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Steel Frame Design & Build LGS Building System

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

NSAI Agrément Certificates establish proof that the certified products are **'proper materials'** suitable for their intended use under Irish site conditions, and in accordance with TGD Part D of the second schedule of the **Building Regulations 1997 to 2023.**

SCOPE

This Certificate relates to the Steel Frame Design and Build (SFDB) LGS Building System, for the manufacture and erection of structural cold-formed Light Gauge Steel (LGS) frame buildings. The SFDB LGS Building System is certified to be used in the following purpose groups: 1(a), 1(b), 1(c), 1(d), 2(a), 2(b), 3, 4(a), 5 and 7(b) as defined in Technical Guidance Documents (TGDs) Part B of the Irish Building Regulations. The system is used for structural walls and floors in the above purpose groups where the height to the upper floor surface of the top floor is not more than 30m from ground level on the lowest side of the building, and where the full structure is designed, manufactured, supplied and erected by SFDB Limited.

The SFDB LGS Building System is also approved for use in non-loadbearing infill panels. The infill panels are used within reinforced concrete, steel frames and traditional construction that possess their own independent lateral stability systems.

The system is designed for use in buildings with traditional brick and block outer leaf cladding or NSAI Agrément certified external wall cladding systems and roof coverings for LGS as per Section 2.1.4 and 2.1.7 of this Certificate. Other claddings systems may be suitable but have not been considered as part of this certification.

Site erection is carried out by approved installers employed by SFDB or specialist sub-contractors under the supervision of SFDB Limited.

In the opinion of NSAI, the SFDB LGS Building System, as described in this Certificate, complies with the requirements of the Building Regulations 1997 to 2023.

DESIGN

The SFDB LGS Building System is intended for use where Architect's finalized construction and fire strategy drawings are available and satisfy the Building Regulations. The Architect and Engineering Design Team of the Developer (the Client) is responsible for the architectural drawings and overall building design to comply with the Building Regulations.

The SFDB nominated Chartered Structural Engineer is responsible for the final structural design of the SFDB LGS Building System.

RESPONSIBILITIES

Prior to the commencement of the contract, the responsibilities are determined and agreed between SFDB and the Main Contractor, including foundations, fire stopping, cavity barriers, roof completion and other elements.

MANUFACTURE, MARKETING & DESIGN

The product is manufactured, marketed, designed and erected by:

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Part D – Materials and Workmanship
D3 – Proper Materials
D1 – Materials and Workmanship

The SFDB LGS Building System is comprised of 'proper materials' i.e. materials which are fit for their intended use and for the conditions in which they are to be used.

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.

Buildings incorporating the SFDB LGS Building System can be designed to meet the requirements of the following clauses of the Irish Building Regulations 1997 to 2023.

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

Part B – Fire Safety
For purpose groups 1(a), 1(b), 1(c), 1(d), 2(a), 2(b), 3, 4(a), 5 and 7(b), the fire safety requirements are laid out in TGD to Part B 2006 of the Building Regulations.

B1 & B6 – Means of Escape in Case of Fire
B2 & B7 – Internal Fire Spread (Linings)
B3 & B8 – Internal Fire Spread (Structure)
B4 & B9 – External Fire Spread

Note: In a building more than 18m high, all external wall cladding, including insulation material used in drained and/or ventilated cavities in the external wall construction should be of limited combustibility A2-s1, d0 rating to I.S. EN 13501-1[31].

B5 & B10 – Access and Facilities for the Fire Service

Part C – Site Preparation and Resistance to Moisture
C3 – Dangerous Substances
C4 – Resistance to Weather and Ground Moisture

Part E – Sound
E1 – Airborne Sound (Walls)
E2 & E3 – Airborne and Impact Sound (Floors)

Part F – Ventilation
F1 – Means of Ventilation
F2 – Condensation in Roofs

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

2.1 PRODUCT DESCRIPTION

This Certificate relates to the SFDB LGS Building System for the design, manufacture and erection of cold-formed light gauge steel (LGS) buildings.

The SFDB LGS Building System is supplied as panelised prefabricated wall and floor elements. The wall units comprise of LGS elements. The floor units can be either constructed as an LGS floor or a composite concrete metal deck floor.

This Certificate contains illustrations to explain the various elements of the SFDB LGS Building System – these illustrations are not intended to be used as construction drawings. SFDB 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 standards, along with Irish Building Regulations.

2.1.1 Foundations, Ground Floor & podium Slab

The construction of the foundations, ground floor and podium slab are outside the scope of this certificate. The SFDB LGS Building System can be constructed on foundations, ground floor or podium slab.

The construction of the foundations, ground floor and podium slab are the responsibility of the Main Contractor and should be constructed in accordance with the Client's Engineering specification. Structure supporting the SFDB LGS Building System shall be checked by Client's Engineer for structural load criteria specified by SFDB Structural Engineer. Tolerances for the system installation on foundations, ground floor or podium slab are defined in SFDB Installation Manual (ref. V 0.1 16.05.2022).

2.1.2 Load Bearing Walls

The load bearing wall panels are encompassed of vertical 89-150mm deep LGS studs, fixed to horizontal head and bottom channel sections. Horizontal noggins are fitted at the mid-height of all panels where required to provide additional strength and where particularly high vertical loads occur. Studs are normally at 600mm centres maximum, but lower centres can also be accommodated. Studs are aligned vertically in-line down the height of a building and floor trusses align with the stud centres. Lateral resistance of the wall is provided by combination of LGS bracing and boarding.

2.1.3 Non-Load Bearing Walls & Infill Panels

The non-load bearing wall panels are made from cold-formed LGS sections. When internal wall panels provide racking resistance to external walls, diagonal wind bracing members can be incorporated into the panel to successfully transfer the horizontal loads safely through the building structure in accordance with structural design requirements. The bracing also serves to keep the frames square during erection.
Panels are designed to resist lateral loads only.

2.1.4 External Walls

The external walls can be load bearing or non-load bearing (infill panels). Insulation is fitted to the external cavity side of the cold formed steel studs. The wall panels are filled with stone mineral wool between the studs for acoustic, thermal and fire performance. The wall panels are then clad with the required thickness and grade of plasterboard as per Table 3 to achieve the appropriate fire rating required for the building. The plasterboards are screw fixed to the cold formed steel stud and track members.

The requirements for the provision of an Air and Vapour Control Layer (AVCL) on external walls are outlined in Section 3 of this certificate.

The system has been assessed with traditional brick and block outer leaf cladding and NSAI certified external wall cladding systems. Other external façade claddings systems may be suitable but have not been considered as part of this certification.

Typical external wall build up with traditional brick/block outer leaf cladding consists of:

- Plasterboard, installed by others and in accordance with this Certificate (refer to Table 3)
- Air and vapour control layer (AVCL), installed by others
- SFDB LGS studs with mineral wool insulation between the studs
- External insulation layer, installed by others
- Stainless steel wall ties and brickwork/blockwork outer leaf, installed by others

2.1.5 Internal Walls

The internal load bearing and non-load bearing wall panels are made from cold-formed LGS. When internal wall panels provide racking resistance to external walls, diagonal wind bracing members can be incorporated into the panel to successfully transfer the horizontal loads safely through the building structure in accordance with structural design requirements. The bracing also serves to keep the frames square during erection.

Typical internal load-bearing wall consists of:

- Plasterboard, installed by others and in accordance with this Certificate (refer to Table 3)
- SFDB LGS studs with/without mineral wool insulation between the studs
- Plasterboard, installed by others and in accordance with this Certificate (refer to Table 3)

All internal load bearing panels must be sufficiently supported directly under the panels with rising blockwork or equivalent. Plasterboard specifications on the steel panels should be in accordance with Table 3 of this certificate, which shows the plasterboard fire resistance requirements for wall, floor and ceiling elements.

2.1.6 Intermediate Floors

Intermediate floors can be constructed using LGS lattice trusses. Floor units can be delivered to site as floor cassettes or separate members. The lattice trusses are supported using steel hangers on a wall panel.

Typical intermediate floor consists of:

- Floor build up, installed by others
- 22mm thk. OSB3 boarding, installed by others or SFDB
- SFDB LGS lattice trusses with mineral wool insulation
- Plasterboard, installed by others and in accordance with this Certificate (refer to Table 3)

The intermediate floor must not be used where a floor is common to two or more buildings (separating floor) or where a compartment floor is used to separate dwellings from each other within a building.

Refer to Section 2.4 of this Certificate for information on compartment floors.

2.1.7 Roof Structure

The roof trusses can be either a traditional timber cut roof, prefabricated roof truss made from timber or steel or a steel prefabricated roof module. The roofing solution chosen for a particular building is both Client and project specific and must be assessed and signed off by a nominated SFDB Chartered Structural Engineer. The System has been assessed only with traditional roofing finishes and NSAI Agrément certified roofing finishes. Other roofing solutions may be suitable but have not been considered as part of this certification.

2.1.8 Internal Linings and Finishes

Linings to walls and ceilings are of plasterboard as specified in Table 3, manufactured to I.S. EN 520[8]. They are attached by means of self-drill/self-tap screws into steel members. In areas prone to high levels of humidity, moisture resistant plasterboard should be used. Joints in plasterboard can be taped and filled in accordance with the plasterboard manufacturer's instructions. Alternatively skim coat plaster can be applied.

2.1.9 Services

Services are outside the scope of this Certificate. Electrical installation should be designed and installed in accordance with I.S. 10101[27]. Heating and plumbing services must be designed and installed by competent professional engineers.

Care shall be taken to avoid dissimilar metals coming into contact to avoid risk of galvanic corrosion. Local earth connection to the steel frame shall be avoided. The structural frame should be earthed in accordance with the current regulations I.S. 10101[27].

Electrical installations and recessed lights may not be accommodated within any of the compartment floor build ups. All electrical installations must be accommodated by creating a separate service void under the compartment floor. All services are installed with reference to Section 3 of TGDs to Part B for all purpose groups to which this certificate applies. Penetrations through compartment floors should be minimised. Mechanical ventilation extraction ducts are allowed to pass vertically through the floor but must be appropriately fire sealed where they enter and exit and comply with the recommendations contained within BS 9999[13].

Where floors are constructed to have open void space for the provision of services by the use of LGS lattice trusses the risk of fire spread within the floor void is greatly increased. Where LGS lattice trusses are used as intermediate floor penetrations such as downlighters, soil vent pipes or ventilation duct heads, in the plasterboard create a vulnerability in the ceiling and as such must be fire stopped by the use of fire collars, fire hoods or fire rated products.

Services can pass through a compartment wall when they are appropriately protected with reference to Section 3 of TGDs to Part B of the Irish Building Regulations for all purpose groups to which this Certificate applies. Services passing

through compartment walls should be kept to a minimum and avoided where possible.

2.2 DESIGN AND MANUFACTURE

The SFDB LGS Building System must be designed in accordance I.S. EN 1993-1[7], and manufactured in accordance with I.S. EN 1090-1[11] to minimum execution class EXC2. The design and manufacture are the responsibility of SFDB.

The steel frame panels which form the wall units are composed of light gauge steel elements manufactured from a galvanised coil. Walls panels are assembled from C-profile LGS sections using self-tapping screw connections. Panels assembly is carried out in the factory environment. Steel grade S390, S450 or S550 is used for non-loadbearing and load bearing panels. Table 1 shows typical LGS profiles for SFDB LGS Building System.

2.3 STRUCTURAL PRINCIPLES

2.3.1 LGS Structure

The basis of the typical SFDB structure is a cold-formed light gauge steel frame, which is assembled into structural panels in the factory and installed on site.

2.3.2 Protective Coatings

The LGS members are all coated with a protective zinc-rich metal coating. The LGS members are manufactured from galvanized coil steel to I.S. EN 10346[10] with 275 g/m^2 zinc protection.

In addition to the steel members in the system being protected by zinc rich protective coatings, further protection against corrosion and longer design life is given to the steel by providing the following:

- The bottom channel on all ground floor LGS panels is additionally protected by a DPC.
- The insulation keeps the steel in a "warmframe" environment, which, in conjunction with an internal AVCL prevents the formation of condensation within the wall structure.
- Studs shall be located minimum 150mm above ground level.
- All fasteners have been assessed and tested for use with the system, to ensure the minimum 60-year design life of the system.

2.3.3 Fasteners and Connection Joints

The design of the SFDB LGS Building System allows for no welding of joints in the system. The system is assembled using fasteners such as screws. Only self-drilling Tek screws are used for the structural connectivity of the system on site. On-site structural connections such as panel to panel connections, OSB boarding to floor joist, floor joist to panel, composite deck to panel and wind bracing are fastened using approved Tek screws.

