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Agrément Certificate
20/5811
Product Sheet 1

ULTRAFRAME ULTRAPANEL ROOF AND GABLE WALL SYSTEM

ULTRAPANEL INSULATED ROOF AND GABLE WALL PANEL SYSTEM

This Agrément Certificate Product Sheet(1) relates to the Ultrapanel Insulated Roof System, comprising roof and wall panels of composite expanded polystyrene boards, hardboard timber and steel structural beams with OSB and steel peripheral beams. The system is used as a structural roof, gable and party wall panel system to support the outer roof finishes in domestic buildings with roof pitch limits from 37.5 to 50˚, and for gable or party walls on buildings with no storey above 14 metres.

(1) Hereinafter referred to as 'Certificate'.

CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.

KEY FACTORS ASSESSED

Structural performance — the system will remain structurally stable and deflections will not be excessive under normal service conditions, if installed with the requirements of this Certificate (see section 6).

Thermal performance — the system can provide adequate insulation to contribute to the building meeting the requirements of the national Building Regulations (see section 7).

Condensation risk — roofs and walls constructed using the system can adequately limit the risk of surface and interstitial condensation (see section 8)

Behaviour in relation to fire — the system is not classified as 'non-combustible' or 'of limited combustibility'. Roofs incorporating the system may achieve an EXT.S.A.C. rating in accordance with BS 476-3 : 2004 and walls may achieve 30 or 60 minutes' fire resistance in accordance with BS EN 13501-2 : 2016 (see section 9).

Durability — provided the installation remains weathertight and the system is protected from damage by the external and internal finishes, the system will have a design life of at least 60 years (see section 13).

The BBA has awarded this Certificate to the company named above for the system described herein. This system has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 19 January 2021

Hardy Giesler
Chief Executive Officer

Certificate amended on 19 May 2021 to update steel rail and clip options

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Regulations

In the opinion of the BBA, the Ultrapanel Insulated Roof and Gable Wall Panel System, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):

The Building Regulations 2010 (England and Wales) (as amended)

Requirement:	**A1**	**Loading**
Comment:		The system has sufficient strength and stiffness to sustain and transmit the design loads to the supporting structure. See section 6 of this Certificate.
Requirement:	**B3(1)(2)(3)**	**Internal fire spread (structure)**
Comment:		Walls with the requisite lining can contribute to satisfying this Requirement. See sections 9.9 and 9.11 of this Certificate.
Requirement:	**B3(4)**	**Internal fire spread (structure)**
Comment:		The panels are restricted by this Requirement. See section 9.2 of this Certificate.
Requirement:	**B4(1)**	**External fire spread**
Comment:		The panels are restricted by this Requirement. See section 9.9 of this Certificate.
Requirement:	**B4(2)**	**External fire spread**
Comment:		Roofs incorporating the system may satisfy this Requirement. See sections 9.6 to 9.8 of this Certificate.
Requirement:	**C2(c)**	**Resistance to moisture**
Comment:		The system can adequately limit the risk of surface condensation and contribute to reducing the risk of damage due to interstitial condensation. See sections 8.1, 8.2 and 8.4 of this Certificate.
Requirement:	**L1(a)(i)**	**Conservation of fuel and power**
Comment:		The system can contribute to satisfying this Requirement. However, compensating fabric measures may be required in some cases. See section 7 of this Certificate.
Regulation:	**7(1)**	**Materials and workmanship**
Comment:		The system is acceptable. See sections 13.1 and 13.2 and the *Installation* part of this Certificate.
Regulation:	**7(2)**	**Materials and workmanship**
Comment:		The system is restricted by this Regulation. See sections 9.1 and 9.9 of this Certificate.
Regulation:	**26**	**CO_2 emission rates for new buildings**
Regulation:	**26A**	**Fabric energy efficiency rates for new dwellings (applicable to England only)**
Regulation:	**26A**	**Primary energy consumption rates for new buildings (applicable to Wales only)**
Regulation:	**26B**	**Fabric performance values for new dwellings (applicable to Wales only)**
Comment:		The system can contribute to satisfying the requirements of these Regulations when compensating fabric and or services measures are taken. See section 7 of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	**8(1)(2)**	**Durability, workmanship and fitness of materials**
Comment:		The use of the system satisfies the requirements of this Regulation. See sections 13.1 and 13.2 and the *Installation* part of this Certificate.

Regulation:	**9**	**Building standards applicable to construction**
Standard:	1.1(a)(b)	Structure
Comment:		The system has sufficient strength and stiffness to transmit the design loads to the supporting structure, with reference to clause 1.1.1(1). See section 6 of this Certificate.
Standard:	2.2	Separation
Comment:		Walls using the appropriate lining can achieve a period of fire resistance of 'medium' duration, with reference to clauses 2.2.1(1) and 2.2.10(1) of these Standards (see sections 9.10 and 9.11 of this Certificate). Party walls are restricted by these Standards, with reference to clause 2.2.6(1). See section 9.10 of this Certificate.
Standard:	2.3	Structural protection
Comment:		Walls using the appropriate lining can achieve a period of fire resistance of 'low' and 'medium' duration, with reference to clauses 2.3.1(1), 2.3.2(1) and 2.3.5(1) of this Standard. See sections 9.10 and 9.11 of this Certificate.
Standard:	2.4	Cavities
Comment:		The panels are restricted by this Standard with reference to clauses 2.4.2(1) and 2.4.4(1). See sections 9.2 and 9.11 of this Certificate.
Standard:	2.6	Spread to neighbouring buildings
Comment:		Walls constructed from the panels using the appropriate lining can achieve a period of fire resistance of 'medium' and 'short' duration, with reference to clause 2.6.1(1) of this Standard, and are restricted with reference to clause 2.6.4(1). See sections 9.1 and 9.10 of this Certificate.
Standard:	2.7	Spread on external walls
Comment:		Spandrel panels are restricted by this Standard, with reference to clause 2.7.1(1) of this Standard. See sections 9.1 and 9.10 of this Certificate.
Standard:	2.8	Spread from neighbouring buildings
Comment:		Roofs incorporating the system may satisfy this Standard, with reference to clause 2.8.1(1). See sections 9.6 to 9.8 of this Certificate.
Standard:	3.15	Condensation
Comment:		The system can adequately limit the risk of surface condensation and contribute to reducing the risk of damage due to interstitial condensation, with reference to clauses 3.15.1(1) to 3.15.4(1) of this Standard. See sections 8.2 to 8.4 of this Certificate.
Standard:	6.1(b)	Carbon dioxide emissions
Comment:		The system can contribute to satisfying clauses, or parts of, 6.1.1(1), 6.1.6(1) and 6.2.3(1) of this Standard when compensating fabric and or services measures are taken. See section 7 of this Certificate.
Standard:	6.2	Building insulation envelope
Comment:		The system can contribute to satisfying clauses 6.2.1(1), 6.2.3(1) and 6.2.9(1) to 6.2.11(1) of this Standard. See section 7 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The system can contribute to satisfying the relevant requirements of Regulation 9, Standards 1 to 6, and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard.
Regulation:	**12**	**Building standards applicable to conversions**
Comment:		Comments in relation to the system under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1(1) and Schedule 6(1).

