IRISH AGRÉMENT BOARD
CERTIFICATE NO. 20/0424
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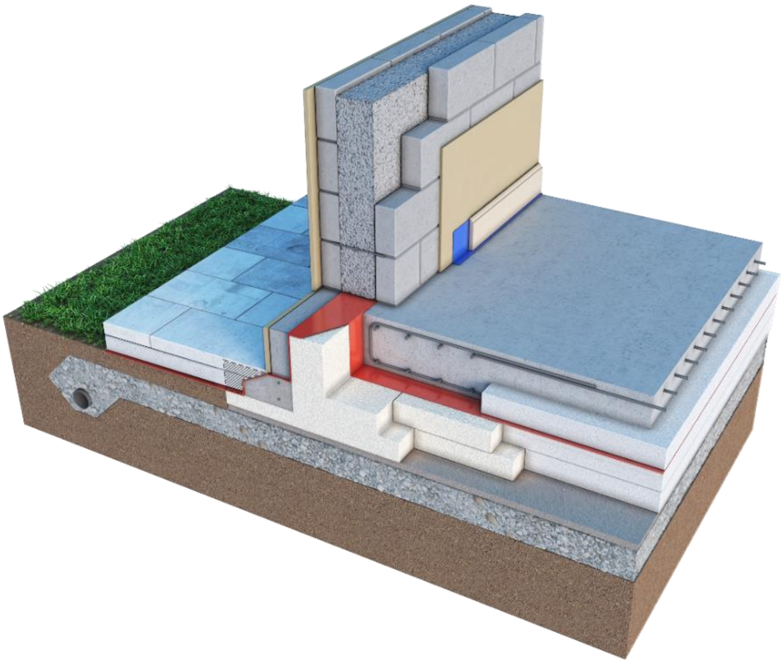
KORE Insulated Foundation System

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

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 to the **Building Regulations 1997 to 2024**.



PRODUCT DESCRIPTION:
This Certificate relates to the KORE Insulated Foundation System, which consists of rigid polystyrene blocks of expanded polystyrene (EPS). When combined with a reinforced concrete slab, the foundation system provides a complete foundation and ground floor solution. The system is engineered to suit specific site conditions and loading, with competent design ensuring compliance with the requirements of the Building Regulations 1997 to 2024, hereafter referred to as the Building Regulations.

USE:
The KORE Insulated Foundation System is used for thermal insulation in below ground applications. The system is certified to be used in the following purpose groups, 1(a), 1(b), 1(d), 1(c), 3, 4(a), as defined in Technical Guidance Documents (TGDs) to Part B of the Building Regulations.

DESIGN:
The KORE Insulated Foundation System is intended for use where the architect's finalised construction and fire strategy drawings are available and satisfy the Building Regulations. The Architectural and Engineering Design team of the Developer (the Client) are responsible for the architectural drawings and overall building design to comply with the Building Regulations.

The KORE Insulated Foundation System is designed for use in permanent buildings with traditional masonry loadbearing walls, timber frame and metal frame construction, subject to competent design.

The KORE Insulated Foundation System must be designed by a Chartered Structural Engineer (Engineer) who is familiar with the KORE "Insulated Foundation System Structural Design Guide".

Readers are advised to check that this Certificate has not been withdrawn or superseded by a later issue by contacting NSAI Agrément, NSAI, Santry, Dublin 9 or online at www.nsai.ie

The design will be based on the individual project requirements and site conditions.

The foundation system is delivered to site with its KORE Floor EPS components polythene wrapped. Once the required site preparation has been carried out, the system components are laid out to form an EPS raft according to the design drawings. KORE Floor EPS300 edge profiles are pinned together to form the perimeter of the system. Internal KORE Floor EPS100/200 sheets are placed together inside the perimeter KORE Floor EPS300 to form an EPS raft formwork. Steel reinforcement is placed to specification on top of the KORE Floor EPS 100/200 before concrete is poured to form the ground-floor of the superstructure.

MANUFACTURE AND MARKETING:

The product is designed, marketed, manufactured and by:

KORE System (t/a Kore Insulation),
The Green,
Kilnaleck,
Co. Cavan,
Ireland
A82 T291
Tel: +353 49 4336998
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1.1 ASSESSMENT

In the opinion of the NSAI Agrément, the KORE Insulated Foundation System, if used in accordance with this Certificate, can meet the requirements of the Building Regulations, as indicated in Section 1.2 of this Irish Agrément Certificate.

1.2 BUILDING REGULATIONS

REQUIREMENTS:

Part D – Materials and Workmanship
D3 – Proper Materials
The KORE Insulated Foundation System, as certified in this Certificate, is comprised of 'proper materials' fit for their intended use (see Parts 3 and 4 of this Certificate).

