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CERTIFICATE NO. 07/0277
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Amvic Insulating Concrete Formwork 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 to Part D of the second schedule to the **Building Regulations 1997 to 2024.**

PRODUCT DESCRIPTION:
This Certificate relates to the Amvic Insulating Concrete Formwork (ICF) System, which consists of modular interlocking expanded polystyrene (EPS) building blocks (graphite enhanced or standard EPS) for permanent formwork for the construction of in-situ concrete walls. Each block (form) is based on two EPS panels with polypropylene connectors moulded into the polystyrene panels and spaced 150/200mm vertically. The forms come in straight and 90° plan sections. Plasterboard slabs are screw-fixed to the polypropylene connectors as an internal finish. An NSAI certified external render system which meets the requirements of this certificate is applied to the external polystyrene insulation of the Amvic ICF System as the external finish. Alternative finishes may be applied in accordance with Section 2.1.12 of this Certificate.

USE:
The Amvic ICF System is certified for use in the construction of buildings of up to 15m in height, as defined in Technical Guidance Document (TGD) Volume 2 to Part B of the Building Regulations 1997 to 2024 for Purpose Groups 1(a), 1(b) and 1(d). The system can also be used up to 15m in height, with specific requirements set out in TGD Volume 1[32] to Part B of the Building Regulations 1997 to 2024, for Purpose Groups 1(c), 2(a), 2(b), 3, 4(a), 5(a) and 5(b). The system has been assessed for use as load bearing and non-load bearing walls in the construction of specifically designed buildings.

DESIGN
The Amvic ICF System is intended for use where the architectural and fire strategy drawings, where necessary in accordance with the purpose group, are available and satisfy the Building Regulations. The Architect and Engineering Design Team and the building Owner[34]/Client[35] are responsible for the architectural drawings and compliance of the building design with the applicable Building Regulations. Amvic Ireland has technical information specific to their ICF system available to assist the client appointed design team.

DEVELOPMENT, MANUFACTURE AND MARKETING
The product is developed and marketed by:

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Part One / Certification 1

1.1 ASSESSMENT
In the opinion of NSAI Agrément, the Amvic ICF System if used in accordance with this Certificate can meet the requirements of the Building Regulations, as referenced in Section 1.2 of this Irish Agrément Certificate. Guidance was adopted from the EAD 340309-00-0305 Non-Load-bearing Permanent Shuttering Kits/Systems Based on Hollow Blocks or Panels of Insulating Materials and Sometimes Concrete – 2019[1], where appropriate in the assessment.

1.2 BUILDING REGULATIONS 1997 to 2024 REQUIREMENTS:

Part D – Materials and Workmanship
D3 – The Amvic ICF 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 – The Amvic ICF System, used in accordance with this Certificate, meets the requirements of the Building Regulations for workmanship.

Note: Nothing in this Certificate is intended to prevent the use of materials of equivalent or superior quality, strength, fire resistance, effectiveness, durability and safety over those described in this Certificate.

Part A - Structure
The Amvic ICF System, as certified in this Certificate, has adequate strength and stability to comply with Part A of the Building Regulations (see Parts 3 and 4 of this Certificate):
A1 – Loading
A2 – Ground Movement
A3 – Disproportionate Collapse

Part B – Fire Safety
For purpose group 1(c), 2(a), 2(b), 3, 4(a), 5(a) and 5(b), Parts B1 to B5 & B12 apply, with the fire safety requirements set out in TGD B Fire Safety Volume 1 (2024) [32] to Part B of the Building Regulations.

For purpose group 1(a), 1(b) and 1(d), Parts B6 – B12 apply and are set out in TGD B Fire Safety Volume 2 Dwelling Houses (2017) to Part B of the Building Regulations.

B1 & B6 – Means of Escape in Case of Fire
The Amvic ICF System can be designed to meet the requirements in respect of means of escape in case of fire.

B2 & B7 – Internal Fire Spread (Linings)
The plasterboard slabs used on the internal finish shall meet or exceed classification A2-s1,d0[20]. The reaction to fire classification of the finished construction will be determined by the class of the lining materials used.

B3 & B8 – Internal Fire Spread (Structure)
The Amvic ICF System, as certified in this Certificate, can meet this requirement subject to competent design and good workmanship.

B4 & B9 – External Fire Spread
The Amvic ICF System, as certified in this Certificate, can meet this requirement subject to competent design and good workmanship. The NSAI certified external render selected for use with the Amvic ICF System, per Section 2.1.12 below, must meet or exceed classification B-s1, d0[20].

Part C – Site Preparation and Resistance to Moisture

C3 – Dangerous Substances

Every ground floor must include a radon sump and be provided with a facility for extracting Radon gas. Where it is shown that protection from dangerous substances such as Radon is required, an approved gas resistant membrane and gas handling system must be provided under the ground floor, in accordance with TGD to Part C of the Building Regulations. The Amvic ICF System permits the incorporation of the appropriate membrane, sump and gas handling system, where required.

C4 – Resistance to Weather and Ground Moisture

The Amvic ICF System, used in accordance with Parts 3 and 4 of this Certificate, will have adequate weather resistance in all exposures, will resist the passage of moisture to the inside of the building and will prevent surface or interstitial condensation.

Part E – Sound

E1 – Airborne and Impact Sound

Separating walls can be designed and constructed to meet the airborne sound level performance outlined in Table 1 of TGD E of the Building Regulations. Separating floors can be designed, detailed and constructed to meet the airborne and impact sound level performance outlined in Table 1 of TGD E provided good workmanship is adhered to onsite.

Part F – Ventilation

F1 – Means of Ventilation

Adequate building ventilation openings can be provided in walls constructed with the Amvic ICF System. It is essential that ventilation ducts through such walls are fully sealed within the walls or from contact with the cut edges of adjacent materials. Alternatively, a mechanical ventilation system can be installed into the thermal airtight envelope which the Amvic ICF System provides. Penetrations in fire rated walls and floors must be appropriately fire stopped, see Section 2.4.8 below.

F2 – Condensation in Roofs

Adequate ventilation can be provided in roofs used with the system to meet this requirement in respect of the prevention of condensation.

Part J – Heat Producing Appliances

J1 – Air Supply

J3 – Protection of Building

When the Amvic ICF System is used in accordance with Section 4.1 of this Certificate, wall lining, insulation and separation distances meet the Regulation requirements.

Part L – Conservation of Fuel and Energy

L1, L5 & L6 – Conservation of Fuel and Energy

The Amvic ICF System will contribute to enabling a building to meet this requirement. U-value and Psi value calculations may be based on a λ value of 0.031W/mK for graphite-enhanced EPS and 0.034W/mK for standard (white) EPS. U-values for the product range are presented in Table 1. Consult TGD Part L for maximum elemental U-values.

Part M – Access and Use

M1 – Access and Use

Buildings based on the Amvic ICF System can be designed to meet the access, circulation and facilities requirements of this Regulation.

2.1 PRODUCT DESCRIPTION

This Certificate contains illustrations to explain the various elements of the Amvic ICF System. These illustrations are not intended to be used as construction drawings. Project Engineer or Architect, as referenced in this Certificate, defines the competent person responsible for co-ordinating individuals or companies providing specific expertise. The Client's Structural Engineer, who may also be the Project Engineer, in conjunction with the design team on a project, will produce a set of project specific details on a project-by-project basis. All drawings should be compliant with the relevant codes of practice and relevant standards, along with current Building Regulations.

2.1.1 General

Each Amvic ICF form consists of two moulded flame-retardant EPS panels separated by polypropylene webs. The polypropylene web ties/spacers are sized to maintain core widths of 150 and 200mm. The forms come in straight and 90° plan sections. The units are erected as a formwork into which vertical and horizontal reinforcement is placed and then filled with concrete, resulting in an insulated, monolithic concrete wall of uniform thickness.

Each EPS side panel is 400mm high and 1200mm in length, with a thickness of 64mm, 75mm, 85mm or 100mm. The panels are manufactured from fire retardant grade EPS in accordance with I.S. EN 13163[2] without the use of HCFC's. The minimum density is 24kg/m^3.

The panels have castellated top and bottom edges to enable the forms to interlock together. Vertical edges are grooved to form a flush fit when joined together. Forms are interlocked with staggered vertical joints.

The web flanges are embedded at least 12.5mm behind the outside surface of the EPS panels during manufacture. The location of the web end plates is indicated on external surfaces of the panels through recessed grooves in the panel surface at 150/200mm vertical centres. The top edges of the polypropylene webs have clips that give support to horizontal reinforcing bars where required. The embedded flat sections of the webs can be used as furring strips to provide a fixing for bracing during construction and provide attachment for interior plasterboard slab wall finish. Corner rods may be installed during site installation at the internal corners of the forms to assist in the attachment of internal lining finish materials.

2.1.2 Structure

The required concrete strength will be specified by the Project Engineer and will depend on building height and load take down. The standard concrete specification is as follows:

- Minimum concrete strength: C25/30 (C30/37 recommended)
- Maximum aggregate size: 10mm
- Concrete slump: S3 (100-140mm)
- Concrete supplier certified to I.S. EN 206[3].

2.1.3 Steel Reinforcement

The steel reinforcement will be specified by the project engineer, typically 12mm diameter round or deformed bars, high tensile to BS 4449[4], BS 4483[5], I.S. EN 10020[6], I.S. EN 10080[13] and I.S. EN 1992-1-1[7] and have a maximum yield strength of 500N/mm^2.

2.1.4 Foundations

The foundations are not part of the Amvic ICF System and are not covered by this Certificate. Foundation design must comply with Part A of the Building Regulations. Amvic Ireland can provide loading information for foundations.

Amvic Product	Overall Thickness (mm)	Insulation (mm)	Concrete Core (mm)	U-value (W/m^{2}K)	
				Graphite (Grey)	Standard (White)
370	370	2 x 85	200	0.17	0.19
350	350	2 x 100	150	0.15	0.16
330	330	2 x 64	200	0.23	0.25
300	300	2 x 75	150	0.20	0.22
280	280	2 x 64	150	0.23	0.25

Table 1: Product Range

2.1.5 External Walls

The different elements of the external wall are as follows, from external surface to internal:

- External render system per 2.1.12 below or traditional brick/block outer leaf to I.S. EN 1996-1-1[26] and S.R. 325[27].
- 64mm/75mm/85mm/100mm EPS board (outer leaf)
- Amvic ICF form with 150mm or 200mm reinforced concrete core width per table 1.
- 64mm/75mm/85mm/100mm EPS board (inner leaf)
- 12.5mm plasterboard slabs with reaction to fire classification of A2,s1-d0 screw fixed to the polypropylene connectors.
- Plasterboard to be taped and jointed such that 4mm gypsum skim coat plaster is applied over the taped plasterboard joints or on the overall wall.

