accordance with BS 8102^[11]. Full technical details for installations with radon membranes, DPCs etc are available from the Certificate holder.

The suspended ground floor should be built in accordance with Section 3.1.9 of TGD to Part C of the Building Regulations 1997 to 2019:

- (a) Using pre-cast concrete at least 100mm thick (but thicker if the structural design requires) and of a grade Section 3.1.4(a) of TGD to Part C of the Building Regulations 1997 to 2019, incorporating a damp proof membrane as necessary, and
- (b) With a ventilated air space measuring at least 150mm clear from the ground to the underside of the floor, and

- (c) With ventilation openings in each external wall placed so that the ventilating air will have a free path between opposite sides and to all parts. The opening should be large enough to give an actual opening of at least equivalent to 1500mm² for each metre run of wall.

Note: (b) and (c) apply where there is a risk of explosive gas mixtures accumulating in voids under the floor. The height of the ventilated air space may be reduced where proprietary void formers are used.

Normal precautions for handling EPS materials should be taken to avoid damaging the system elements during offloading, storage, handling and installation. Any damaged parts of the system elements must be either repaired or replaced before installation.

This Certificate does not contain a full set of installation instructions, but an overview of the procedures involved. For a full list of these instructions, refer to the Certificate holder's manuals. Should a conflict arise between this Certificate and the Certificate holder's manuals, this Certificate shall take precedence.

2.4.2 Procedure

The installers should confirm that the system supplied to site agrees with the details shown on the engineer's drawings for the project.

The system elements are brought into place by a lorry-mounted high reach crane. An alternative acceptable method is to use four chain-lifting connectors or a lifting clamp which is then directed by operatives until set in place.

With the first system element accurately in place, the subsequent elements are then positioned.

The system elements must be fitted tightly and care must be taken in placing the service access points in the correct positions.

The joints between the floor elements must be completely filled-in using concrete or sand/cement mortar with strength class C25/30.

Spantherm elements are supplied to site with openings for services cast-in. No cutting or drilling of the elements must be undertaken on site, without first consulting the Certificate holder.

A concrete screed or other suitable finish is applied to the design specification. When using a concrete pumps, truck or skip, concrete should not be discharged onto the system from heights greater than 300mm and concrete heaps must not be formed over 150mm.