D1 – Materials and Workmanship
The KORE Insulated Foundation System, used in accordance with this Certificate, meets the requirements of the building regulations for workmanship.

Part A – Structure
A1 - Loading
The KORE Insulated Foundation System has adequate strength and stiffness to accept loads from the superstructure (see Clause 3.1 of this Certificate).

A2 – Ground Movement
An appropriately designed ground floor or podium slab can safely sustain the combined dead, imposed and wind loads of the system into the foundation structure without causing undue deflection to any part of the building.

Part B – Fire Safety
For purpose group 1(a), 1(b) and 1(d), the fire safety requirements are laid out in Technical Guidance Document (TGD) Volume 2 (2017) to Part B of the Building Regulations 1997 to 2024. For purpose group 1(c), 3, and 4(a) the fire safety requirements are laid out in TGD Volume 1 (2024) to Part B of the Building Regulations 1997 to 2024.

For the Volume 2 Dwelling Houses (2017), Part B6 to B11 are required to be adhered to, while for purpose group 1(c), 3 and 4(a) Parts B1 to B5 and B12 are required to be adhered to.

B3 & B8 – Internal Fire Spread (Structure)
The KORE Insulated Foundation System is designed and constructed so that its stability will be maintained for a reasonable period in the event of fire in compliance with Section B3 and B8 of TGD B to the Building Regulations.

Part C – Site Preparation and Resistance to Moisture
C3 – Dangerous Substances
Each dwelling ground floor must include a radon sump and provide the facility for radon extraction. Where it is shown that protection from dangerous substances, e.g. radon, is required, an approved gas resistant membrane and gas handing system must be provided under the ground floor. The KORE Insulated Foundation System permits the incorporation of the appropriate membrane, sump and gas handling system.

C4 – Resistance to Weather and Ground Moisture
The KORE Insulated Foundation System when installed as indicated in Clause 2.4 of this Certificate and taking due consideration for the guidance outlined in Clause 3.1.2 of this Certificate, will have adequate damp-proof courses and membranes to resist the passage of moisture from the ground.

Part L – Conservation of Fuel and Energy
L1, L5 & L6 – Conservation of Fuel and Energy
The KORE Insulated Foundation System can be readily designed to incorporate the required thickness of insulation to meet and surpass the backstop elemental U-values as set out in the TGD to Part L of the Building Regulations.

Thermally bridged junctions have been assessed for both their linear thermal transmittance (i.e. Psi-value (ψ-value)) and their temperature factors (f_{Rsi}) in accordance with the procedures outlined in IP 1/06[2], BRE report BR 497[3] and I.S. EN ISO 10211[4]. As a result, best practice has been observed to limit heat loss due to thermal bridging and minimise the risk of mould growth due to surface condensation.

2.1 PRODUCT DESCRIPTION

2.1.1 General

The KORE Insulated Foundation System consists of rigid polystyrene boards cut from moulded blocks of EPS which are manufactured in accordance with I.S. EN 13163[1]. The system consists of three KORE EPS components, KORE Floor EPS100 White, KORE Floor EPS 200 White and KORE Floor EPS300 White. The system provides an efficient insulating layer to reduce the thermal transmittance of ground concrete floors. The system is tested to ensure compliance with the requirements for compressive strength, water vapour transmission, thermal conductivity, thermal resistance and dimensional stability.

An in situ concrete slab is poured on top of the KORE Insulated Foundation System. Vertical upstands of insulation are used to separate the slab from the wall to reduce thermal bridging at the wall/floor junction. The KORE Insulated Foundation System does not contain CFCs or HCFC gases and has zero Ozone Depletion Potential.

This Certificate contains illustrations to explain the various elements of the KORE Insulated Foundation System. These illustrations are not intended to be used as construction drawings. The client's Chartered Structural Engineer in conjunction with the design team on a project, will produce a set of project specific details. All drawings should be in compliance with relevant codes of practice and relevant standards along with current Building Regulations. Kore will produce the EPS elements of the Insulated Foundation System based on these detailed drawings.

2.2 MANUFACTURE

KORE Insulated Foundation System boards are designed on a project specific basis by the design team on CAD software which is converted to profiler machine software when it is ready for manufacturing. The process begins with the raw materials consisting of various grades of polystyrene granules which are sourced from external suppliers being loaded into a pre-expander machine. The pre-expander machine will select the specific production recipe required to produce the desired grade/density of the material to be manufactured.