All fasteners used in the LGS system are adequately protected against corrosion i.e. galvanising/zinc coating and made from a suitable metal to ensure the design life of the system is maintained. SFDB provide a full specification of all fasteners, where they are to be used and how they are to be installed during the construction of the system. Only system fasteners approved or supplied by SFDB may be used with the system. It is important to ensure that protective coatings on fasteners are not removed, i.e. to assist the fitting of a connection, as this would severely compromise the corrosion performance of the fastener. SFDB specify corrosion protection of fasteners with consideration to the environment in which they are to be used, with additional coatings applied on site where required and carried out by approved installers employed by SFDB.

2.3.4 Racking

The composite action of the steel studs, bracing and horizontal diaphragm action of the floor and roof elements combine, as per the design, to provide the required stiffness to meet the stability requirements of the building system.

Foundations and lateral stability systems such as concrete cores are outside of the scope of this certificate. All structural criteria and load transfer to lateral stability system will be determined by SFDB Structural Engineer and communicated to Client's Structural Engineer.

2.3.5 Holding Down

To provide resistance to uplift, the bottom channel of the wall panels is fixed to the ground floor slab, podium slab or rising wall with approved fixings. The type of fixing used to hold down the panels of the system will be dependent on what substrate the fixing is being fixed to. These fixings are designed by the SFDB Structural Engineer to I.S. EN 1992-4[35] and are installed in accordance with the HSA *Code of Practice for the Design and Installation of Anchors in accordance with section 60 of the Safety, Health and Welfare at Work Act 2005* and carried out by competent personnel in accordance with SFDB Installation Manual. The positions of the fixings are project specific and are determined by the SFDB Structural Engineer. The plasterboard is site applied allowing access for the fixings to be installed on site.

2.4 COMPARTMENTATION

2.4.1 Separating Wall

Separating walls (party walls) are constructed using two independent cold formed steel framed leaves with a recommended minimum cavity of 50mm between both frames. The individual frames are boarded (on site or in the factory) with the appropriate level of boarding required to

provide the acoustic and fire properties, as illustrated in Table 3. The LGS studs are filled with the appropriate mineral wool insulation from ground floor to the underside of the roof structure to provide the required fire and acoustic properties.

Where the attic space is habitable the mineral wool insulation must go up to the underside of the roof for acoustic purposes. Where the party wall abuts an external wall, the mineral wool insulation within the cavity of the party wall extends through the inner leaf of the external wall and abuts the external leaf of the system and forms the fire stop in the wall. This detail seals air gaps and minimises flanking sound transmission.

The head of the party wall must also be fire stopped and cavity closed as specified by the SFDB construction details. Where services are required in a party wall, they can be accommodated by creating a service cavity to the party wall with timber battens or metal top hat sections and plasterboard. All battens used with the SFDB LGS building system are treated in accordance with BS 8417[12]. Design must comply with the requirements of Section 3 of TGDs Part B of the Building Regulations for all purpose classes to which this certificate applies.

2.4.2 Single Frame Compartment Walls

A compartment wall within the SFDB building system can be constructed of a single frame wall and must be designed and specified to meet the acoustic, fire and structural requirements of the Building Regulations.

This compartment wall must not be used where a wall is common to two or more buildings (separating wall) or where a compartment wall is used to separate dwellings from each other within a building.

2.4.3 Steel Lattice Truss or C-joists Compartment Floors

The structure of a compartment floor used with the SFDB Building System consists of cold formed steel lattice trusses or C-joists.

The construction of compartment floors must be such that the achievement of the required fire resistance performance relies primarily on the integrity of the linings of such constructions. The integrity of linings of compartment floors should not be breached to allow for the installation of services (e.g. pipes, wires, flues, including manufacturing flues), except where necessary to allow services pass through these compartment floors. Where services pass through compartment floors, they should be installed in accordance with Section 3 of TGDs to Part B of the Building Regulations.

The LGS compartment floor construction can comply with Part E of the Irish Building Regulations through the appropriate use of resilient layer, gypsum boarding and mineral wool insulation between the steel lattice trusses or steel C-joists, while maintaining the fire performance of the compartment floor.

Typical steel lattice truss/ C-joists compartment floor consists of:

- Floor finishes, installed by others
- Resilient acoustic layer to Architect's specification (refer to section 3.8), installed by others
- Min. 18mm thk. OSB3 deck, installed by others
- SFDB steel lattice truss/ C-joists
- 100mm thk. mineral wool between LGS floor sections (min. density 22kg/m^3)
- Resilient bars to Architect's specification,
- Plasterboard, installed by others and in accordance with this Certificate (refer to Table 3)

In buildings to which this Certificate applies and where the height of the top storey is 10m or more and to comply with Section 3.2.5.2 of TGD to Part B of Building Regulations, compartment floor must be constructed of non-combustible materials as described in Section 2.4.4 of this Certificate. Use of the SFDB LGS floors in buildings with top storey height of 10m or more as well as use of the LGS compartment floor for buildings of purpose group 2a (Residential Institutional as per TGDs to Part B)is not permitted.

2.4.4 Composite Concrete Metal Deck Compartment Floors

The compartment floors can be constructed using steel concrete composite deck structure. The build is outlined in Table 3. The SFDB System compartment floor can be designed to provide up to 90mins fire resistance from the underside. The compartment floor is non-combustible and is suitable for use in buildings of any purpose group up to the maximum height allowed in this Certificate.

The steel concrete composite deck adopts the use of steel decking as both a permanent shutter for concrete and as a structural element forming composite action between steel and concrete. SFDB uses a dovetail metal deck, which usually adopts the profile height of 51mm (R51 profile).

Typical steel concrete composite deck consists of:

- Floor finishes, installed by others
- Resilient layer, installed by others
- SFDB steel concrete composite floor system

- Mineral wool (if required), installed by others
- Plasterboard supported on proprietary metal frame, installed by others and in accordance with this Certificate (refer to Table 3)

An additional layer of resilient material is added to the top of the composite slab to meet the requirements outlined in Section 4.4 of TGD to Part E of the Building Regulations (see Section 4.4.2.1 of TGD to Part E for definition of resilient material). The underside of the deck is fitted with the ceiling type required by the specific project.

2.4.5 Cavity Barriers and Fire Stops

To meet the requirements of TGD to Part B Volume 2 of the Building Regulations, the correct specification and placement of cavity barriers and fire stops shall be detailed and shown on a schedule for the project. Typically, cavity barriers and fire stops should be provided in the construction of LGS walls as follows:

- Separating walls shall have a vertical cavity barrier sealing the cavity at the wall ends, running from DPC level to the underside of the fire stopping at the top of the wall.
- At a separating wall junction with the external wall, the vertical cavity barrier runs out to the inner face of the external cladding to form the cavity barrier.
- Horizontal cavity barriers shall be placed at the perimeter of all compartment floors. The cavity barrier should be appropriate for the external cladding that is intended to cavity close in the event of a fire and smoke entering the cavity.
- A cavity barrier shall cover the full floor depth as well as the upper wall panel rail and lower wall panel head plate.
- Cavity barriers are required around all openings in external walls such as doors, windows, vents, extractor fans, meter cupboards, etc.

The SFDB site install manager will inspect all cavity barriers and fire stops prior to the closing up of the cavities and ceilings and this is recorded in the quality control file for that site. The fire stopping must be installed correctly before SFDB will issue the certificate for the building.

2.5 DELIVERY, STORAGE AND SITE HANDLING

2.5.1 Delivery of Panels & Storage

Frame panels are transported vertically on stillages to site. Where lifting points are required, they are located, designed and certified by the SFDB Structural Engineer, taking into account the unit weight and dimensions and the distance of lift required. They will conform to the requirements of the Safety, Health and Welfare at Work Act 2005 and the Safety, Health and Welfare at Work (Construction) Regulations 2013.

All off-loading and erection shall be in accordance with the SFDB Method Statement and Installation Manual. Erection tools should be of suitable quality to avoid surface contamination. Smaller panels may be manually manoeuvred into position.

All lifting shall be carried out by competent personnel in accordance with the SFDB Installation Manual (ref. V 0.1 16.05.2022) and site-specific safety statement. Care is needed to avoid scratching the surface of any exposed LGS members. Frames must be stored on a dry, clean, level base with a suitable packing to prevent damage and must not be dropped or allowed to rest on projecting objects. Once panels are delivered to site all panels must be stored under a tarp for protection against the elements unless the elements are being fitted on the same day.

Flooring and other ancillary items such as insulation, boarding and cavity barrier must also be kept dry and stored on a firm level base.

2.5.2 Safe Handling

For every site a specific risk assessment must be created in order to access the risks involved with the handling and installation of the steel frame panels and any ancillary products.

Panels should always be moved using a crane or teleporter supplied by the steel frame installer or contractor (project specific) using the pre-attached lifting eyes on each panel or via slings. The only exception to this is small panels below a safe weight limit as specified in the risk assessment. The ends of all steel sections are sharp, gloves must always be worn when moving steel products.

2.5.3 Traceability

The SFDB CAM software assists the tailor made custom designed roll formers in arranging production groups and complex punching operations. The software also directs dynamic inkjet printing for parts identification and positioning ensuring all pieces are identified for accurate and fast assembly.

Each assembly drawing contains the unique identification number for each steel member. This allows for ease of assembly by the assemblers.

2.5.4 Typical Material List Supplied to Site

With each customised delivery to site, a comprehensive bill of materials is supplied. This bill of materials gives a detailed list of all components delivered and fixing schedule to site to complete the installation of the LGS building.

All panels are individually numbered using the marking system to correspond with the erection drawings supplied with the bill of materials. This

marking system facilitates speed and accuracy during assembly and erection on site.

2.6 INSTALLATION

2.6.1 General

Site installation must only be carried out by approved licensed installers employed by SFDB or by a specialist sub-contractor under the supervision of SFDB and in accordance with the SFDB Installation Manual (ref. V 0.1 16.05.2022). In any scenario, the SFDB is responsible for site inspections and sign off in accordance with Building Regulations.

Installers are approved once they have undergone on-site training, and understand the fundamental structural principals of the system, fire stopping requirements, tolerances, importance of weathering, storage and handling of the LGS panels and all other relevant information. Installers must have installed panels under the guidance of a qualified installer and shall have a signed record of training.

All off-loading and erection should be in accordance with the SFDB method statement, erection procedures and the lifting plan. Care must be taken to avoid any damage to the steel frame components during lifting and connection brackets during transportation and installation.

A SFDB Structural Engineer must assess the adequacy of the design of the proposed superstructure of the building system in accordance with the SFDB Inspection Plan and the DHLGH *Code of Practice for Inspecting and Certifying Buildings and Works*.

2.6.2 Site Supervision

The approved installation contractors are subject to supervision by a SFDB Site Manager. Typically, the SFDB site manager will agree a schedule of inspections with the Erection Contractor. The Supervisor of the Erection Crew is responsible for the quality and productivity of work carried out by the Erection Crew.

The Erection Supervisor reports directly to the SFDB Site Manager to ensure all work follows the requirements of the design drawings and the requirements of SFDB certification for the building.

SFDB employ a full-time site manager who works closely with the erection supervisor, and the Main Contractor responsible for providing the concrete substructure. The Main Contractor is responsible for ensuring all concrete slabs are within the engineer's specified tolerances before panels are installed on site. No panels are installed until the SFDB Site Manager approves the concrete base that the panels are being fixed to.

Each building has its own quality control file which is kept on site by the SFDB Site Manager. All fixings and brackets between panels are visually inspected, periodically photographed and recorded in the quality control file. The Site Manager also inspects and records all fire stopping performed on site. Any defects noted are recorded, photographed where possible and notified in writing to the Erection Supervisor. The Site Manager will inspect and approve the remediation before work can proceed. The approved LGS Erection Contractors are subject to continuous supervision by the SFDB Site Manager.

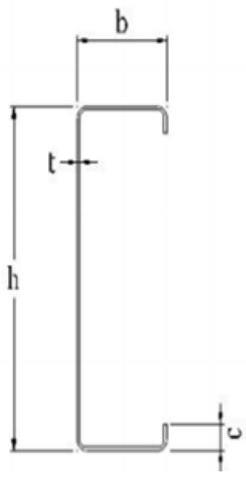
The Main Contractor appoints a cladding contractor who is responsible for all fixings and brackets between the external cladding and the LGS system. All cladding connections to the LGS system are agreed between the cladding contractor, façade engineer and SFDB Structural Engineer to ensure that LGS system structure is designed to support cladding loads.