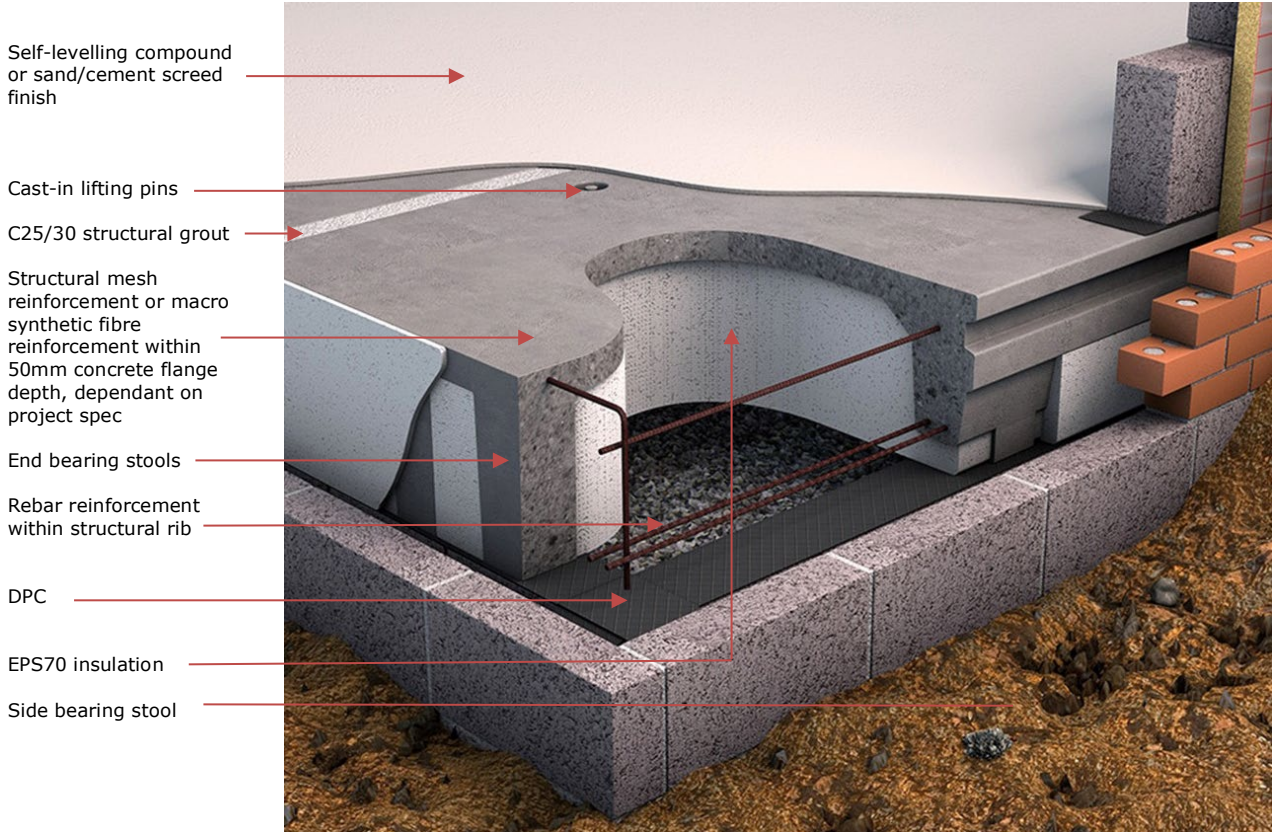


Figure 2: Spantherm Insulated Concrete Ground Floor System⁺

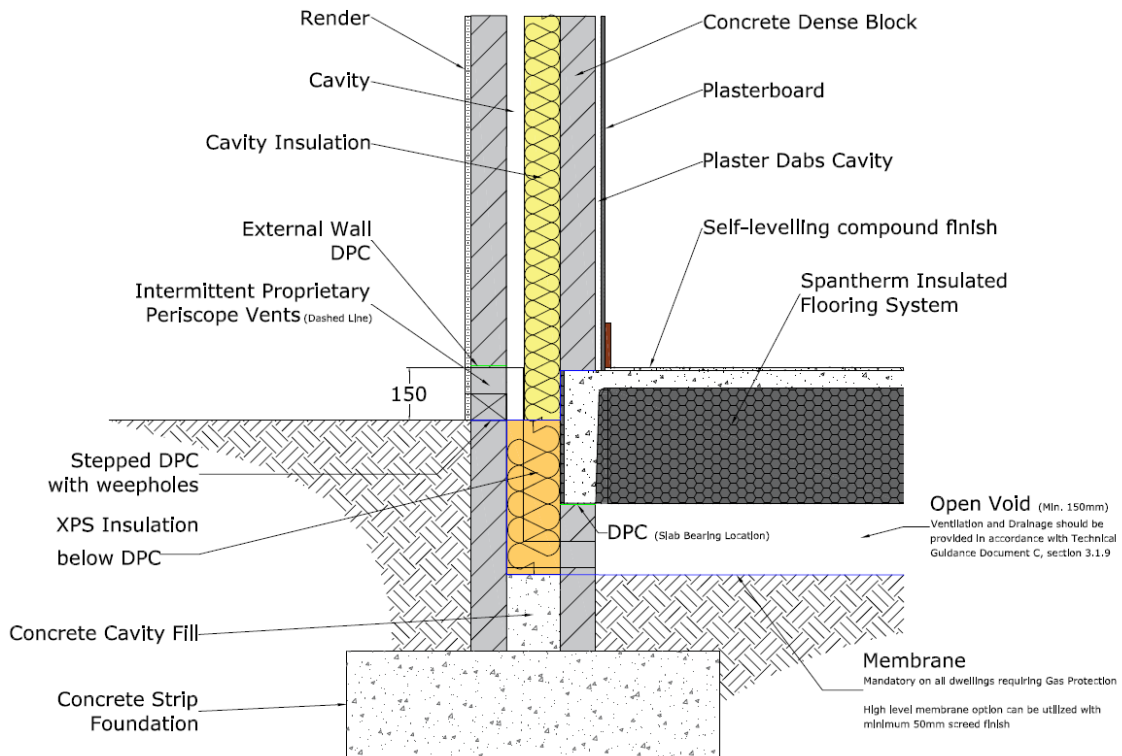


Figure 3: Masonry wall with ventilated void⁺

⁺ These example drawings are indicative only and all detailing used on site must be confirmed by the building's designer in compliance with Building Regulations.

3.1 GENERAL

The Spantherm Insulated Precast Concrete Floor System, when used in conjunction with concrete screeds, self-levelling compound, timber floor battens or other suitable applied floor finishes as specified in this Certificate, is effective for use in forming insulated suspended ground floors and ground floors without a ventilated void, in domestic and residential buildings.

The building designer must perform a site-specific assessment to ascertain the requirements for a sub-floor void, or not, and construction details of the Spantherm system, taking into account the following:

- A geotechnical assessment of the site to identify the potential for shrinkable soils and clay heave.
- A geo-environmental assessment to identify the potential for ground contamination and ground gases, including radon gas and volatile organic compounds (VOCs). Where contamination or gases are present, a suitably qualified and experienced person must assess the compatibility of the insulation with any potential emissions and specify a suitable arrangement of membranes, compatible with EPS, below the Spantherm elements. Where required, drainage of any subfloor void and provision for services must also be taken into account.
- A provision for preparation and levelling of the ground, avoidance of high-points or raised levels of fill, to ensure the integrity of any membranes placed on the ground and avoidance of unintended structural actions on the Spantherm elements. If necessary, a membrane may be protected from damage during construction by sand or lean concrete blinding.
- Provision for protection of the building from moisture, including detailing of any DPCs, DPMs and ventilated voids.

