IRISH AGRÉMENT BOARD
CERTIFICATE NO. 23/0434
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Castleforms Raft Therm 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 TGD Part D of the second schedule of the **Building Regulations 1997 and subsequent revisions.**

SCOPE

This Certificate relates to the Castleforms Raft Therm System. Castleforms Raft Therm System is a combination of a ground floor insulation and perimeter formwork panels moulded from high-density EPS. The EPS panels are combined with a reinforced concrete slab to provide a complete raft solution. The system is engineered to suit specific site conditions and loading, whilst also giving excellent thermal performance. Castleform Raft Therm System is compatible for use with different wall types such as traditional masonry, timber frame, SIP panels, light gauge steel and ICF.

Castleforms Raft Therm System is certified for use in the construction of buildings of up to two storeys (6m) in height to the top floor of the final floor level in purpose groups 1(a), 1(b) and 1(d) as defined in Technical Guidance Document to Part B Volume 2 of the Building Regulations, and 1(c), 2(a), 2(b), 3, 4(a), 4(b) and 5 as defined in TGD to Part B of the Building Regulations.

DESIGN

The developer is responsible for the overall building design and compliance with Building Regulations.

The Castleforms Raft Therm System is intended for use where the architectural and fire strategy drawings are available and satisfy the Building Regulations.

In the opinion of NSAI, the Castleforms Raft Therm System, as described in this Certificate, complies with the requirements of the Building Regulations.

DEVELOPMENT, MANUFACTURE AND MARKETING:
The Castleforms Raft Therm System is developed, manufactured, and marketed by:

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1.1 BUILDING REGULATIONS

Part D – Materials and Workmanship
D1 – Materials & Workmanship
D3 – Proper Materials
The Castleforms Raft Therm 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.

Buildings incorporating the Castleforms Raft Therm System can be designed to meet the requirements of the following clauses of the Building Regulations:

Part A - Structure
A1 – Loading
A2 – Ground Movement
A3 – Disproportionate Collapse

Part B – Fire Safety

Part C – Site Preparation and Resistance to Moisture
C1 – Preparation of site
C2 – Subsoil drainage
C3 – Dangerous Substances
C4 – Resistance to Weather and Ground

Part H – Drainage and Waste Water Disposal

Part L – Conservation of Fuel and Energy
Sections L1, L5, L6

2.1 PRODUCT DESCRIPTION

This Certificate contains illustrations to explain the various elements of the Castleforms Raft Therm System. These illustrations are not intended to be used as construction drawings. The Client's structural engineer in conjunction with the design team will design specific details on a project-by-project basis. The design must be compliant with the relevant codes of practice and relevant standards, along with current Building Regulations.

2.1.1 Castleforms Raft Therm

The system consists of the following EPS components:

- Perimeter L-shaped (or other shapes) formwork panels moulded from high density white/grey EPS300/360/400, which are used to create the external edge beam of the foundation.
- Flat sheets moulded from high density white/grey EPS300/360/400, fitted underneath internal loadbearing walls and in basement floors.
- Flat sheets moulded from medium density white/grey EPS100, fitted underneath the floor between the external edge beam and beams carrying any internal loadbearing walls.

An in situ concrete slab is poured on top of the Castleforms Raft Therm System.

Ancillary items include steel combs used to secure L-sections together when creating the external edge beam, and plastic pins used to secure flat sheets together.

The system is evaluated by the Client's engineer to ensure compliance with the requirements for compressive strength, water vapour transmission, thermal conductivity, thermal resistance and dimensional stability.

Thickened reinforced concrete ring beams and internal beams are positioned over high density insulation and designed to support the imposed structure loads. The reinforced thickened beams and floor slab are poured together.

Figure 1 - Castleforms Raft Therm EPS Components

2.1.1 Concrete

The concrete mix design must be specified by the Client's structural engineer. This will depend on loading from the superstructure, the ground conditions noted in the ground investigation report and exposure class. Concrete specification shall be in accordance with I.S. EN 206[2].

2.1.2 Steel Reinforcement

Steel reinforcement used in Castleforms Raft Therm System must be specified by the Client's structural engineer and be in accordance with BS 4449[3], BS 4482[4], BS 4483[5], I.S. EN 10020[6], I.S. EN 10080[30] and I.S. EN 1992-1-1[7].

Steel reinforcement is placed on top of the Raft Therm White/Grey EPS 100/300/360/400 before concrete is poured to form the raft. Adequate cover to the reinforcement shall be determined by the Client's structural engineer.

2.1.2 External and Internal Walls

External and internal walls are outside of the scope of this certificate. Castleform Raft Therm System is compatible for use with different wall types such as traditional masonry, timber frame, SIP panels, light gauge steel and ICF. Superstructure designer shall specify required connection between the walls and the Castleforms Raft Therm System.

2.1.3 Ancillary Items

- PVC pipe sleeves for penetrations;
- Radon membrane/barrier;
- Hot knives and grooving tools;
- Waterproofing membrane;

These items are outside the scope of this Certificate.

2.2 MANUFACTURE

All Castleforms' EPS components are manufactured in accordance with I.S. EN 13163[1]. Production is controlled at different stages through inspections and quality control checks per the Castleforms Quality Manual and Inspection Schedule.

See Castleforms' Declaration of Performance (DoP) for the EPS characteristics used in the Castleforms Raft Therm System. The essential characteristics for EPS were assessed for Castleforms' DoP, Issue No. 003, October 2022.

2.3 DELIVERY, STORAGE AND MARKING

The Castleforms Raft Therm System products are delivered to site poly-wrapped. The wrapping should not be opened until the contents are required. All packaged components are clearly labelled with product type and production date allowing full traceability of supply.