The granules are then placed in stabilisation hoppers before being sent to the Block Mould where they are expanded and cut into blocks of EPS without the use of additional gases. Apart from the EPS 300 perimeter profiles all components are plain edged on all four sides.

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, compressive strength and thermal conductivity. All quality checks are recorded and signed off on a dedicated Quality form for each stage of manufacturing.

2.3 DELIVERY, STORAGE AND MARKING

2.3.1 Delivery

The KORE Insulated Foundation System is loaded on the delivery truck and delivered to site with a protective polythene wrap. Each pack carries a label bearing the CE marking together with the product description, product characteristics, manufacturer's name, date, Fire Class, Bar Code and NSAI Agrément Certificate number for the system.

2.3.2 Storage

Boards must be protected from prolonged exposure to sunlight and should be stored under cover in their original opaque wrapping, not in contact with ground moisture and raised above ground level. Care must be taken to avoid contact with solvents and with materials containing volatile organic components such as coal, tar and newly treated timber.

2.3.3 Handling

Installation instructions and details, outlining the steps necessary to ensure proper installation, are included in each pack. The boards must not be exposed to a naked flame or other ignition source. Handling and storage arrangements must comply with the recommendations of Paragraph 8 and 9 of BS 6203[6].

2.3.4 Typical Material List Supplied to Site

With each customised delivery of a KORE Insulated Foundation System to site, a comprehensive bill of materials is supplied. This bill of materials gives a detailed list of all components delivered to site to complete the installation of the foundation system.

2.4 INSTALLATION

2.4.1 Site Investigation

The existing site ground conditions need to be determined in accordance with Eurocode 7[7][8] by an engineer specialising in ground investigation.

The ground investigation needs to show the condition of the existing soil, the safe bearing capacity at varying depths and the ground water level. The investigation must also highlight any possible contamination of the existing ground.

Figure 1 - KORE Insulated Foundation System before DPM and Concrete

2.4.2 Ground Preparation

When installing the KORE Insulated Foundation system, the foundation base should be dug out until solid ground is found, removing all topsoil and made ground, with any soft spots or contaminated soil excavated and filled with compacted hardcore. The general arrangement drawings must show the formation level that the existing ground needs to be reduced to. The excavations should extend beyond the footprint of the foundation by at least a depth of the granular fill + 500mm.

A land drainage pipe must be installed around the perimeter of the foundation base at the end of the DPM/Radon extension and at a minimum depth of 450mm below ground level; Figure 2 illustrates the general detail with clause 3.1.2 addressing project design requirements. The land drainage pipe should be surrounded by pipe grit. The build-up of the granular fill material below the foundation will vary depending on the ground conditions and the depth of granular fill required.

The build-up of the granular fill material below the foundation will vary depending on the ground conditions and the depth of granular fill required. The granular fill should be specified in accordance with Annex E of S.R. 21[9] and I.S. EN 13242[10]. The build-up must be shown on the Engineer's drawings and will typically consist of 30-50mm T3 Blinding on 200mm T2 permeable hardcore on T1 granular fill in accordance with Annex E of S.R. 21[9]. A minimum of 200mm T2 permeable granular fill is required to allow the extraction of radon gas as shown in I.S. 888[11] Clause 5.1.

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 and Annex A of S.R. 21[9].

2.4.3 EPS Placement

The edge profiled EPS300 ring-beam forms are laid out on the blinding layer in their precise positions and held together using either U Pins or PU adhesive. Once positioned the EPS300 forms create the perimeter of the foundation. Next the EPS300 blocks are positioned under internal loadbearing and/or party walls as required by the site-specific construction drawing.

The KORE Insulated Foundation System internal EPS sheets should then be placed inside the ring-beam edge forms. These sheets consist of EPS100 and EPS200 sheets which are to be laid with closely butted joints, subsequent layers should be laid staggered with a break bonded pattern and fitted tightly at the edges and around any service penetrations.
The KORE Insulated Foundation System's unique design maintains continuity of insulation between the upstand lip of the EPS300 ring-beam and the wall insulation, additional heat loss due to thermal bridging is significantly lower than traditional forms of construction where continuity of floor and wall insulation cannot be maintained.

2.4.4 DPM/Radon membrane

A damp-proof membrane (DPM), e.g. 1200-gauge polythene, or an NSAI Agrément certified radon barrier (subject to site conditions) should be laid between or 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 ring-beam until it meets and seals with the stepped damp proof course (DPC) of the external wall. The DPM/Radon barrier is extended out 1m beyond the external face of the building envelope.

Care should be taken to avoid damage to the insulation or DPM and radon barriers as the slab is being poured and operatives should make use of barrow runs and walkways whilst installation progresses.