3.2 FLOOR LOADING

The Certificate holder undertakes structural calculations for the structural adequacy of the system. Individual designs are verified by calculation in accordance with IS EN 1992-1-1^[12] and its Irish National Annex. All calculations should take account of the floor loading requirements and load category A and C limitations set out in IS EN 1991-1-1^[13] and its Irish National Annex.

The design loadings for self-contained single-family dwelling units as defined in IS EN 1991-1-1^[13] and its Irish National Annex are:

- Uniformly distributed load 1.5-2.0kN/m²
- Concentrated load 2.0-3.0kN

The Spantherm element contains concrete stools within the EPS profile, which form the bearing points. The location of these concrete stools must be specified according to the design of the wall or foundation onto which the element bears. No contribution to the structural performance of the element should be attributed to the EPS, nor must the EPS be considered as load-bearing. Care must be taken to ensure that unintended structural actions are not imposed on the element as a result of contact with the ground. Suitable tolerances to the level of the ground underneath the element must be specified in the design documents.

Spantherm elements are available in lengths up to 7500mm. The Certificate holder's design department will specify the appropriate element design and reinforcement according to the floor layout, floor finishes, partition layout and imposed loading.

3.3 VOID DEPTH & CLAY HEAVE

The void depth beneath the ground floor required for each project will vary according to site conditions and should be carefully considered as part of the design of the floor construction, so as not to exceed 1m.

Spantherm elements must only be used without an underfloor void where the risk of clay heave is not present. Should a site investigation indicate the presence of shrinkable soils, the potential for clay heave must be assessed and a suitable ventilated void provided.