Castleforms Raft Therm System components should not deteriorate in normal storage conditions so long as they remain in their packaging protected from the environment prior to use. Storage must be on firm, level and dry ground, and if the components are to be stored outside, they may be further protected from the weather by a secured covering. Castleforms Raft Therm System materials should be protected from prolonged exposure to direct sunlight and must not be exposed to plastic materials containing plasticizers or to volatile aggressive solvents. The polystyrene must not come into contact with aggressive chemicals or deleterious agents, e.g. diesel oil, petrol, various cleaning solvents, hydrocarbons, membranes containing coal tar pitches or building products containing solvents. Reasonable care must be taken to prevent damage to forms before, during and after installation. The formwork panels must not be punctured, split, deformed or unduly compressed before use.

2.4 INSTALLATION

2.4.1 General

This Certificate does not contain a complete 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.

Site construction is undertaken using trained installers in accordance with the Castleforms' Installation Manual. Trained installers must;

- Work in compliance with the Castleforms Raft Therm System installation manuals.
- Be familiar with the requirements of this Agrément certificate.
- May be subject to supervision by Castleforms, including unannounced site inspections

Concrete working best practice should be followed in both hot and cold conditions. The concrete may be placed when the air temperature is between 5°C and 30°C.

The Client's assigned certifier and the builder are responsible for the overall quality of the work in accordance with the design carried out by the project design team.

2.4.2 Site Investigation

Castleforms Raft Therm System must be designed to suit the site and soil conditions of each building. A ground investigation should be carried out in accordance with Eurocode 7 by a qualified geotechnical specialist to determine the depth of the good natural ground and the allowable bearing capacity. The Raft Therm System should never be constructed on made ground. The geotechnical specialist on the project must review the ground investigation report and determine the most suitable build-up. They must also inspect the ground before any stone fill is placed to ensure the ground conditions are consistent over the full area of the foundation. Any soft spots or inconsistencies must be remediated. Where used in brownfield sites, a thorough examination of the soil for contaminants etc is required before Raft Therm System can be used. Such contaminants must be removed before installation of Castleforms Raft Therm System.

2.4.3 Ground Preparation

When installing the Castleforms Raft Therm System, the site is cleared of topsoil and loose organic material to a level where suitable load bearing ground is exposed and a layer of free draining hardcore is evenly spread below foundation. Hardcore is laid to the depth specified by the structural engineer, in well compacted layers as per specification. The general arrangement drawings must show the formation level that the existing ground needs to be reduced to.

All stone used below the foundation system must be certified and fully compacted. The stone build-up shall be inspected before installation commences. The granular fill should be specified in accordance with S.R. 21[12] Annex E and I.S. EN 13242[13] and will typically be T3 Blinding on T2 Permeable on T1 Structural. The granular fill material must be placed and compacted in accordance with I.S. 888[14] Clause 5.2 to 5.5 and Annex B Table B.1. The top layer of T3 blinding should be a maximum of 40-50mm thick. It is critically important that the blinding is laid and compacted to a tight tolerance level of +/- 3mm over the full area of the building, this is to ensure the Raft Therm System is fully supported on the compacted fill underneath.

Any service pipes or radon sump required should be trenched out at this stage by service trenches

which are excavated in the granular fill. The service trenches are to be filled in with bedding material in accordance with the recommendations of TGD to Part H of the Building Regulations.

2.4.4 EPS Placement

Starting from each corner, the edge profiled EPS300 ring-beam forms are laid out on the blinding layer in their precise positions and held together using steel combs. Each component should be a tight fit to the next. Once positioned the EPS300 forms create the perimeter of the foundation.

Next, high density EPS 300 sheets are carefully placed underneath internal loadbearing and/or compartment walls as required by the site-specific construction drawing.

The placement of the first layer of underfloor EPS 100 sheets then commences from the perimeter inwards. The second and subsequent layers of floor insulation are installed, with joints staggered through the layers to prevent a continuous joint running from top to bottom and fitted tightly at the edges and around any service penetrations. Plastic pins are provided to secure the sheets together.

EPS300 is typically provided below the perimeter thickening and internal thickenings where higher compressive stresses are applied. EPS100 is provided below the main floor slab where the compressive stress reduces. In cases where the applied loads are slightly above the capacity of the EPS300 a higher density EPS360 and EPS400 option is available.

The Client's structural engineer is required to determine the applied stresses and the safe working loads on the EPS in order to specify the most suitable product. The final EPS requirements should be shown on the structural drawings.

2.4.5 DPM/ Radon Membrane

A damp-proof membrane (DPM) or an NSAI Agrément certified radon barrier should be laid below the EPS layers, with joints taped to prevent the passage of ground moisture. The DPM/Radon barrier should be carried up and over the upstand lip of the EPS300/360/400 ring-beam.

Care should be taken to avoid damage to the insulation or DPM and radon barriers as the slab is being poured.

2.4.6 Services

Building layout and site conditions including the surrounding topography will influence the positioning of service pipes within and around the Raft Therm System base. The location and depth of service pipework including the radon sump(s) must be clearly marked on the design drawings for accurate installation. The type of graded stone for backfilling around the pipework must also be clearly specified. The service pipes are generally fitted in the graded stone fill and/or ground below the stone fill, this will depend on the depth of the service trench that is required.

Care must be taken when installing oil service pipe into the stone base to ensure this pipe is not damaged and does not come into direct contact with the Raft Therm System EPS. For additional protection the oil service pipe must be carefully inserted through an outer sleeve pipe that is placed a minimum of 250mm below the lowest point of the Raft Therm System base.

After pipework assembly has been completed and backfilled as specified, the opened service trenches are reinstated and compacted as per the surrounding base taking care not to damage the buried pipework.

2.4.7 Reinforcement Installation

Reinforcement is installed as per the drawings and schedules provided by the Client's structural engineer, which will vary depending on the layout, superstructure and loading. The reinforcement drawing and schedule will outline the minimum reinforcement lap lengths and minimum concrete cover in accordance with IS EN 1992-1-1[7]. Care needs to be taken when installing reinforcement so as not to damage the radon membrane.

Reinforcement should be checked for correct cover distance and rigidity. Before the initial pour and between concrete pours, care must be taken to remove any debris from inside the formwork. All reinforcement must be checked by a competent registered installer and/or Client's engineer.

