

CERTIFICATE NO. 08/0311

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Extraspace Advance System

Systèmes pour constructions Bausystem

The **Irish Agrément Board** is designated by Government to issue European Technical Approvals.

Irish Agrément Board Certificates establish proof that the certified products are 'proper materials' suitable for their intended use under Irish site conditions, and in accordance with the **Building Regulations 1997 to 2007**.

The **Irish Agrément Board** operates in association with the **National Standards Authority of Ireland (NSAI)** as the National Member of UEAtc.



PRODUCT DESCRIPTION:

This Certificate relates to the Extraspace Advance System, a modular building system used to construct educational, office, institutional, and other non-residential buildings. Modules consist of structural steel framework, composite roof and end panels and range in size from 6m to 12.2m in length and 2.4m to 4m in width.

This Certificate certifies compliance with the requirements of the Building Regulations 1997 to 2007.

USE:

The Extraspace Advance System is certified for two storey use for hospitals, schools and in purpose groups 2(b), 3, 4(a), 4(b), 5, 6, 7(a), 7(b) and 8 as defined in Technical Guidance Document B of the Building Regulations 1997 to 2007.

Staircases, windows, door sets, fittings, raised access floors, adequacy of mechanical/electrical services, plumbing and ventilation of bathrooms and rooms

containing sanitary conveniences are outside the scope of this Certificate.

MANUFACTURE AND MARKETING:

The product is manufactured and marketed by:

Extraspace,
Crag Avenue,
Clondalkin Industrial Estate,
Clondalkin,
Dublin 22.
Tel: 01 4673100
Fax: 01 4570326

Readers are advised to check that this Certificate has not been withdrawn or superseded by a later issue by contacting the Irish Agrément Board, NSAI, Glasnevin, Dublin 9 or online at <http://www.nsai.ie/modules/certificates/uploads/pdf/IAB080311.pdf>

1.1 ASSESSMENT

In the opinion of the Irish Agrément Board (IAB), the Extraspace Advance System if used in accordance with this Certificate can meet the requirements of the Building Regulations 1997 to 2007, as indicated in Section 1.2 of this Agrément Certificate.

1.2 BUILDING REGULATIONS 1997 to 2007

REQUIREMENTS:

Part D – Materials and Workmanship

D3 – Proper Materials

The Extraspace Advance System, as certified in this Certificate, is comprised of 'proper materials' fit for their intended use (see Part 4 of this Certificate).

D1 – Materials & Workmanship

The Extraspace Advance System, as certified in this Certificate, meets the requirements for workmanship.

Part A - Structure

A1 – Loading

The Extraspace Advance System once appropriately detailed, designed and constructed has adequate strength and stability to meet the requirements of this Regulation (see Part 3 of this Certificate).

A2 – Ground Movement

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

Part B – Fire Safety

B1 – Means of Escape in Case of Fire

Windows in the ground or higher floors may be used as a means of escape in the case of fire.

Where a window is required to provide an alternative means of escape, it must provide an unobstructed opening of not less than 850mm high by 500mm wide. The window should be positioned as required by BS 5588-1:1990 *Fire precautions in the design, construction and use of buildings – Code of practice for residential buildings*, and BS 5588-11:1997 *Fire precautions in the design, construction and use of buildings – Code of practice for shops, offices, industrial, storage and other similar buildings*, and in accordance with Part B1 of TGD B of the Building Regulations 1997 to 2007.

Any restrictor fitted must be easy to operate.

B2 – Internal Fire Spread (Linings)

The plasterboard side of walls and ceilings is designated Class 0. It may therefore be used on the internal surfaces of buildings of every purpose group without restriction.

B3 – Internal Fire Spread (Structure)

The structural elements of the Extraspace Advance System have been designed so the system will have its stability maintained for a reasonable period in the event of fire.

The Extraspace Advance System can accommodate sub-division into horizontal compartments. Extraspace construction methods ensure continuity at the junctions of the fire resisting elements enclosing the compartment. Internal compartment walls are carried up to the underside of the Kingspan KS1000RW roof panel. Any openings in fire separating elements can be suitably protected in order to maintain the fire integrity of the element. Openings between compartments are limited to doors and pipes.