The external renders certified for use onto EPS for new build are described in their own Certificates and Section 2.1.12.

2.1.6 Compartment Walls

The compartment or separating wall consists of the following:

- 4mm gypsum skim coat plaster applied over the taped plasterboard joints or on the overall wall.
- 12.5mm plasterboard slabs with reaction to fire classification of A2,s1-d0 screw fixed to the polypropylene connectors.
- 64mm/75mm/85mm/100mm EPS board.
- Amvic ICF form with 150/200mm reinforced concrete core width performing the separating function as detailed in Section 4.1 below.
- 64mm/75mm/85mm/100mm EPS board.
- 12.5mm plasterboard slabs with reaction to fire classification of A2,s1-d0 screw fixed to the polypropylene connectors.
- 4mm gypsum skim coat plaster, applied over the taped plasterboard joints or on the overall wall.

The class A2-s1,d0 12.5mm gypsum plasterboard slabs are screwed to the webs of the polypropylene connectors for wall linings that are acceptable for all areas according to the TGD's to Part B of the Building Regulations.

Section 4 of this Certificate references the requirements of TGD B Volume 1, 2024 in respect of compartment wall fire performance for specific Purpose Groups and permitted heights.

A continuous concrete core can provide the necessary fire resistance, subject to competent design. Therefore, the plasterboard lining may be omitted in the attic space of two storey housing, provided the space is a non-habitable area without permanent access[36].

For buildings greater than 2 storeys, the attic must be lined with plasterboard unless compliance with the Building Regulations is shown through other evidence. Hazardous items should not be stored in the attic space. A **risk assessment** must be carried out if the attic space is used to house mechanical or electrical equipment which may include but not limited to the risks outlined in Section 7.2 of S.R. 55:2021 *Design and installation of solar PV micro-generators in homes*[37]. The publication 'Loft Conversion Guidelines'[36] must be consulted regarding compliance with the Building Regulations, in the event of future conversion from non-habitable use.

Figure 3 shows the ICF form assembly detail with two options for forming the external wall/separating wall T-junction. With regard to sound transmission, the Amvic ICF 200mm core wall has a mass of 480kg/m^2 and this meets the requirements of Diagram 4 of TGD to Part E of the Building Regulations. The 150mm core wall has been tested and found to meet the 53dB requirement.

2.1.7 Internal Walls

Load bearing internal walls are constructed using either the 150mm core or 200mm core Amvic ICF forms, and slabbed and plastered as per Section 2.1.6. Traditional masonry block internal walls and timber or metal stud internal walls can also be used with the system.

2.1.8 Floors

Generally, ground floors will be floating concrete slabs with insulation below or above the slab, with the upper floors in timber or hollowcore. All compartment floors must be constructed using hollowcore slabs, precast concrete or cast in-situ concrete slabs in accordance with the structural engineers specification.

<u>Suspended Ground Floor Slabs</u>

When the depth of fill under the ground floor slab exceeds 900mm it will normally be necessary to suspend the ground floor slab, either using an in-situ reinforced concrete slab or a precast system.

<u>Precast Floor/External Wall Connection</u>

The bearing surface should be nominally 100mm, minimum 75mm, as specified in I.S. EN 1992-1-1[7]. The slabs are bedded in 1:3 mortar placed on top of the wall. The minimum cover to the vertical reinforcing steel must be at least 30mm, as specified. The form straddling the transition between the walls and the floor is cut as required to allow the smooth transition between the floors. This form is filled with concrete of the same specification as the rest of the wall. The floor/wall dowels may be bent or alternatively connection bars can be hooked around the vertical bars to secure the structure in accordance with the structural engineers specification. Figure 9 shows a typical arrangement.

Timber Floors

In two storey construction, first floors are assumed to be formed using solid or open metal web timber floor joists fixed to the load bearing walls using a ledger board secured to the concrete using the Amvic standard detail in Figure 6 or a proprietary hanger system approved by the project engineer. Where intermediate floors have open void space for the provision of services, through Engineered Joists, as per Supplementary Guidance to TGD B Volume 2 2017, or counter battens below traditional solid joists, then the risk of fire spread within the floor void is greatly increased. Where required, interior fire barriers must be installed as described in Section 4.1.1 of this certificate.

2.1.9 Roof

The Amvic ICF System allows for the supply by others of a conventional timber or trussed roof with slating or tiling in accordance with SR 82[8].

2.1.10 Stairs

Stairs are not part of the Amvic ICF System and are not covered by this Certificate

2.1.11 Chimney

Chimneys are not part of the Amvic ICF System and are not covered by this Certificate.