In locations where clay heave is anticipated, a void depth sufficient to accommodate the possible expansion of the ground below the +floor must be provided in addition to ventilation requirements. In cases where the risk of clay heave has been confirmed by geotechnical investigations, a total void of up to 300mm may be required as follows:

- High volume change potential (300mm total void)
- Medium volume change potential (250mm total void)
- Low volume change potential (200mm total void)

3.4 BEARING ON THE SUPPORT STRUCTURE

Spantherm units are considered as minor floor elements in accordance with IS EN 13224^[6] and

the minimum bearing lengths defined in Table 3 are required.

Support	Minimum bearing length
Masonry	100mm
Concrete	80mm
Steel	70mm

Table 3: Minimum Bearing Length

A suitably qualified and experienced engineer must ensure the adequacy of the supporting structure to resist the permanent and variable actions imposed by the Spantherm units, in accordance with IS EN 1992-1-1^[12], IS EN 1993-1-1^[14] or IS EN 1996-1-1^[15] and their Irish National Annexes, for concrete, steel or masonry structures are appropriate.

3.5 SERVICES

Openings for services are provided in the precast element during manufacture. The requirements for service openings must be communicated to the Certificate holder in advance, as elements should not be altered on site without prior consultation with the Certificate holder.

The maximum continuous working temperature of EPS is 80°C. Where underfloor heating systems are to be used, the advice of the Certificate holder should be sought.

3.6 STRENGTH

The system when installed in accordance with the manufacturer's instructions and this Certificate, will resist the loads likely to be met during installation and in service.

3.7 LIMITING THERMAL BRIDGING

Care must be taken in the overall design and construction of junctions between the floor and external, internal and party walls, to limit excessive heat loss and air infiltration.

The junction ψ -values given in Table 4 may be used in the Dwelling Energy Assessment Procedure (DEAP) Building Energy Rating (BER) calculation, or values can be modelled in accordance with the requirements of BRE Report BR 497^[19], BRE Information Paper IP 1/06^[20] in accordance with Appendix D of TGD to Part L of the Building Regulations 1997 to 2019.

3.8 WATER VAPOUR PENETRATION AND CONDENSATION RISK

3.8.1 Interstitial Condensation

Unless a calculation to IS EN ISO 13788^[16] and BS 5250^[10] demonstrates that it is not required, a VCL should be placed between the unit and the upper floor finish. In the case of suspended floors, the vapour resistance of the VCL should be at least equal to that of the DPM, which is placed below the unit. In the case of a slab on ground floor, the

vapour resistance of the VCL should be established through calculation.

In the case of suspended floors, to help minimise the risk of condensation, the void space beneath the lowest point of the floor construction should be at least 150mm high, with provision for adequate through-ventilation in the form of ventilation openings provided in two opposing external walls. The ventilation openings should be at least 1500mm² per metre run of external wall or 500mm² per square metre of floor area, whichever is greater. Where pipes are used to carry ventilating air, these should be at least 100mm in diameter.

To minimise the risk of interstitial condensation at junctions with external walls, specifiers should ensure that wall insulation extends to at least 150mm below the bottom of the concrete nib.

3.8.2 Surface Condensation

Floors will adequately limit the risk of surface condensation when the thermal transmittance (U-value) does not exceed 0.7W/m²K at any point and the junctions with walls are in accordance with the relevant requirements of BRE Information Paper IP 1/06^[20].

Junction designs are acceptable when the temperature factor, f_{Rsi} , modelled in accordance with IS EN ISO 10211^[18] and BR 497^[19], meets or exceeds the critical temperature factors, f_{CRsi} , detailed in Tables 1 and 2 of BRE Information Paper IP 1/06^[20] for the relevant building type.

Floors will adequately limit the risk of surface condensation when the thermal transmittance (U-value) does not exceed 1.2W/m²K at any point and floors are designed and constructed to BS 5250^[10].

To minimise the risk of surface condensation at service penetrations, care should be taken to minimise gaps in the insulation layer.

3.9 DURABILITY AND MAINTENANCE

Spantherm elements are manufactured in accordance with IS EN 206^[1] and IS EN 13369^[21] for the requirements of exposure class XC3 and will have adequate durability for the life of the building in which they are installed (taken as 60 years), when designed and installed in accordance with the requirements of this Certificate.