The Main Contractor must also appoint a competent Fire Engineer to inspect fire stopping, cavity closing and service shafts. This is to ensure that they are in compliance with the Fire Engineer project specific fire strategy for the building. Any defects noted are recorded, photographed where possible and notified in writing to the installation supervisor. SFDB will inspect and approve the remediation before work can proceed.

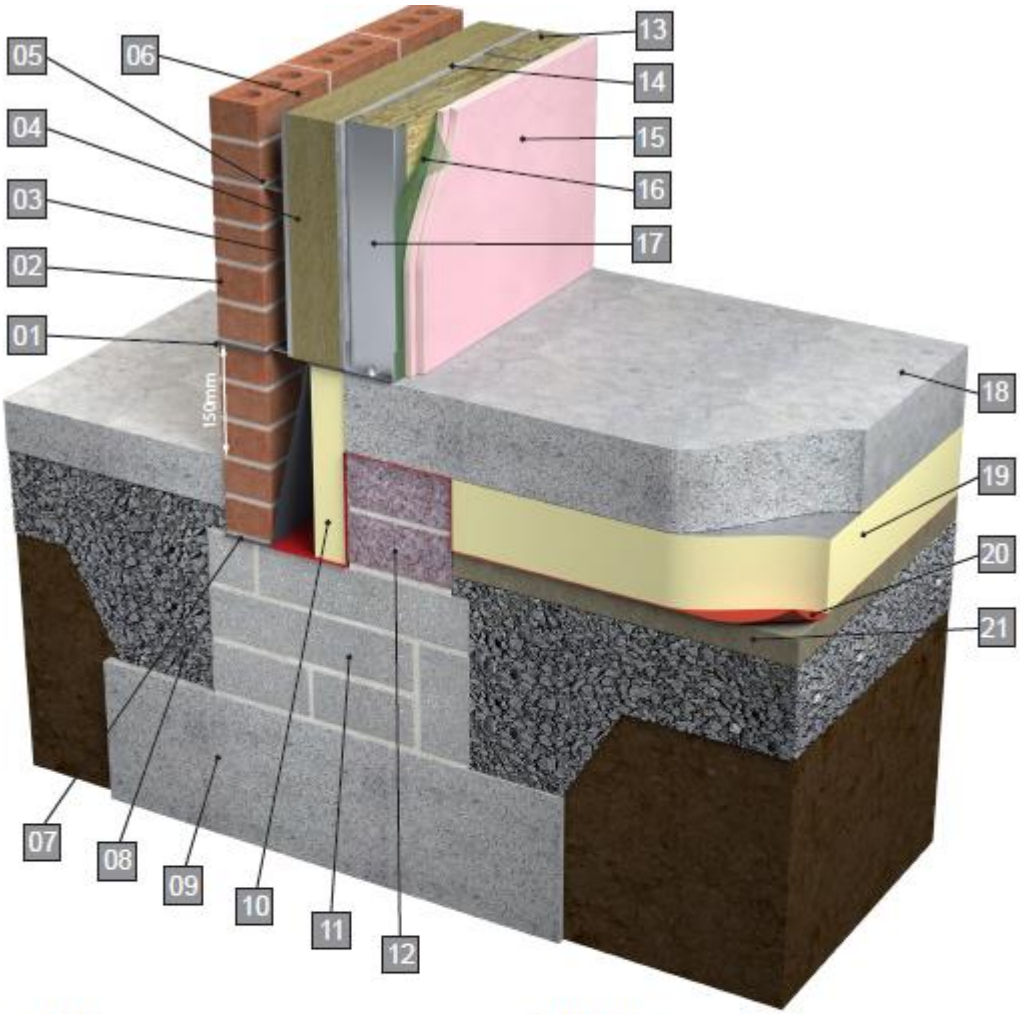
2.6.3 Plasterboard Installation

The proper application of plasterboard to the steel frame members is critical for both fire and sound performance. Attention shall be given to proper and practical detailing on the part of the designer and a high standard of workmanship on behalf of SFDB. Plasterboard, in addition to all cavity barriers and fire stops on all walls and floors must be fully checked on site and signed off in accordance with project specific details by the appropriate personnel. All boarding that provides fire resistance must conform to the specification given in Table 3.

Table 1: LGS Profiles and properties					
SFDB – LGS Frame Profile					
Component Type	**Grade of steel**	**Typical Section Details (mm)**			
		Depth (h)	**Width (b)**	**Lip (c)**	**Thickness (t)**
Wall Stud	S390, S450, S550	89-100	45-51	0-15	1.0 - 2.0
Wall Stud /Roof Truss	S390, S450, S550	89-100	45-51	0-15	1.0 - 2.0
Wall Stud/Roof Truss /Floor Joist	S390, S450, S550	89-150	45-51	0-15	1.0 - 3.0
Floor Joist	S390, S450, S550	200-250	45-51	0-15	1.0 - 3.0



Note: 30,60 & 90min fire resistance build-ups are shown in the following details for illustrative purposes only.



01. DPC

02. 102mm brickwork outer leaf.

03. S.S. Wall Tie Channel fixed through insulation to LGS Frame.

04. Protherm Max Plus Insulation to specification.

05. Cavity Wall Tie.

06. 50mm Drained/Ventilated cavity.

07. Stepped DPC

08. Drained Backfill.

09. R.C. foundation to structural engineers specification.

10. PIR inslation to specification to slab edge.

11. Rising wall.

12. Thermal block course to specification.

13. Stone mineral wool to specification. (min. 22kg/m³)

14. 12mm A2 Versapanel.

15. Type F plasterboard lining to provide adequate protection to steel frame in accordance with this Certificate.

16. Air & Vapour control layer (AVCL).

17. 100mm LGS stud frame.

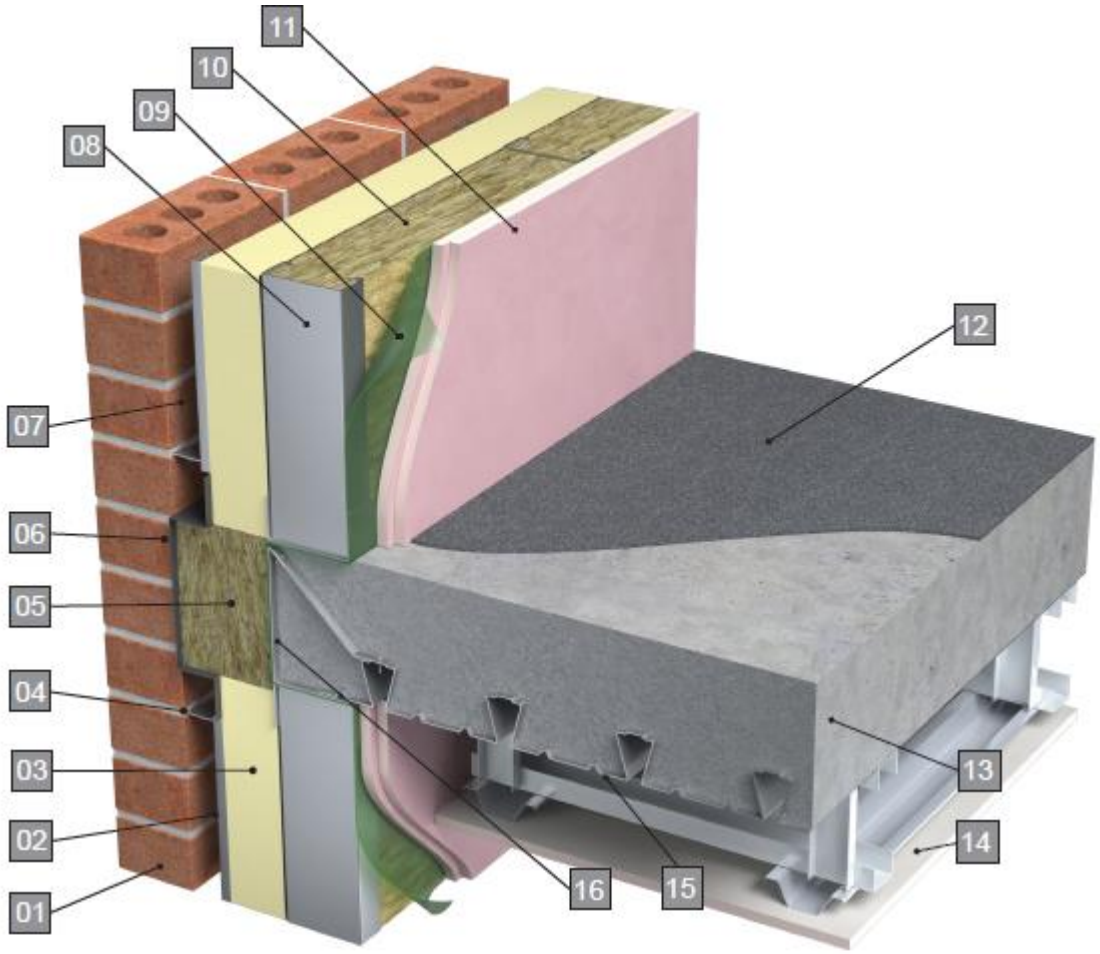
18 . Concrete floor slab to specification.

19 . Floor insulation to specification.

20 . DPM / Radon barrier.

21 . Sand Blinding

Figure 1: External Wall to Insulated foundation detail



01. 102mm brickwork outer leaf.

02. S.S. Wall Tie Channel fixed through insulation to LGS Frame.

03. PIR Insulation to specification.

04. Cavity Wall Tie.

05. Cavity Barrier to specification.

06. DPC wrapped around cavity barrier.

07. 50mm Drained/Ventilated cavity.

08. 100mm LGS stud frame.

09. Air & Vapour control layer (AVCL) to specification.

10. Stone mineral wool to specification Min. density (22kg/m²).

11. Type F plasterboard lining to provide adequate protection to steel frame in accordance with this Certificate.

12. 4-6mm Cork matting resilient layer installed by others and in accordance with TGD Part E.

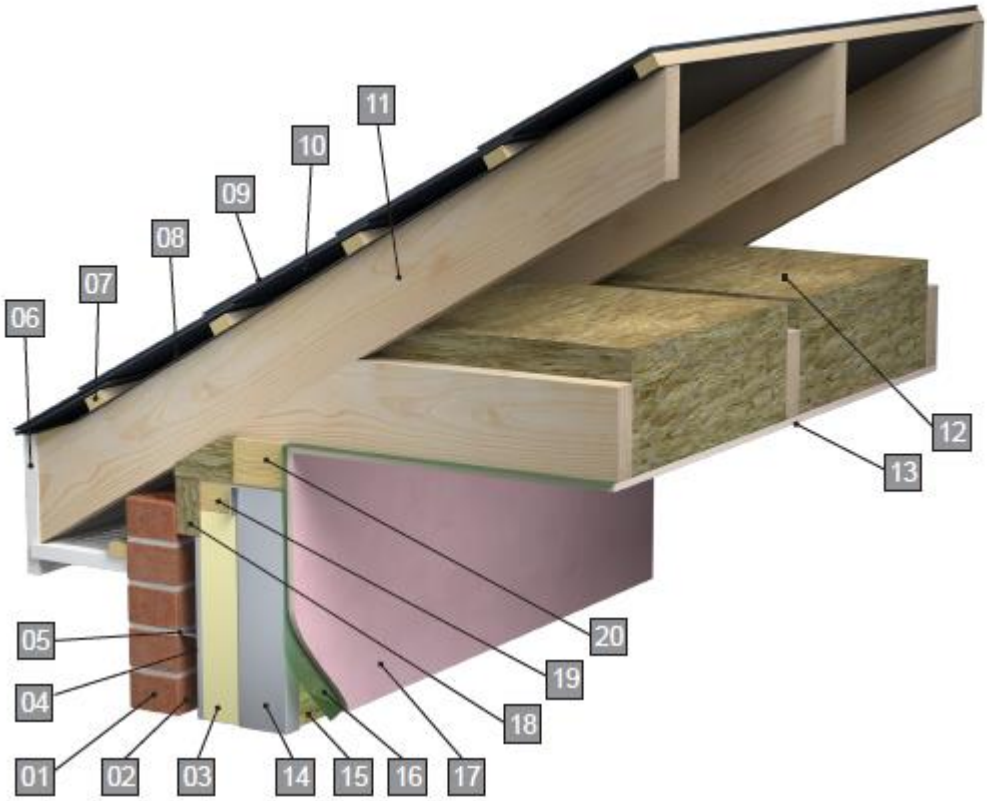
13. Composite concrete metal deck to specifications.