B4 – External Fire Spread

The external walls are constructed so that the risk of ignition from an external source, and the spread of fire over their surfaces is restricted due to the low rates of spread of flame and heat release. Walls are clad with a plastisol-coated galvanised steel sheet.

The Extraspace Advance System roof is constructed so that the risk of spread of flame and/or fire penetration from an external fire source is restricted.

Part C – Site Preparation and Resistance to Moisture

C4 – Resistance to Weather and Ground Moisture

The Extraspace Advance System is raised up off the ground so that the floor, external and internal walls shall not be damaged by moisture from the ground. The floor is supported by beams on concrete foundations giving minimum 305mm clearance.

Part F – Ventilation

F1 – Means of Ventilation

The Extraspace Advance System is naturally ventilated with windows placed as and where necessary. Mechanical systems can also be incorporated.

Part J – Heat Producing Appliances

J3- Protection of Building

Heating installations vary from project to project and can be readily designed/installed to meet the requirements of this Regulation.

Part L – Conservation of Fuel and Energy

L1 – Conservation of Fuel and Energy

Elemental U-values have been assessed and can be demonstrated to conform to this Regulation for the purpose groups defined in on Page 1 of this Certificate.

Part M – Access for People with Disabilities

M1 – Access and Use

Buildings can be designed to meet the access, circulation and facilities requirements of this Regulation.

2.1 PRODUCT DESCRIPTION

2.1.1 General

The Extraspace Advance System is based on a module consisting of a structural steel framework and composite roof and end wall panels. Modules are used to construct single or two storey buildings incorporating walls to suit their location in the building. The modules are available in the standard range of sizes given in Table 1.

	Value/Units
Width	2.4m to 4m
Length	6m to 12.2m

Table 1: Product Range

2.1.2 Structural Frame

The modular galvanised steel frame consists of cold-rolled structural steel hollow section column/stanchions located at the four corners of the module. The sections are bolted to cold-formed galvanised steel perimeter beams at floor and roof level. Cold-formed steel floor and roof joists span each module and are welded to the beams at roof and floor level. At the top of each column there is an integral lifting point, designed to accept a lifting eyebolt, thus enabling the module to be crane handled.

Vertical dead and imposed loads are supported by the load bearing steel frame. Resistance to horizontal loading (racking) is provided by means of a diaphragm action of the floor and roof in conjunction with the steel frame.

Holding down bolts are provided where the engineer's assessment indicates that actual net uplift forces will be applied to the foundation. These conditions can occur where units are used in highly exposed locations such as along the coastline – site specific assessments are required in these instances.

2.1.3 Floors

Floors comprise 18mm thick deck of structural floor decking, designed in accordance with BS 5268-2:2002 *Structural use of timber – Code of practice for permissible stress design, materials and workmanship*, and fixed to structural joists.

Thermal insulation is provided by 130mm thick expanded polystyrene sheets, manufactured to BS 3837-1:2004 *Expanded polystyrene boards – Boards and blocks manufactured from expandable beads – Requirements and test methods*. The sheets are cut to size to sit between the floor joists on 0.7mm galvanised steel sheeting which is fixed to the underside of the floor joists to provide a rodent-free environment and under floor cable management.

2.1.4 External Walls

External walls are of composite construction consisting of an external skin of plastisol coated steel sheet, timber studs and peripheral frame with an internal lining of 12.5mm plasterboard clad with a decorative plasticized PVC sheeting.

Thermal insulation is provided by 125mm thick expanded polystyrene sheets, manufactured to BS 3837-1:2004 as before, which fill the void between the external skin and internal lining.

The elements are glued together and cured in a vacuum process.

2.1.5 External Roof/Ceiling Panel

The roof is comprised of 80mm thick IAB certified Kingspan KS1000RW roof panels: composite panels with a trapezoidal profiled outer surface made from plastisol-coated 0.5mm hot-dipped zinc coated steel to IS EN 10326:2004 *Continuously hot-dip coated strip and sheet of structural steels – Technical delivery conditions*. The insulation core is a CFC-free polyurethane (PUR). The Kingspan KS1000RW panels have a Class 0 and AA designation.