Structural engineering drawings shall show any movement joints or crack inducers required based on the area of the slab and concrete volume. The finished concrete should be level to within +/- 5mm over a full wall length.

2.4.8 Underfloor heating

Where underfloor heating is specified as part of the building design this is generally fitted below steel reinforcement by a specialist contractor. To preserve the structural integrity of the system, large banks of underfloor heating pipes should be a maximum 200mm wide with a minimum space of 100mm between the banks, banks should also run perpendicular to thickened areas of the slab and not parallel.

2.4.9 Concrete Placement

Pre-pour checklist shall be completed prior to placing concrete. Refer to Castleforms' Installation Manual.

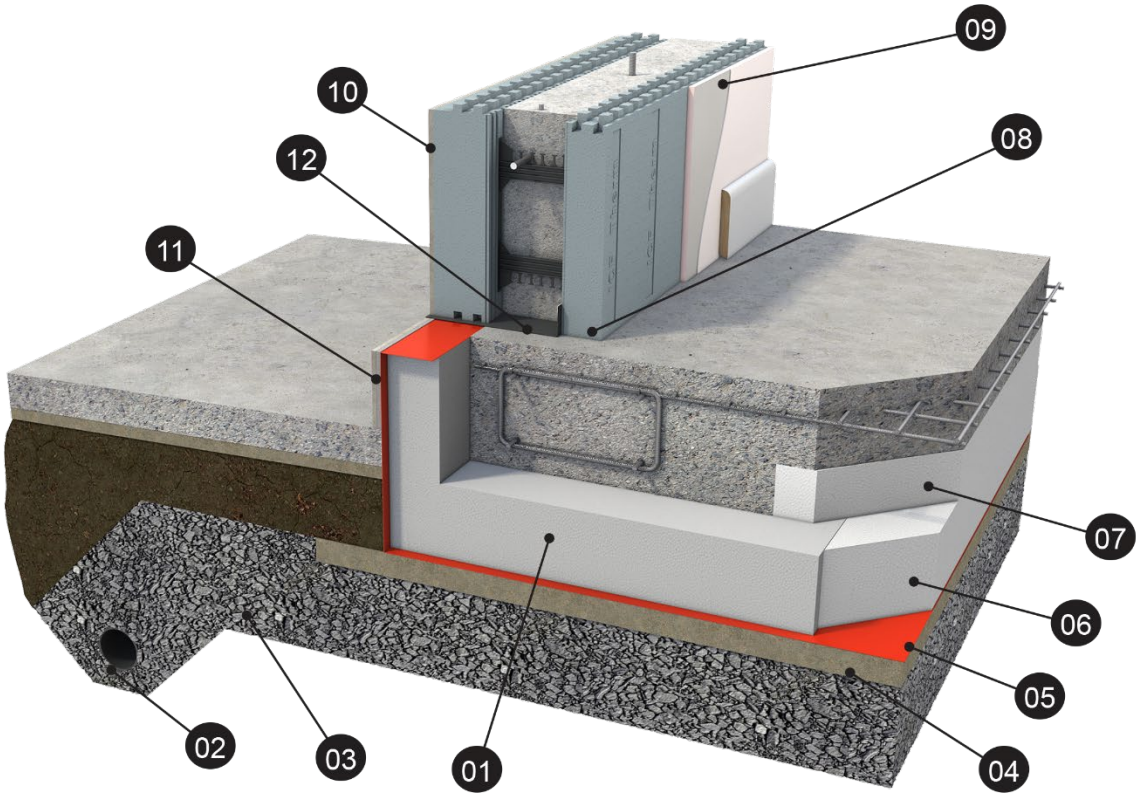
Adequate supervision and care by the installer is needed when placing concrete. Client's structural engineer specification shall be followed for

concrete specification, surface finish, sampling of concrete, etc.

Where a mechanical power float is used, it should not come into contact with the perimeter L sections, instead the outside edges of the concrete slab should be hand floated.

Adequate consolidation/compaction of the concrete should be in accordance with I.S. EN 1992-1-1[7] .

Any damage to the forms should be repaired immediately. The concrete in the Castleforms Raft Therm System must be left to cure until it has achieved a specified minimum strength.



01. Insulated Raft Foundatuion Foundation to engineers specification and detail. L-Section (Dimesion varies).

02. Land-drain around perimeter of building.

03. Compacted graded stone fill in accordance with S.R.21:2014 + A1:2016 & Annex E. Typically T3 blinding on T2 permeable on T1 structural.