For guidance on the correct installation of DPM/Radon barrier at level door threshold's designer should refer to 'KORE Construction Details' manual.

2.4.5 Reinforcement and Concrete Fill

Reinforcement is installed as per the drawings and schedules provided by the design 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 I.S. EN 1992-1-1[12]. Care needs to be taken when installing reinforcement so as not to damage the radon membrane.

The concrete mix design must be specified by the main Engineer on the project and conform to I.S. EN 206[13]. This will depend on loading from the superstructure, the ground conditions noted in the ground investigation report.

The structural engineer is to provide a drawing showing 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.

2.4.6 Approved Installers

Installation should be carried out by KORE trained applicators who:

- Are trained and approved by KORE to install the product.
- Work in compliance with the KORE Insulated Foundation System manual.
- Are familiar with the requirements of this Agrément certificate.
- Receive and pass annual audits by KORE to ensure standards are being maintained.
- Attend CPD updates as required by KORE which inform installers of updates and evolving best practice.
- Are subject to supervision by KORE, including unannounced site inspections by both KORE in accordance with the KORE installer approval scheme.

2.4.7 Site Supervision

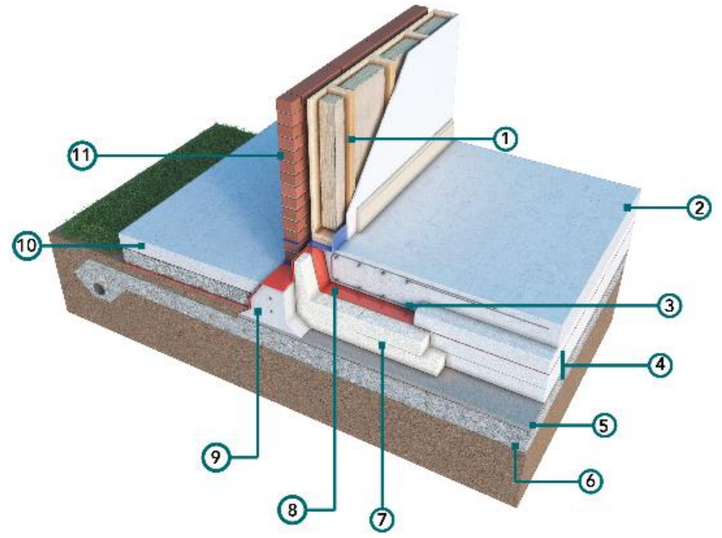
The client's assigned certifiers and the builder are responsible for the overall quality of the work in accordance with the design carried out by the assigned design team.

The approved installers are responsible for the quality and productivity of the installation elements assigned to them. The approved installers ensure that works are carried out in line with Health & Safety requirements as per the site-specific Method Statement & Risk Assessment.

The installation team's supervisor will sign off on the various works carried out by them. The Builder's site manager will agree a schedule of inspections and oversight and sign off on this.

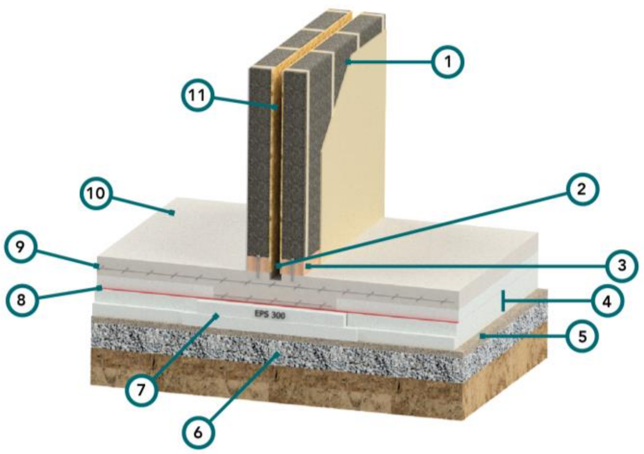
The Chartered Structural Engineer will carry out an inspection after the reinforcement is fixed to ensure that the installation conforms with his design.

The Builder's site manager will sign off on the installation following the pouring of the concrete base prior to the commencement of the construction of the superstructure.