The roof is bolted to, and supported by, firings which are fixed to every fourth roof joist to create a fall of 100mm along the length of the module.

2.1.6 Protection of Steelwork Against Corrosion

The side beams and joists are produced from galvanised steel sheet. Roof beams more than 9.6m long are to IS EN 10025-1:2004 *Hot rolled products of structural steels – Technical delivery conditions*. All other roof/floor beams and joists are to IS EN 10326:2004. Posts are to IS EN 10219-1:2006 *Cold formed welded structural hollow sections of non-alloy and fine grain steels – Technical delivery conditions*. The external skin of the building is protected by cladding steel with 200 micron high-performance plastisol coating on a Galvalite hot-dip zinc coated substrate to IS EN 10326:2004.

2.1.7 Finishes

The external faces of the wall panels, wall trims and fascias have a plastisol coating with a leather grain finish available in a wide range of colours. The external face of the roof panel is available in a variety of coatings and colours to suit particular conditions.

Fascias and wall trims of plastisol coated steel are fitted to the external corners, the roof perimeter, the lower perimeter of all modules, the upper perimeter of modules to be used at ground floor in two storey buildings, and the horizontal junction between modules in two storey buildings. Fascias and wall trims are fitted after site assembly of the modules is completed.

2.2 MANUFACTURE

System components are brought in to agreed specifications or in accordance with European Standards or Agrément Certificates.

Quality checks are made on the sub-assemblies such as wall and roof panels and the steel frame, and on the final assembly of the modules. Quality control carried out during manufacture includes checks on dimensions, squareness and welding.

2.3 DELIVERY, STORAGE AND MARKING

The modules are transported to site on a flat-bed lorry or trailer long enough to fully support the module. The open sides of the modules are weatherproofed during transit using polythene sheet.

The modules are unloaded by crane and are normally positioned on the day of delivery, thus site storage is not required.

2.4 INSTALLATION

2.4.1 General

Buildings must be erected with due regard to any boundary and must be sited in accordance with the provisions of B4 of the Building Regulations 1997 to 2007. Due regard must be taken of all 'unprotected areas'.

Erection is carried out by Extraspace. The arrangements for erection have been assessed and found to be satisfactory.

2.4.2 Preparation

Clients are normally responsible for provision of suitable foundations and services and therefore the following aspects should be subject to supervision and should be checked before the modules are delivered to site:

- Setting out and level of foundations.
- Setting out of service connections.

2.4.3 Procedure

The modules are placed by crane by Extraspace on prepared foundations using purpose-designed lifting points incorporated in the steel frame. Access to the site is required for the crane and this requirement will be agreed with the client.

Temporary weatherproofing at joints between modules and the open ends of incomplete buildings is provided by Extraspace to suit the construction sequence.

Building modules can be stacked up to two storeys high. The modules are bolted together at the four steel column points and along the longitudinal beams.

The completion of external and internal cladding and trims is carried out on site. Service connections are made and internal subdivisions and finishes completed at joints between modules.

2.4.4 Supervision

The following checklist is provided to offer guidance to clients who intend to carry out their own additional site supervision. The items listed are of a general nature and are in addition to all other building requirements.

- Before each ground floor module is positioned, check the location of dpcs and the positioning of sealing strip between adjacent modules.
- During positioning, check that no damage is caused to the steelwork protective systems.
- After each ground floor module is positioned, check the fixings between modules.
- Before each first floor module is positioned, check the positions of sealing strip between adjacent modules.
- After each first floor module is positioned, check the fixings between modules.
- Completion of roof weatherproofing at junction between modules.
- Satisfactory extension of finishing over joints between modules.
- Fixing of casings to columns to ensure continuity of fire protective systems.
- Satisfactory fixing of ground floor skirt panels to provide ventilation.

Erection will be supervised by suitably qualified Extraspace personnel who will sign-off on completion of all installations. This sign-off will verify that all quality checks have been completed and the installation has been carried out in accordance with this Certificate and the Building Regulations 1997 to 2007.