(1) Technical Handbook (Domestic).

The Building Regulations (Northern Ireland) 2012 (as amended)

Regulation:	**23(a)(i) (iii)(b)(i)**	**Fitness of materials and workmanship**
Comment:		The system is acceptable. See sections 13.1 and 13.2 and the *Installation* part of this Certificate.
Regulation:	**29**	**Condensation**
Comment:		The system can contribute to reducing the risk of damage due to interstitial condensation. See section 8.4 of this Certificate.
Regulation:	**30**	**Stability**
Comment:		The system has sufficient strength and stiffness to sustain and transmit the design loads to the supporting structure, without excessive deflection or deformation. See section 6 of this Certificate.
Regulation:	**35(1)(2)(3)**	**Internal fire spread – Structure**
Comment:		Walls with the requisite lining can contribute to satisfying this Regulation. See sections 9.9 and 9.11 of this Certificate.
Regulation:	**35(4)**	**Internal fire spread – Structure**
Comment:		The panels are restricted by this Regulation. See section 9.2 of this Certificate.
Regulation:	**36(a)**	**External fire spread**
Comment:		The wall panels are restricted by this Regulation. See section 9.9 of this Certificate.
Regulation:	**36(b)**	**External fire spread**
Comment:		Roofs incorporating the system may satisfy this Regulation. See sections 9.6 to 9.8 of this Certificate.
Regulation:	**39(a)(i)**	**Conservation measures**
Comment:		The systems can contribute to satisfying this Regulation. See section 7 of this Certificate.
Regulation:	**40(2)**	**Target carbon dioxide emissions rate**
Comment:		The systems can contribute to satisfying this Regulation when compensating fabric and or services measures are taken. See section 7 of this Certificate.

Construction (Design and Management) Regulations 2015
Construction (Design and Management) Regulations (Northern Ireland) 2016

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

See section: 3 *Delivery and site handling* (3.1 and 3.3) and the *Installation* part of this Certificate.

Additional Information

NHBC Standards 2021

In the opinion of the BBA, the Ultrapanel Insulated Roof and Gable Wall Panel System, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards*, Part 2, Chapter 2.1 *The Standards and Technical Requirements*, Technical Requirement R3, *Materials requirement.*

CE marking

The Certificate holder has taken the responsibility of CE marking the structural steel components in accordance with harmonised European Standard BS EN 1090-1 : 2009.

Technical Specification

1 Description

1.1 The Ultrapanel Insulated Roof System, comprising roof and wall panels, is a prefabricated, panelised system with interlocking panels of expanded polystyrene (EPS) and structural beams formed from 0.7 or 0.8 mm cold-rolled steel rails and 6 mm oil-tempered hardboard webs. The panels are a standard size, typically 600 mm wide and 113, 213 or 287 mm deep for walls, and 213 or 287 mm deep for roofs. Cold-formed steel clips join adjacent panels together to form the roof and wall structures. After installation, the clips are fixed with screw fixings which prevents slippage of all components. Timber and steel composite beams (eaves, hip, ridge, valley and intermediate) are used in order to complete the roof structure. Steel tie bars anchored at the eaves span the roof structure to provide lateral stability.