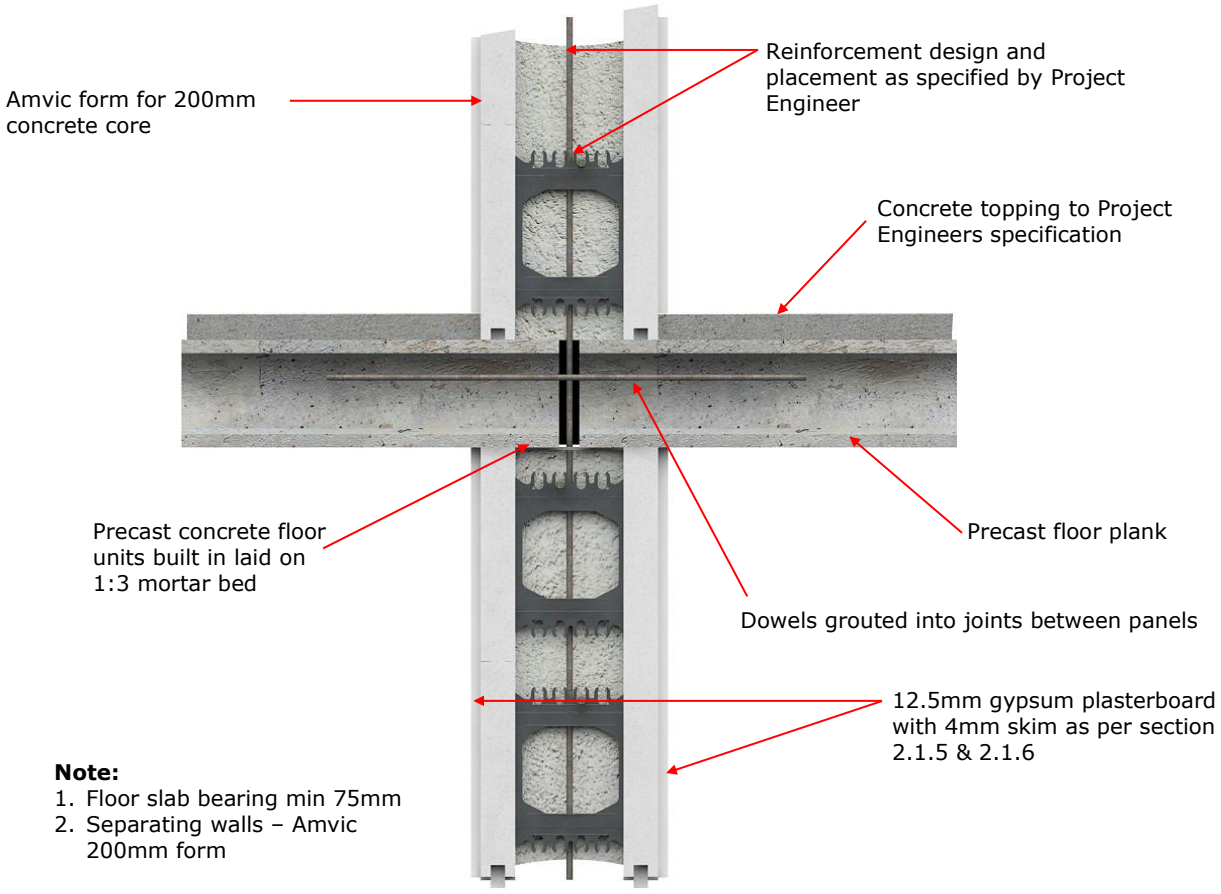

Figure 1: Precast Hollowcore Floor on Separating Wall

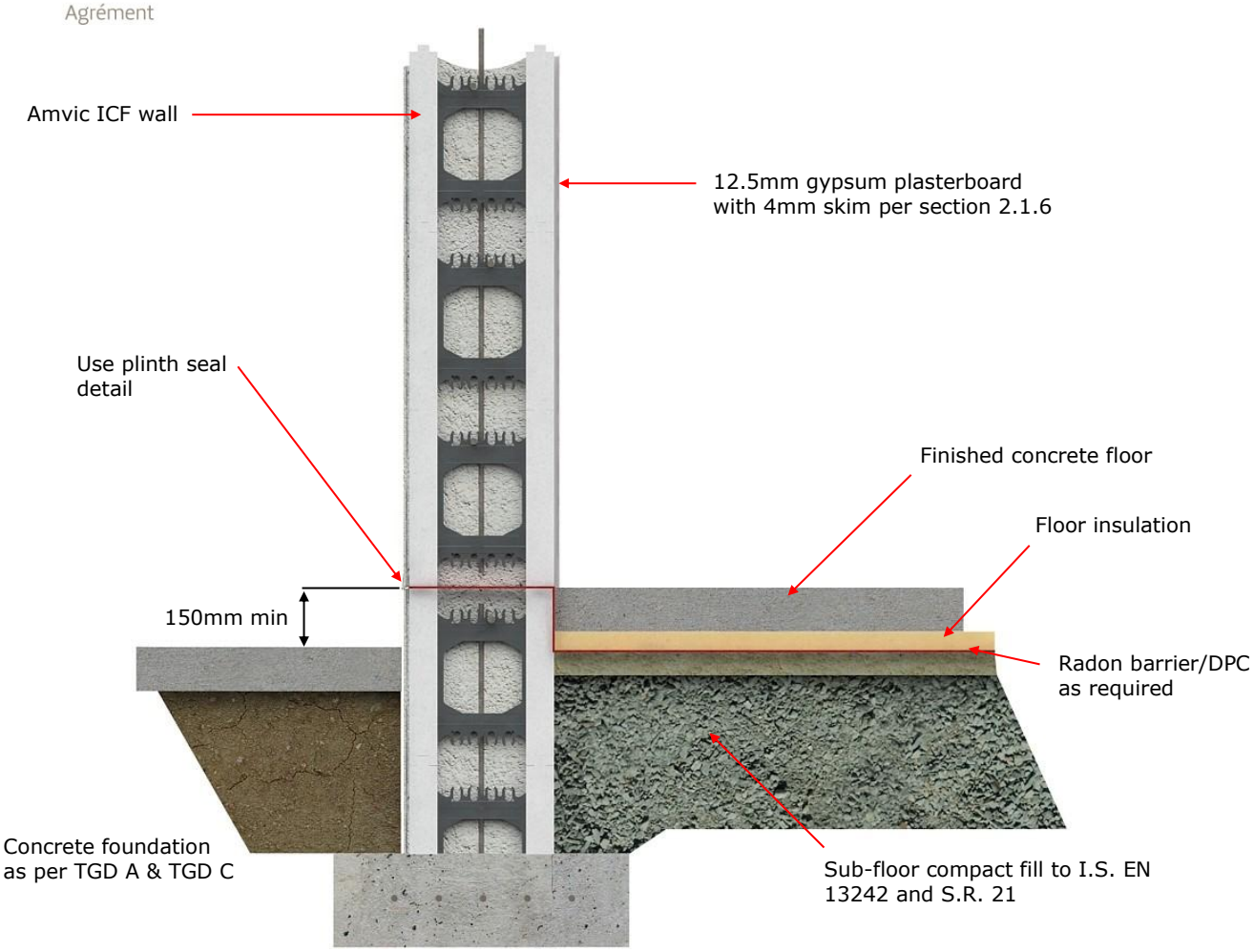

Figure 2: Typical Floor to Wall Amvic ICF Detail

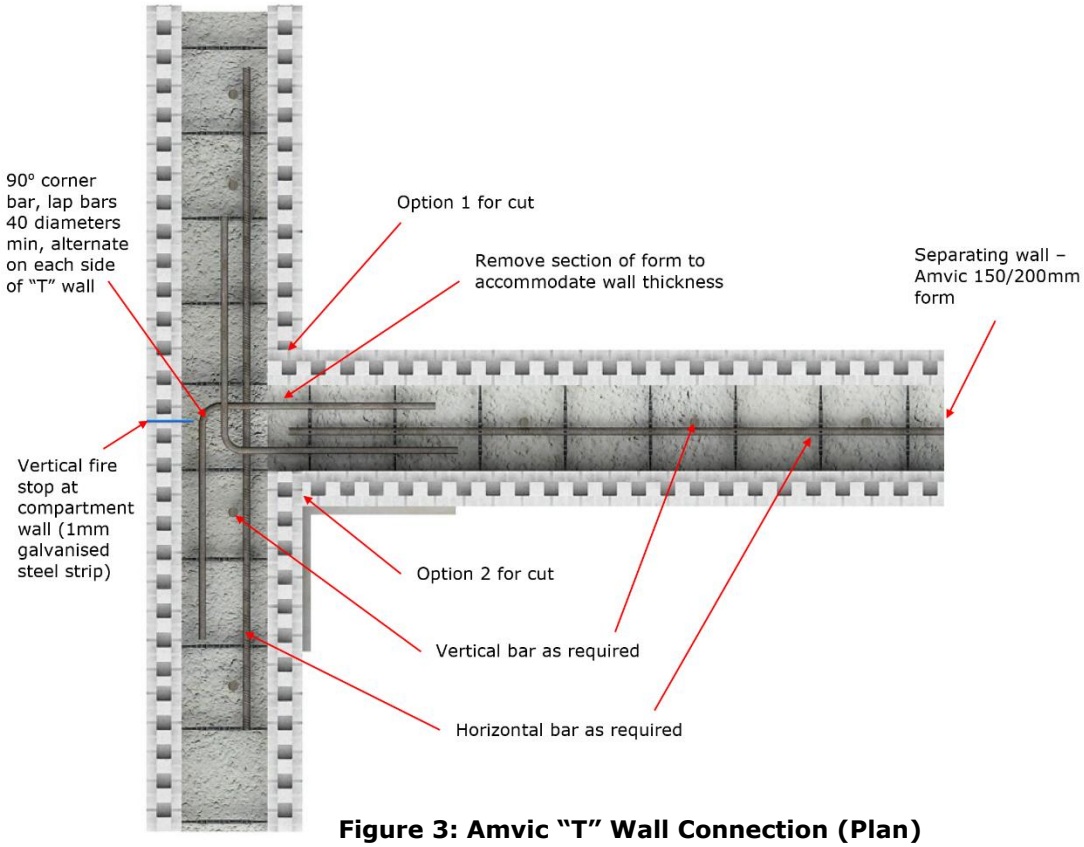

Figure 3: Amvic "T" Wall Connection (Plan)

2.1.12 External Finish

An external render system certified by NSAI Agrément for use onto EPS which meets the requirements of Section 3 and 4 of this Certificate is applied to the external polystyrene insulation of the Amvic ICF System. A typical external render system consists of the following:

- Basecoat consisting of high polymer modified cement product
- Reinforcing mesh consisting of alkali resistant glass fibre mesh, 160g/m2
- Second basecoat consisting of high polymer modified cement-based product.
- Topcoat primer.
- Render Topcoat finish consisting of silicone/acrylic.
- topcoat, available in a variety of colours and grain sizes up to 3mm.
- Ancillary items such as PVC beads, fixings and approved fire stops.

Only a complete render system (finish coat, primer, base coat and mesh) which is part of a current NSAI certified Agrément Certificate may be used with the ICF system. The render must also be approved by the relevant ETICs Certificate holder and the system manufacturer before application to the ICF. A light rasping of the Amvic ICF block is required to ensure good adhesion of the basecoat.

Installers of the render must be currently registered on the NSAI External Thermal Insulating Composite Systems (ETICS) Installer Scheme for the Certificate containing the chosen render. Before any external finish is applied the fire barriers must be fitted opposite all separating walls and floors (see Section 4.1.1). For impact resistance of external walls, see Section 3.1.5. Alternative finishes compatible with the Amvic ICF system include traditional brick/stone outer leaf cladding. Other finishes may be suitable but have not been considered as part of this certification.

2.1.13 Ancillary Items

- Anchor bolts
- Proprietary Timber Ledger connection system per project engineers specification
- Timber joists
- Brickwork/stonework ties
- PVC pipe sleeves for penetrations (see Section 2.4.8 below)
- Basement waterproofing membrane
- Course thread drywall screws 75/32mm
- Corner rods – hollow polypropylene rods
- ICF wall push/pull bracing or equivalent
- Fire stops

The ancillary products listed above have not been assessed by NSAI Agrément and remain under the manufacturer's responsibility.

2.2 MANUFACTURE

The EPS building blocks are manufactured by Amvic Ireland. The modular units are moulded with the interlocks and with markings on the block face showing the locations of the polypropylene connectors. Each EPS building block is manufactured with its integral polypropylene connectors. Production is controlled at different stages through inspections and quality control checks per the Amvic Ireland Quality Manual[28].

EPS Property	Test Method	Value
Declared EPS Thermal Conductivity (with graphite)	I.S. EN 12667	0.031 W/mK
Declared EPS Thermal Conductivity (standard)	I.S. EN 12667	0.034 W/mK
Compressive Strength at 10% Deformation	I.S. EN 826	150kN/m^2
Bending Strength	I.S. EN 12089	200kN/m^2
EPS Density	I.S. EN 1602	Min 24kg/m^3
Reaction to Fire	I.S. EN ISO 11925-2, I.S. EN 13501-1	Euroclass E
Water Vapour Permeability	I.S. EN 12086, I.S. EN ISO 16535	33g/m^2/day
Water Absorption by Partial Immersion	I.S EN ISO 16535	0.04kg/m^2
Water Absorption by Total Immersion	I.S EN ISO 16535	1.8%

Table 2: Properties of EPS used in Amvic ICF System

2.3 DELIVERY, STORAGE AND MARKING

Forms are delivered to site in suitable protective packaging. All packaged components are clearly labelled with product type and production date allowing full traceability of supply.

Amvic ICF 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 must be further protected from the weather by a secured covering. Amvic ICF 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.

The forms are easily handled on site and may be readily cut or trimmed with a knife or fine toothed saw. Reasonable care must be taken however to prevent damage to forms before, during and after installation. The forms must not be punctured, split, deformed or unduly compressed before use.

2.4 INSTALLATION

2.4.1 General

Amvic Ireland undertakes responsibility for the design and manufacture of the system. An approved Amvic Design Guideline for Housing[29] is available (see Section 3). Site construction is undertaken using approved installers in accordance with the Amvic Installation Manual[30]. An external render system certified by NSAI shall be applied onto the Amvic ICF system by an NSAI Agrément registered installer following the procedure detailed in the render certificate. The location and correct installation of fire barriers must be confirmed prior to rendering. 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.

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[29][30]. Should a conflict arise between this Certificate and the Certificate holder's manuals, this Certificate shall take precedence.

2.4.2 Foundations

Foundations are not covered by this Certificate. However, foundations and substructures must comply with the relevant clauses of BS 8004[9], I.S. EN 1992-3[10] and BS 8102[11] as appropriate, and must provide a flat and level footing for the first course of ICF blocks. Any reinforcing bars cast into the substructure must be positioned such that they allow for compaction and located in the system with adequate concrete cover for protection. The foundation base from which the Amvic ICF System is to be built must be checked to ensure it is clean, flat and level. Foundation design must comply with Part A of the Building Regulations.

2.4.3 Damp Proof Course (DPC)

Forms with appropriate materials and workmanship can produce adequately damp proof structures by using a layer of water resisting concrete, a minimum of 150mm above external ground level, in accordance with Type B structures defined in BS 8102[11]. Alternatively install a DPC, e.g. brush applied liquid membrane. The external detail must be such that protection is provided up to a minimum of 150mm above the external ground level. See Section 1.2 for radon requirements. For Amvic ICF foundation walls, the DPC may also be formed as shown in Figure 2.

2.4.4 Wall Assembly

The castellations of the first course forms are cut off. Assembly of the forms starts at the corners and works into the centre of an elevation, with the units interlocking tightly together. The Amvic ICF System must be raised course by course in a stretcher bond construction. The interlocking mechanism must be fully engaged, and checking as the work proceeds must be carried out to ensure that correct line and level is maintained.

Construction of the first course commences by first locating the corner forms and then working inwards towards the centre of each wall line or structural opening. The long end of the corner form should be kept in the same direction to maintain a running bond. Cut the final form to be placed to complete the course. Run the forms through the door and deep window openings (cut out later) so that interlocking of forms is maintained above each opening. The line of the walls to be built must be set out and checked.