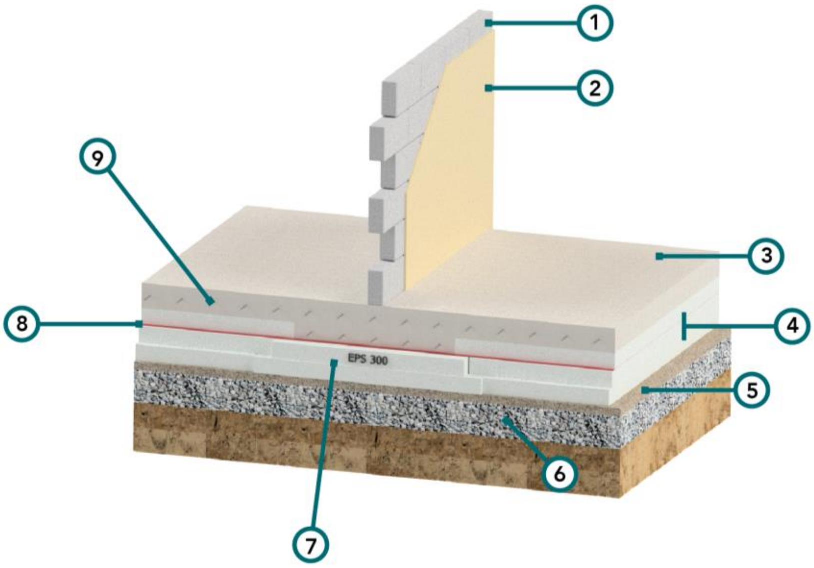
1. Timber frame design & detailing to be carried out by main consulting engineer & timber frame supplier. Indicative only.
2. Concrete floor slab to engineer's specification
3. Steel reinforcement to engineer's specification
4. 3 layers of KORE EPS100 White (100mm thick)
5. 30-50mm compacted T3 blinding in accordance with S.R.21:2014+A1:2016 & Annex E
6. Compacted T2 permeable stone in accordance with S.R.21:2014+A1:2016 & Annex E
7. 2 layers of KORE EPS300 (100mm thick)
8. Radon barrier
9. Concrete ring beam to engineer's specification
10. Concrete foot path
11. Outer masonry leaf

Figure 2 - External Wall to Foundation Junction



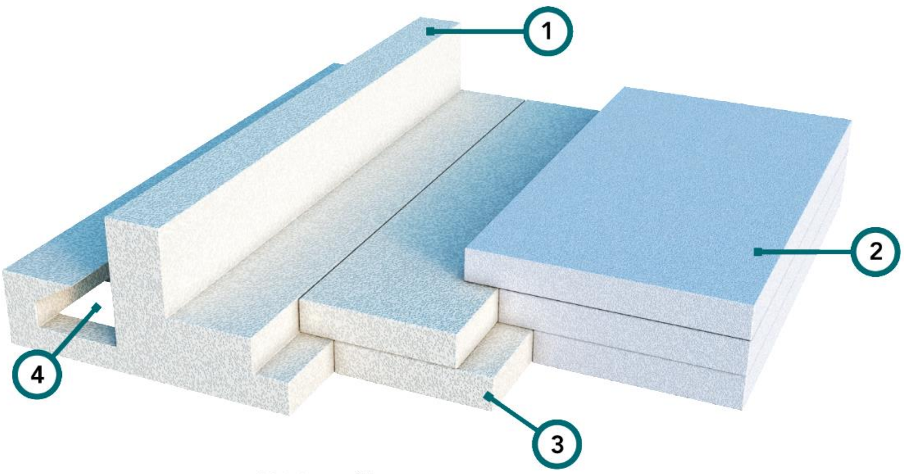
1. Timber frame design & detailing to be carried out by main consulting engineer & timber frame supplier. Indicative only.
2. Drainage channel to be cast between dwellings as shown in I.S. 440
3. Sole plate design to comply with IS EN 1995 Design of Timber Structures
4. 3 layers of KORE EPS100 White (100mm thick)
5. 30-50mm compacted T3 blinding in accordance with S.R.21:2014+A1:2016 & Annex E
6. Compacted T2 permeable stone in accordance with S.R.21:2014+A1:2016 & Annex E
7. 2 layers of KORE EPS300 White (100mm thick)
8. Radon barrier
9. Steel reinforcement to engineer's specification
10. Concrete floor slab to engineer's specification
11. Wall cavity

Figure 3 - Separating wall to Foundation Detail



1. Internal load bearing wall
2. Plasterboard dry lining to specification
3. Concrete floor slab to engineer's specification
4. 3 layers of KORE EPS100 White (100mm thick)
5. 30-50mm compacted T3 blinding in accordance with S.R.21:2014+A1:2016 & Annex E
6. Compacted T2 permeable stone in accordance with S.R.21:2014+A1:2016 & Annex E
7. 2 layers of KORE EPS300 White (100mm thick)
8. Radon barrier
9. Steel reinforcement to engineer's specification