As the system is an integral part of the floor construction, maintenance is not necessary.

3.10 RE-USE AND RECYCLABILITY

The precast concrete and EPS components can be fully recycled.

4.1 THERMAL INSULATION

The overall floor U-value will depend significantly on the deck U-value, the ratio of the exposed (and semi-exposed) floor perimeter length to floor area (P/A), the amount of underfloor ventilation and the ground thermal conductivity. Each floor U-value therefore should be calculated to IS EN ISO 13370^[17]. The manufacturer’s declared thermal conductivity ($\lambda_{90/90}$) of the EPS board is:

- 0.038W/m.K for standard white EPS used in Standard 300, Standard 375 and Advance 375.
- 0.031W/m.K for graphite enhanced EPS used in Advance 300 and Plus 375.

A suspended floor deck U-value (from inside to the underfloor void) or floor slab resistance will depend on the unit product, unit width and internal floor finish. The suspended floor deck U-values and floor slab resistances, for each unit product and unit width, have been numerically modelled to IS EN ISO 10211^[18] and are shown in Tables 5 and 6 respectively. Where the floors contain a combination of floor units and/or unit widths, the aggregate floor deck U-value may then be taken as an area-weighted average and the overall floor U-value calculated as described above.

For a sample suspended floor, and slab on ground floor, U-values are given in Tables 7a, 7b, 8a and 8b, and indicate that the system can enable a floor to meet, or improve upon, the design floor U-values of between 0.13 and 0.25W/m²K as required by TGD to Part L of the Building Regulations 1997 to 2019. U-values and ψ -values are to be calculated by an NSAI approved thermal modeller – a register of these can be found at <https://www.nsa.ie/certification/agreement-certification/thermal-modellers-scheme/>.

4.2 TESTS AND ASSESSMENTS WERE CARRIED OUT TO DETERMINE THE FOLLOWING:

- Structural calculations
- Thermal properties and condensation risk
- Durability

4.3 OTHER INVESTIGATIONS

- Existing data on product properties in relation to fire, toxicity, environmental impact and the effect on mechanical strength/stability and durability were assessed.
- 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.
- Site visits were conducted to assess the practicability of installation and the history of performance in use of the product.

4.4 CE MARKING

The manufacturer has taken responsibility of CE marking the system in accordance with harmonised European Standard IS EN 13224^[6]. An asterisk (*) appearing in this Certificate indicates that data shown is an essential characteristic of the product and declared in the manufacturers Declaration of Performance (DoP). Reference should be made to the latest version of the manufacturer’s DoP for current information on any essential characteristics declared by the manufacturer.

Floor Slab Depth	Range	Flanking Elemental U-values		Direction of Span	Thermal Transmittance Ψ -value* (W/m.K)	Temperature Factor (Pass/Fail)
		Spantherm Floor U-value [§] (W/m ² .K)	External Wall U-value (W/m ² .K)			
375	Advanced	0.13	0.18	Perpendicular	0.144	Pass
				Parallel	0.123	Pass
	Plus	0.11	0.18	Perpendicular	0.143	Pass
				Parallel	0.122	Pass
	Standard	0.17	0.18	Perpendicular	0.054	Pass
				Parallel	0.066	Pass
300	Advanced	0.15	0.18	Perpendicular	0.123	Pass
				Parallel	0.135	Pass
	Standard	0.17	0.18	Perpendicular	0.117	Pass
				Parallel	0.137	Pass

[§] Floor U-value is based on a characteristic dimension of floor B = 8m and a P/A of 0.25 (BR 497)
 * When the flanking element U-values’ differ by an absolute aggregate amount of +20%, then the above values are no longer valid and the certificate holder should be contacted for assistance on valid thermal bridging calculations