Segments (cut from standard forms) are used to make up wall lengths and should ideally be placed adjacent to large openings. Cuts should be made along the grooves on the face of the forms, so that successive courses will interlock correctly. Reinforce or glue all cuts and weak spots.

Following completion of the first course, subsequent courses are laid in a running bond, this being achieved by reversing the corner forms to create a 300mm stagger. After the second course is in place, secure the forms to the footing using low expansion foam. Install horizontal reinforcing as coursing progresses. Corner rods are inserted into the corner forms, if required.

Internal wall formwork is jointed into external formwork by removal of a vertical slice, see Figure 3. Where the specified elevation height is not a multiple of the standard form, units may be trimmed using woodworking tools.

The formation of door and window openings using timber framing must be carefully carried out. Remove forms at openings, cutting 25mm smaller to allow for adjustments. The inside of the opening is lined with 50mm x 150mm treated timber frame or the Amvic EPS insulated closer and glued/screwed into position and propped/braced as required, see Figure 8.

2.4.5 Reinforcement Placement

Horizontal reinforcement can be placed in different locations across the concrete fill void using the form tie/spacer toothed slots. Horizontal reinforcing bars for lintels must be located within the lintel as specified in the structural design, the minimum length of bar being equivalent to the width of opening in the structure plus 500mm. Vertical reinforcement can then be secured to horizontal reinforcement at required centres using standard fixing methods. Bar lapping lengths as per I.S. EN 1992-1-1[7] should be adopted. The system requires that in plain walls horizontal reinforcement be provided in top and bottom courses of every wall lift. The reinforcement is checked to ensure there is adequate concrete cover for protection and that compaction can take place. The horizontal and vertical reinforcement shall be as specified by the chartered structural engineer (see Section 3.1.1).

2.4.6 Bracing

Install bracing system following installation of the fourth course of forms. Temporary bracing and propping during construction is essential to maintain alignment and adequate lateral stability during concrete filling. The installer is responsible for ensuring the adequacy of all temporary bracing. As a minimum, the full height of the assembled formwork system must be supported 700mm from corners and along the length of each wall at maximum horizontal centres of 1.8m. All lintels must be adequately supported until the concrete has attained its minimum working strength. On exposed sites or in adverse weather conditions further support may be necessary. Typically, the bracing and alignment systems are placed on one side of the formwork (usually the inside face) during construction, however for very long or walls greater than one storey height, bracing on two sides is recommended. Amvic recommend push/pull bracing systems that do not include working platforms. Where combined bracing/platform systems are used, please consult the HSA 2018 Code of Practice for Access and Working Scaffolds[30].

2.4.7 Openings

The rigidity of the formwork is reduced by window and door openings, but is increased by the incidence of corner and crosswall details. Openings are formed during construction of the formwork. EPS inserts/closers are inserted prior to the timber formwork being placed around openings between the EPS panels to seal openings, which is then secured in place and braced before pouring concrete. All lintels must be adequately supported until the concrete has attained its minimum working strength. On exposed sites or in adverse weather conditions, further support may be necessary. Where joists are installed they must be adequately supported by the wall. The joists must not penetrate the external face of the formwork system.

2.4.8 Services

Wall openings or ducts for service penetrations can be positioned within the formwork prior to concrete pouring. At all service entry points, care must be taken to effect a properly sealed joint to prevent the ingress of vermin or moisture. Gaps in the insulation may be made good by filling and sealing with a self-expanding polyurethane foam. However, where fire barriers are penetrated for services, appropriate fire stopping solutions must be applied to ensure a continuous sealed fire barrier, in compliance with Part B of the Building Regulations.

Where services or flues are to penetrate the wall, a duct or sleeve through the Amvic ICF System should be inserted prior to placing the concrete. Electrical cables should be ducted (to avoid plasticizer migration). At a minimum, the cables must be placed in PVC conduit and must be sized to minimise heat build-up with resulting fire risk, in accordance with I.S. 10101[12]. Electrical sockets and switches shall be installed in PVC or metal boxing. Service entry points to basement walls should be avoided.

2.4.9 Pre-Pour Checks

Once the bracing and propping is erected, adjustments are made for plumb, alignment and level by use of the push/pull screws. 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 and pre-pour checks must be checked by approved installer.

2.4.10 Concrete Placement

Adequate supervision and care by the installer is needed when placing concrete[38]. Concrete can be placed using line pump or overhead boom from a concrete pump lorry. Small volumes of concrete can be placed by hand, e.g. to make up small deficiencies at the end of each pour or to the sill of window openings. The concrete should be

directed into the central cavity away from corners and not directly against the polystyrene units in 1.2m lift height allowing concrete to free-flow into corners and below window openings. The first lift is allowed to stiffen before placing the second lift of concrete. Typically, storey heights should be placed in two or three lifts. When forming construction joints between concrete pours, these should be located within 100mm of the top of the Amvic ICF System for ease of access and visual checking. Construction joints should be horizontal rather than vertical.

Lintels must be filled with concrete in a single operation, ensuring that the concrete integrates fully with the concrete in the walls at both ends. Particular attention should be paid at opening/lintel reinforcement as the steel can impede the flow of concrete around these sections.

To prevent damage to the system, the use of poker vibrators above 25mm diameter is not recommended, However, care must be taken not to exert excessive pressure on the system by overuse of vibrators and should be kept back from the corner approximately 1m.

In very hot or freezing conditions, the top of the Amvic ICF System must be covered to protect the concrete from adverse curing conditions.

The recommended concrete pour rate is 1000 to 1200mm/hr with a maximum of 1500mm/hr in warm temperatures. The formwork system is filled and compacted progressively in layers not exceeding 1.2m lifts with a total daily concrete pour height not exceeding 3m (i.e. one storey height). This is to ensure adequate compaction is achievable and to avoid possible displacement of any reinforcement and excessive pressure being exerted on the Amvic ICF System.

2.4.11 Concrete Compaction

Adequate consolidation/compaction of the concrete in line with I.S. EN 1992-1-1[7] is essential and the concrete must be placed so that it completely fills the Amvic ICF System without creating any voids. A 25mm vibrating poker should be used with care and kept back from the corners by approximately 1m.

Particular attention should be given to basement walls and areas around openings. Particular attention should also be paid to the window and door openings where the steel reinforcement can impede the flow of concrete beneath these sections. Concrete in lintels must be mechanically tamped or vibrated to ensure proper compaction around any steel reinforcement.

Where reinforcement is present for structural purposes, mechanical vibration is essential with internal poker vibrators smaller than 25mm diameter. Special care is required to avoid touching the formwork when using this equipment. Where internal poker vibrators are used, these should be confined to the central concrete core between reinforcement layers and used in accordance with the Certificate holder's instructions.

The formation of construction joints between concrete pours should be located as close to the top of the form wherever possible for the formwork wall to enable visual checking and ease of access for the formation of these joints. The construction joints formed should be horizontal rather than vertical.

The completeness of filling of the formwork can be easily confirmed by tapping its surface (with the palm of the hand or a wooden mallet) – any voids will be detected by a distinctive hollow sound. This should be done as the concrete is placed so that any voids detected can be easily corrected. The compaction of the concrete can be confirmed by tapping the surface as described up to 2.8m high walls. For load bearing walls above this height, the EPS can be removed to inspect the concrete core or alternatively, normal concrete cores can be taken as required.

2.4.12 Post-Pour Tasks

After pouring is complete, immediately check the walls are straight and vertical adjusting the bracing support as required.

Any damage to the forms should be repaired immediately and any concrete spillage or leakage of grout may be removed by carefully hosing down the exposed face of the system before it sets.

The concrete in the Amvic ICF System must be left to cure until it has achieved a specified minimum strength, usually after two or three days, for construction to continue. Structural fixings should not be loaded until the concrete has achieved a sufficient strength, and supports should be left in place as long as required.

Where lateral bracing walls and other structures are intended to act in concert with the concrete filled forms, the polystyrene face must be removed to allow the required structural connection between the concrete core and the supplementary structure.

Backfilling around bottom layers of formwork to the ground floor walls should not take place until the concrete has reached sufficient design strength, i.e. a minimum period of seven days.

Any damage to the faces of the Amvic ICF System must be made good prior to the application of the internal and external finishes.