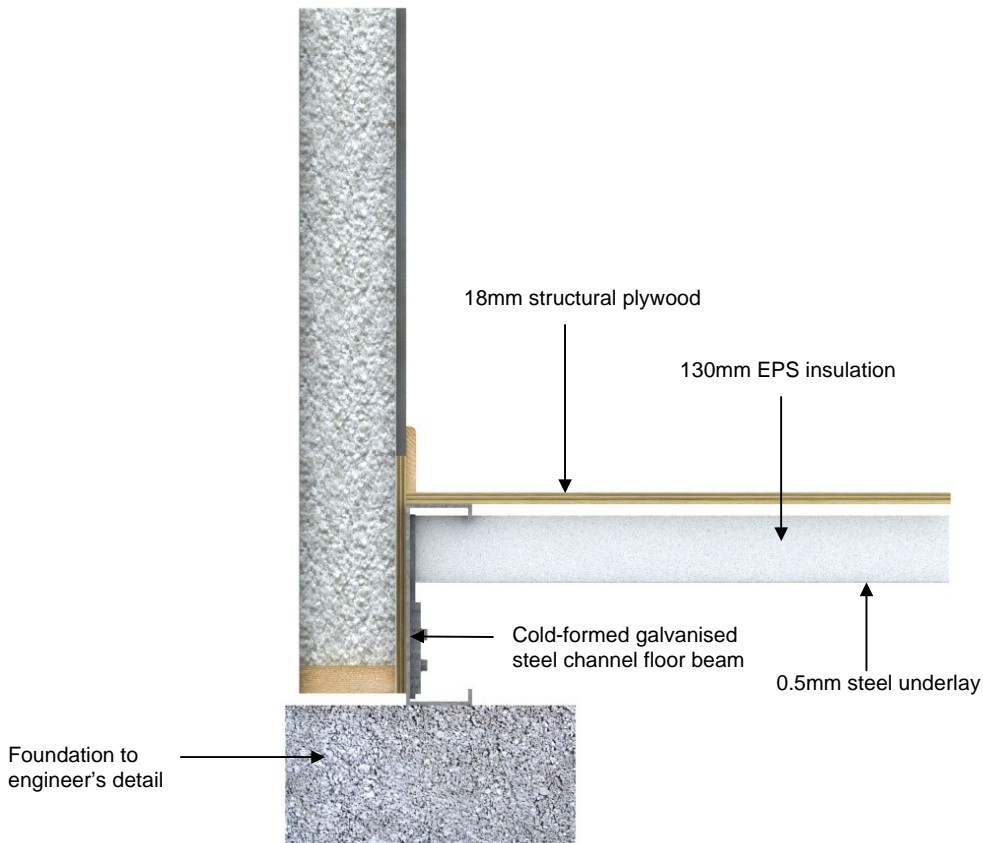