1.2 The system components covered by this Certificate are shown in Figures 1 to 6.

Figure 1 Ultrapanel roof and wall panels

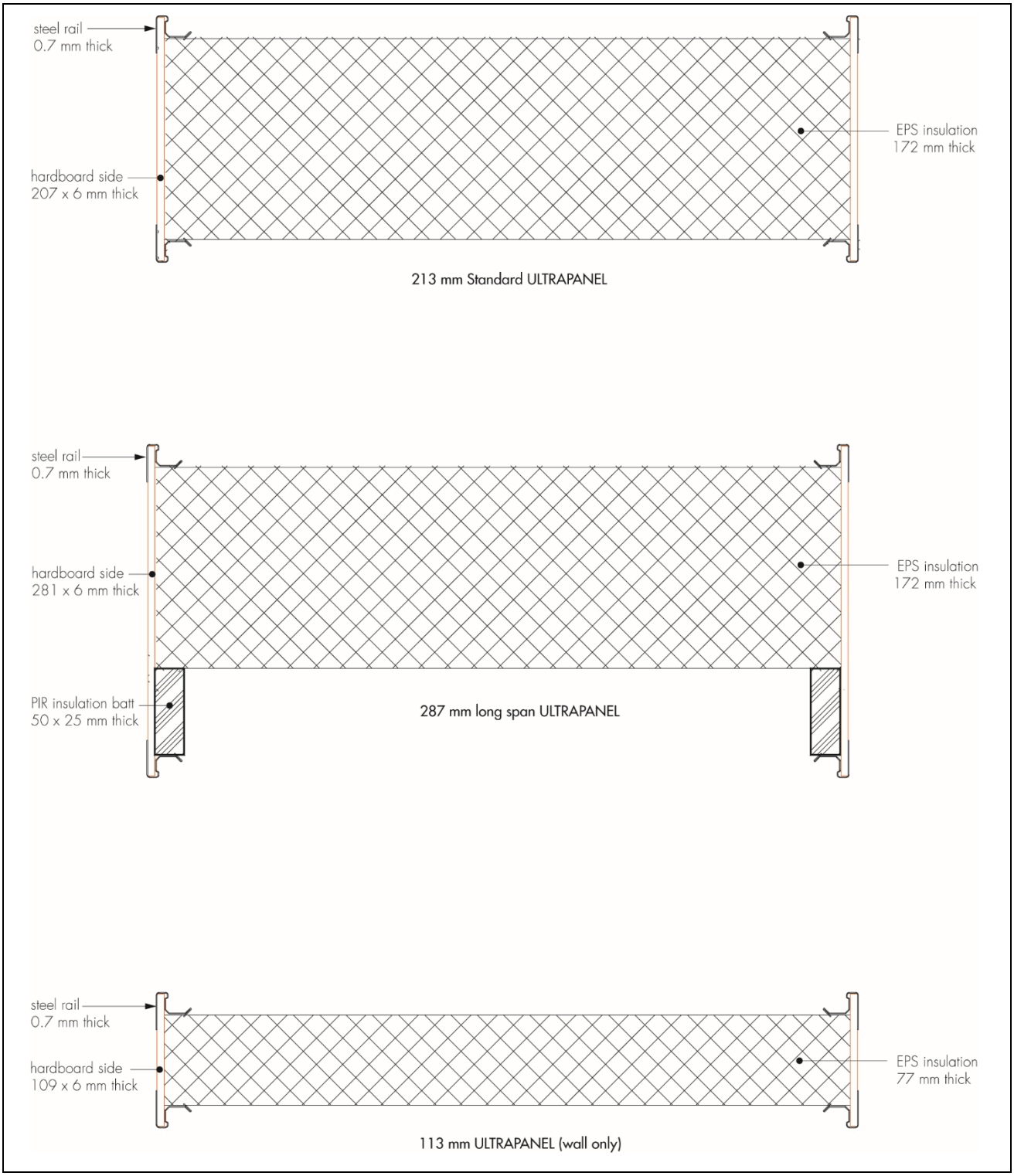
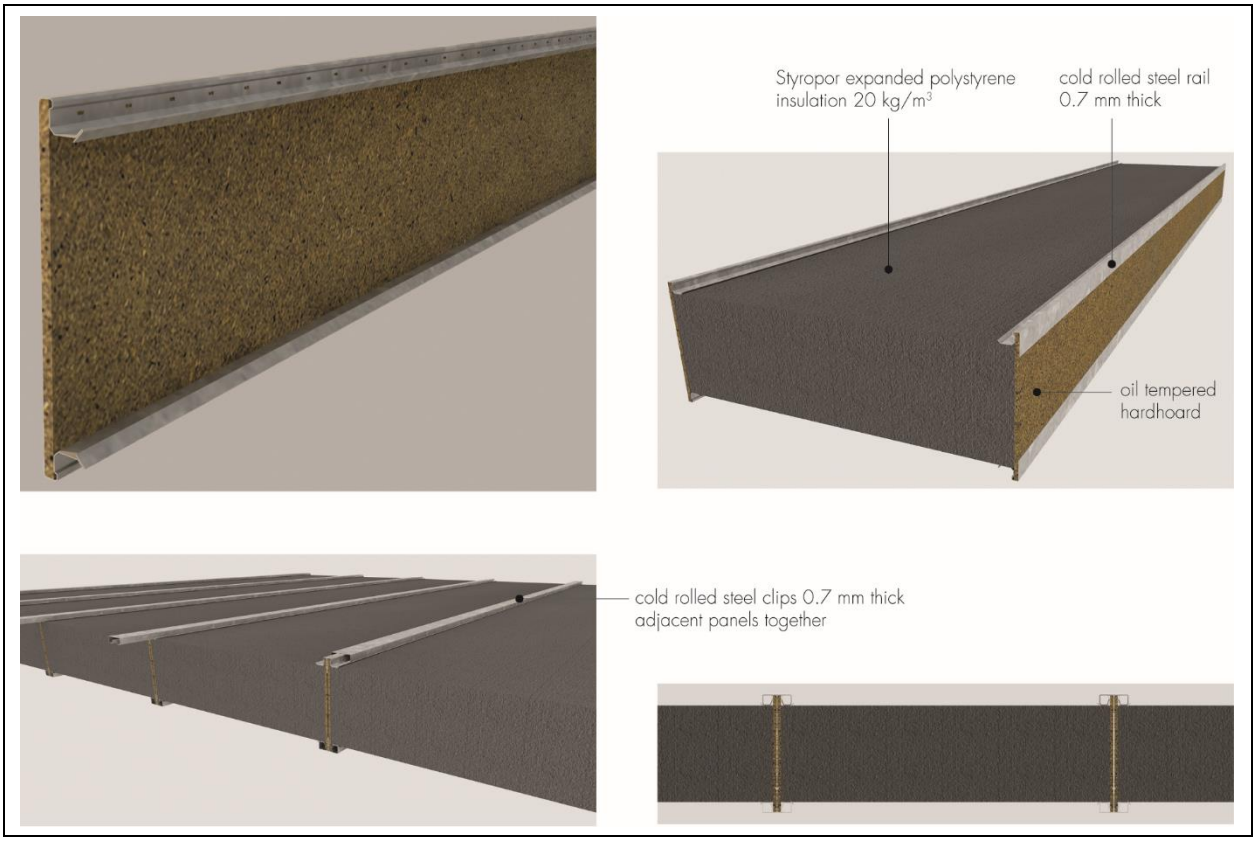


Figure 2 Panel components, single panel, panels connected with steel clip and panel's cross section



Roof and wall panels

- Roof panels of 213 and 287 mm thickness (EPS thicknesses of 172 mm in both thicknesses, as shown in Figure 1)
- Wall panels of 113, 213 and 287 mm thickness (EPS thickness of the 113 mm panel is 77 mm)
- Lengths up to 7 m

These consist of:

- cold-rolled steel sections of galvanized steel grade DX51D or S280 with zinc coating of Z275 – 20 µm per side coating thickness, 0.7 mm thickness or DX51D with zinc coating of Z275, 0.8 mm thickness, in accordance with BS EN 10346 : 2015
- insulation of grey expanded polystyrene (EPS 70) with thermal conductivity, $\lambda_D = 0.030$ W.m^{-1}K^{-1} in accordance with BS EN 13163 : 2012 and for 113 mm wall panels an insulation of rigid polyisocyanurate foam (PIR) board, faced with aluminium foil/kraft/foil tri-laminate on both sides with declared thermal conductivity, $\lambda_D = 0.022$ W.m^{-1}K^{-1} in accordance with BS EN 13165 : 2012
- oil-tempered hardboard of 6 mm thickness, Class 2 in accordance with BS EN 13986 : 2004
- for the 287 mm thick panels, 50 x 25 mm thick PIR insulation batts are used, with thermal conductivity of $\lambda_D = 0.022$ W·m^{-1}·K^{-1} and with aluminium foil facings on both sides

The panels are interlocked by:

- cold-rolled steel clips used to join the panels together, of galvanized steel grade DX51D or S280 with zinc coating of Z275 – 20 µm per side coating thickness, 0.7 mm thickness or DX51D with zinc coating of Z275, 0.8 mm thickness, in accordance with BS EN 10346 : 2015

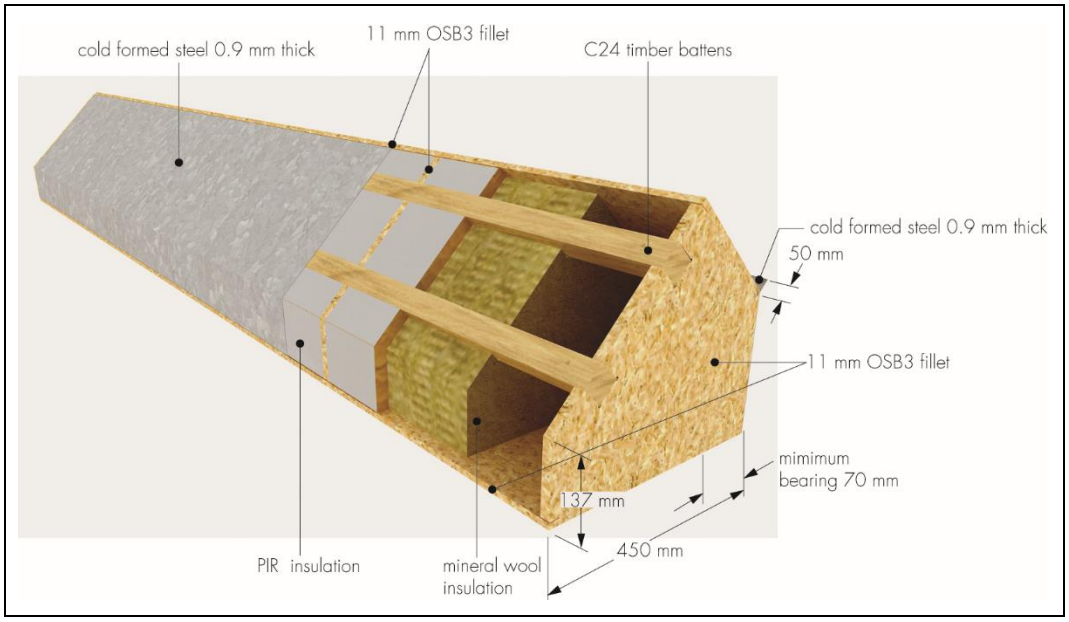
1.3 The insulated panels are assembled into roof structures using prefabricated eaves, hip, ridge and intermediate beams.

Eaves beams

Eaves beams are formed of 0.9 mm cold-rolled steel, 11 mm OSB3, C24 timber rails with mineral wool and PIR insulation infill (see Figure 3). The components are joined with polyurethane adhesive. The beam sides are designed to match the intended pitch of the roof:

- cold-rolled/formed steel sections to surround the wood and insulation (see also Figures 15, 16 and 17 - apart from bottom side of the eaves beam), of galvanized steel grade S280 with zinc, aluminium and magnesium coating ZM250 - 20 µm per side coating thickness, 0.9 mm thickness, manufactured in accordance with BS EN 10346 : 2015
- timber battens – 46 x 46 mm of C24 treated timber to BS EN 338 : 2016 and preservative treated for hazard class 2 to BS 8417 : 2011. Used to strengthen the beam face and provide fixing surface for the clips. Locations for fixing into timber battens are clearly marked with the inclusion of stickers to facilitate both installation and inspection.
- PIR insulation of 25 mm thickness, comprising a polyisocyanurate rigid foam insulation core with a thermal conductivity of λ_D = 0.022 $W \cdot m^{-1} \cdot K^{-1}$ with aluminium foil facings on both sides with zero ODP, in accordance with BS EN 14308 : 2015
- rock mineral wool insulation of thermal conductivity of λ_D = 0.035 $W \cdot m^{-1} \cdot K^{-1}$, manufactured to a nominal density of 45 $kg \cdot m^{-3}$ to BS EN 13162 : 2012
- OSB/3 – 11 mm thickness, manufactured in accordance with BS EN 300 : 2006
- adhesive – structural two-part solvent-free polyurethane adhesive, used to join the S280 ZM250 steel to OSB/3

Figure 3 Eaves beam



Hip, ridge, valley and intermediate beams:

Hip, ridge, valley (inverted ridge beam) and intermediate beams (see Figures 4 and 5) are formed of 0.9 mm cold-rolled steel – steel is on the top two sides of the beam with a return as shown, 11 mm OSB3 and mineral wool insulation with the same specifications as the eaves beam.

- mineral wool insulation with thermal conductivity of λ_D = 0.035 $W.m^{-1}.K^{-1}$ and λ_D = 0.044 $W.m^{-1}.K^{-1}$, manufactured in accordance with BS EN 13162 : 2012.