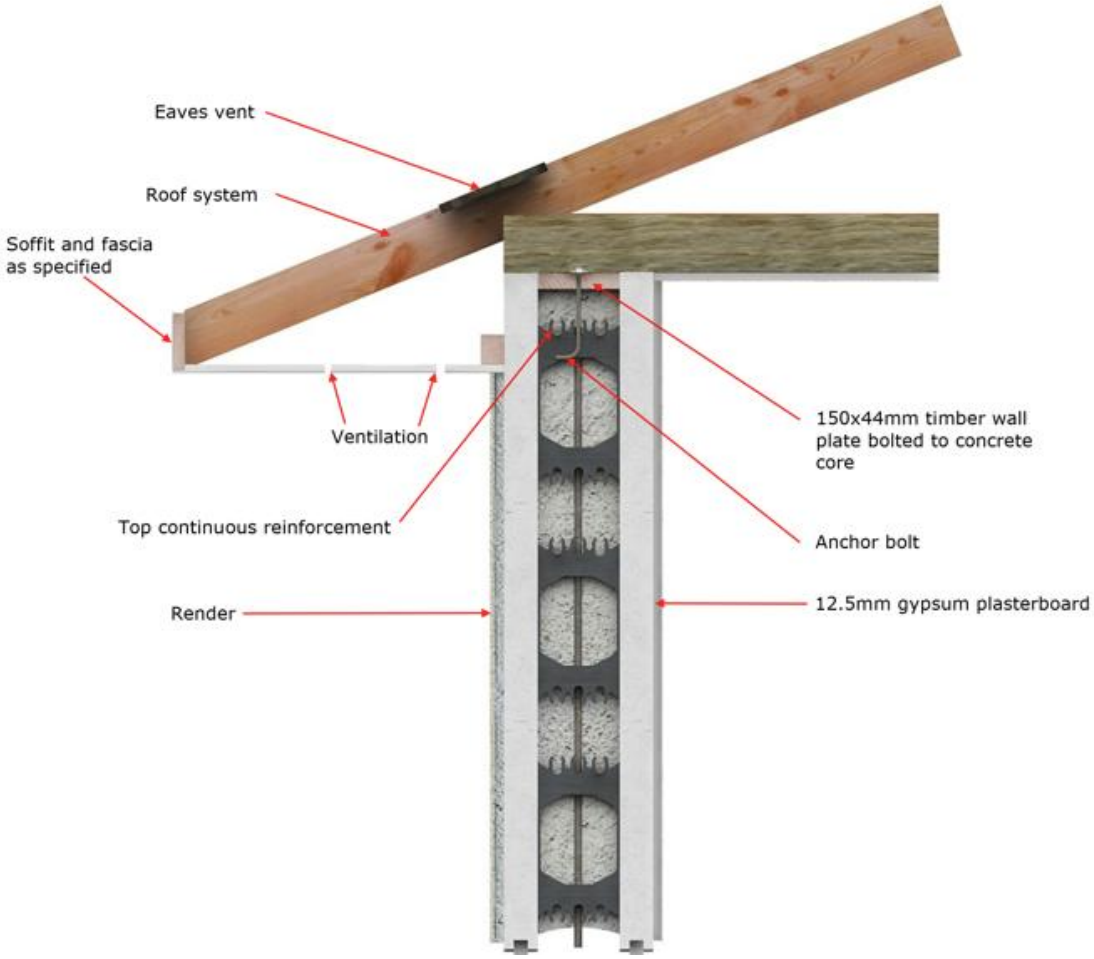

Figure 4: Amvic Wall/Roof Connection

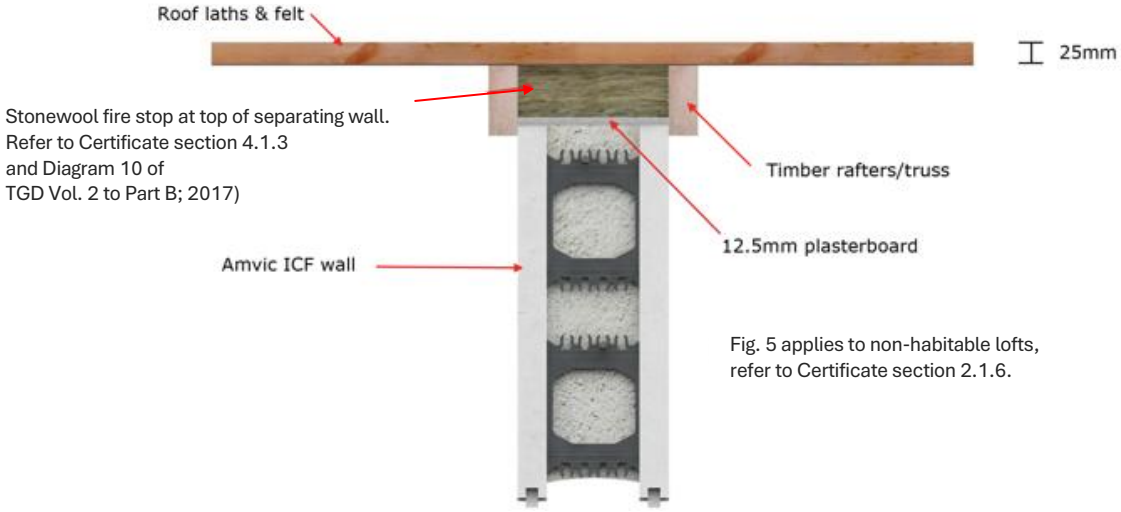

Figure 5: Top of separating wall detail in attic space with no permanent access.

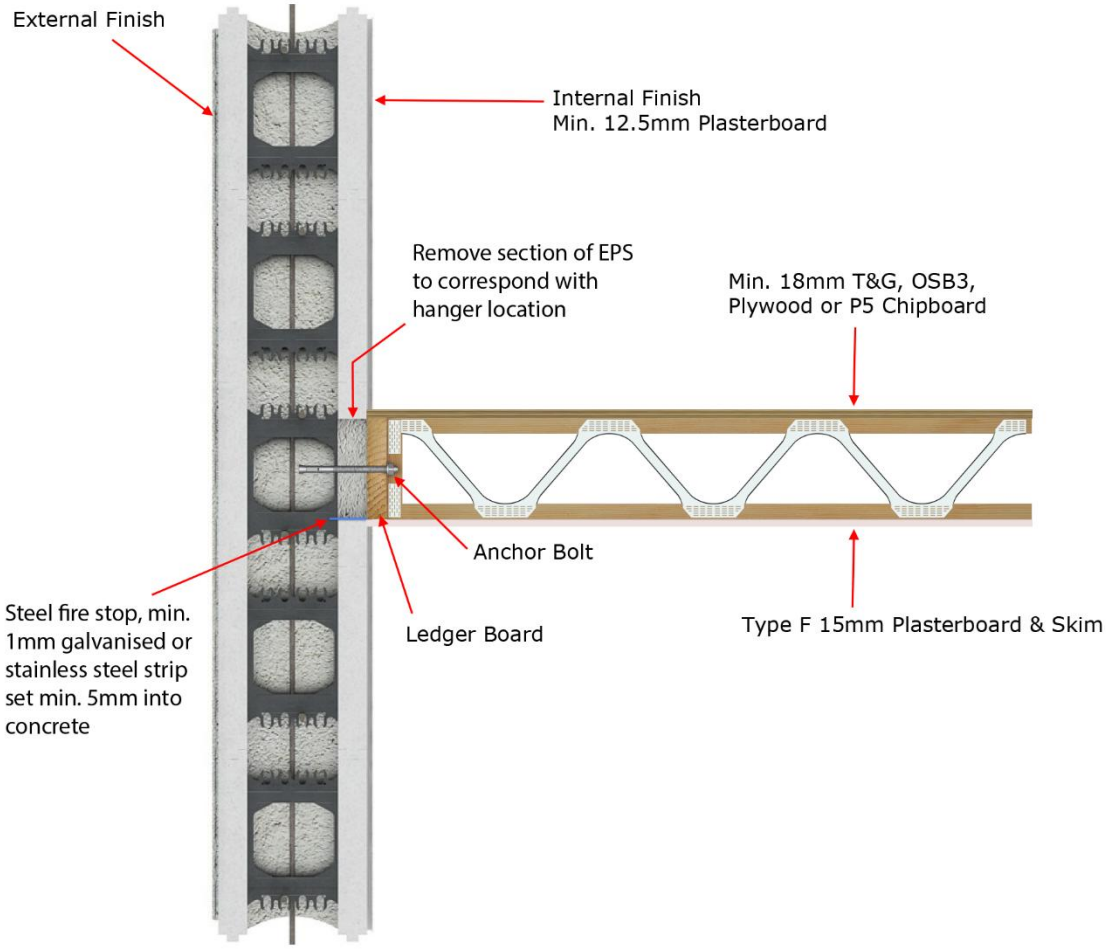

Figure 6: Ledger board anchor detail for open web (as illustrated) and solid joists.