Figure 4 - Internal Wall to Foundation Junction



1. EPS300 profile
2. EPS100 in layers
3. EPS300 sheets
4. Cut out in EPS to form pillar in outer ring beam

Figure 5 - Typical EPS Profile Layout

3.1 STRENGTH AND STABILITY

3.1.1 General

The KORE Insulated Foundation System must be designed by a competent Engineer in consideration of the ground investigation and the current version of the KORE *'Insulated Foundation System Structural Design Guide'*. The design will vary depending on the existing ground conditions and the type of superstructure being constructed. A list of EPS300, EPS200 and EPS100 essential characteristics are declared in the manufacturer's Declaration of Performance (DoP). These values are listed in Table 1 on this certificate (see note in clause 3.6 of this certificate) along with the allowable long-term design compressive strength at 2% deformation for each EPS type with is used in the design.

The Engineer on the project must provide a full set of general arrangement drawings with dimensions, sections and details. Guided by the ground investigation report, the Engineer must show the formation levels under the footprint of the proposed building. He must also provide a full reinforcement drawing and bending schedule showing all mesh, loose and bent bars required for the full foundation system.

The Builder's site manager will sign off on the installation following the pouring of the concrete base prior to the commencement of the construction of the superstructure.

Buildings constructed using the KORE Insulated Foundation System shall be certified by an Engineer as being in accordance with TGD to Part A of the Building Regulations.
The Client's Engineer will have to provide the Engineer designing the KORE Insulated Foundation System with the calculated loads that will be imposed on the foundation. This information will be used in the design of the foundation.

3.1.2 Substructure Design

The structural assessment of the Kore Insulated Foundation System shall be site specific and project specific. An Engineer suitably qualified in this type of structure shall undertake the structural engineering of every building element. In accordance with I.S. EN 1990[14], a DSL2 (Design Supervision Level) should be employed to check the design in line with good practice.

The Insulated Foundation System can be used in conjunction with additional materials to maintain thermal performance and provide higher compressive strength in certain structural scenarios.

3.1.3 Design Loads

The design loadings for self-contained single-family dwelling units are defined in I.S. EN 1991-1-1[15]. The vertical dead loads should be calculated based on the self-weight of materials to be used in construction.

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[14]
- I.S. EN 1991-1-1[15]
- I.S. EN 1991-1-4[16]
- I.S. EN 1991-1-3[17]

Reinforcement and spacings of anchor bolts must be as per the KORE "Insulated Foundation System Structural Design Guide".

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

The uplift forces applied to the foundation due to wind or notional horizontal loads needs to be reviewed by the main structural engineer to ensure there is sufficient dead load to prevent uplift of the foundation system.

3.1.4 Concrete Floor Slab

As the KORE Insulated Foundation System is used under a concrete slab, resistance to concentrated and distributed loads is a function of the slab specification. The concrete slab must be designed to meet the requirements of I.S. EN 1992-1-1[15] and I.S. EN 1992-1-2[19]. The concrete grade shall be specified by the Engineer and shall comply with the requirements of I.S. EN 206[18].

Where there is to be a lightly loaded internal wall, the width of the concrete underneath may need to be thickened, hence the width of the EPS100 insulation may need to be reduced.

In circumstances where an internal loadbearing wall is to be used and the concrete beneath is required to be thickened and additional reinforcement is required, the EPS underneath may also be required to be upgraded to EPS200/EPS300.

When there is a change in the cross sectional area of the concrete slab either to accommodate internal load bearing walls or local point loads arising from columns, these changes will give rise to thermal bridging as described is Clause 4.3 of this certificate.

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.

3.3 UNDERFLOOR HEATING

The KORE Insulated Foundation System can accommodate underfloor heating systems. The maximum continuous working temperature of EPS is 80°C. The underfloor heating pipes can be accommodated in a screed layer or concrete slab as illustrated in the 'KORE Construction Details' manual to maximise the benefits of thermal mass. As set out in the TGD to Part L of the Building Regulations, when the source of space heating is underfloor heating, the maximum floor U-value should be 0.15 W/m^{2}K and the KORE Insulated Foundation System will satisfy this requirement (see Table 2 of this certificate).

3.4 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[25]);
- 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.

3.5 ELECTRICAL & PLUMBING SERVICES

The positioning and future access to all plumbing and electrical cabling services should be carefully considered during the design phase of the construction. Guidance on the correct installation of electrical and plumbing services is contained in the KORE "Insulation Foundation Installation Guide".

Electrical installation should meet the requirements of I.S. 10101[25]. The KORE Insulated Foundation System shall not be placed in direct contact with electrical cables or hot water pipes (max temp 80°C).