Figure 4 Hip, ridge and valley beams

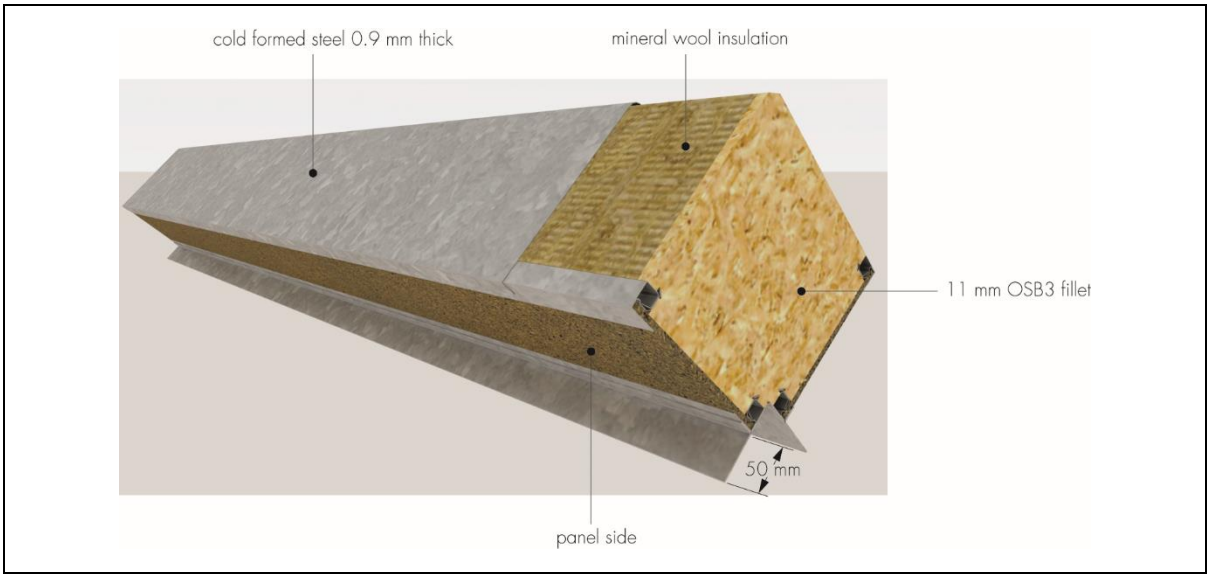
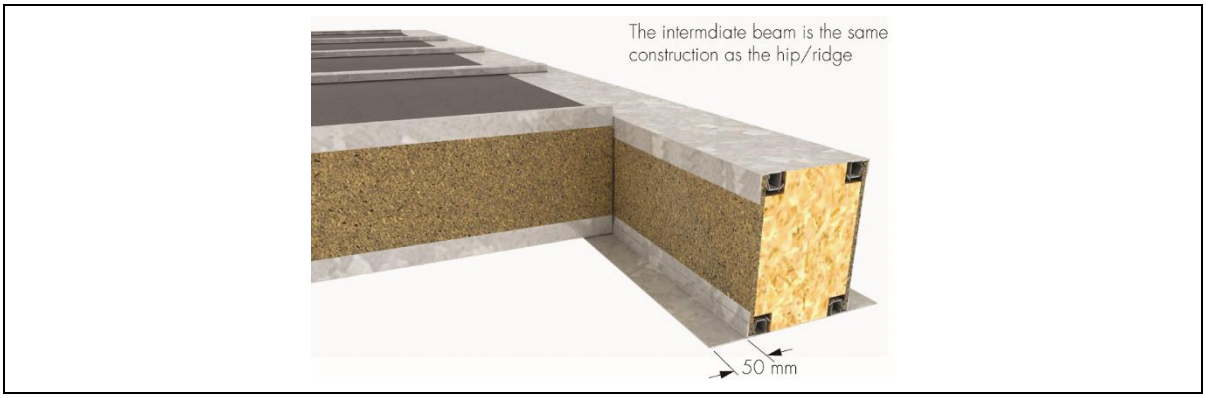


Figure 5 Intermediate beam



1.4 Fixings to be used with the roof and gable wall panel systems:

- Steel screw of grade ASTM A510, grade 1022 (equivalent EN grade 4.6) with zinc coating of Electropolyseal V (1000 hr) grade and thickness of coating 20-25 microns, head diameter 8.94 mm and length 50.8 mm, used externally in the systems eg clip fixings, soffits, gable ladder

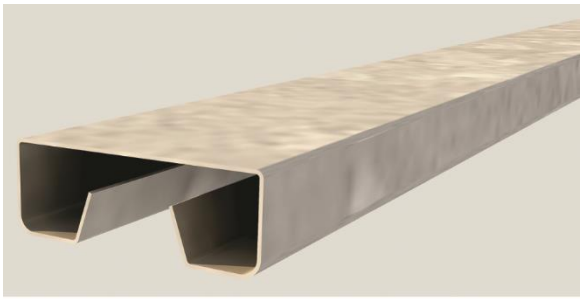
- Steel screw of grade ASTM A510, grade 1022 (equivalent EN grade 4.6) with zinc coating of clear zinc (Fe/Zn 3A per ASTM F1941) grade and thickness of 2.5 microns, head diameter 8.23 mm and length 19 mm, for internal use eg clip fixing

1.5 Additional components of the system, within the scope of the Certificate, are:

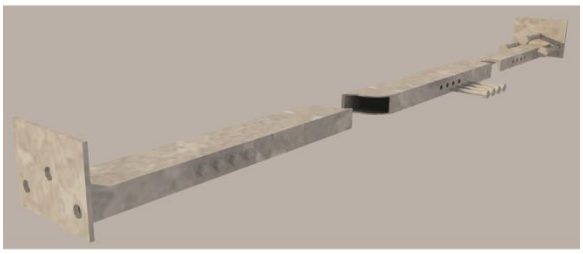
- tie bars of 50 x 25 x 2 mm of S235 JRH CF RED fixed to a spigot channel 40 x 20 x 5 mm. S275, which is welded to 4 mm S275 steel plate, used to tie the opposite eaves beams together, spanning the width of the roof (see Figure 6)
- gable wall base fixing angle 50 x 50 x 0.9 mm S280GD + ZM250 fixed at 300 mm centres by screw GPHS00 14.2 x 38 mm
- tie brackets formed of 50 x 50 x 4 mm S275 rolled steel angle (see Figure 6)
- steel fixing plates of 200 x 100 x 0.9 mm S280GD + ZM250 at minimum 2 m centres, but positioned next to existing tie straps (provided by others) – can be 'L' shaped component with 50 x 50 x 0.9 mm dimensions or 'U' shaped components with 50 x 113 x 50 mm dimensions with 0.9 mm steel thickness of the same material grade
- clips of 0.7 or 0.8 mm cold-formed steel of grade DX51D + Z275, fixed to eaves, ridge, valley and intermediate beams (see Figure 6)
- diagonal bars of 0.9 x 100 mm flat steel, grade S280GD + ZM250, used to cross brace the wall panels
- fixings used for the components listed in this section are:
  - tie bar: 4 no. M6 high tensile steel bolts and 3 no. 25 mm dia M10 barrel nuts for 3 no. M10 high tensile steel bolts

- steel fixing plate: internal and external fixings
- clips: internal and external fixings
- diagonal bars: internal fixings (5 no. usually, but can vary between each project).