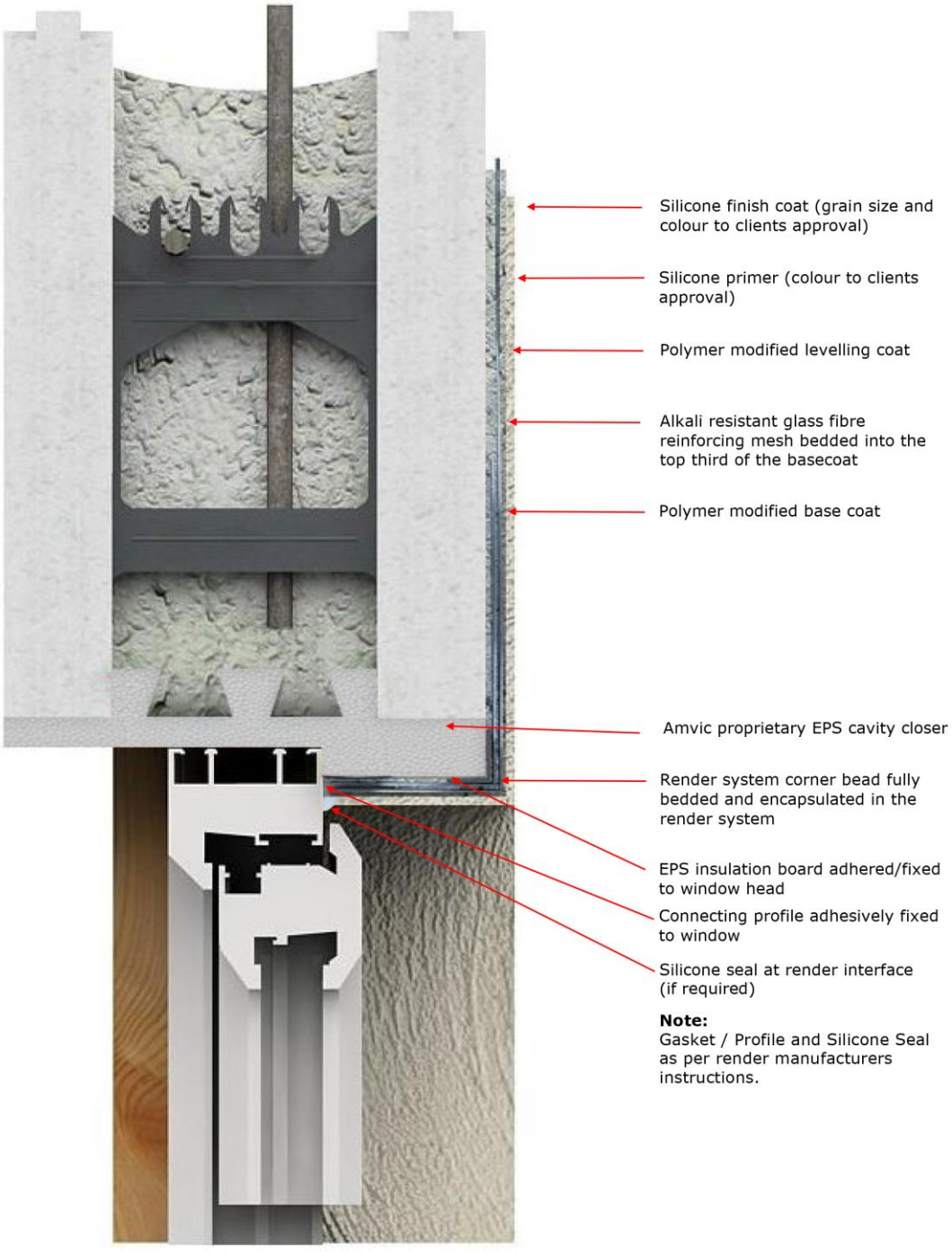

Figure 7: Window Head Detail

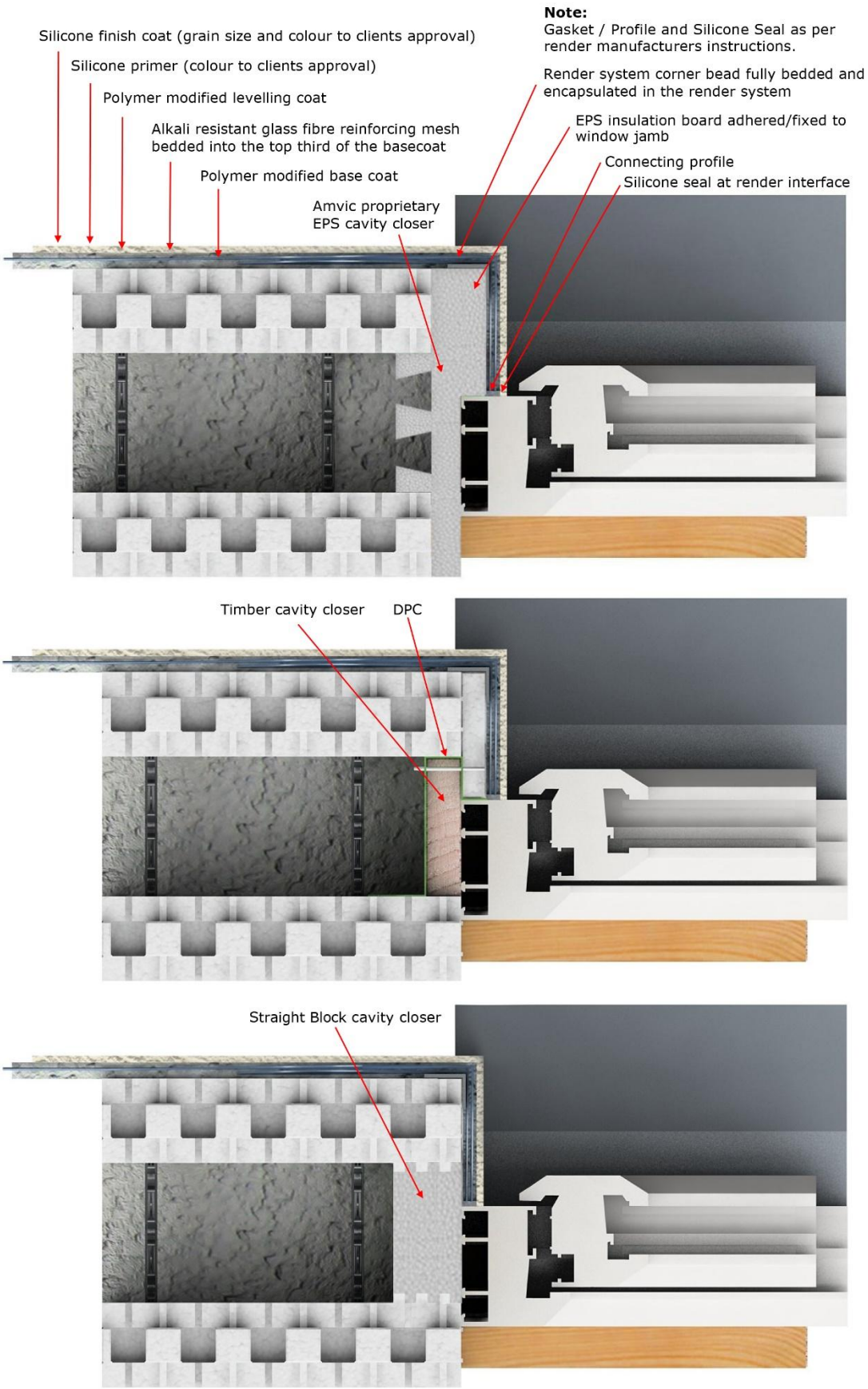

Figure 8: Window Jamb Detail

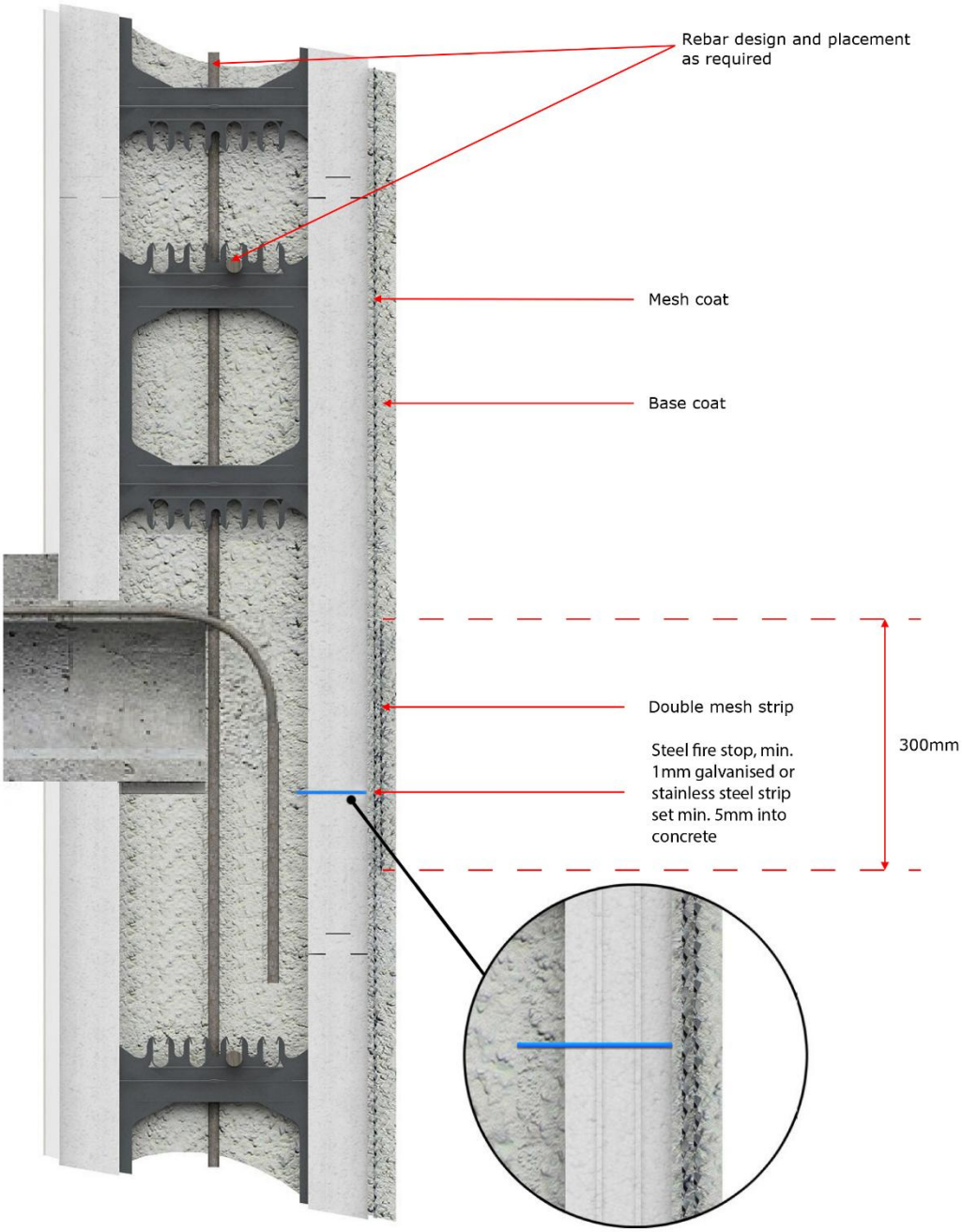

Figure 9: Fire Stop Detail

3.1 STRENGTH & STABILITY

3.1.1 General

The Amvic ICF System is intended for use where Architect's drawings are available and satisfy the Building Regulations. The Architect, Engineer or competent 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 Amvic ICF System shall be certified by a competent, chartered civil or structural engineer, with experience in design of buildings and structures incorporating the Amvic ICF System, as being in accordance with Part A of the Building Regulations.

The Amvic Ireland Design Guide for Housing[29] provides guidance for the structural design of dwelling houses up to 3 storeys (10m) in height.

3.1.2 Loading

The vertical imposed loads within the scope of the Design Guide are detailed in Table 3. Higher loads are possible subject to a structural design by a chartered structural engineer.

Element	Loading	Value
Roof	Distributed Load	0.75kN/m^2
Floor	Distributed Load	1.50kN/m^2
Ceiling	Distributed Load	0.75kN/m^2

Table 3: Vertical Imposed Loads

The vertical dead loads should be calculated based on the self-weight of materials to be used in construction, and reference should be made to I.S. EN 1991-1-1[14] in this regard. The following self-weights apply to the Amvic ICF wall thicknesses:

- 150mm wall: 3.7kN/m^2
- 200mm wall: 4.9kN/m^2

These figures include the mass of the concrete, insulation and internal Amvic ICF System fixings.

Designs for typical dwellings which have been completed have been examined by NSAI Agrément and comply with the following standards:

- I.S. EN 1991-1-1[14]
- I.S. EN 1991-1-7[15]
- I.S. EN 1991-1-4[14]

Reinforcement for lintel load spans and spacings of anchor bolts for timber ledger intermediate floor installation, must be as per the Amvic Ireland Design Guide for Housing, or as specified by the Project Engineer.

Where timber elements are used they are designed in accordance with I.S. EN 1995-1-1[17] and I.S. EN 1995-1-2[18].

Design snow and wind loads must be based on Diagram 14 and 15 of TGD to Part A of the Building Regulations. Panel designs are based on the wind exposure map provided in the TGD to Part A of the Building Regulations. For very exposed sites on hills above the general level of the surrounding terrain, the system can be specifically designed to withstand the unusually high wind loading in accordance with I.S. EN 1991-1-7[15]. This is likely to involve the provision of additional ground anchorage and increased lateral bracing, both of which can be readily provided in the system.

3.1.3 Retained Earth

Differences in the final level of ground or floor slabs between one side of a wall and the other should not exceed four times the wall thickness unless designed by an Engineer, e.g. in basement construction using the 200mm concrete core ICF forms.

3.1.4 Stability

Because of the homogeneous and boxed nature of the form of construction, domestic structures built using the Amvic ICF System will be stable in themselves. Normally the elements requiring particular care are the tying-in of floors and roofs into walls and the bracing of any free standing or unbutressed sections of wall.