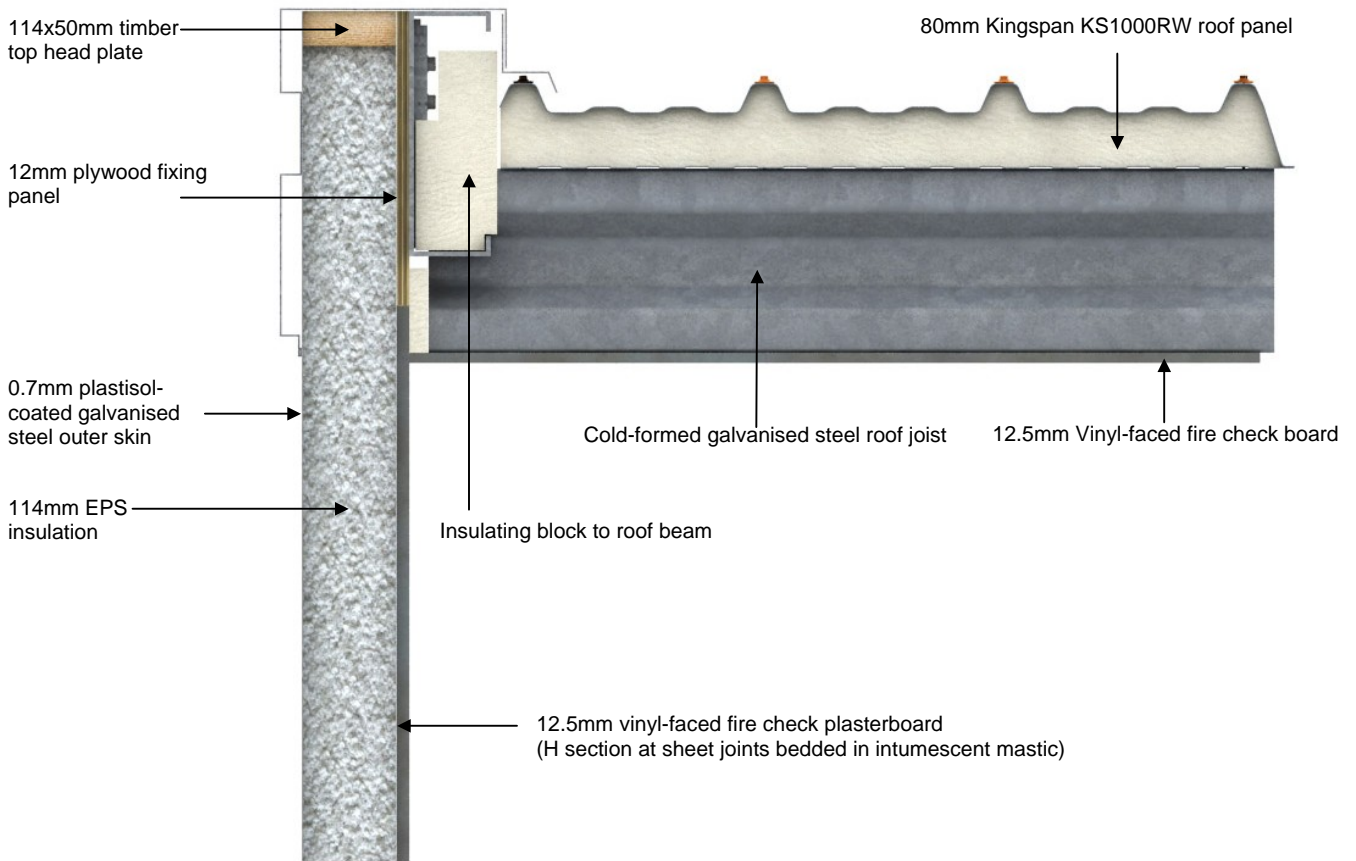