04. Sand Blinding layer.

05. Radon barrier / DPM lapped and taped where appropriate.

06. EPS Floor Insulation.

07. EPS Floor Insulation.

08. First course set and levelled on shims or starter track. Fill gaps with low-expanding PU-Foam.

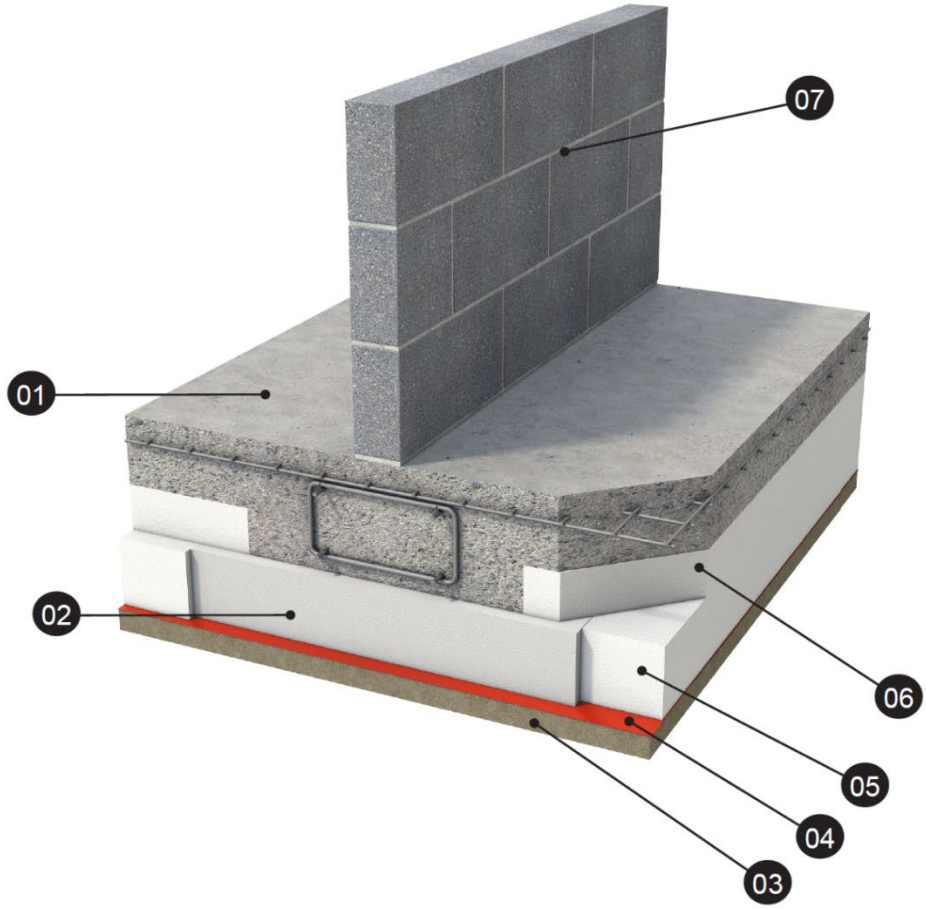
09. 12.5mm Gypsum plasterboard, screw fixed to ICF.

10. Approved EPS render.

11. Cement board & render.

12. DPC

Figure 2 - ICF Wall & Raft Therm System with Radon/DPM below EPS dressed Up To The Outside Of The Perimeter L Section



01. RC slab with mesh reinforcement.

02. EPS 300/360/400.

03. 50mm Sand Blinding.

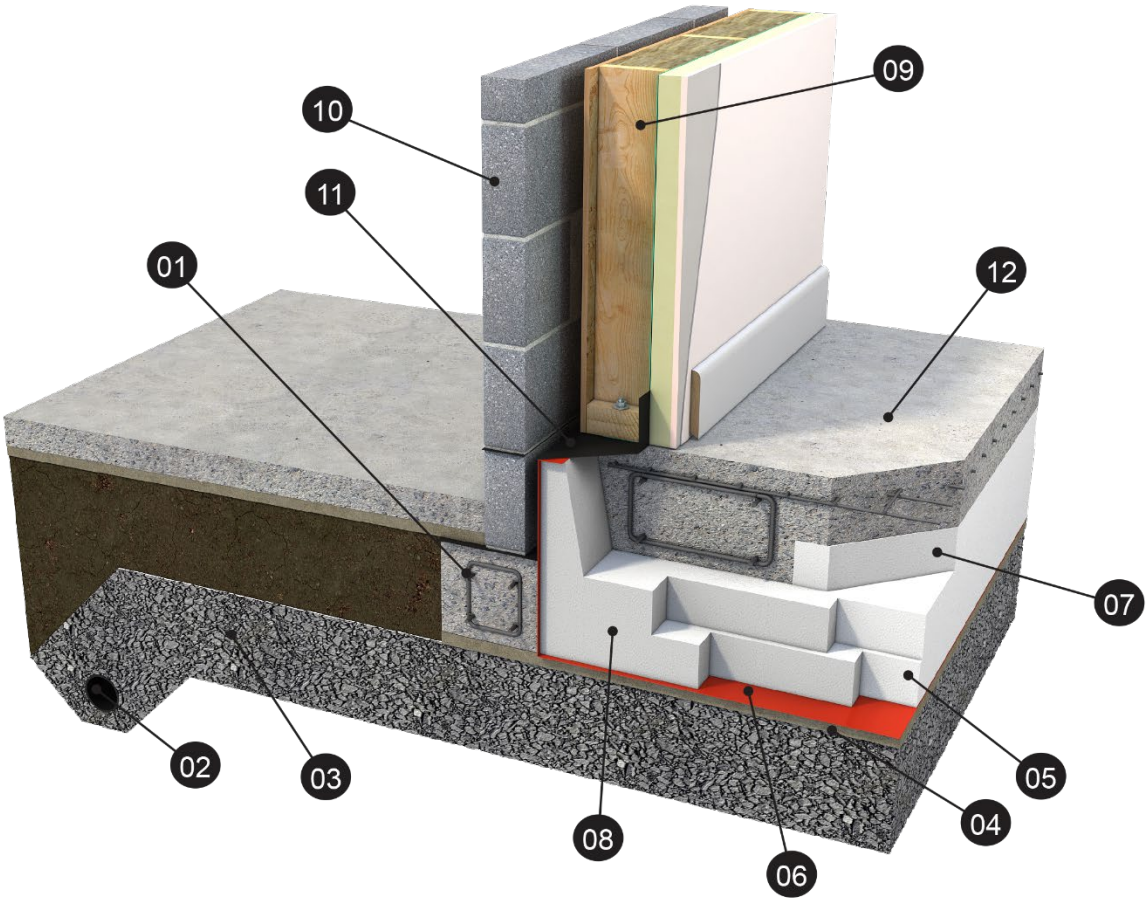
04. Radon barrier / DPM lapped and taped where appropriate.

05. EPS100 insulation.

06. EPS100 insulation.

07. Internal load brearing wall.

Figure 3 – Internal, Loadbearing Masonry Wall Detail & Raft Therm System



01. Reinforced concrete ringbeam for outer leaf (Blockwork) to engineers specification and detail.

02. Land-drain around perimeter of building.

03. Compacted graded stone fill in accordance with S.R.21:2014 + A1:2016 & Annex E. Typically T3 blinding on T2 permeable on T1 structural.