14. Plasterboard on suspended ceiling by others.

15. Profiled metal floor deck to specification.

16. Composite deck edge trim.

Figure 2: External Wall and Compartment Floor Junction



01. 102mm brickwork outer leaf.

02. 50mm Drained/Ventilated cavity.

03. PIR Insulation to specification.

04. S.S. Wall Tie Channel fixed through insulation to LGS Frame.

05. Cavity Wall Tie.

06. Fascia.

07. Treated timber battens.

08. Roofing felt to specification.

09. Roofing finish to specification.

10. Roof ventilation gap.

11. Roof truss to specification.

12. Roof insulation to specification.

13. Fire protection (if required) to roof trusses in accordance with Building regulations .

14. 100mm LGS stud frame.

15. 100mm Stone mineral wool to specification. (Min. 22kg/m³)

16. Air & Vapour control layer (AVCL).

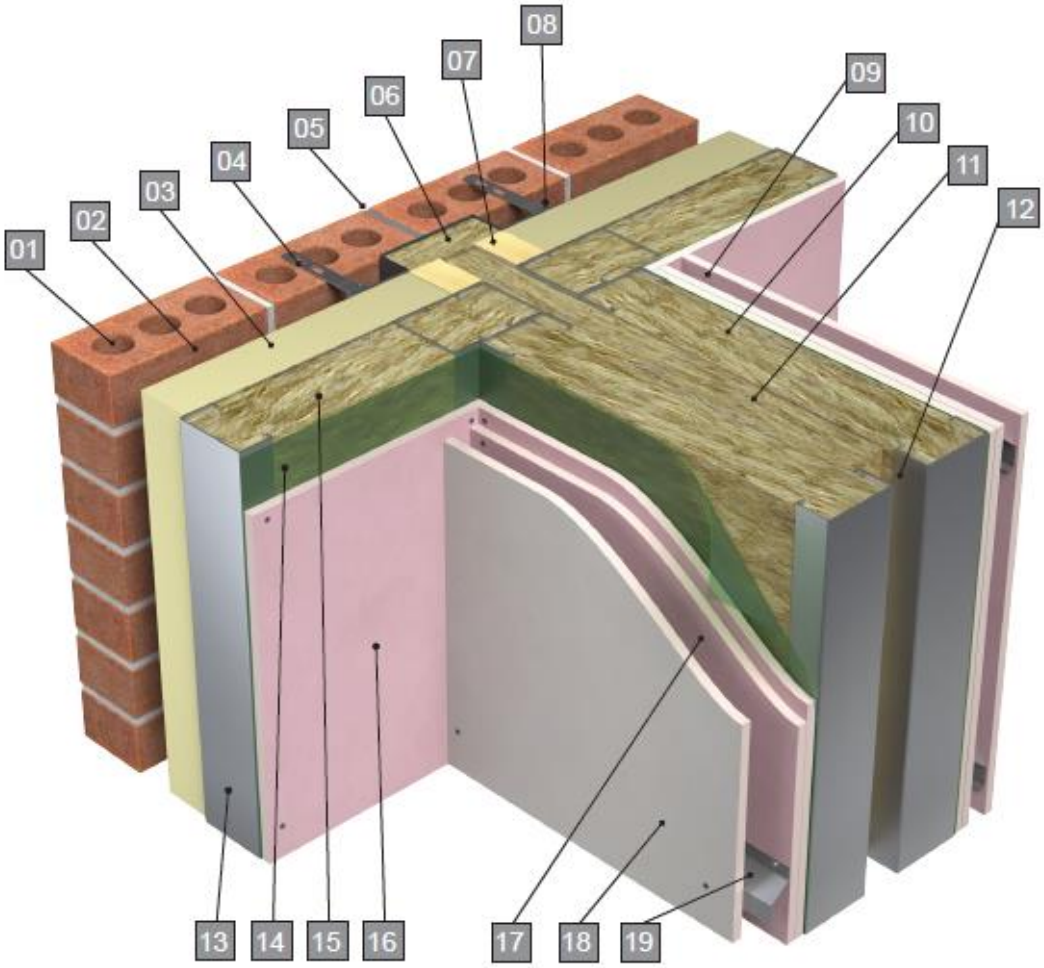
17. Type F plasterboard lining to provide adequate protection to steel frame in accordance with this Certificate.

18. Proprietary cavity closer to specification.

19. Treated timber batten.

20. Treated timber wall plate to specification.

Figure 3: Eaves Detail



01. 102mm brickwork outer leaf.

02. 50mm Drained/Ventilated cavity.

03. PIR Insulation to specification.

04. Cavity Wall Tie.

05. Movement Joint.

06. DPC wrapped Cavity Barrier mechanically fixed back to substrate with non-combustible approved fixings to manufacturer's specification.

07. Treated timber batten.

08. S.S. Wall Tie Channel fixed through insulation to LGS Frame.

09. Sevice cavity.

10. Stone mineral wool to specification within separating wall, Min. density (22kg/m²).

11. 600mm section of stone mineral wool insulation.

12. 50mm Cavity.

13. 100mm LGS stud frame.

14. Air & Vapour control layer (AVCL) to specification.

15. Stone mineral wool to specification Min. density (22kg/m²).

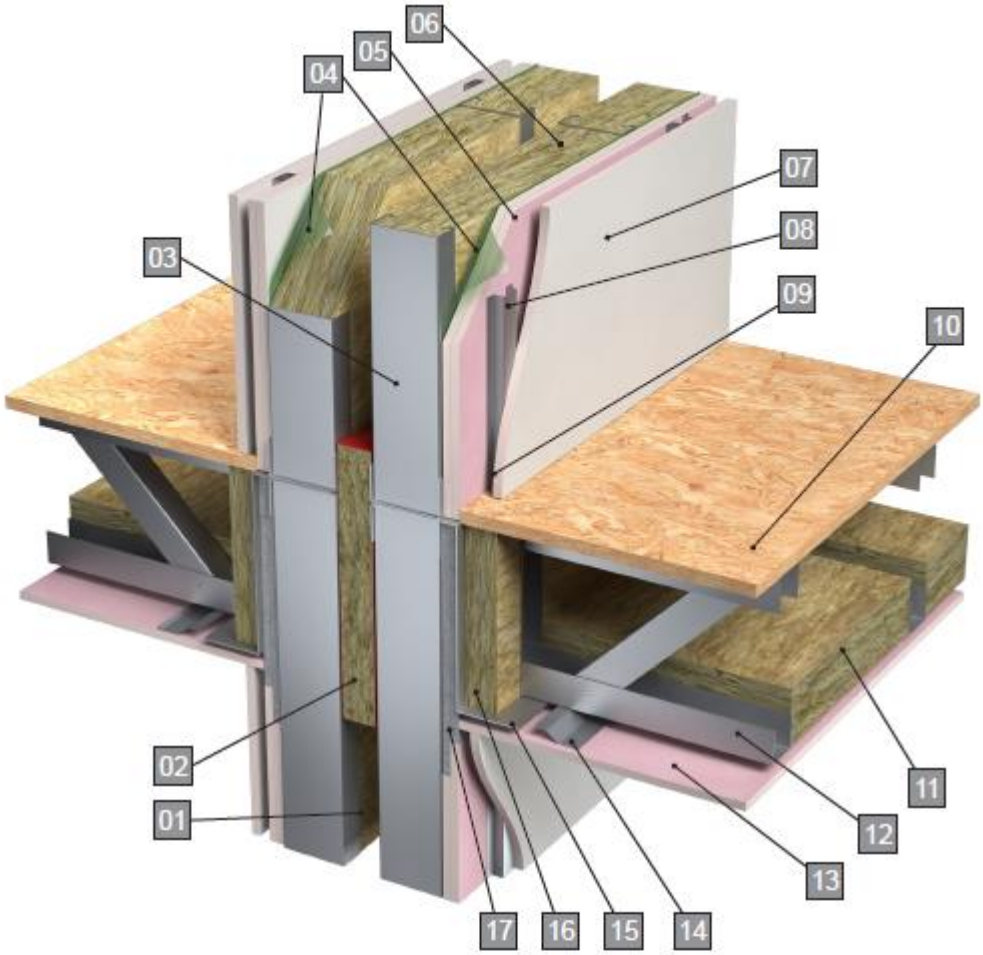
16. Type F plasterboard lining to provide adequate protection to steel frame in accordance with this Certificate.

17. Weather Defense board and Type F plasterboard lining to provide adequate protection to steel frame in accordance with thisCertificate

18. 12.5mm Type A plasterboard to specification to form service cavity if required.

19. 16mm Resilient bar to form service cavity if required.

Figure 4: External wall to Separating wall junction



01. 50mm cavity.

02. Stone mineral wool batt to specification.

03. 89 - 100mm LGS stud frame.

04. Air & Vapour control layer (AVCL) to specification.

05. Weather Defence board and Type F plasterboard lining to provide adequate protection to steel frame in accordance with this Certificate.

06. Stone mineral wool to specification Min density 22kg/m³.

07. 12.5mm Type A plasterboard to form service cavity if required.

08. Top-hat to form service cavity.

09. Isolation strip.

10. 22mm OSB3 board.

11. Stone mineral wool cavity closer with protective sleeve to specification.

12. 250mm LGS truss / joist to specification.

13. Ceiling plasterboard to specification. (1 x 12.5mm Type F - 30min FR)

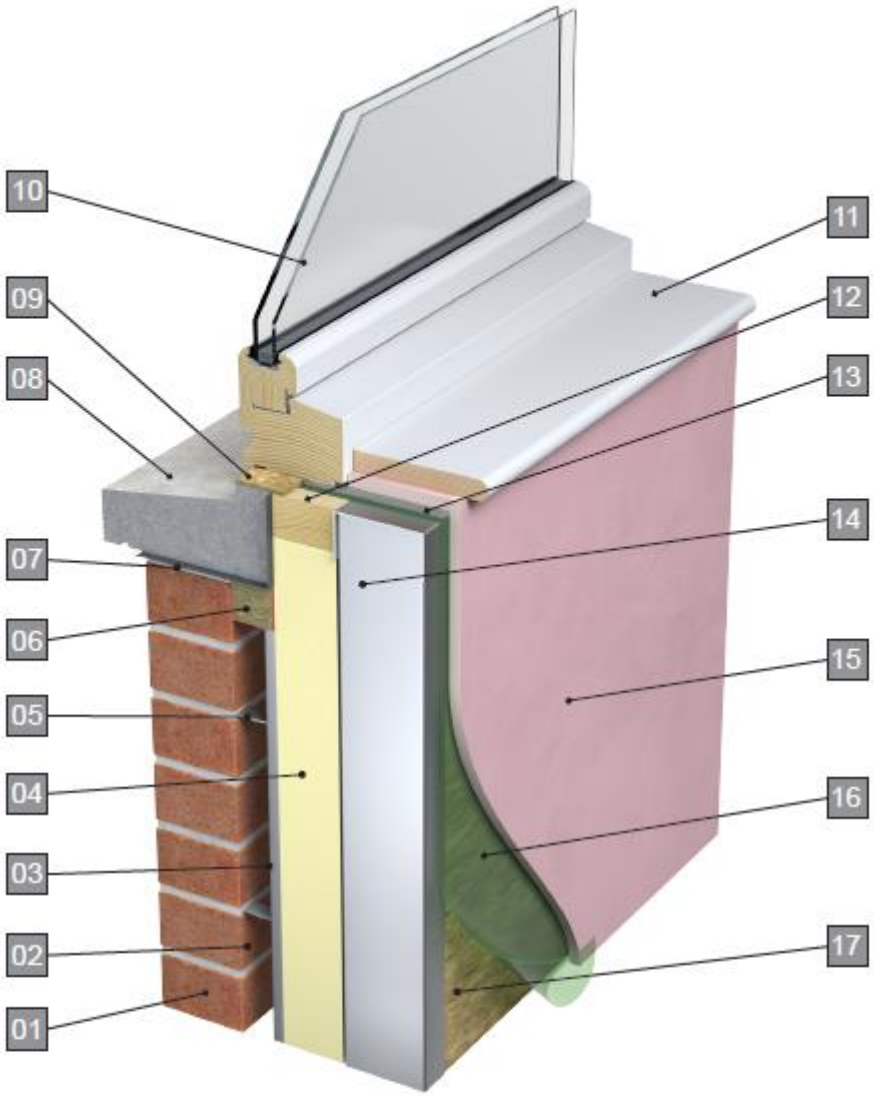
14. 16mm resilient bar.