Figure 1: Roof, Wall and Floor Details for 114mm Wall Construction

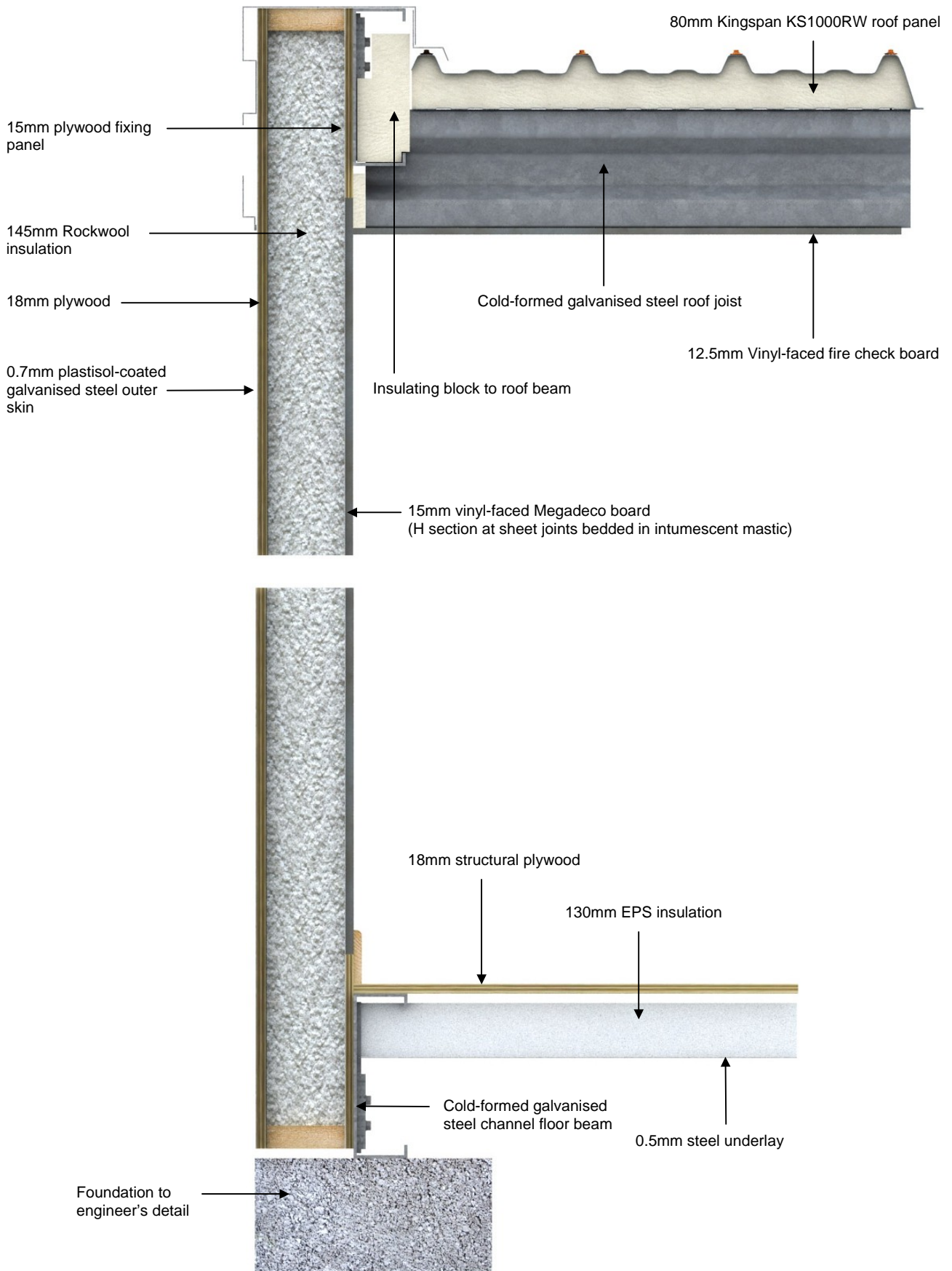


Figure 2: Roof, Wall and Floor Details for 1HRFR Wall Construction

3.1 CERTIFICATE OF STRUCTURAL COMPLIANCE

A suitably qualified structural design engineer must underwrite the structural design of every modular building designed for the Extraspace Advance System. Each steel frame structure must be accompanied with a structural design certificate of compliance with the requirement of Part A of the Building Regulations 1997 to 2007. This certificate should cover the adequacy of the dimensions and thickness of each element and member making up the steel frame superstructure, and assess the suitability of the interface between the superstructure and the external cladding. The structural certificate of compliance must also confirm that there is sufficient uplift resistance and that there is adequate racking and load bearing capacity to either side of any opening to ensure the stability of the wall.

3.2 DESIGN LOADS

Designs of typical buildings have been examined by the IAB and demonstrate compliance with the following Codes of Practice. In general, the frame design is in accordance with IS EN 1990:2005 *Irish National Annex to Eurocode – Basis of structural design*, BS 5950-1:2000 *Structural use of steelwork in building – Code of practice for design – Rolled and welded sections* and BS 5950-5:1998 *Structural use of steelwork in building – Code of practice for design of cold formed thin gauge sections*, to support loads in accordance with BS 6399-1:1996 *Loading for buildings – Code of practice for dead and imposed loads*, BS 6399-2:1997 *Loading for buildings – Code of practice for wind loads*, and BS 6399-3:1988 *Loading for buildings – Code of practice for imposed roof loads*. Design snow and wind loads should be based on Diagram 14 and 15 of TGD to Part A of the Building Regulations 1997 to 2007.