04. Sand Blinding layer.

05. EPS Floor Insulation.

06. Radon barrier / DPM lapped and taped where appropriate.

07. EPS Floor Insulation.

08. Insulated Raft Foundation to engineers specification and detail.

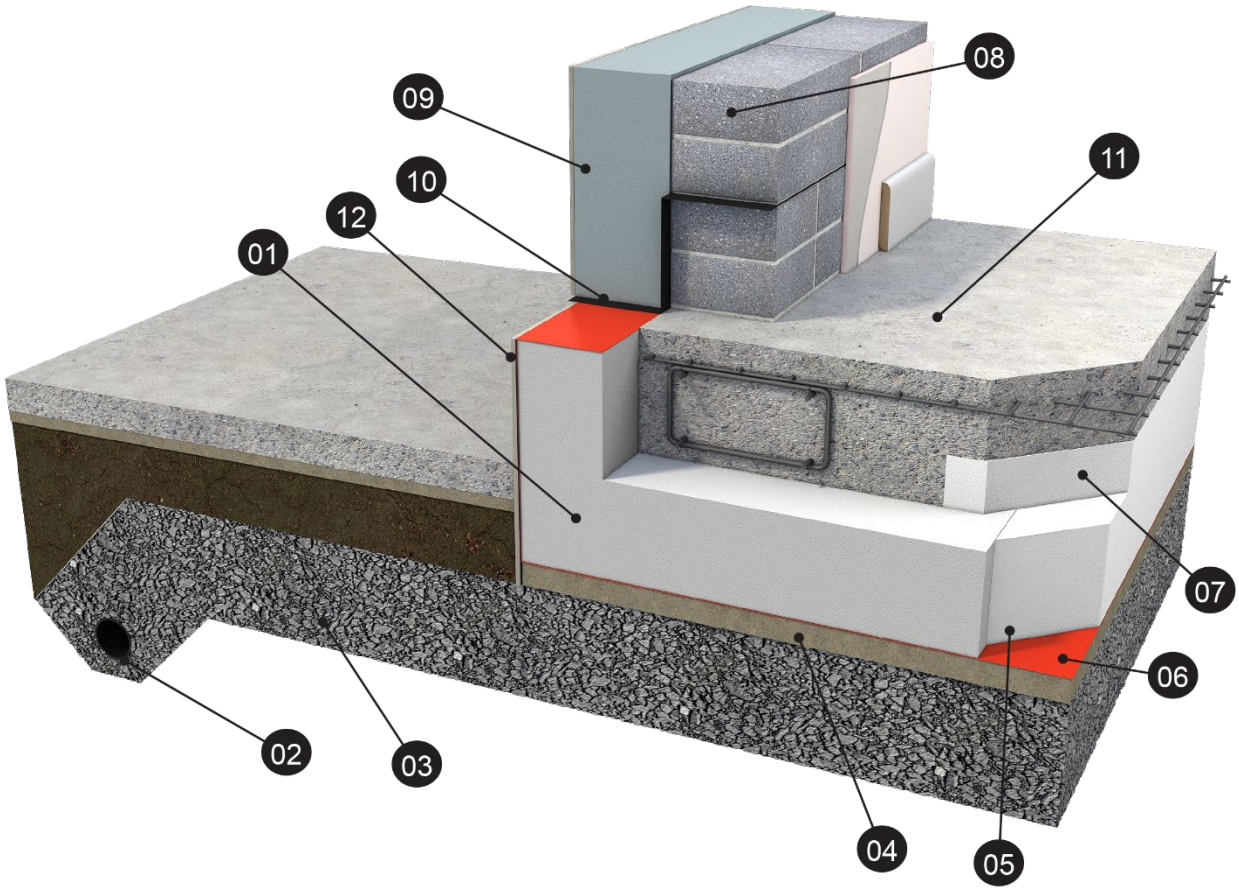
09. Timber Frame external wall.

10. Blockwork outer leaf

11. DPC.

12. Reinforced concrete ringbeam and floor slab to engineers specification and detail.

Figure 4 - Timber Cavity External Wall & Raft Therm System



01. Insulated Raft Foundation to engineers specification and detail.

02. Land-drain around perimeter of building.

03. Compacted graded stone fill in accordance with S.R.21:2014 + A1:2016 & Annex E. Typically T3 blinding on T2 permeable on T1 structural.