15. Z hanger / C hanger to specification.

16. Stone mineral wool batt to specification.

17. Staggered Class 0 board lining to provide adequate protection to steel frame in accordance with this Certificate.

Figure 5: Intermediate Floor to Compartment Wall Detail



01. 102mm brickwork outer leaf.

02. 50mm Drained/Ventilated cavity.

03. S.S. Wall Tie Channel fixed through insulation to LGS Frame.

04. PIR Insulation to specification.

05. Cavity Wall Tie.

06. Cavity Barrier.

07. DPC wrapped around cill.

08. Pre-cast concrete cill.

09. Compressible joint strip to specification.

10. Window to specification including any plates or brackets required for fixing purposes.

11. Window board.

12. Mineral wool cavity closer to specification.

13. Window support plate fixed to LGS stud. (To specification)

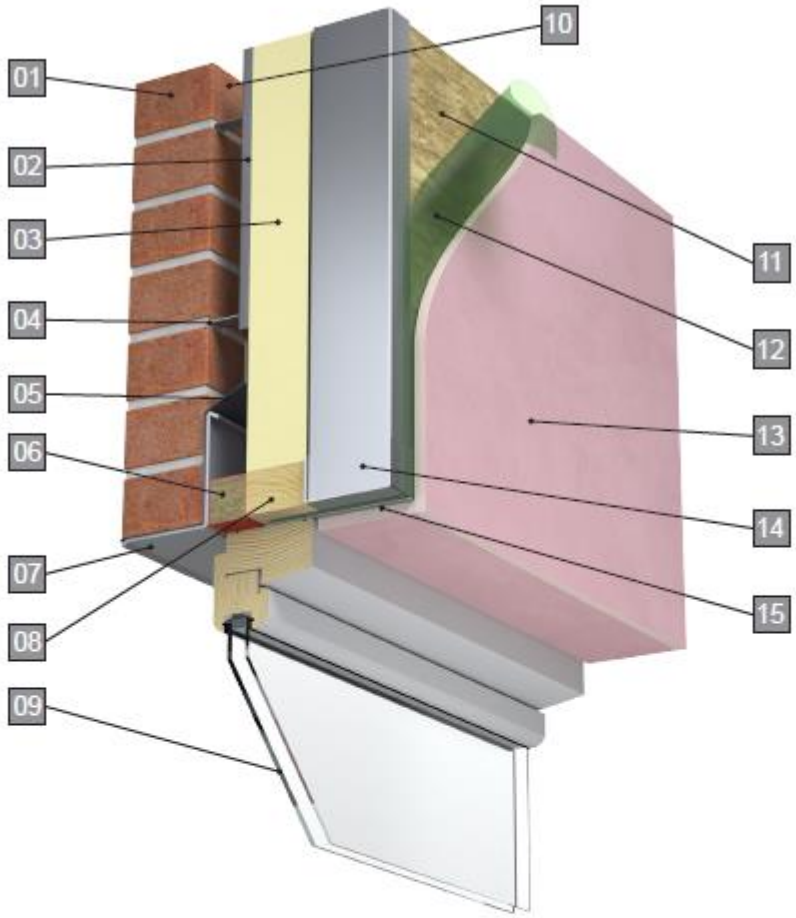
14. 100mm LGS stud frame.

15. Type F plasterboard lining to provide adequate protection to steel frame in accordance with this Certificate

16. Air & Vapour control layer (AVCL) to specification.

17. Stone mineral wool to specification Min 22kg/m³.

Figure 6: Window Sill Detail



01. 102mm brickwork outer leaf.

02. S.S. Wall Tie Channel fixed through insulation to LGS Frame.

03. PIR Insulation to specification.

04. Cavity Wall Tie.

05. DPC. Adhesive tape fixing DPC to insulation.

06. Cavity Barrier.

07. Galvanised steel lintel.

08. Treated timber batten.

09. Window to specification including any plates or brackets required for fixing purposes.

10. 50mm Drained/Ventilated cavity.

11. Stone mineral wool to specification Min density 22kg/m3.

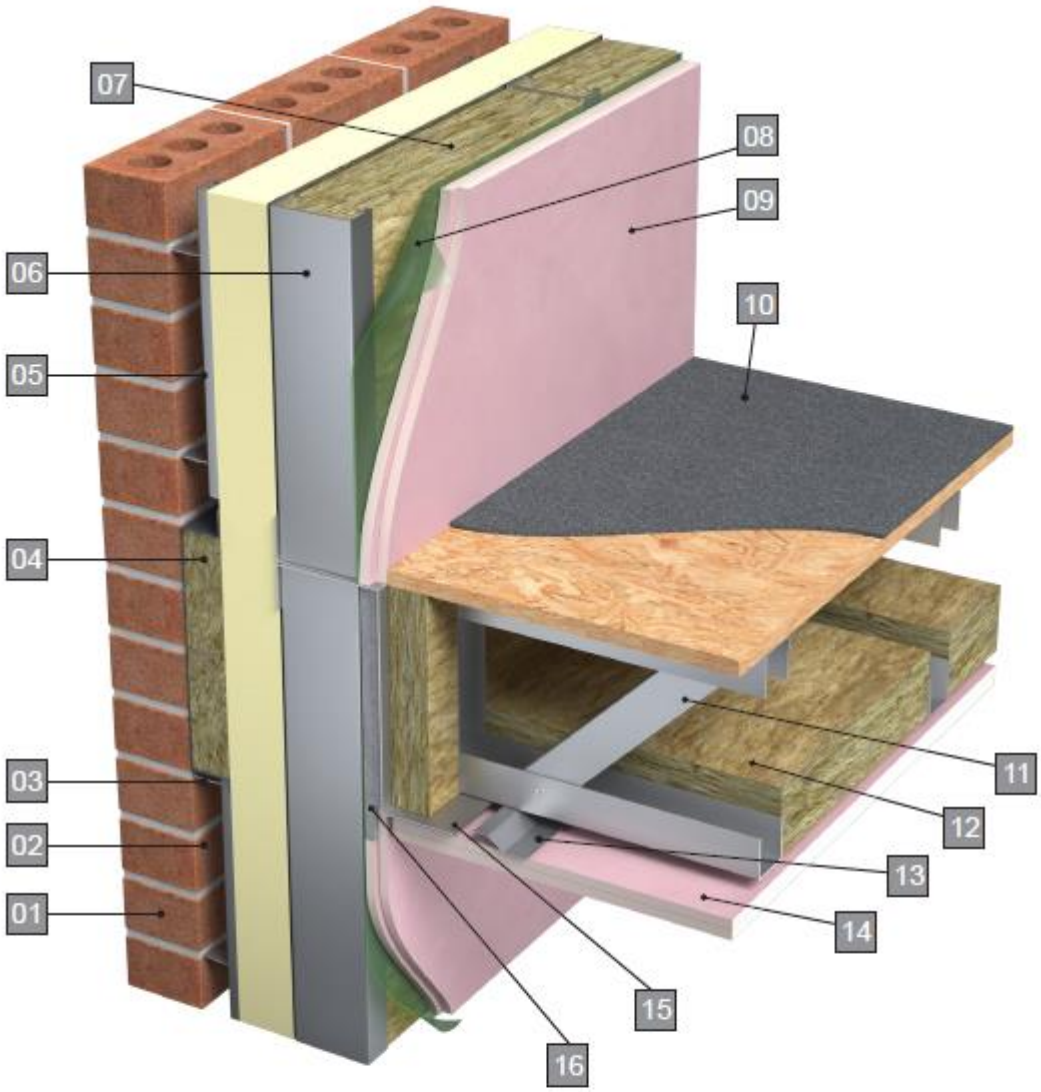
12. Air & Vapour control layer (AVCL) to specification.

13. Type F plasterboard lining to provide adequate protection to steel frame in accordance with this Certificate.

14. 100mm LGS stud frame.

15. Window support plate fixed to LGS stud. (To specification)

Figure 7: Window Head Detail



01. 102mm Brick outer leaf.

02. 50mm cavity.

03. Cavity wall tie.

04. Proprietary cavity closer to specification to cover full depth of the floor as per TGDs to Part B of the Building Regulations.

05. PIR Insulation to specification.

06. 89 - 100mm LGS stud frame.

07. 100mm Stone mineral wool to specification (Min 22kg/m³).

08. Air & vapour control layer (AVCL).

09. 12.5mm Type F Plasterboard to specification.

10. 18mm OSB deck.

11. LGS truss / joist to specification.

12. Insulation to specification.

13. RB1 Resilient Bar to specification.

14. Ceiling Plasterboard to specification.

15. Z hanger / C hanger to specification.

16. Staggered Class 0 board to specification.

Figure 8: Compartment floor detail

3.1 STRENGTH AND STABILITY

3.1.1 General

The Architectural and Engineering Design Team are responsible for ensuring that architectural drawings and overall building design comply with the Building Regulations. SFDB, using an experienced Chartered Structural Engineer, are responsible for the structural design of the SFDB LGS Building System.

3.1.2 Certificate of Structural Compliance

SFDB are responsible for the design, manufacture, supply, installation and certification of the system.

3.1.3 Superstructure Design

The design must be in accordance with I.S. EN 1990[14] and IS EN 1993-1[7].

3.1.4 Substructure Design

The design of the building's substructure is outside the scope of this certificate.

3.1.5 Infill Panels Design

Non-load bearing partitions and walls are designed in conformance with the criteria set out in I.S. EN 1993-1[7], BS 5234-1[18] and I.S. EN 10143[19].

3.1.6 Design

The design of a typical building has been examined by the NSAI Agrément and demonstrates compliance with the Codes of Practice and Irish Building Regulations.

During the design process, loads are determined by SFDB depending on the intended use of the building and Client's requirements, using I.S. EN 1991-1 suite and designed with reference to:

- Dead and imposed load to I.S. EN 1991-1-1[15]
- Snow load to I.S. EN 1991-1-3[17]
- Wind loads based on I.S. EN 1991-1-4[16]

Design wind and snow loads should be based on Diagrams 1 and 14 of TGD to Part A of the Building Regulations.

3.1.7 Structural Testing

Where it is required, structural testing can be used to verify the relevant aspects of the structure where the design falls outside the scope of I.S. EN 1993-1-1[7]. No structural testing has been carried out as part of NSAI Agrément certification assessment.

3.2 FIRE

3.2.1 General

Buildings using the SFDB LGS Building System must be designed to comply with the relevant requirements of TGDs to Part B of the Building Regulations.

The building details of the system incorporate suitable cavity barriers and fire stops to satisfy the requirements of Section 3 of TGDs to Part B of the Building Regulations. Additional guidance is contained in BS 9991[22] & BS 9999[13].

The SFDB LGS Building System must be designed with the required boarding specification to meet the minimum requirements of Table A1 and Table A2 to TGDs to Part B of the Building Regulations for all purpose groups to which this certificate applies, and any other building specific structural fire performance requirements.

All roof coverings in conjunction with the system shall be designated AA/B_{ROOF} (t4) per TGDs to Part B of the Building Regulations. Other NSAI Agrément approved roof coverings may also be used with the system under the guidance of the SFDB nominated Chartered Engineer.

Table 2 illustrates the surface spread of flame characteristics for typical materials used in the SFDB LGS Building System. A more comprehensive list of material and product fire performance ratings can be found in Table A6 of TGDs to Part B of the Building Regulations.

Table 2: Surface Spread of Flame

Material	National Rating	Euroclass
Brickwork/Blockwork	Class 0	A1
Weather Resistant Boarding	Class 0	A2 – s1, d0
Timber Boarding	Class 3	D – s3, d2
Internal Fire Rated Plasterboard before decoration	Class 0	A2 – s1, d0
Slates/Tiles	AA	BRoof(t4)

3.2.2 Fire Resistance of Compartment Walls

Table 3 lists the fire resistance tests for non-loadbearing and loadbearing elements, in accordance with I.S. EN 1364-1[33] and I.S. EN 1365-1[20]. All fire testing has been carried out with service penetrations in the walls.

Any compartment wall providing fire compartmentation shall be carried up through any roof space and brought up to the underside of the roof cladding to provide adequate fire stopping.

3.2.3 Fire Resistance of Compartment Floors

The fire resistance of the composite concrete metal deck is provided from the underside of the deck as detailed in Table 3 of this Certificate. The composite deck can provide up to 90 minutes load bearing fire resistance from a combination of the reinforcement steel bars within the trough of the decking and adequate concrete cover to the reinforcement steel bars. The composite concrete metal deck shall be used as a compartment floor in all buildings that height of the top storey is 10m or more. In all buildings of purpose group 2a (Residential Institutional) compartment floor must be constructed of composite concrete metal deck. Refer to Section 3 of TGDs to Part B for more information.