3.1.5 Impact Resistance

The Amvic ICF System can provide a robust system that has a high resistance to hard and soft body impacts likely to be associated with normal use situations. The rendered wall is acceptable for all normal situations and subject to the appropriate selection of render, per 2.1.12, can achieve Category I, which is described in EAD 040083-00-0404[19] as a zone readily accessible at ground level to the public and vulnerable to hard body impacts but not subjected to abnormally rough use. Other stronger solutions are available if required – the Certificate holder must be contacted for details.

3.2 STRUCTURAL FIRE SAFETY

To be read together with Section 4 of this certificate**.**

When the building has been designed and installed in accordance with the requirements of this Certificate, the walls are capable of withstanding the effects of fire for 60 minutes without loss of stability. Further structural fire resistance can be achieved by the incorporation of additional reinforcing steel in accordance with I.S. EN 1992-1-2[25] Table 5.4. See Section 4.1.1 for fire behaviour of the constructed system.
The NSAI Agrément certified external render approved for use onto EPS must meet or exceed a reaction to fire classification of B-s1, d0 to I.S. EN 13501-1[20]. Fire barriers must be installed per 4.1.1. The plasterboard slabs used on the internal wall finish must meet or exceed a reaction to fire classification of B-s1,d0.

3.3 WEATHERTIGHTNESS

Externally the walls are protected by an NSAI certified render per 2.1.12. A DPC is installed at ground level to prevent rising damp. A DPC is also used around window cills, and a double seal is used at window reveals (see Figure 7). Aluminium window sills must include an upstand on the back of the sill with stop ends with welded corners on both ends with wraparound DPC. In the case of concrete sills, they shall either be stooled or be 75mm wider than the window ope and be provided with the wraparound DPC.

Part Four / Technical Investigations 4

4.1 BEHAVIOUR IN RELATION TO FIRE

This Section 4.1 must be read completely with other documents as referenced for further detail. The fire performance requirements for Purpose Groups 1a, 1b and 1d (Dwelling House) are addressed in TGD B Vol. 2 (2017).

For other Purpose Groups consult TGD B Vol. 1 (2024) including Section 3.5.5 for compartment wall fire performance requirements. This includes specific provisions for Purpose Group 2(a) and separate detail on compartment walls for buildings of Purpose Groups 1(c), 2(b), 3, 4(a), 5(a) and 5(b) where the topmost floor height exceeds 11m.

Escape stairway enclosures constructed using the Amvic ICF system must be lined in accordance with the provisions of the relevant TGD to Part B. The Amvic ICF system is certified for use in buildings up to 5 storeys, subject to design in compliance with the TGDs to the building regulations.

Where the design complies with Section 3.1 above and I.S. EN 1992-1-2[25], an Amvic ICF wall with a continuous 150mm concrete core has over 60 minutes fire performance. Minimum cover to reinforcement is 30mm for durability, which exceeds the required cover of 25mm for fire protection. The combination of Amvic ICF load bearing wall, separating wall and concrete floor elements achieves a 60 minute fire resistance when constructed with good workmanship in accordance with this certificate. See Section 4.1.1 for timber intermediate floors. The concrete in the walls has A1 classification and is non-combustible as per TGD to Part B of the Building Regulations. The polystyrene used in the wall and floor panels is flame retardant and Class E in accordance with I.S. EN 13501-1[20].

The NSAI certified external render system shall achieve a minimum B-s1,d0 per I.S. EN 13501-1 [20]. In the case of the internal wall, 12.5mm gypsum plasterboard slabs minimum class B-s1,d0 per I.S. EN 13501-1 are screwed directly to the webs of the polypropylene connectors. The internal walls meet the reaction to fire requirements of Table 13 of TGD B Vol. 1 and Section 2.4 of TGD B Vol. 2 to Part B of the Building Regulations.

4.1.1 Fire Barriers

The system must be fire stopped externally opposite every compartment wall and compartment floor. The external render must be applied as specified in its own NSAI Agrément Certificate and specific manufacturer instructions. To protect the external fire barrier, a strip of mesh reinforcement is placed along the length of the fire barrier before a second layer of mesh reinforcement is placed in the render basecoat along the length of the entire wall. The external render acts as a fire barrier at the insulation around the window and door openings. The location of fire breaks should be specified by the Architect or fire consultant on a project specific basis.

Fire barriers shall be continuous and unbroken. Fire barriers are created by placing strips of galvanised or stainless steel 1mm thick (weight 2.68kg/m2) to the full depth of the expanded polystyrene and set a minimum of 5 mm into the cavity prior to concrete placement, as shown in Figure 9 or as described in Section 3 of the applicable TGD to Part B of the Building Regulations for compliance with Purpose Group requirements.

Typically, plasterboard is screw fixed directly to the ICF wall ensuring the intervals match the plastic connectors. Where internal or external cavities are created in the ICF wall build up to accommodate services, cavity barriers shall be provided. See 4.1.2 below.

4.1.2 External Wall/ Floor Junction – internal fire break:

Compartment floors require fire barriers in accordance with TGDs to Part B of the Building Regulations. In the case of two storey construction, timber intermediate floors must use a minimum of 15mm plasterboard, class A-s1,d0 on the ground floor ceiling to achieve a 30 minute fire resistance in accordance with the Supplementary Guidance to the TGD Vol. 2 to Part B[33] of the Building Regulations.

Penetrations through the plasterboard, such as down-lighters, soil vent pipes or ventilation duct heads must be fire stopped appropriately in accordance with TGDs to Part B of the Building regulations. Where intermediate floors have open void space for the provision of services, either by the use of engineered open web joists, or counter battens below traditional solid joists, the Amvic system includes an additional measure of a steel fire break, set a minimum of 5mm in the concrete per Figure 6. The 1mm steel strip must be placed before the concrete is poured and is inserted horizontally through the inner EPS panel level with the bottom of the ledger board/top of the internal ceiling plasterboard as shown in Figure 6. The location of fire breaks should be specified by the Architect or Fire consultant on a project specific basis.

Where a service void is created in the internal wall build-up, a fire barrier shall be provided at the top of the void at floor level. A fire barrier can be achieved by a timber battens min. 38mm thick, mineral wool or galvanised metal strip (minimum 1mm thick), combined or not with the use of insulation in the floor void which has a classification of A2 or better for buildings under 10m in height. A section of the inner ICF panel can be removed allowing the fire barrier to be directly fixed back to the concrete core.

4.1.3 Separating Wall/ Roof Junction – fire break:

The separating wall/roof detail is shown in Figure 5 which represents a section through a pitched roof. The eave must be fire stopped opposite the party wall. 25mm thick battens may run continuously across a party wall, subject to appropriate fire stopping between each of those battens such that no void exists along the length of the separating wall and the roof structure, as detailed in Diagram 10 of TGD Vol. 2 (2017) to Part B of the Building Regulations. The gap between the party wall and the underside of the roof underlay should be as small as practicable and generally not greater than 50mm.

4.1.4 Security of Fixings

Fixings should be applied by trained installers. Mechanical fixing of mineral wool fire barriers is required at typically 300mm intervals; Stainless steel (SS) fixings must be used externally. For detail on the mechanical fixing of external render finishes, consult the NSAI Agrément certificate specific to the chosen render system and follow any additional guidance from the ICF manufacturer. The project specific site package regarding the installation method and location of the SS fixings through the reinforcing mesh must also specify how the render is to be applied to fire barriers. Typically, additional layers of mesh are applied at fire barrier locations with stainless steel fixings through the mesh and mineral wool, fixing back to the concrete at a rate of one fixing per square metre above two stories. The fixing design should take account of the extra duty required under fire conditions.

4.1.5 Toxicity

The system is non-toxic in normal conditions. In fire conditions, the polystyrene will begin to soften, to contract, and final melt above 100°C. Ignition occurs between 350°C and 450°C. The mass of material present is low and hence the amount of heat released is low. When burning, EPS behaves like other hydrocarbons such as wood and paper. The products of combustion are basically carbon monoxide and styrene; during a fire, the styrene may be further decomposed, giving off oxides of carbon, water and a certain amount of smoke. The polystyrene used in the Amvic ICF System is flame retarded.

4.2 THERMAL INSULATION AND U-VALUES

The thermal conductivity, λ, value of the Amvic ICF wall is 0.031W/mK for graphite enhanced EPS and 0.034 W/mK for standard (white) EPS, with allowance made for the cold bridging effect of the polypropylene connector. The calculated U-value for an Amvic ICF wall can meet or exceed the required U-value of 0.18 W/m^2K (see Table 1). Lower U-values can be achieved by using additional energy improvement measures such as internal drylining board.

4.3 LIMITING THERMAL BRIDGING

The linear thermal transmittance (ψ) or Psi describes the heat loss associated with junctions and around openings. The Amvic ICF System has been assessed and when detailed in accordance with this Certificate, these thermally bridged junctions can be compared with the requirements of Table D2 of Appendix D of TGD to Part L of the Building Regulations. 'ψ' values for bridged junctions as outlined in Table 4 can be used for calculating the 'y' factor for a dwelling.

'ψ' values for other junctions outside the scope of this Certificate should be assessed in accordance with BRE IP1/06[21] and BRE Report BR 497[22] in accordance with Appendix D of TGD to Part L of the Building Regulations.

4.4 CONDENSATION

The system was subjected to an interstitial condensation risk analysis, which concluded that the risk of condensation is minimal and that no vapour barrier is required.

4.5 SOUND

The separating wall requirement is met by the wall thickness of the Amvic 200mm core wall which gives 490kg/m^2. This satisfies the requirement of 415kg/m^2 of Diagram 4 of TGD to Part E of the Building Regulations. The 150mm core wall can also be used as this has been tested to meet the 53dBa requirement. With regard to compartment floors in apartments, the minimum required mass for hollowcore type floors with a screed and soft covering is 365kg/m^2 as per Diagram 32 of TGD to Part E of the Building Regulations.

4.6 DURABILITY AND MAINTENANCE

The structural core of buildings constructed with the Amvic ICF system should have a service life of at least 60 years, provided it is designed in accordance with Part A of Irish Building Regulations. The EPS formwork will have a similar service life provided it is protected from damage by the external and internal finishes of the wall construction.

It is important to note that the durability of the external render system is entirely dependent on the correct installation of the product in accordance with its NSAI Agrément Certificate, the manufacturer's instructions, I.S. EN 13914-1[24] and ongoing care and maintenance as described in Section 4 of their NSAI Agrément Certificates. Critical details include rendering at window sills, raised features, junctions with eaves and verges, and the use of suitably designed overhangs and flashings. Reference should be made to I.S. EN 13914-1[24] for general advice on design, in particular on the use of angle, stop and movement joint beads.