04. Sand Blinding layer.

05. EPS Floor Insulation.

06. Radon barrier / DPM lapped and taped where appropriate.

07. EPS Floor Insulation.

08. Blockwork Inner leaf.

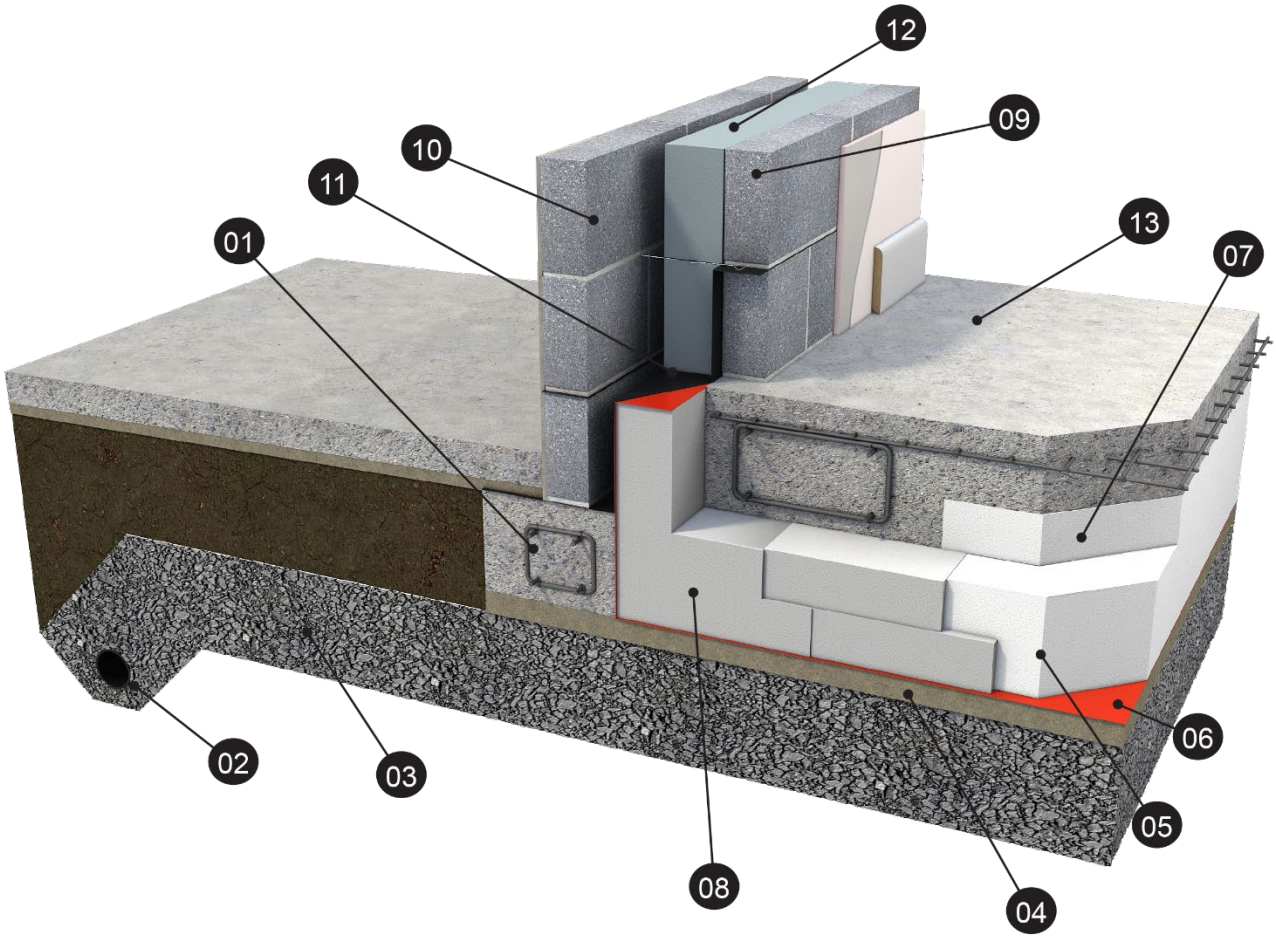
09. External Insulation & render system.

10. DPC.

11. Reinforced concrete ringbeam and floor slab to engineers specification and detail.

12. Cement Board and Render.

Figure 5 - Single Leaf Masonry External Wall & Raft Therm System



01. Reinforced concrete ringbeam for outer leaf (Blockwork) to engineers specification and detail.

02. Land-drain around perimeter of building.

03. Compacted graded stone fill in accordance with S.R.21:2014 + A1:2016 & Annex E. Typically T3 blinding on T2 permeable on T1 structural.