The fire resistance of the LGS compartment floor as per Figure 8 in this certificate is provided from the underside of the floor by adequate boarding as detailed in Table 3 of this Certificate. Use of the SFDB LGS floors in buildings with top storey height of 10m or more as well as use of the LGS compartment floor for buildings of purpose group 2a (Residential Institutional as per TGDs to Part B)is not permitted.

3.3 AIRTIGHTNESS

Airtightness testing is a mandatory requirement of TGDs to Part L of the Building Regulations. Testing must be carried out as specified in I.S. EN ISO 9972[23] with additional guidance given in the NSAI's "Certified Air Tightness Tester Scheme Master Document" and TGDs to Part L of the Building Regulations.

The air tight tape and AVCL must be installed by others. Location of AVCL is shown on Figures 1 to 8 of this Certificate.

3.4 WEATHERTIGHTNESS AND DAMP PROOFING

The system has adequate DPCs and DPMs to resist the passage of moisture. Roof coverings will provide adequate weather resistance when completed in accordance with this Certificate and the manufacturer's instructions.

Buildings constructed using the SFDB building System can readily accommodate adequate rainwater gutters and down pipes.

3.4.1 External Cladding

Where the external facade is constructed of a masonry/brick outer leaf it must incorporate a minimum 40mm clear drained, ventilated cavity, to minimise the risk of water reaching the cavity face of the inner leaf.

The external leaf of the SFDB LGS Building System can be constructed of traditional brick/block to I.S. 325-1[5] and I.S. EN 1996-1-1[6], or NSAI Agrément approved external cladding system. Where such cladding systems are used, it is important the maximum storey height and all other relevant requirements in their NSAI Agrément certificate are complied with.

3.5 WINDOWS AND DOORS

Windows and doors are outside the scope of this Certificate. However, Figures 6 and 7 give indicative details of how they can be installed to limit heat loss and moisture penetration.

Other considerations for the design of windows and doors include:

- Escape in the event of fire,
- Safety and security,
- Thermal performance.

Note: NSAI's Window Energy Performance (WEP) Scheme gives full details of the energy performance aspects of window systems.

3.6 THERMAL PERFORMANCE

The panels were assessed as a hybrid warm frame system where the insulation is included both outside of the steel structure and in between the steel components. The SFDB LGS Building System can be provided for a wide range of required elemental U-values.

Some building elements, namely the roof, ground floor, windows and doors may be site and project specific. Therefore, the U-value of these elements must be calculated before overall compliance with Part L of the Building Regulations can be determined.

TGDs to Part L of the Building Regulations directs users to Digest 465 "U-values for light steel construction" published by BRE. A more precise

result is obtained by using a numerical method which conforms to I.S. EN ISO 10211[4].

3.6.1 Limiting Thermal Bridging

The linear thermal transmittance ψ-value (Psi-value) describes the heat loss associated with junctions and around openings. The certificate holder has carried out ψ-value calculations for a range of thermally bridged junctions as well as used Acceptable Construction Details to meet the requirements of Building Regulations.

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 taken. When all 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 (HTB) 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 HTB by the exposed surface area.

ψ-values for other junctions outside the scope of this certificate should be assessed in accordance with the BRE IP 1/06[2] and BRE Report BR 497[3] in accordance with Appendix D of TGD to Part L of the Building Regulations.

3.6.2 Internal Surface Condensation

As part of the assessment carried out to determine the 'Ψ' values, internal surface temperatures (fRsi) are also checked. When internal surface temperatures (fRsi) are greater than 0.75, best practice will have been adopted to safeguard against the risk of surface condensation occurring under normal occupancy and humidity class levels.

3.7 INTERSTITIAL CONDENSATION

3.7.1 Condensation in Walls

Air and vapour control layer is provided behind the plasterboard for protection against interstitial condensation.

3.7.2 Condensation in Roofs

Roof ventilation should be provided in accordance with TGD Part F of the Building Regulations and the recommendations of BS 5250[1].
In the case of cold flat roofs, a cross-ventilated void, not less than 50mm deep, between the slab or deck and insulation should be provided in conjunction with the AVCL being provided on the warm side of the insulation. Ventilation openings should be provided to every roof void along two opposite sides of the roof and should be equivalent in area to a continuous opening of not less than 25mm at each side. It should also be noted that the dimensions of the cross-ventilated void and the ventilation depends on the size of the roof.

In the case of warm flat roofs, the risk of surface condensation is dependent on the nature of the supporting structure. With all flat roofs, there is a risk of interstitial condensation forming between the thermal insulation and the waterproof covering. To avoid this risk, an AVCL should be provided immediately above the supporting structure.

In the case of inverted flat roofs, it is essential that the thermal insulation used resists water absorption and is sufficiently load bearing to support the protective finish of ballast, paving or soil.

3.8 SOUND

As per TGD to Part E to the Building Regulation, all building, post completion must be subjected to acoustic testing.

3.8.1 Compartment Floor Composite Concrete Metal Deck

The composite concrete metal deck can meet either the requirements of a Type 1 floor concrete base with a soft covering or a Type 2 Floor concrete base with a floating floor as described in TGD to Part E of the Building Regulations.

In both floor types the resistance to airborne sound depends mainly on the mass of the concrete base, plasterboard ceiling and good flanking detailing. Minimum mass area of concrete shall be as per Section 4 of the TGD to Part E of the Building Regulations.

In a Type 1 floor the soft covering reduces the impact sound at source. The impact sound reduction is achieved with the use of a suitable approved layer of soft floor covering. The covering is not intended to be the final finished floor but is intended to act as a resilient layer beneath different floor finishes such as vinyl, carpet, timber flooring, tiles etc.

In the Type 2 floor with a concrete base and a floating layer, the floating layer reduces the transmission of impact sound to the base and to the surrounding construction.

3.8.2 Compartment Floor Steel Lattice Truss or C-joists

The steel lattice truss or C-joists compartment floor can meet requirements of TGD to Part E of

the Building Regulations by correct detailing of the floor and material specification.
Resilient layer installed on OSB deck shall be specified by the Client's Architect with advice from the SFDB. Resilient layer between the OSB deck and floor finishing is crucial to install to achieve adequate acoustic performance.

Floor build-up elements such as mineral wool between the joists, adequate joists depth and resilient bars at ceiling boarding must be provided to ensure adequate acoustic performance is provided.

3.9 MAINTENANCE

Maintenance will be required at a level comparable with that for buildings of traditional construction. The elimination of wet trades in the construction of the inner leaf of external walls reduces drying time and can reduce the incidence of superficial cracking early in the life of the building.

Repainting should be carried out in accordance with the relevant recommendations of BS 6150[26]. Timber boarding, fascia, soffits etc. where used, should be treated with an appropriate paint system or translucent stain and should be maintained by periodic re-coating using a paint or stain suitable for external applications, applied in accordance with the manufacturer's instructions.

It shall be the responsibility of the building owner to monitor the condition of the building and commission maintenance and repairs as required. It is envisaged these will be carried out by the building owner in accordance with BS 8210[28].

4.1 BEHAVIOUR IN FIRE

4.1.1 Fire Resistance

Assessment of test results shows that buildings constructed using the SFDB LGS Building System can meet the Building Regulation requirements in relation to fire resistance as shown in Table 3.

4.2 THERMAL PROPERTIES

Assessment of U-value calculations shows that the SFDB LGS Building System meets and can exceed the maximum back-stop elemental U-value requirements of TGDs to Part L of the Building Regulations.

Tables 4 – 6 of this Certificate gives the various elemental wall U-values in W/m^2K with a traditional 100mm masonry cladding. Where the SFDB system is used with NSAI Agrément certified cladding the U-values shall be provided by the NSAI approved thermal modeller as per Section 4.2.1 of this Certificate.

4.2.1 Limiting Thermal Bridging

Table 7 of this certificate gives ψ-values for a range of SFDB LGS Building System junctions. A full listing of ψ-value calculations, along with the building details on which calculations are based, are contained within the certificate holder's technical data sheets for ψ-values.

U-values and Ψ-values are to be calculated by an NSAI approved thermal modeller – a register of these can be found at https://www.nsai.ie/certification/agrement-certification/thermal-modellers-scheme/.

4.2.2 Internal Surface Condensation

Table 7 of this Certificate gives internal surface temperature factors (fRsi) for a range of building junctions.

The junctions of the SFDB LGS Building System have been assessed to comply with the requirements of TGDs to Part L of the Building Regulations.

4.3 INTERSTITIAL CONDENSATION

4.3.1 Condensation in Walls

Calculations to BS 5250[1] have been carried out for all possible wall build ups as covered by this certificate. They predict no interstitial condensation within the external wall and pass the risk criteria in I.S. EN ISO 13788[24].

4.4 SOUND

4.4.1 Separating Walls

The acoustic performance of the separating wall specified in Section 2.4.1 has been assessed by both on-site testing and comparison with Robust Standard Details for Separating Wall - Steel Frame E-WS-1 and SCI Publication P372 *Acoustic Detailing for Steel Construction* and through adopting best practice at salient junctions to minimise the effects of airborne, impact and flanking sound.

The separating wall in the SFDB Building System has been assessed and when constructed in accordance with this Certificate can meet the requirements of TGD to Part E of the Building Regulations.

4.4.2 Separating/Compartment Floors

Separating floor build up was assessed using SCI P322, TGD to Part E to the Building Regulations and acoustic on-site testing.

For compartment composite concrete metal deck floors the mass per unit area of floor build up meets the specification for a Type 2 separating floor and can meet the specifications for a Type 1 separating floor when complying with the guidelines in Section 4 of TGD to Part E of the Building Regulations. See Section 3.8.1.

For compartment steel lattice truss or C-joists floors, the correct detailing and material specification shall be provided as per Section 3.8.2 of this Certificate.

4.4.3 Acoustic Testing

Successful on-site acoustic tests were carried out on the SFDB Building System. The testing included sound insulation tests on separating walls in accordance with I.S. EN ISO 16283-1[29] and impact sound insulation to I.S. EN ISO 16283-2[30].

4.5 DURABILITY

The LGS structure has been assessed as capable of achieving a minimum design life of 60 years. The steel structure is constructed from steel members having a minimum $275g/m^2$. Zinc galvanised coating which will provide adequate protection to the steel members. In addition to this, the steel is kept in a "warmframe" environment, which should prolong the life of the steel.

The DPC and the galvanising will provide adequate protection to ensure that the bottom channel has a life equal to that of the other frame members.

The insulations are durable materials and will remain effective as an insulant for the life of the building. The roof, internal wall and ceiling linings and the outer leaf of the external wall shall be constructed from conventional durable materials.

4.6 TESTS AND ASSESSMENTS WERE CARRIED OUT TO DETERMINE THE FOLLOWING

- Structural strength and stability (racking resistance, load bearing capacity),
- Behaviour in relation to fire,
- System specific load bearing fire testing to I.S. EN 1365-1[20],
- On-site acoustic performance,
- Thermal insulation performance calculations,
- Desktop study on corrosion of fasteners in normal conditions with a view to a minimum 60-year design life,
- Compatibility with other materials,
- Risk of condensation both surface and interstitial,
- 3D thermal modelling of junction details in accordance with BRE IP 1/06[2].

4.7 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.