3.3 WIND LOAD

Buildings designed using the Extraspace Advance System will have adequate resistance to wind load in areas within the 25m/s maximum 60 minute wind speed contour (as shown in Diagram 15A of TGD to Part A of the Building Regulations 1997 to 2007). For very exposed sites on hills above the general level of the surrounding terrain, the system can be specifically designed to meet the requirements as defined in BS 6399-2:1997. The system can be designed to be used in all locations in Ireland.

3.4 FOUNDATION DESIGN

Foundation design must be in accordance with BS 8004:1986 *Code of practice for foundations*.

4.1 BEHAVIOUR IN RELATION TO FIRE

Buildings must be sited in accordance with the provisions of B4 of the Building Regulations 1997 to 2007. Due regard must be taken of all 'unprotected areas'.

It can be shown by assessment that the building components will meet the requirements of the Building Regulations 1997 to 2007 for fire rating as shown in Table 2.

Component	Duration
External walls	60mins (from inside)
Combined ceiling and floor assembly	60mins (from underside)
Steel column	60mins

Table 2: Fire Rating

The various exposed surfaces of the buildings assessed as having a Class 0 rating are:

- Plastisol-coated steel external roof surfaces
- Plastisol-coated steel external wall surfaces
- Plasticized PVC-coated gypsum board internal wall surfaces
- Plastisol-coated steel ceiling surface
- Mineral fibre tiles (suspended) ceiling surface

The roof is designated AA in accordance with the Building Regulations 1997 to 2007.

Adequate provision must be made for escape in case of fire.

The regulations dealing with fire spread contain limits to the size of compartments in buildings according to the use, and in some cases, height.

Where it is necessary for fittings, services or ducts to penetrate the fire-resisting construction, the detailing must ensure that the relevant fire resistance is not impaired, particularly in relation to the integrity requirements.

Cavity walls in the Extraspace Advance System are constructed as per Diagram 17 of TGD to Part B of the Building Regulations 1997 to 2007 and are excluded from the provisions for cavity barriers as per Table 3.2 of TGD B.

4.2 THERMAL INSULATION

The U-value of the building elements is shown in Table 3. The level of insulation at junctions between elements and around openings in walls will adequately limit the risk of excessive additional heat loss and local condensation problems.

Component	U-Value (W/m ² K)	Required U-Value (W/m ² K)
Ground floor	0.25	0.25
External wall	0.27	0.27
Roof	0.19	0.22

Table 3: U-value of Building Elements

If a building requires an improved U-value, the Extraspace Advance System can be readily designed to achieve and conform as requested – please contact the Certificate Holder for details.

4.3 CONDENSATION

The buildings are not suitable for use where the internal relative humidity is expected to exceed 70% for any significant length of time since condensation may occur. Assuming normal internal conditions of temperature and humidity, and appropriate ventilation, it is considered that the amount and duration of any condensation will be insufficient to significantly affect the structural or thermal properties of the building.

If the floor is penetrated by services, e.g. soil pipes, the joints between the services and the floor deck and floor insulation must be adequately sealed to prevent the ingress of water and water vapour.

Equipment producing large quantities of water vapour, for example flueless heaters, must not be used.

Adequate underfloor ventilation is provided to ensure that any condensation on the steelwork or insulation is effectively dispersed.

4.4 VENTILATION

The design of the windows should allow adequate ventilation and is an important factor in reducing the incidence of surface condensation. The windows should be designed so that the amount of openable window ventilation is a minimum of 5% of the floor area or provision of mechanical ventilation considered.

4.5 WEATHERTIGHTNESS AND DAMP PROOFING

The steel supporting columns raise the building clear of the ground, giving it an inherent resistance to rising damp in the walls.

The ground beneath the building should, as a minimum, be effectively cleared of turf and other vegetable matter at least to a depth sufficient to prevent later growth.

In preparing the site for erection of the building, adequate drainage must be provided or other precautions taken, to prevent water flowing beneath the building or ponding against the perimeter steelwork. Flowerbeds should not be positioned so that loose soil can become banked against the building perimeter.

The roof and external wall surface will provide adequate weather resistance. The final weathertightness of the building is dependent upon effective positioning and sealing of the roof cover strips, the sealing of the horizontal joint between stacked modules and the vertical joints between adjacent modules.