04. Sand Blinding layer.

05. EPS Floor Insulation.

06. Radon barrier / DPM lapped and taped where appropriate.

07. EPS Floor Insulation.

08. Insulated Raft Foundation to engineers specification and detail.

09. Blockwork inner Leaf.

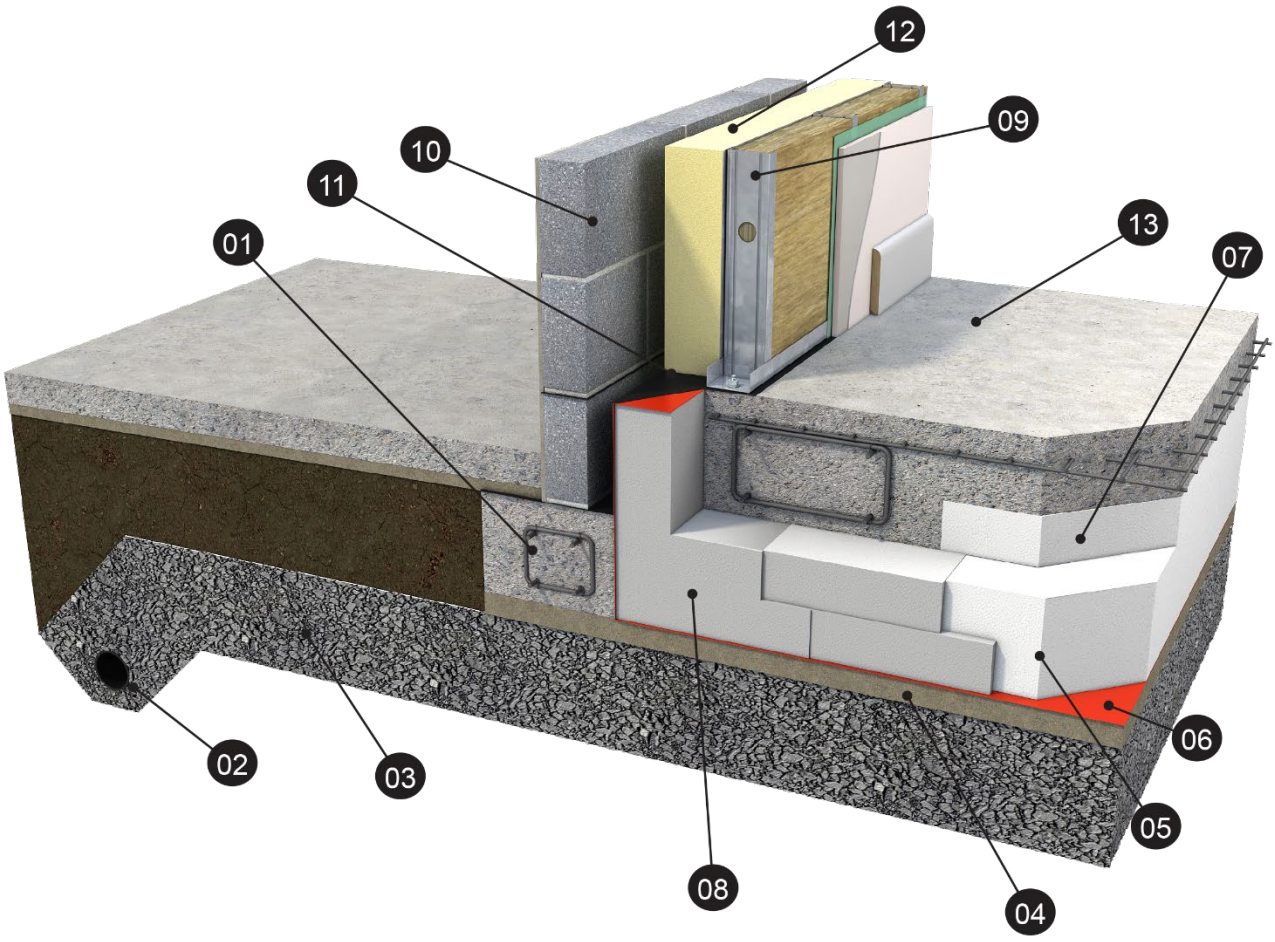
10. Blockwork outer leaf

11. DPC.

12. Cavity Insulation.

13. Reinforced concrete ringbeam and floor slab to engineers specification and detail.

Figure 6 - Cavity Masonry External Wall & Raft Therm System



01. Reinforced concrete ringbeam for outer leaf (Blockwork) to engineers specification and detail.

02. Land-drain around perimeter of building.

03. Compacted graded stone fill in accordance with S.R.21:2014 + A1:2016 & Annex E. Typically T3 blinding on T2 permeable on T1 structural.

04. Sand Blinding layer.

05. EPS Floor Insulation.

06. Radon barrier / DPM lapped and taped where appropriate.

07. EPS Floor Insulation.

08. Insulated Raft Foundation to engineers specification and detail.

09. LGS Inner Leaf.

10. Blockwork outer leaf

11. DPC.

12. Cavity Insulation.

13. Reinforced concrete ringbeam and floor slab to engineers specification and detail.

Figure 7 – LGS Cavity Wall & & Raft Therm System

3.1 STRENGTH AND STABILITY

3.1.1 General

The Castleforms Raft Therm System is intended for use where Architect's drawings are available and satisfy the Building Regulations – the Architect and Engineer design team of the developer are responsible for the architectural drawings and overall building design to comply with the Building Regulations.

Buildings constructed using the Castleforms Raft Therm System shall be certified by a competent, chartered structural engineer, with experience in design of buildings and structures incorporating the Castleforms Raft Therm System, as being in accordance with Part A of the Building Regulations.

3.1.2 Raft Design

Structural assessment is site and project specific. The substructure design shall be in accordance with I.S. EN 1992-1-1[7]. In accordance with IS EN 1990[16], a DSL2 (Design Supervision Level) should be employed to check the design in line with good practice.

3.1.3 Loading

The loading as specified by Client's structural engineer shall be used in the design of the Castleforms Raft Therm System. The loading shall be calculated based on I.S. EN 1990[16] and I.S. EN 1991-1-1[17]. The loading depends on usage of the building, client requirements and other project specific requirements.

The designs for typical dwellings must include for both live and dead loads, wind loads and snow loads which can be established using the following standards:

- I.S. EN 1990[16]
- I.S. EN 1991-1-1[17]
- I.S. EN 1991-1-4[19]

Design snow and wind loads must be based on guidance given in TGD to Part A of the Building Regulations.

Long-term design compressive strength shall be used for design of the raft foundation. Where high point loads occur, a concrete pad foundation may be required to dissipate greater allowable loads back down to allowable EPS long-term design compressive strength.

3.2 STRUCTURAL FIRE SAFETY

The minimum thickness of overlay shall be a 150mm thick reinforced concrete slab and the thickness shall increase around perimeters and locally under load bearing elements as required by the design.

Adequate protection to the underfloor EPS must be provided in all areas to ensure that the structural integrity of the building is not compromised in the event of a fire. The Engineer must ensure that sufficient separation and protection is provided to the load bearing EPS in the event of a fire occurring either externally or internally.

3.2.1 Toxicity

The system is non-toxic in normal conditions. In fire conditions, the polystyrene will begin to soften, to contract, and finally melt above 200°C. The polystyrene used in the Castleforms Raft Therm System is Class E in accordance with I.S. EN 13501-1[25]. EPS used for Raft Therm is flame retarded.

3.3 WEATHERTIGHTNESS

A DPM/radon barrier is installed at ground level to prevent rising damp. The DPM/Radon barrier is installed below EPS and dressed up to the outside of the perimeter L-section of the EPS.

3.4 UNDERFLOOR HEATING

The Castleforms Raft Therm System can accommodate underfloor heating, and this is generally fitted below the steel reinforcement by a specialist contractor. The maximum continuous working temperature of EPS is 80˚C. The underfloor heating pipes can also be accommodated in a screed layer or concrete slab. Refer to Castleforms' Installation Manual and Section 2.4.8 for installation guidelines. As set out in TGD to Part L of the Building Regulations, when the source of space heating is underfloor heating, the maximum floor U-value should be 0.15W/m^{2}K.

3.5 PENETRATIONS

To reduce radon, air and moisture ingress into buildings the following guidelines should be followed:

- Design for controlled movement of construction (see I.S. EN 1996-1-1);
- Ensure that all designed cavities are effectively closed to interior spaces;
- Design for grouping of services with effective gas seal of ground slab openings and penetrations.

3.6 ELECTRICAL AND PLUMBING SERVICES

The positioning and future access to all plumbing and electrical services should be carefully considered during the design phase of the construction. Refer to Castleforms' Installation Manual and Section 2.4.6 for installation guidelines.

Electrical installation should meet the requirements of I.S. 10101[15]. The Castleforms Raft Therm System shall not be placed in direct contact with electrical cables or hot water pipes (max temp 80°C).

3.7 LIMITING THERMAL BRIDGING

The linear thermal transmittance 'ψ' (Psi) describes the heat loss associated with junctions and around openings. The certificate holder has carried out ψ-value calculations for thermally bridged ground floor junctions.