Figure 6 Ultrapanel system components



cold rolled steel clip 0.7 mm thick



Steel tie bar and bracket

1.6 Ancillary items used with the system but outside the scope of the Certificate:

- rooflights / roof windows – in-plane roof windows (supplied by others) can be fitted into the Ultrapanel system – each roof window comes with its own proprietary flashing kit
- dormer windows – prefabricated GRP dormers supplied by others, or on-site fabricated items can be designed into the roof system. Detailed installation instructions are supplied with the GRP dormer
- supporting walls – the eaves beams can be seated on a masonry or timber frame walls
- window frames in the spandrel – a window frame in timber/aluminium/PVC can be added into the gable/spandrel external wall. It must be fitted with a cavity tray; the membrane must be fitted/taped around the opening in accordance with the manufacturer's guidelines and a cavity closure used in each reveal
- roofing battens of appropriate size, organically treated in accordance with BS 5534 : 2014
- roof tiles/slates/finishes – laid to provide the finished roof and primary weatherproof membrane
- breather membrane in accordance with BS EN 13859-1 : 2014 and BS EN 13859-2 : 2014
- gypsum plasterboard backed with a vapour control membrane in accordance with BS EN 14190 : 2014
- internal finish (one or two layers of 15 mm gypsum board) – as described in section 9 of this Certificate, eg 15 mm Gyproc wallboard to the ceiling and dwarf cavity wall, one 15 mm Gyproc Fireline to the spandrel and two layers (staggered joints) to the party wall
- cavity stop sock – 120 x 100 x 1200 mm, manufactured from rockfibre mineral wool with thermal conductivity λ_D = 0.037 $W.m^{-1}.K^{-1}$, to BS EN 13162 : 2012
- party wall cavity barrier – 2 x 75 x 290 mm, manufactured from rockfibre mineral wool with thermal conductivity λ_D = 0.037 $W.m^{-1}.K^{-1}$, to BS EN 13162 : 2012, each pinned to a Fermacell strips each side of the cavity
- FERMACELL board – 2 boards of 220 mm x 12.5 mm thick x 2400 mm long as part of the fire stopping arrangement at the party wall head
- restraint strap 30 x 2.5 mm (if required) – 900 mm long to secure the wall plate to the supporting wall, installed by the housebuilder. It is the Certificate holder's responsibility to restrain the eaves beam to the wall plate using the flat steel plates, as described in section 1.5 ('U' shaped and 'L' shaped)
- decorative chimneys.

2 Manufacture

2.1 The EPS is expanded using conventional techniques.

2.2 The steel profiles are slit and rolled into the appropriate shape, then cinched into the hardboard web to composite panels.

2.3 The peripheral beams are manufactured from timber, steel and insulation using conventional wood and metal-working techniques.

2.4 As part of the assessment and ongoing surveillance of product quality, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

2.5 The management system of Ultraframe (UK) Ltd has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 by BSI (Certificate FM23560)

3 Delivery and site handling

3.1 The roof and gable wall panels and components of the system are packed in bundles, wrapped for protection and delivered to site. Each pack's weight varies depending on the house style and lift schedule. Each panel is marked by letters and numbers that describe the correct order of installation, the quantity, gross weight and site location.

3.2 The panel packs must be stored under cover and protected from moisture, wind and hydrocarbons. The panels should remain strapped together until ready for placement on the roof or wall, in order to be restrained from any movement (eg windy conditions).

3.3 The individual panels and small beams should be lifted by two persons. Packs of panels, which sit on timber pallets, can be safely lifted by the use of a telehandler or similar, onto the work area. Alternatively, a suitable crane can be used to lift packs or pre-fabricated sub-assemblies into position on site.

3.4 The panels can withstand the normal loads associated with site handling and installation. Any damage to components and panels before or during installation can affect the durability of the systems and so, damaged components must not be used.

3.5 The system can provide some weather protection, but should be overclad with the roof finishes as soon as practicable.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Ultrapanel Insulated Roof and Gable Wall Panel System.

Design Considerations

4 Use

4.1 The Ultrapanel Insulated Roof and Gable Wall Panel System is satisfactory for use as a structural roof system and a non-loadbearing wall system. The roof and gable wall systems are intended for domestic buildings with a finished roof pitch between 37.5 and 50˚. The wall panels may be used as gable or party walls on buildings with no storey above 14 metres, subject to design and fire constraints. This Certificate covers the roof and wall panel system designed and fitted as a complementary unitary solution. However, the wall or the roof panel system could be used independently of each other, which is not covered by this Certificate, further guidance can be provided by the Certificate holder on intended design and usage.

4.2 The system is suitable for use with a conventional timber batten and tile or slate roof finish, incorporating an appropriate roofing membrane above the panels to resist the passage of moisture.

4.3 If architectural features, through-fittings or rooflights are required on the roof and in walls, special care and attention is necessary to ensure that these features have been correctly detailed and fitted. Openings for windows and doors are created by using appropriately sized panels. The cutting or forming of these openings within a wall panel, however, must be taken into account, in particular with regard to the loadbearing capacity of individual elements and overall stability of the structure.

5 Practicability of installation

The Ultrapanel Insulated Roof and Gable Wall Panel System must only be installed by competent roofing installers/ contractors trained and approved by the Certificate holder and supported with site supervision as necessary. The Certificate holder provides guidance and assistance in design.

6 Structural performance

6.1 The system has adequate strength and stiffness to sustain the specified actions when used in accordance with this Certificate. A suitably qualified structural engineer must ensure that the specified roof construction can resist the positive and negative loads foreseen for the particular building, using the information given in Table 1 and section 6.2. The design properties of the roof and wall panels and beams of the system, are given in Tables 1 and 2.