Table 3: Fire Data for Loadbearing Wall, Floor and Ceiling Elements				
Type	**Element:**	**Test Standard**	**Results**	**Purpose Group**
External Load Bearing Walls – Inside to Outside				
1	• Test conducted on 3000mm x 3000mm x 207mm (w x h x th) panel with total vertical load of 72kN • 6 No. LGS C-Studs (100x51x1.2mm) with noggins at mid height • Exposed side: 1No. layer 12.5mm Gyproc Fireline fixed using 25mm long drywall screws at 300mm centres. • 100mm stone mineral wool (22kg/m^3 density) fitted between studs • 80mm PIR insulation fixed to LGS frame with steel wall tie channel at 600mm centres • 2 No. Double Sockets were fitted on the fire side	I.S. EN 1365-1[20]	30 mins from inside	1(a), 1(b), 1(c), 1(d), 2(a), 2(b), 3, 4(a), 5, 7(b)
2	• Test conducted on 3000mm x 3000mm x 219mm (w x h x th) panel with total vertical load of 90kN • 6 No. LGS C-Studs (100x51x1.2mm) with noggins at mid height • Exposed side: 2No. layers of 12.5mm Gyproc Fireline fixed using 42mm long drywall screws at 300mm centres on both layers. • 100mm stone mineral wool (22kg/m^3 density) fitted between studs • 80mm PIR insulation fixed to LGS frame with steel wall tie channel at 600mm centres • 2 No. Double Sockets were fitted on the fire side	I.S. EN 1365-1[20]	60 mins from inside	1(a), 1(b), 1(c), 1(d), 2(a), 2(b), 3, 4(a), 5, 7(b)
3	• Assessment conducted on 2975mm x 3000mm (w x h) panel with total vertical load of 72kN • 6 No. LGS C-Studs (100x51x1.2mm) – with noggins at mid height • 100mm stone mineral wool (22kg/m^3 density) fitted between studs • Exposed side: Single layer of Gyproc Fireline Type F 12.5 mm thick using 25mm long drywall screws at 300mm centres. • Non-fire side: 12mm thk. A2 Versapanel fibre cement board using 41mm long wing tip counter sink screws at 600mm centres, 125mm Rockwool Rainscreen Duo Slab and wall tie channels fixed at 337.5mm ctrs (2 No. Double Sockets were fitted on the fire side)	I.S. EN 1365-1[20]	30 mins from inside	1(a), 1(b), 1(c), 1(d), 2(a), 2(b), 3, 4(a), 5, 7(b)
4	• Assessment conducted on 2975mm x 3000mm (w x h) panel with total vertical load of 90kN • 6 No. LGS C-Studs (100x51x1.2mm) – with noggins at mid height • 100mm stone mineral wool (22kg/m^3 density) fitted between studs • Exposed side: 2No. layers layer of Gyproc Fireline Type F 12.5 mm thick using 42mm long drywall screws at 300mm centres. • Non-fire side: 12mm thk. A2 Versapanel fibre cement board using 41mm long wing tip counter	I.S. EN 1365-1[20]	60 mins from inside	1(a), 1(b), 1(c), 1(d), 2(a), 2(b), 3, 4(a), 5, 7(b)

	sink screws at 600mm centres, 125mm Rockwool Rainscreen Duo Slab and wall tie channels fixed at 337.5mm ctrs • (2 No. Double Sockets were fitted on the fire side)			
5	• Assessment conducted on 2975mm x 3000mm (w x h) panel with total vertical load of 78kN • 6 No. LGS C-Studs (100x51x1.2mm) – with noggins at mid height • 100mm stone mineral wool (22kg/m^3 density) fitted between studs • Exposed side: 3No. layers layer of Gyproc Fireline Type F 12.5 mm thick using 35mm and 45mm long drywall screws at 300mm centres. • Non-fire side: 12mm thk. A2 Versapanel fibre cement board using 41mm long wing tip counter sink screws at 600mm centres, 120mm Rockwool Rainscreen Duo Slab and wall tie channels fixed at 337.5mm ctrs • (2 No. Double Sockets were fitted on the fire side)	I.S. EN 1365-1[20]	90 mins from inside	1(a), 1(b), 1(c), 1(d), 2(a), 2(b), 3, 4(a), 5, 7(b)
6	• Assessment conducted on 3000mm x 3000mm (w x h) panel with total vertical load of 72kN • 6No. LGS C-Studs (100x50x1.2mm) with noggins at mid height • 100mm stone mineral wool (22kg/m^3 density) fitted between studs • 1 No. layer of 12mm A2 Versapanel fibre cement board using 38mm long drywall screws at 600mm centres, 20mm Hadley spacer rail, 120mm Rockwool Rainscreen Duo Slab Insulation, basecoat render with glass fibre mesh (8mm thick) – as per Agrément certified external wall façade system specification • Exposed side: 1No. layer of Gyproc Fireline Type F 12.5 mm thick fixed using 25mm long drywall screws at 300mm centres • 2 No. Double Sockets were fitted on the fire side	I.S. EN 1365-1[20]	30 mins from inside	1(a), 1(b), 1(c), 1(d), 2(a), 2(b), 3, 4(a), 5, 7(b)
7	• Assessment conducted on 3000mm x 3000mm (w x h) panel with total vertical load of 78kN • 6No. LGS C-Studs (89x45x1.2mm) with noggins at mid height • 100mm stone mineral wool (22kg/m^3 density) fitted between studs • 1 No. layer of 12mm A2 Versapanel fibre cement board using 38mm long drywall screws at 600mm centres, 20mm Hadley spacer rail, 120mm Rockwool Rainscreen Duo Slab Insulation, basecoat render with glass fibre mesh (8mm thick) – as per Agrément certified external wall façade system specification • Exposed side: 2No. layers of Gyproc Fireline Type F 12.5 mm thick fixed using 25mm long and 42mm long drywall screws at 300mm centres • 2 No. Double Sockets were fitted on the fire side	I.S. EN 1365-1[20]	60 mins from inside	1(a), 1(b), 1(c), 1(d), 2(a), 2(b), 3, 4(a), 5, 7(b)

8	• Test conducted on 3000mm x 3000mm x 252mm (w x h x th) panel with total vertical load of 78kN • 6No. LGS C-Studs (89x45x1.2mm) with noggins at mid height • 100mm stone mineral wool (22kg/m^3 density) fitted between studs • 1 No. layer of 12mm A2 Versapanel fibre cement board using 38mm long drywall screws at 600mm centres, 20mm Hadley spacer rail, 120mm Rockwool Rainscreen Duo Slab Insulation, basecoat render with glass fibre mesh (8mm thick) – as per Agrément certified external wall façade system specification • Exposed side: 3No. layers of SINIAT GTEC Fireboard Type F 12.5 mm thick using 35mm long and 45mm long drywall screws at 300mm centres • 2 No. Double Sockets were fitted on the fire side	I.S. EN 1365-1[20]	90 mins from inside	1(a), 1(b), 1(c), 1(d), 2(a), 2(b), 3, 4(a), 5, 7(b)
External Load Bearing Walls – Outside to Inside				
9	• Test conducted on 3000mm x 3000mm x 320mm (w x h x th) panel with total vertical load of 78kN • 6No. LGS C-Studs (89x45x1.2mm) with noggins at mid height • 100mm stone mineral wool (22kg/m^3 density) fitted between studs • Exposed side: Single layer of 12mm A2 Versapanel fibre cement board fixed using 38mm long drywall screws at 600mm centres, 20mm Hadley spacer rail, 120mm Rockwool Rainscreen Duo Slab Insulation, basecoat render with glass fibre mesh (8mm thick) – as per Agrément certified external wall façade system specification • 1No. layer of SINIAT GTEC Fireboard Type F 12.5 mm thick using 25mm long drywall screws at 300mm centres	I.S. EN 1365-1[20]	120 mins from outside	1(a), 1(b), 1(c), 1(d), 2(a), 2(b), 3, 4(a), 5, 7(b)
Internal Load Bearing Walls				
10	• Test on 300mm x 3000mm x 125mm (w x h x th) panel with total vertical load of 72kN • 6 No. LGS C-Studs (100x51x1.2mm) with noggins at mid height • Exposed side: 1No. layer of Gyproc Fireline 12.5 mm thick using 25mm long drywall screws at 300mm centres • 100mm stone mineral wool (22kg/m^3 density) fitted between studs • 1No. layer of Gyproc Fireline 12.5 mm thick using 25mm long drywall screws at 300mm centres • (2 No. Double Sockets fitted on each side)	I.S. EN 1365-1[20]	30 mins from either side	1(a), 1(b), 1(c), 1(d), 2(a), 2(b), 3, 4(a), 5, 7(b)
11	• Assessment on 300mm x 3000mm (w x h) panel with total vertical load of 90kN • 6 No. LGS C-Studs (100x51x1.2mm) with noggins at mid height • Exposed side: 2No. layers of Gyproc Fireline 12.5 mm thick using 42mm long drywall screws at 300mm centres • 100mm stone mineral wool (22kg/m^3 density) fitted between studs	I.S. EN 1365-1[20]	60 mins from either side	1(a), 1(b), 1(c), 1(d), 2(a), 2(b), 3, 4(a), 5, 7(b)

	• 2No. layers of Gyproc Fireline 12.5 mm thick using 42mm long drywall screws at 300mm centres • 2 No. Double Sockets were fitted on the fire side			
12	• Assessment on 300mm x 3000mm (w x h) panel with total vertical load of 78kN • 6 No. LGS C-Studs (100x51x1.2mm) with noggins at mid height • Exposed side: 3No. layers of Gyproc Fireline 12.5 mm thick using 42mm long drywall screws at 300mm centres • 100mm stone mineral wool (22kg/m^3 density) fitted between studs • 3No. layers of Gyproc Fireline 12.5 mm thick using 35mm long and 55mm long drywall screws at 300mm centres • 2 No. Double Sockets were fitted on the fire side	I.S. EN 1365-1[20]	90 mins from either side	1(a), 1(b), 1(c), 1(d), 2(a), 2(b), 3, 4(a), 5, 7(b)
Separating Walls				
13	**Twin frame separating Wall** • Test conducted on 3000mm high x 3000mm wide x 253mm thick panel with total vertical load of 156kN • 6 No. LGS C-Studs (89x45x1.2mm) with noggins at mid height • 1No. layer of 12.5mm Siniat Weather Defence Board fixed with 40mm screws to LGS at 300centres. • 1No. layers of 15mm Siniat Gtec Fireboard fixed with 25mm screws to LGS at 300centres. • 100mm stone mineral wool (22kg/m^3 density) fitted between studs • 20mm Cavity • 6 No. LGS C-Studs (89x45x1.2mm) with noggins at mid height • 100mm stone mineral wool (22kg/m^3 density) fitted between studs • 1No. layers of 15mm Siniat Gtec Fireboard fixed with 25mm screws to LGS at 300centres. • 1No. layers of 12.5mm Siniat Weather Defence Board fixed with 40mm screws to LGS at 300centres • 2 No. Double Sockets were fitted on the fire side	I.S. EN 1365-1[20]	60 mins from either side	1(a), 1(b), 1(c), 1(d), 2(a), 2(b), 3, 4(a), 5, 7(b)
14	**Twin frame separating Wall** • Assessment conducted on 3000mm high x 3000mm wide with total vertical load of 90kN • 6 No. LGS C-Studs (100x51x1.2mm) with noggins at mid height • 1No. layer of 12.5mm Siniat Gtec Fireboard fixed • 1No. layers of 12.5mm Siniat Gtec Fireboard (plasterboards fixed with 42mm screws to LGS at 300centres) • 100mm stone mineral wool (22kg/m^3 density) fitted between studs • 20mm Cavity • 6 No. LGS C-Studs (100x51x1.2mm) with noggins at mid height • 100mm stone mineral wool (22kg/m^3 density) fitted between studs • 1No. layers of 12.5mm Siniat Gtec Fireboard	I.S. EN 1365-1[20]	60 mins from either side	1(a), 1(b), 1(c), 1(d), 2(a), 2(b), 3, 4(a), 5, 7(b)