Each module is provided with suitable rainwater gutters and downpipes.

The performance of windows and doors is not covered by this document, however the perimeter joints between windows and doors and the wall panels are detailed in such a way that is adequate to ensure that water penetration will not occur at these positions.

4.6 ELECTRICAL AND PLUMBING SERVICES

Electrical and plumbing services are outside the scope of this Certificate. However, in designing and installing these services, precautions must be taken to avoid the possible risk of long-term damage to the structure or the services by, for example, the ingress of water, water vapour or condensate from cold water service pipes.

4.7 DURABILITY

The main structural steel framework has been assessed as capable of achieving a minimum design life of up to 60 years in accordance with BS 7543:2003 *Guide to durability of buildings and building elements, products and components*. Other elements can achieve a design life of 25 years depending on the materials, construction and degree of maintenance.

Particular care is required in arrangement for damp proof courses, integrity of vapour control layers and weathertightness of the building envelope.

Foot traffic over the roof should be restricted to the purpose of maintenance and suitable precautions taken to avoid the risk of damaging the plastisol coating.

The plastisol coating and galvanising will be effective for the building's envisaged life. The ceiling covering will remain effective for this period. If a suspended ceiling is used, the mineral fibre tiles will be effective during the building's envisaged life, but may require occasional painting. Care must be taken to ensure that any paint coating maintains the Class 0 surface spread of flame of the tiles.

The vinyl floor covering may require replacement during the building's envisaged life, depending on the use. Should it be necessary to replace or repair the vinyl floor covering, all joints must be welded. Any replacement vinyl floor covering must be to an equivalent specification as the original.

The sealants used in the construction of the modules in the factory and to seal between modules on site are concealed and are not subject to excessive movement. They should not normally require replacement during the building's envisaged life.

4.8 MAINTENANCE

External cladding requires an occasion washing down with water containing a mild detergent. In some areas, after approximately 10 years of service, it may be

necessary to restore the visual appearance of the building by painting, using a paint recommended by Extraspace.

The exposed columns should be repainted in accordance with BS 5493:1977 *Code of practice for protective coating of iron and steel structures against corrosion*.

In the event of impact or other damage to an external wall, a replacement plastisol-coated steel panel can be fitted over the original panel by Extraspace. If necessary, damage to the foam core of the wall can be made good before fitting the replacement panel. This will restore the appearance and ensure that the weathertightness and insulation are unaffected.

Trims or skirt panels can be readily replaced if necessary.

4.9 TESTS AND ASSESSMENTS WERE CARRIED OUT TO DETERMINE THE FOLLOWING

The following is a summary of the tests and assessments which have been carried out on the Extraspace Advance System:

- Structural strength and stability.
- Behaviour in relation to fire.
- Impact resistance of floor and wall panels.
- Load capacity of roof and floor.
- Durability.
- Maintenance requirements.

4.10 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.

5.1 National Standards Authority of Ireland ("NSAI") following consultation with the Irish Agrément Board ("IAB") 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 issue so long as:

- (a) the specification of the product is unchanged.
- (b) the Building Regulations 1997 to 2007 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 IAB 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 IAB 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.

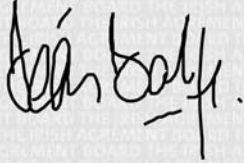
5.7 Where reference is made in this Certificate to any Act of the Oireachtas, Regulation made thereunder, Statutory Instrument, Code of Practice, National Standards, manufacturer's instructions, or similar publication, it shall be construed as reference to such publication in the form in which it is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

The Irish Agrément Board

This Certificate No. **08/0311** is accordingly granted by the NSAI to **Extraspace** on behalf of The Irish Agrément Board.

Date of Issue: **April 2008**

Signed



Seán Balfe
Director of the Irish Agrément Board

Readers may check that the status of this Certificate has not changed by contacting the Irish Agrément Board, NSAI, Glasnevin, Dublin 9, Ireland. Telephone: (01) 807 3800. Fax: (01) 807 3842. www.n Sai.ie