Table 4: Junction Ψ -values

Unit	Depth (mm)	Unit width (mm)	Internal finish	
			No screed ¹	100mm screed
Spantherm Standard	375	1200	0.2247	0.2204
		900	0.2466	0.2416
		600	0.2888	0.2816
		400	0.2428	0.2378
Spantherm Advance	375	1200	0.1634	0.1611
		900	0.1804	0.1777
		600	0.2122	0.2084
		400	0.2428	0.2378
Spantherm Plus	375	1200	0.1354	0.1340
		900	0.1498	0.1482
		600	0.1767	0.1741
		400	0.2027	0.1993
Spantherm Standard	300	1200	0.2231	0.2189
		900	0.2497	0.2445
		600	0.3009	0.2934
		400	0.3598	0.3490
Spantherm Advance	300	1200	0.1861	0.1831
		900	0.2087	0.2051
		600	0.2524	0.2471
		400	0.3034	0.2957

¹ Additional internal floor finishing layers may be added to the deck build-up as required

Table 5: Suspended Floor Deck U-values (W/m²K)

Unit	Depth (mm)	Unit width (mm)	Internal finish	
			No screed ¹	100mm screed
Spantherm Standard	375	1200	4.2375	4.3376
		900	3.8480	3.9463
		600	3.2841	3.3765
		400	3.7865	3.8761
Spantherm Advance	375	1200	5.7424	5.8458
		900	5.1740	5.2752
		600	4.3690	4.4622
		400	3.7865	3.8759
Spantherm Plus	375	1200	7.0031	7.1068
		900	6.3040	6.4055
		600	5.3170	5.4106
		400	4.6011	4.6903
Spantherm Standard	300	1200	4.0952	4.1996
		900	3.6318	3.7329
		600	2.9773	3.0701
		400	2.4488	2.5389
Spantherm Advance	300	1200	4.9872	5.0920
		900	4.4180	4.5194
		600	3.6165	3.7094
		400	2.9662	3.0563

¹ Additional internal floor finishing layers may be added to the deck build-up as required

Table 6: Floor Slab Resistances¹ (m²K/W)

P/A ratio	Spantherm Standard	Spantherm Advance	Spantherm Plus
0.4	0.17	0.13	0.11
0.6	0.18	0.14	0.12
0.7	0.18	0.14	0.12
0.9	0.19	0.14	0.12

Table 7a: Example Suspended Floor U-values (W/m²K) for Floors Constructed of 1200mm Elements (375mm Depth)

P/A ratio	Spantherm Standard	Spantherm Advance
0.4	0.17	0.14
0.6	0.18	0.15
0.7	0.18	0.15
0.9	0.18	0.16

Table 7b: Example Suspended Floor U-values (W/m²K) for Floors Constructed of 1200mm Elements (300mm Depth)

The calculations in Table 7a and 7b assume:

- 100mm screed internal finish
- A 300mm thick perimeter wall with a U-value of 0.35W/m²K
- Underfloor ventilation area of 0.0015m²/m
- Ground conductivity of 2.0W/m.K
- All other parameters are default values from BRE Report BR 443^[22]

P/A ratio	Spantherm Standard	Spantherm Advance	Spantherm Plus
0.4	0.16	0.13	0.11
0.6	0.17	0.14	0.12
0.7	0.18	0.14	0.12
0.9	0.18	0.14	0.12

Table 8a: Example Slab on Ground Floor U-values (W/m²K) for Floors Constructed of 1200mm Elements (375mm Depth)

P/A ratio	Spantherm Standard	Spantherm Advance
0.4	0.16	0.14
0.6	0.18	0.15
0.7	0.18	0.15
0.9	0.19	0.16

Table 8b: Example Slab on Ground Floor U-values (W/m²K) for Floors Constructed of 1200mm Elements (300mm Depth)

The calculations in Table 8a and 8b assume:

- 100mm screed internal finish
- Ground conductivity of 2.0W/m.K
- All other parameters are default values from BRE Report BR 443^[22]