	• 1No. layers of 12.5mm Siniat Gtec Fireboard (plasterboards fixed with 42mm screws to LGS at 300centres) 2 No. Double Sockets were fitted on the fire side			
15	**Twin frame separating Wall** • Test conducted on 3000mm high x 3000mm wide x 253mm thick panel with total vertical load of 156kN • 6 No. LGS C-Studs (89x45x1.2mm) with noggins at mid height • 1No. layer of 12.5mm Siniat Gtec Fireboard fixed with 55mm screws to LGS at 300centres. • 1No. layer of 12.5mm Siniat Gtec Fireboard fixed with 40mm screws to LGS at 300centres. • 1No. layers of Siniat Gtec Fireboard fixed with 25mm screws to LGS at 300centres. • 100mm stone mineral wool (22kg/m^3 density) fitted between studs • 20mm Cavity • 6 No. LGS C-Studs (89x45x1.2mm) with noggins at mid height • 100mm stone mineral wool (22kg/m^3 density) fitted between studs • 1No. layer of 12.5mm Siniat Gtec Fireboard fixed with 55mm screws to LGS at 300centres. • 1No. layer of 12.5mm Siniat Gtec Fireboard fixed with 40mm screws to LGS at 300centres. • 1No. layers of Siniat Gtec Fireboard fixed with 25mm screws to LGS at 300centres. • 2 No. Double Sockets were fitted on the fire side	I.S. EN 1365-1[20]	90 mins from either side	1(a), 1(b), 1(c), 1(d), 2(a), 2(b), 3, 4(a), 5, 7(b)
Non-Load Bearing Walls				
16**	**Internal Non-Load Bearing Partition Wall** Panel dimensions and build up as per No.10	I.S. EN 1364-1	30 mins from exposed side	1(a), 1(b), 1(c), 1(d), 2(a), 2(b), 3, 4(a), 5, 7(b)
17**	**Internal Non-Load Bearing Partition Wall** Panel dimensions and build up as per No.11	I.S. EN 1364-1	60 mins from exposed side	1(a), 1(b), 1(c), 1(d), 2(a), 2(b), 3, 4(a), 5, 7(b)
18**	**Internal Non-Load Bearing Partition Wall** Panel dimensions and build up as per No.12	I.S. EN 1364-1	90 mins from exposed side	1(a), 1(b), 1(c), 1(d), 2(a), 2(b), 3, 4(a), 5, 7(b)
19	**Non-Load Bearing Infill Wall** • Test conducted on 3000mm high x 3000mm panel non-Loaded • 6 No. LGS C-Studs (100x51x1.2mm) with noggins at mid height • Exposed side: 1No. layer 12.5mm Gyproc Fireline fixed using 25mm long drywall screws at 300mm centres and 1 No. layer of 12.5 Gyproc Fireline fixed using 45mm long drywall screws at 300mm centres • 100mm stone mineral wool (22kg/m3 density) fitted between studs • 1No. layer of A2 Versapanel fibre cement board fixed using 38mm long drywall screws at 300mm centres	I.S. EN 1365-1[20]	90 mins from inside	1(a), 1(b), 1(c), 1(d), 2(a), 2(b), 3, 4(a), 5, 7(b)

	• 100mm mineral wool (22kg/m^3 density) secured with Ancon 25/14 Channel wall tie system • 2 No. Double Sockets were fitted on the fire side			
Intermediate Floor				
20	**Floor supporting a Uniformly Distributed Load of 1.5kN/m2** • Test conducted on 4300mm long x 3000mm wide x 300.5mm thick floor • Exposed side: 1No. layer of 12.5mm Gyproc Fireline Board fixed on fire side face using 25mm screws at 400/200/150mm max centres (refer to fire report) • 16mm Resilient bar • 6 No. LGS lattice-Joists 250mm deep at 600mm nominal centres • 100mm Rockwool Rollbatt (22kg/m^3 density) between the joists • 1No. layer of 22mm OSB fixed to LGS joists 45mm screws at 300mm centres	I.S. EN 1365-2[21]	30 mins from below ceiling level	1(a), 1(b), 1(c), 1(d), 2(b), 3, 4(a), 5, 7(b) ***
Compartment Steel Lattice Floor (For use only where the height of the top storey is less than 10m)				
21*	**Floor supporting a Uniformly Distributed Load of 2.5kN/m2** • Test conducted on 4300mm long x 3000mm wide x 300.5mm thick floor • Exposed side: 1No. layer of 15mm Gyproc Fireline Board fixed on fire side face using 25mm screws at 200/150mm max centres and 1no. layer of 15mm Gyproc Fireline Board fixed using 42mm screws at 200/150mm max centres (refer to fire report) • 16mm Resilient bar • 6 No. LGS lattice-Joists 250mm deep at 600mm nominal centres • 100mm Rockwool Rollbatt (22kg/m^3 density) between the joists • 1No. layer of 18mm OSB3 fixed to LGS joists with 38mm screws at 300mm centres (Refer to section 2.4.3 and 3.8.2 for information on resilient layer)	I.S. EN 1365-2[21]	60 mins from below ceiling level	1(a), 1(b), 1(c), 1(d), 2(b), 3, 4(a), 5, 7(b) ***
Compartment Floors Composite Concrete Metal Deck				
22	**Loaded Floor supporting Imposed Load of 2.0kN/m^2** 160mm normal weight concrete with 1.2mm Tata Comflor 51. Concrete reinforced with A252 Mesh with a minimum 30mm cover to the top of the reinforcing mesh – 4500mm span.	Eurocode Design	60 mins from below deck	1(a), 1(b), 1(c), 1(d), 2(a), 2(b), 3, 4(a), 5, 7(b)

Notes:

- The above build-ups are summaries of those tested to the referenced standards – they should not be taken as an exhaustive list. For full details of test reports, the Certificate holder should be contacted.
- Type F plasterboard refers to the particular type of plasterboard tested in the respective fire tests and the details are available directly from SFDB Ltd.
- Stone mineral wool refers to the particular type and density of stone mineral wool used in a particular fire test and the details are available directly from SFDB Ltd.
- Joints are staggered on successive layers of plasterboard.
- For alternative approaches to fire safety requirements, refer to 0.2 of TGD to Part B of the Building Regulations.

- In situations where there is no fire requirement for non-loadbearing walls, alternative non-loadbearing wall boarding specifications can be used once they have been agreed and signed off on by SFDB Ltd where the boarding supplier has provided supporting fire test data.

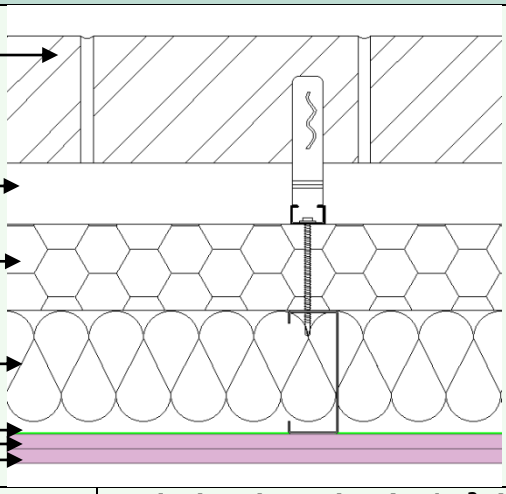
** Non-load bearing wall fire resistance data is provided from the load bearing data and can be utilised under the Field of Direct Application whereby the load can be decreased on the specimen.

***Design to be dictated by project specific loading requirements on a case by case basis to meet the requirements of SCI P424.

* Purpose Group 2(a) is removed from the construction in compliance with Section 3.2.5.1 of TGD B of the Building Regulations.

External walls U-value for variable PIR thickness

Wall build-up:
Layer 7: Brick/masonry cladding
Layer 6: 50mm cavity
Layer 5: Variable PIR layer [2][3] (see below)
Layer 4: LGS/MW insulation [1]
Layer 3: AVCL
Layer 2: 12.5mm Plasterboard
Layer 1: 12.5mm Plasterboard



Wall thickness	PIR variable thickness:	Calculated U-value (W/m²K)
353mm	75mm	0.18
363mm	85mm	0.17
373mm	95mm	0.16
383mm	105mm	0.15
393mm	115mm	0.14
403mm	125mm	0.13
413mm	135mm	0.13
423mm	145mm	0.12

Calculation complies with BRE Digest 465 *U-values for light steel-frame construction*
[1] Corrections have been made for 1.2mm LGS studs @ 600mm c/c bridging layer 4.
[2] A level 1 correction for air voids has been applied to layer 5 (IS EN ISO 6946 Table D.1)
[3] Correction for mechanical fasteners have been applied to layer 5 equating to 6 No. 5.5mm Ø Stainless steel fixing to connect brick tie channel to LGS section.

Table 4: Typical External Wall U-Values

Sample U-value Calculation for 75mm PIR						
Layer	**Description**	**% Bridged**	Thickness [mm]	Thermal conductivity **λ** [W/m K]	Thermal resistance **R** [W/m²K]	
	Rsi				0.13	
1	Firecheck Plasterboard		12.5	0.25	0.05	
2	Firecheck Plasterboard		12.5	0.25	0.05	
3	AVCL					
4	Steel Stud	0.002	100	50	0.002	
	Mineral Wool	0.998	100	0.044	2.273	
5	Variable PIR Insulation		**75**	0.022	3.409	
6	Cavity Low-e (0.9, 0.2)		50		0.44	
7	Brickwork Outer Leaf		102.5	0.77	0.133	
	Rse				0.04	
				Ru Total =	6.518	
				RL Total =	4.947	
	From BRE Digest 465			P = 0.687, $R_T = pR_{max} + (1 - p)R_{min}$ =	6.0263	
				Correction term, ΔU =	0.014	
				Corrected U-Value (2DP) =	**0.18**	W/m²K
Correction as described in Table 5 apply						

Table 5: Sample U-value calculation for 75mm PIR

Effect on 0.176 W/m²K (75mm PIR) U-value for variations in LGS thickness and centres						
Centres of studs	**LGS Thickness (Gauge)**					
	0.8mm	1.0mm	1.2mm	1.5mm	2.0mm	2.5mm
300mm	0.192	0.194	0.196	0.198	0.20	0.201
400mm	0.1845	0.186	0.188	0.19	0.192	0.193
600mm	0.177	0.179	0.18	0.182	0.183	0.1848

Table 6: Effect on U-value for variations in LGS thickness and centres

Ground Floor slab U-value for varying P/A ratio											
P/A Ratio	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60
U-value	0.099	0.113	0.122	0.129	0.135	0.139	0.142	0.144	0.147	0.148	0.150
Floor U-values based on 150mm RC Slab on 120mm PIR insulation (λ=0.022) on soil (λ=2.0). P/A Ratio = Exposed perimeter of the floor to total ground-floor area ratio.											

Table 7: Typical Ground Floor U-Values

Target linear thermal transmittance (ψ) for different types of junctions.					
ACD Ref:	**Junction Description**	**Temperature Factor f_{Rsi} (Min = 0.75)**	**SFDB Offsite Ψ-value (W/m.K)**		**TGD L Default Ψ-value (shown for indicative purposes only)**
5.02	Ground Floor - Insulation below slab(2)	0.79	0.114	>	0.106
5.03	Compartment Concrete Metal Deck Floor	0.93	0.039	<	0.055
5.04	Separating Wall (plan)(1)	0.90	0.053	<	0.057
5.05	Separating Wall top (section)(1)	0.83	0.098	>	0.095
5.07/5.08	Eaves Detail (2)	0.86	0.08	>	0.026
5.15	Gable end detail(2)	0.79	0.083	>	0.034
5.19	Ope - Lintel - Mineral wool Cavity Closer	0.94	0.006	<	0.016
5.20	Ope - Jambs - Mineral wool Cavity Closer(2)	0.92	0.033	>	0.019
5.21	Ope - Sill - concrete, Prop. Cavity Closer(2)	0.83	0.072	>	0.021
5.22.1	Steel Frame Separating Wall through ground floor (base)(1)(2)	0.82	0.236	>	0.132
5.23.1	Corner Detail(2)	0.82	0.058	>	0.029
5.23.2	Inverted Corner Detail	0.96	-0.052	<	-0.043

(1) Value of ψ is applied to each dwelling.
(2) Some ψ-values do not meet the default ψ-values; however, all junctions pass f_{Rsi} assessments.
(3) Flanking element U-values for walls, roof and floor thermal models above were based on,
U_W = 0.167 W/m²k, U_F = 0.129 W/m²k, U_R = 0.141 W/m²k
Modelled junction ψ-values are based on typical SFDB details above can be used in y-value calculations, if relevant detail is applicable

Table 8: Typical ψ-Value W/mK

Please note: All U-value calculations illustrated in the above U-value tables should be taken as examples of performance that can be achieved. It is strongly recommended that U-value calculations are produced on a project specific basis by a competent person as U-value calculations may increase or decrease depending on a wide range of parameters such as number of fixings per square meter, size of fixing, emissivity of PIR surface facing into cavity etc. therefore U-values should be recalculated if the build-ups differ from those described in Tables 5, 6, 7 and 8.

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

(a) the specification of the product is unchanged.

(b) the Building Regulations and any other regulation or standard applicable to the product/process, its use or installation remains unchanged.

(c) the product continues to be assessed for the quality of its manufacture and marking by NSAI.

(d) no new information becomes available which in the opinion of the NSAI, would preclude the granting of the Certificate.

(e) the product or process continues to be manufactured, installed, used and maintained in accordance with the description, specifications and safety recommendations set out in this certificate.

(f) the registration and/or surveillance fees due to IAB are paid.

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

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

(a) the absence or presence of patent rights subsisting in the product/process; or

(b) the legal right of the Certificate holder to market, install or maintain the product/process; or

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

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

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

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

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

NSAI Agrément

NSAI Agrément

This Certificate No. **23/0441** is accordingly granted by the NSAI to **SFDB Ltd** on behalf of NSAI Agrément.

Date of Issue: **21st December 2023**

Signed

Kevin D. Mullaney
Director of NSAI 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

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