The render manufacturer is responsible for the design of the render to meet the durability requirements and exposure conditions. Render shall meet durability and exposure conditions as per S.R. 325[27]. Any damage to the surface finish shall be repaired immediately and regular maintenance shall be undertaken as outlined in render manufacturer's specification.

Regular inspections should be made over the life of the system. The system shall be inspected and maintained in accordance with the Certificate holder's instructions, as detailed in the Repair and Maintenance Method Statement, which is incorporated into the Building Owner's Manual. Below is a non-exhaustive list of maintenance inspections and works which should be undertaken regularly:

• Visually inspect the render and architectural details for signs of damage or water ingress (at least annually).

• Necessary repairs must be carried out immediately and must be in accordance with the Certificate holder's instructions to prevent deterioration or damage, and to protect the integrity of the system.

• The external sealants around window and door frames should be inspected periodically and replaced when necessary. All sealants should be replaced as required and fully replaced every 18 to 20 years to maintain performance.

• Synthetic finishes may be subject to aesthetic deterioration due to exposure to UV light. They should be re-coated every 18 to 20 years to maintain appearance.

• Care should be taken to ensure that the synthetic finish used is compatible with the original system and that the water vapour transmission or fire characteristics are not adversely affected.

4.7 PRACTICABILITY

A Design Guide and Installation Manual incorporating Health & Safety guidelines is provided by Amvic Ireland. Erection of the Amvic ICF System must be by approved trained installers.

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

- Structural strength and stability
- Behaviour in fire
- Resistance to airborne and impact sound transmission
- Condensation risks for external walls
- Thermal transmittance values
- Site erection controls

4.9 OTHER INVESTIGATIONS

(i) Existing data on product properties in relation to fire, toxicity, environmental impact 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) Bought-in components were assessed for suitability in use.

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

Target linear thermal transmittance (ψ) for different types of junctions	**Amvic ICF ψ value**		
	64mm panels	**75mm panels**	**100mm panels**
	Target U-value Wall: 0.23W/m²K Warm Roof: 0.12W/m²K Cold Roof: 0.08W/m²K Ground Floor: 0.11W/m²K	**Target U-value** Wall: 0.20W/m²K Warm Roof: 0.12W/m²K Cold Roof: 0.08W/m²K Ground Floor: 0.11W/m²K	**Target U-value** Wall: 0.15W/m²K Warm Roof: 0.12W/m²K Cold Roof: 0.08W/m²K Ground Floor: 0.11W/m²K
Description	(W/mK)	(W/mK)	(W/mK)
Warm Roof Eaves (insulation between and below rafter level)	-0.019	-0.013	-0.002
External Corner	0.046	0.042	0.037
Inward Facing Corner	-0.093	-0.084	-0.072
Internal Wall In Plan	-0.001	-0.001	-0.001
Intermediate Floor	0.208	0.185	0.212
Ground Floor Perimeter	0.052	0.052	0.048
Window Sill Concrete	0.089	0.053	0.132
Window Sill Pressed Metal Sill	0.005	0.007	0.017
Window Sill 78mm Pressed Metal Sill	0.009	0.013	0.021
Window Sill Timber Support	0.010	-	-
Window Head 113mm Frame	0.001	0.003	0.040
Window Head 78mm Frame	0.020	0.019	0.055
Window Jamb 113mm Frame	0.001	0.003	0.040
Window Jamb 78mm Frame	-	0.019	0.054
Eaves with Window Head	-0.003	0.008	0.023
Separating Wall(200mm core)	0.158	0.216	0.184
Separating Wall(150mm core)	0.143	0.192	0.168
Cold Roof Eaves (insulation at ceiling level)	0.033	0.031	0.028
Cold Roof Eaves With Window Head (insulation at ceiling level)	0.057	0.055	0.055
Intermediate Floor Parallel Joists	0.011	0.013	0.034
Intermediate Floor Perpendicular Joists	-0.006	-0.004	0.094
Barge Detail	0.067	0.064	0.059
Intermediate Floor Between Dwellings	0.247	0.222	0.249
Gable Wall to Cold Ventilated Attic Space	-	-	0.070
ψ-values for additional and improved junctions are available from the Certificate holder. Installation details and thermal modelling calculations for these junctions are available from the Certificate holder.			

Please note: The Part L Acceptable Construction Detail (ACD) for external insulation on solid masonry/hollow block walls permits variation in the Target U-Values such that the Psi values remain valid when the aggregate percentage change from the respective target U-values in the table do not exceed +20%. Therefore the difference in U-values from 0.15 to 0.17 W/m²K, for the 350 and 370 products respectively, implies the Psi values for the Amvic 350 block (2x100mm EPS panels) can be applied to the 370 block (2x85mm EPS panels). This assumes the junction constructions remain as modelled, aside from the decrease in EPS thickness.

Table 4: Linear thermal transmittance (ψ)

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/building system is unchanged.

(b) the Building Regulations and any other regulation or standard applicable to the product/building system, including processes for its manufacture, installation or use, remain unchanged.

(c) the product/building system 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/building system continues to be manufactured, installed, used and maintained in accordance with the description, specifications, processes 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/building system or related 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. **07/0277** is accordingly granted by the NSAI to **Amvic Ireland** on behalf of NSAI Agrément.

Date of Issue: **May 2007** (Original Certificate)

Signed

Martin Searson
Head of MMC Certification

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

Revisions:
December 2007: Scope extended to cover use of the system up to six storeys in height.
27th October 2017: References to Building Regulations and standards updated, addition of 75mm thick block.
7th February 2022: Addition of 100mm thick block, references to Building Regulations and standards updated, general text changes.
03rd March 2025: References to Building Regulations and standards updated, addition of 85mm EPS leaf block.
27th April 2026: References to Building Regulations and standards updated.

Bibliography

[1] EAD 340309-00-0305 *Non-Load-Bearing Permanent Shuttering Kits/Systems Based on Hollow Blocks or Panels of Insulating Materials and Sometimes Concrete – 2019*

[2] I.S. EN 13163:2012+A1:2015 *Thermal insulation products for buildings – Factory made expanded polystyrene (EPS) products – Specification.*

[3] I.S. EN 206:2013+A2:2021 *Concrete – Specification, performance, production and conformity.*

[4] BS 4449:2005+A3:2016 *Steel for the reinforcement of concrete – Weldable reinforcing steel – Bar, coil and de-coiled product – Specification.*

[5] BS 4483:2005 *Steel fabric for the reinforcement of concrete – Specification.*

[6] I.S. EN 10020:2000 *Definition and classification of grades of steel.*

[7] I.S. EN 1992-1-1:2004+AC:2010+A1:2014 *Eurocode 2: Design of concrete structures – Part 1-1: General rules and rules for buildings. + national annex I.S. EN 1992-1-1:2004/NA:2010.*

[8] SR 82:2017 *Slating and tiling – Code of practice.*

[9] BS 8004:2015+A1:2020 *Code of practice for foundations.*

[10] I.S. EN 1992-3:2006 *Eurocode 2 – Design of concrete structures – Part 3: Liquid retaining and containment structures.*

[11] BS 8102:2022 *Code of practice for protection of below ground structures against water from the ground.*

[12] I.S. 10101:2020+AC2:2025 *National rules for electrical installations.*

[13] I.S. EN 10080:2005 Steel for the reinforcement of concrete – Weldable reinforcing steel – General

[14] I.S. EN 1991-1-1:2002 NA:2013 *Eurocode 1: Actions on structures – Part 1-1: General actions – Densities, self-weight, imposed loads for building (Including National Annex 2013).*

[15] I.S. EN 1991-1-7:2006+NA/A1:2010+AC2:2015 National Annex to Eurocode 1: Actions on structures – Part 1-7: General

[16] I.S. EN 1991-1-4:2005 *Eurocode 1: Actions on structures – Part 1-4: General actions – Wind actions (including Irish National Annex 2015)*.

[17] I.S. EN 1995-1-1:2005 *Eurocode 5: Design of timber structures – Part 1-1: General – Common rules and rules for buildings (including National Annex 2005)*

[18] I.S. EN 1995-1-2:2005 *Eurocode 5: Design of timber structures – Part 1-2: General – Structural fire design (including National Annex 2010)*.

[19] EAD 040083-00-0404:2019 *External Thermal Insulation Composite Systems (ETICS) with Renderings.*

[20] I.S. EN 13501-1:2018 *Fire classification of construction products and building elements – Classification using data from reaction to fire tests.*

[21] BRE IP1/06 *Assessing the effects of thermal bridging at junctions and around openings.*

[22] BRE BR 497 *Conventions for calculating linear thermal transmittance and temperature factors.*

[23] BS 7543:2015 *Guide to durability of buildings and building elements, products and components.*

[24] I.S. EN 13914-1:2016 *Design, preparation and application of external rendering and internal plastering – External rendering*.

[25] I.S. EN 1992-1-2:2004+AC:2008+A1:2019 *Eurocode 2: Design of concrete structures – Part 1-2: General rules – Structural fire design.*

[26] I.S. EN 1996-1-1:2005 +A1:2012/NA:2010+A1:2014 *Eurocode 6 - Design of masonry structures - Part 1-1: General rules for reinforced and unreinforced masonry structures.*

[27] S.R. 325:2013+A2:2018/AC:2019 *Recommendations for the design of masonry structures in Ireland to Eurocode 6.*

[28] Amvic Ireland *Quality Manual*:2024.

[29] Amvic Ireland *Design Guide for Housing*, Rev. 9:2025, *available from Amvic Ireland*.

[30] Amvic Ireland *Installation Manual*: December 2024, *available from Amvic Ireland*.

[31] HSA:2018 *Code of Practice for Access and Working Scaffolds*.

[32] DHLGH:2026 *TGD B 2024, Fire Safety Volume 1, Reprinted Edition January 2026 Corrections Incorporated.*

[33] DHLGH:2017 Supplementary Guidance to TGD B (Fire Safety) Volume 2- Dwelling Houses:2017

[34] DHLGH:2016 *Code of Practice for Inspecting and Certifying Buildings and Works*.
https://assets.gov.ie/static/documents/code-of-practice-for-inspecting-and-certifying-buildings-and-works.pdf

[35] 2013: *The Safety, Health and Welfare at Work (Construction) Regulations*.

[36] DHLGH:2022 *Loft Conversion Guidelines Protect Your Family - Fire Safety Guidance.*
https://www.gov.ie/en/department-of-housing-local-government-and-heritage/publications/loft-conversion-guidelines/.

[37] S.R. 55:2021 *Design and installation of solar PV micro-generators in homes.*

[38] I.S. EN 13670:2009 & LC:2019 *Execution of Concrete Structures.*