5.1 National Standards Authority of Ireland ("NSAI") following consultation with NSAI Agrément has assessed the performance and method of installation of the product/process and the quality of the materials used in its manufacture and certifies the product/process to be fit for the use for which it is certified provided that it is manufactured, installed, used and maintained in accordance with the descriptions and specifications set out in this Certificate and in accordance with the manufacturer's instructions and usual trade practice. This Certificate shall remain valid for five years from date of latest revision so long as:

- (a) the specification of the product is unchanged.
- (b) the Building Regulations 1997 to 2019 and any other regulation or standard applicable to the product/process, its use or installation remains unchanged.
- (c) the product continues to be assessed for the quality of its manufacture and marking by NSAI.
- (d) no new information becomes available which in the opinion of the NSAI, would preclude the granting of the Certificate.
- (e) the product or process continues to be manufactured, installed, used and maintained in accordance with the description, specifications and safety recommendations set out in this certificate.
- (f) the registration and/or surveillance fees due to NSAI are paid.

5.2 The NSAI Agrément mark and certification number may only be used on or in relation to product/processes in respect of which a valid Certificate exists. If the Certificate becomes invalid the Certificate holder must not use the NSAI Agrément mark and certification number and must remove them from the products already marked.

5.3 In granting Certification, the NSAI makes no representation as to;

- (a) the absence or presence of patent rights subsisting in the product/process; or
- (b) the legal right of the Certificate holder to market, install or maintain the product/process; or

(c) whether individual products have been manufactured or installed by the Certificate holder in accordance with the descriptions and specifications set out in this Certificate.

5.4 This Certificate does not comprise installation instructions and does not replace the manufacturer's directions or any professional or trade advice relating to use and installation which may be appropriate.

5.5 Any recommendations contained in this Certificate relating to the safe use of the certified product/process are preconditions to the validity of the Certificate. However the NSAI does not certify that the manufacture or installation of the certified product or process in accordance with the descriptions and specifications set out in this Certificate will satisfy the requirements of the Safety, Health and Welfare at Work Act 2005, or of any other current or future common law duty of care owed by the manufacturer or by the Certificate holder.

5.6 The NSAI is not responsible to any person or body for loss or damage including personal injury arising as a direct or indirect result of the use of this product or process.

5.7 Where reference is made in this Certificate to any Act of the Oireachtas, Regulation made thereunder, Statutory Instrument, Code of Practice, National Standards, manufacturer's instructions, or similar publication, it shall be construed as reference to such publication in the form in which it is in force at the date of this Certification.

NSAI Agrément

This Certificate No. **21/0427** is accordingly granted by the NSAI to **Creagh Concrete Products Ltd** on behalf of NSAI Agrément.

Date of Issue: **10th June 2021**

Signed



Seán Balf
Director of NSAI Agrément

Readers may check that the status of this Certificate has not changed by contacting NSAI Agrément, NSAI, 1 Swift Square, Northwood, Santry, Dublin 9, Ireland. Telephone: (01) 807 3800. Fax: (01) 807 3842. www.n sai.ie

Bibliography

- [1] IS EN 206:2015 *Concrete – Specification, performance, production and conformity.*
- [2] BS 4449:2005+A3:2016 *Steel for the reinforcement of concrete – Weldable reinforcing steel – Bar, coil and decoiled product – Specification.*
- [3] BS 5896:2012 *High tensile steel wire and strand for the prestressing of concrete – Specification.*
- [4] IS EN 14889-2:2007 *Fibres for concrete – Part 2: Polymer fibres – Definitions, specifications and conformity.*
- [5] BS 8500-1:2015+A2:2019 *Concrete – Complementary British Standard to EN 206 – Method of specifying and guidance for the specifier.*
- [6] IS EN 13224:2011 *Precast concrete products – Ribbed floor elements.*
- [7] IS EN 13163:2012+A1:2016 *Thermal insulation products for buildings – Factory made expanded polystyrene (EPS) products – Specification.*
- [8] IS EN ISO 9001:2015 *Quality management systems – Requirements.*
- [9] IS EN ISO 14001:2015 *Environmental management systems – Requirements with guidance for use.*
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