3.6 CE MARKING

The manufacturer has taken responsibility for CE marking the KORE Insulated Foundation System in accordance with harmonised European Standard I.S. EN 13163[1]. An asterisk (*) appearing in this Certificate indicates that data shown is an essential characteristic of the product and declared in the manufacturer's 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.

4.1 BEHAVIOUR IN FIRE

Although the KORE Insulated Foundation 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.

The KORE Insulated Foundation System is manufactured from EPS in accordance with I.S. EN 13163[1] and contains a fire retardant which gives the EPS a Class E reaction to fire when measured in accordance with I.S. EN 15715[21] and classified in accordance with I.S. EN 13501-1[20].

The minimum thickness of overlay shall be as described in clause 3.2 of this certificate.

As KORE Insulated Foundation System is manufactured without the use of CFCs or HCFCs, there is no release of such toxic gas on burning.

4.2 THERMAL PERFORMANCE

The KORE Insulated Foundation System, when installed in accordance with this Certificate, is effective in reducing the thermal transmittance (U-value) of new floor constructions.

Calculations of the U-value for specific constructions should be carried out in accordance with I.S. EN ISO 13370[23], using the manufacturer's declared thermal conductivity values as outlined in Table 1 of this Certificate. The calculated U-value of the KORE Insulated Foundation System will be project specific and will depend on the perimeter/area (P/A) ratio. Examples of U-value calculation result are given in Table 2 of this Certificate for a range of P/A ratios.

4.3 LIMITING THERMAL BRIDGING

The linear thermal transmittance ψ-value (Psi-value) describes the additional heat loss associated with junctions and around openings. The Certificate holder has carried out ψ-value calculations for a range of thermally bridged ground floor junctions in accordance with IP 1/06[24], BRE report BR 497[3] and I.S. EN ISO 10211[4].

Table 3 of this certificate gives ψ-values for the KORE Insulated Foundation System for typical building junctions and a range of different common external wall types.

The 'KORE Construction Details' manual contain a more comprehensive list of Ψ-value for typical building junctions along with information on both floor and wall target U-values. These details are available from the Certificate holder on request.

When flanking elemental U-values deviate by an aggregated 20%[1] from the target U-values, the ψ-values no longer remain valid and guidance must be sought from the Certificate holder. Alternatively the ψ-values should be recalculated by an NSAI registered Thermal Modeller or equivalent competent person in accordance with the BRE IP 1/06[24] and the conventions outlined in BRE report BR 497[3].

The Dwelling Energy Assessment Procedure (DEAP) used to produce the Building Energy Rating (BER) for a dwelling takes account of the total effects of thermal bridging through the input of the Y-value, which is a multiplier applied to the total exposed area of the building.

Where limited provisions are made to eliminate any risk of surface condensation or mould growth, the default Y-value of 0.15 should be entered into DEAP. When <u>all</u> building junctions are demonstrated to be equivalent to or better than the corresponding Acceptable Construction Details (ACD), then the Y-value can be taken as 0.08.

Alternatively, the transmission heat loss coefficient due to thermal bridging (H_{TB}) can be calculated out by summing up the ψ-values for each junction and multiplying by the linear length of each junction. The Y-value is calculated by dividing H_{TB} by the exposed surface area. The ψ-values published in Table 3 of this certificate can be used in a Y-value calculation subject to flanking elemental U-value being within acceptable range/tolerance.

ψ-values for other junctions outside the scope of this Certificate should be assessed by an NSAI registered Thermal Modeller or equivalent competent person.

4.4 INTERNAL SURFACE CONDENSATION

As part of the assessment carried out to determine the ψ-values, internal surface temperatures (f_{Rsi}) are also checked. When internal surface temperatures are greater than 15°C, best practice will have been adopted to safeguard against the risk of surface condensation occurring under normal occupancy and humidity class levels.

[1] See footnote 3 of TGD to Part L (2022) Dwellings; Table D1-D6.

4.5 RESISTANCE TO MOISTURE

The KORE Insulated Foundation System will not allow moisture to cross the floor construction provided it is installed in accordance with this Certificate (see Clause 3.1.2 of this certificate for further guidance on DPC and Radon membranes). The KORE Insulated Foundation 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 are contained in Table 1 of this certificate.

4.6 DURABILITY AND MAINTENANCE

KORE Insulated Foundation 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 KORE insulated foundation System must take into account the integrity of the system

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

See Table 1

- Density
- Water vapour transmission
- Long term water absorption by diffusion
- Dimensional accuracy
- Compressive stress
- Bending strength
- Dimensional stability
- Thermal conductivity
- Thermal resistance
- Efficiency of the construction process

4.8 OTHER INVESTIGATIONS

- Properties in relation to fire, toxicity, environmental impact and the effect on mechanical strength/stability and durability were assessed.
- The KORE Design Responsibilities document.
- 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.