Table 1 of this certificate gives ψ-values for the Castleforms Raft Therm System for typical ground floor junction with ICF external wall. ψ-values for other external wall types and other junctions outside the scope of this certificate should be assessed by NSAI approved thermal modeller in accordance with Appendix D of TGD to Part L of the Building Regulations.

'ψ' (Psi) values of Table 1 can be used to calculate the 'y' factor for DEAP building energy rating (BER) calculation on project by project case basis.

Where either of the above options are shown to be valid, or when the required values cannot be achieved, all relevant details should be recorded on the 'Certificate of Compliance' for that project for use in future BER calculations.

3.8 DURABILITY AND MAINTENANCE

Castleforms Raft Therm System's boards are rot proof and durable. As floor insulation, the boards are judged to be stable and will remain effective as an insulation system for the life of the building, once installed in accordance with this Certificate and the manufacturer's instructions. As the product is confined and protected under the floor, it will remain durable without the necessity for maintenance.

Long periods of exposure to UV light can damage the EPS. However, during storage, and when installed in accordance with this Certificate, the EPS will be protected from such exposure. It is important to note that alterations to the building structure subsequent to the installation of the Castleforms Raft Therm System must take into account the integrity of the system

4.1 BEHAVIOUR IN FIRE

The concrete structural elements of Castleforms Raft Therm System have a class 0 rating and are non-combustible as per TGD to Part B of the Building Regulations. Castleforms Raft Therm System are manufactured in accordance with I.S. EN 13163[1] from flame-retardant EPS. The EPS has a Class E reaction to fire when measured in accordance with I.S. EN 15715[24] and classified in accordance with I.S. EN 13501-1[25].

Although the Castleforms Raft Therm System is combustible, when used in the context of this Certificate, the increase in fire load in the building consequent to its use is negligible. In the event of a fire, the boards will be contained within the floor by an overlay until the overlay itself is destroyed. Therefore, it is considered that the system will not contribute to the developmental stage of a fire or present a smoke or toxic hazard.

4.2 THERMAL PERFORMANCE

The Castleforms Raft Therm System, when installed in accordance with this Certificate, is effective in reducing the thermal transmittance (U-value) of new floor constructions. The EPS declared thermal conductivity values are outlined in Casteforms' DoP (Issue No. 003, October 2022). The calculated U-value of the Castleforms Raft Therm System will be project specific and will depend on the perimeter/area (P/A) ratio. Refer to Table 2 for sample U-Values calculation for a range of different P/A ratios.

4.3 CONDENSATION AND MOISTURE RESISTANCE

The Castleforms Raft Therm System was subjected to an interstitial condensation risk analysis, assessing internal surface temperatures (fRsi). The assessment concluded that the risk of condensation is minimal and that no vapour barrier is required.

The Castleforms Raft Therm System will not allow moisture to cross the floor construction provided it is installed in accordance with this Certificate (see Clause 2.4.5 of this certificate for further guidance on DPM and Radon membranes). The Castleforms Raft Therm System incorporates a closed cell structure which does not allow water uptake by capillary action. An assessment of the long team water absorption by partial and total immersion was performed and the results of this assessment can be obtained from Castleforms.

4.4 PRACTICABILITY

The practicability of construction and adequacy of site supervision arrangements were assessed and considered adequate. Castleforms' Design Manual and Installation Manual guidelines are provided by Castleforms for each project, and these were reviewed and found to be satisfactory.

4.5 TESTS AND ASSESSMENTS WERE CARRIED OUT TO DETERMINE THE FOLLOWING

- Structural strength and stability
- Behaviour in fire
- Density
- Long term water absorption by diffusion
- Dimensional accuracy
- Compressive stress
- Bending strength
- Dimensional stability
- Thermal transmittance values
- Site erection controls

4.6 OTHER INVESTIGATIONS

(i) Existing data on product properties in relation to fire and the effect on mechanical strength/stability and durability were assessed.

(ii) 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.

(iii) Site visits were conducted to assess the practicability of installation and the history of performance in use of the product.

(iv) No failures of the product in use have been reported to NSAI Agrément.

Target linear thermal transmittance (ψ) for different types of junctions.		
Junction Description	**Temperature Factor f_{Rsi} (Min = 0.75)**	**Castleforms Ψ-value (W/m.K)**
Insulated Raft Foundation Detail with External ICF wall	0.81	0.091
The Ψ-value relates to a floor with a 150mm RC slab on 300mm EPS insulation (λ=0.035W/m.K) on soil (λ=2.0 W/m.K). Flanking element U-values for ICF walls was based on U_W = 0.17 W/m^{2}k Modelled junction ψ-values above can be used in y-value calculations.		

Table 1 - Typical ψ-Value W/mK

Ground Floor Slab U-value for varying P/A ratio											
P/A Ratio	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60
U-value	0.074	0.083	0.088	0.092	0.095	0.097	0.098	0.10	0.101	0.101	0.102
Floor U-values based on 150mm RC Slab on 300mm EPS insulation (λ=0.035W/m.K) on soil (λ=2.0 W/m.K). P/A Ratio = Exposed perimeter of the floor to total ground-floor area ratio.											

Table 2 - Ground Floor Slab U-value [W/m^{2}K]

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 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 Agrément 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, 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.

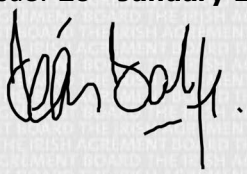
5.7 Where reference is made in this Certificate to any Act of the Oireachtas, Regulation made thereunder, Statutory Instrument, Code of Practice, National Standards, manufacturer's instructions, or similar publication, it shall be construed as reference to such publication in the form in which it is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

NSAI Agrément

This Certificate No. **23/0434** is accordingly granted by the NSAI to **Castleforms Ltd** on behalf of NSAI Agrément.

Date of Issue: **20th January 2023**

Signed



Seán Balfe
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.nsai.ie

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