Table 1 Roof panel and beam properties

Member name	Stiffness EI ($N.mm^2$)	Design bending resistance (kN.m)	Design shear capacity (kN)	Design axial capacity ($kN.m^{-1}$)
213 panel	5.40E+11	8.27	20	103
287 panel	9.80E+11	9.4	26	103+
450 eaves beam (horizontal)	8.50E+12	15.6	N/A	N/A
213 intermediate / hip / ridge beams	5.20E+11	6.4	20	N/A
287 intermediate / hip / ridge beams	9.30E+11	10.4	26	N/A
213 valley beams	7.80E+11	7.1	N/A	N/A

Table 2 Wall panel properties

Member name	Stiffness EI ($N.mm^2$)	Design bending resistance (kN.m)	Design shear capacity (kN)	Design axial capacity ($kN.m^{-1}$)
113 wall panel	9.00E+10	3.2	10	76
213 wall panel	5.40E+11	8.27	20	103

6.2 When evaluating the design loads, the wind loads must be calculated in accordance with the recommendations of BS EN 1991-1-4 : 2005 and its UK National Annex, and the imposed snow loads must be checked in accordance with the recommendations of BS EN 1991-1-3 : 2003 and its UK National Annex.

6.3 The steel tie bar has a design resistance of 64 kN. A minimum of two are required per roof; larger roofs may require intermediate tie-bars to resist the lateral forces at the eaves and limit the lateral deflection at the supporting walls.

6.4 The system is capable of accommodating thermal movements provided it is installed in accordance with this Certificate and the Certificate holder's instructions.

6.5 The fixings used in the system have the design properties shown in Table 3, below. The correct number of fixings required to resist the design actions must be calculated in each project by a qualified structural engineer.

Table 3 Fixings pull-out, pull-through and shear capacity

Fixings	Design pull-out strength	Design pull-through strength	Design shear (bearing) capacity
	kN	kN	kN
External	0.42	2.20	0.97
Internal	0.41	2.06	1.07

6.6 Resistance to lateral (racking) forces, where required, can be provided by diagonal flat steel braces, fixed to each clip and the peripheral beams.

6.7 When the panels are used to construct the inner leaf of an external cavity wall, the inner and outer masonry leaves must be designed and constructed in accordance with BS EN 1996-1-1 : 2005, BS EN 1996-1-2 : 2005, BS EN 1996-2 : 2006 and BS EN 1996-3 : 2006, and their UK National Annexes, and PD 6697 : 2019. Where there are openings in the gable wall, the lintels must be designed to support the spandrel panels and any supporting masonry in the temporary and permanent conditions.

6.8 The panels are capable of withstanding the impacts associated with normal handling, installation and service.

7 Thermal performance

7.1 Calculations of the area-weighted thermal transmittance (U value) should be carried out in accordance with BS EN ISO 6946 : 2017 and BRE Report BR 443 : 2006, using the thermal resistances, R values ($m^2K \cdot W^{-1}$), in Table 4 of this Certificate.

Table 4 Example panel thermal resistance (R) values

Panel option	R-value ($m^2K \cdot W^{-1}$)	
	Roof(1)	Wall(2)
113 mm panel with EPS insulation	-	2.554
113 mm panel with PIR insulation	-	3.755
213 mm panel	5.272(1)	5.410
287 mm panel	5.440(1)	5.592
213 mm Intermediate panel	3.293	-

(1) includes unventilated air space on warm side of panel.
(2) includes unventilated air spaces on warm and cold side of panel.

7.2 The U value of a complete element will depend on the selected panel and the internal and external finishes. Calculated U values for example constructions are given in Table 5.

Table 5 Example element thermal transmittance (U) values ($Wm^{-2} \cdot K^{-1}$) and minimum temperature factors, f_{Rsi}

Flanking element	Panel option	U-value ($Wm^{-1}K^{-1}$)	Temperature factor, f_{Rsi}
Gable wall(1)	113 mm panel (EPS insulation)	0.32	0.93
	113 mm panel (PIR insulation)	0.23	0.92
Gable wall(1)	213 mm panel	0.17	0.96
Pitched roof(2)		0.18	0.97
Gable wall(1)	287 mm panel	0.16	0.98
Pitched roof(2)		0.18	0.98
Pitched roof(3)	Intermediate panel	0.28	0.96

(1) includes the following build-up:
- 15 mm plasterboard (0.25 $Wm^{-1}K^{-1}$)
- Ultrapanel panel option
- breather membrane
- 100 mm unventilated cavity (R = 0.18 $m^2K \cdot W^{-1}$)
- 102.5 mm brickwork

(2) includes the following build-up:
- 15 mm plasterboard (0.25 $Wm^{-1}K^{-1}$)
- Ultrapanel panel option
- ventilated airspace (R_{si} = 0.10 $m^2K \cdot W^{-1}$)
- LR membrane

(3) includes the following build-up:
- 15 mm plasterboard (0.25 $Wm^{-1}K^{-1}$)
- intermediate panel option
- LR membrane
- ventilated airspace (R_{se} =0.10 m^2K/W)

7.3 The junction ψ-values given in Table 6 may be used in SAP calculations or values can be modelled in accordance with the requirements and guidance in BRE Report BR 497 : 2007, BRE Information Paper IP 1/06 and the provisions in the documents supporting the national Building Regulations relating to competency to perform calculations, determine robustness of design/construction and limiting heat loss by air infiltration. Alternatively, default psi values may be used from SAP 2012, Appendix K.