KORE EPS Characteristics to I.S. EN 13163[1]				
Essential Characteristics	**Performance**			**Test Standard**
	EPS100	**EPS200**	**EPS300**	
Thermal Conductivity*	0.036 W/mK	0.033 W/mK	0.032 W/mK	EN 12667
Reaction to Fire*	Class E	Class E	Class E	EN 15715
Length*	L3	L3	L2	EN 822
Width*	W3	W3	W2	EN 822
Thickness*	T2	T2	T2	EN 823
Compressive Strength σ_{10}*	CS (10)100	CS (10)200	CS (10)300	EN 826
Long-term design Compressive Strength (0.3 σ_{10})	30 kN/m²	60 kN/m²	90 kN/m²	EN 826 EN 13163
Bending Strength*	BS150	BS250	BS450	EN 12089
Dimensional Stability*	DS(N)2	DS(N)2	DS(N)2	EN 1603
Tensile Strength Perpendicular to Faces*	TR170	TR220	N/A	EN 1607
Flatness*	P (5) ≤0.72m² P (15) >0.72m²	P (5) ≤0.72m² P (15) >0.72m²	P (10)	EN 825
Squareness*	S (5)	S (5)	S (2)	EN 824
Long Term Water Absorption by Partial Immersion*	WL(P)i 0.2kg/m²	WL(P)i 0.2kg/m²	WL(P)i 0.1kg/m²	EN 12087
Long Term Water Absorption by Total Immersion*	WL(T)i 4.5%	WL(T)i 5%	WL(T)i 4%	EN 12087
Long-Term Compressive Creep Behaviour Factor*	<2%	<2%	<2%	EN 13163 Annex F
Shear Behaviour*	75kPa	125kPa	225kPa	EN 13163 Annex F
Water Vapour Diffusion*	30 to 70	40 to 100	40 to 100	EN 13163 Annex F

Table 1 - Product Characteristics

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[1]	0.076	0.085	0.091	0.094	0.097	0.099	0.101	0.102	0.103	0.104	0.105
[1] Floor U-values based on 300mm EPS100 on soil (λ=2.0). P/A Ratio = Exposed perimeter of the floor to total ground-floor area ratio.											

Table 2 - Ground Floor U-value table

Linear thermal transmittance (ψ-values) for different types of junctions					
Ref:	**Junction Description**	**Flanking Elemental U-values[1] W/m²K**		**F_{Rsi}**	**Ψ-Value[4] W/m.K**
		U_W	**U'_F**		
CWI 14	KORE system with full fill cavity block wall	0.18	0.094	0.93	0.088
EWI 89	KORE system with ETICS applied to masonry wall	0.16	0.094	0.93	0.094
ICF 07	KORE system with ICF wall	0.18	0.094	0.85	0.151
TF 06	KORE system with masonry clad timber frame	0.12	0.094	0.92	0.091
TF 10	KORE system with masonry clad timber frame	0.17	0.094	0.85	0.203
Gen 01	KORE system with lightly loaded internal wall	N/A	N/A	N/A	0.031
Gen 02	KORE system with heavily loaded internal wall	N/A	N/A	N/A	0.020
SD001	KORE system with timber frame party wall[3]	N/A	N/A	N/A	0.025
SD003	KORE system with masonry party wall[3]	N/A	N/A	N/A	0.0245

[1] The published Ψ-Value are valid for the flanking element U-values for walls (U_W) and for floors with 300mm of EPS100 which gives a modelling floor U-value U'_F of 0.094W/m²K. Actual floor U-values will be project specific and will relate to the actual perimeter/area ratio on site.
[2] F_{rsi} or the temperature factor mush be greater than 0.75
[3] Value of Ψ is applied to each dwelling
[4] Modelled junction ψ-values above can be used in y-value calculations.

Table 3 - Linear thermal transmittance for a range of wall types

5.0 CONDITIONS OF CERTIFICATION

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 last revision date 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 2005[22], 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

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This Certificate No. **20/0424** is accordingly granted by the NSAI to **Kore System** on behalf of NSAI Agrément.

Date of Issue: **June 2020** (Original Certificate)

Signed

Martin Searson

Martin Searson
Head of MMC

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 www.nsai.ie

Revisions:
13th Nov 2025: 5 Year review; References to Building Regulations and standards updated.

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