Table 6 Junction psi values(1)

Junction	SAP reference	Flanking element description	Ψ-value ($Wm^{-1}K^{-1}$)	Temperature factor, f_{Rsi}
Ridge	R5	Pitched roof(2)	0.025	0.94
Eaves (insulation at rafter level)	E11	Pitched roof(2) External wall(3)	0.000	0.95
Gable (insulation at rafter level)	E13	Pitched roof(2) Gable wall(4)	0.029	0.93

(1) refer to Figures 7, 8 and 9

(2) includes the following build-up
- 12.5 mm plasterboard (0.25 $Wm^{-1}K^{-1}$)
- 213 mm standard panel

(3) includes the following build-up
- 15 mm plasterboard (0.25 $Wm^{-1}K^{-1}$)
- 25 mm cavity (R = 0.18 m^2K/W)
- 100 mm block inner leaf (1.33 $Wm^{-1}K^{-1}$)
- cavity insulation (0.033 $Wm^{-1}K^{-1}$)
- 100 mm brick outer leaf (0.77 $Wm^{-1}K^{-1}$)

(4) includes the following build-up
- 15 mm plasterboard (0.25 $Wm^{-1}K^{-1}$)
- 213 mm standard panel

Figure 7 Section detail through ridge

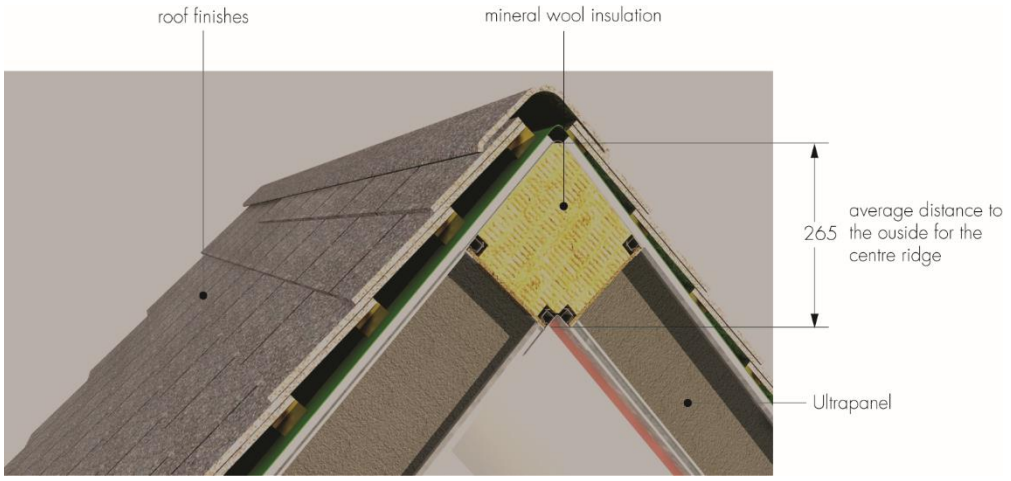
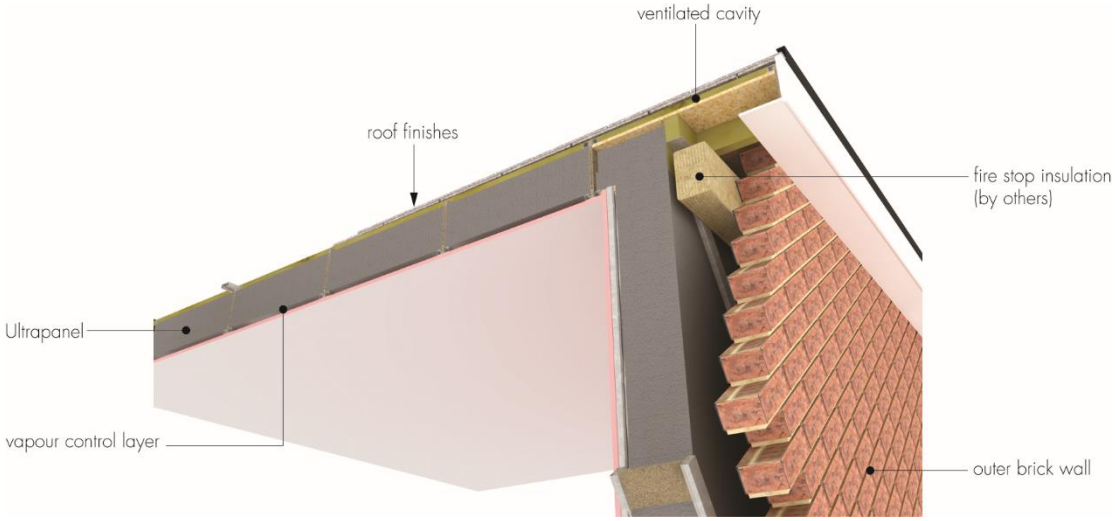


Figure 8 Eaves detail

Figure 9 Spandrel wall junction detail



8 Condensation risk

Surface condensation

8.1 Roofs and walls will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 0.7 $W \cdot m^{-2} \cdot K^{-1}$ at any point and the interfacing junctions with other elements are designed in accordance with the guidance referred to in section 7.3 of this Certificate.

8.2 Building fabric designs are acceptable when the temperature factor, f_{Rsi}, detailed in Tables 5 and 6 meets or exceeds the critical temperature factors, f_{CRsi}, detailed in tables 1 and 2 of BRE Information Paper IP 1/06 for the relevant building type.

8.3 Roofs and walls will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 1.2 $W \cdot m^{-2} \cdot K^{-1}$ at any point and when roofs and walls are designed and constructed to BS 5250 : 2011. Additional guidance can be found in BRE Report BR 262 : 2002.

Interstitial condensation

8.4 Elements will adequately limit the risk of interstitial condensation when they are designed and constructed in accordance with BS 5250 : 2011 (Annexes D, F, G and H), using the following water vapour diffusion factors (μ):

OSB (panel edges) – 50
EPS panels – 30
PUR (panel edges of 287 mm panel) – 60
mineral wool (intermediate beam) – 1
Steel – ∞
PIR insulation panel and facers at S_d=22.2 m – 10.4

8.5 Example calculations for the constructions in Table 5 of this Certificate for humidity Class 4 (high occupancy dwellings) indicate a low risk of any interstitial condensation forming.

8.6 In roofs, a vapour permeable membrane with a maximum vapour resistance of 0.25 $MN \cdot s \cdot g^{-1}$ should be used; for walls, a breather membrane with a maximum vapour resistance of 0.6 $MN \cdot s \cdot g^{-1}$ should be used.

8.7 The risk of interstitial condensation in both the external walling and roofing is greatest when the building is drying out after construction. Guidance on preventing condensation is given in BRE Digest 369 and BRE Report BR 262 : 2002.

9 Behaviour in relation to fire

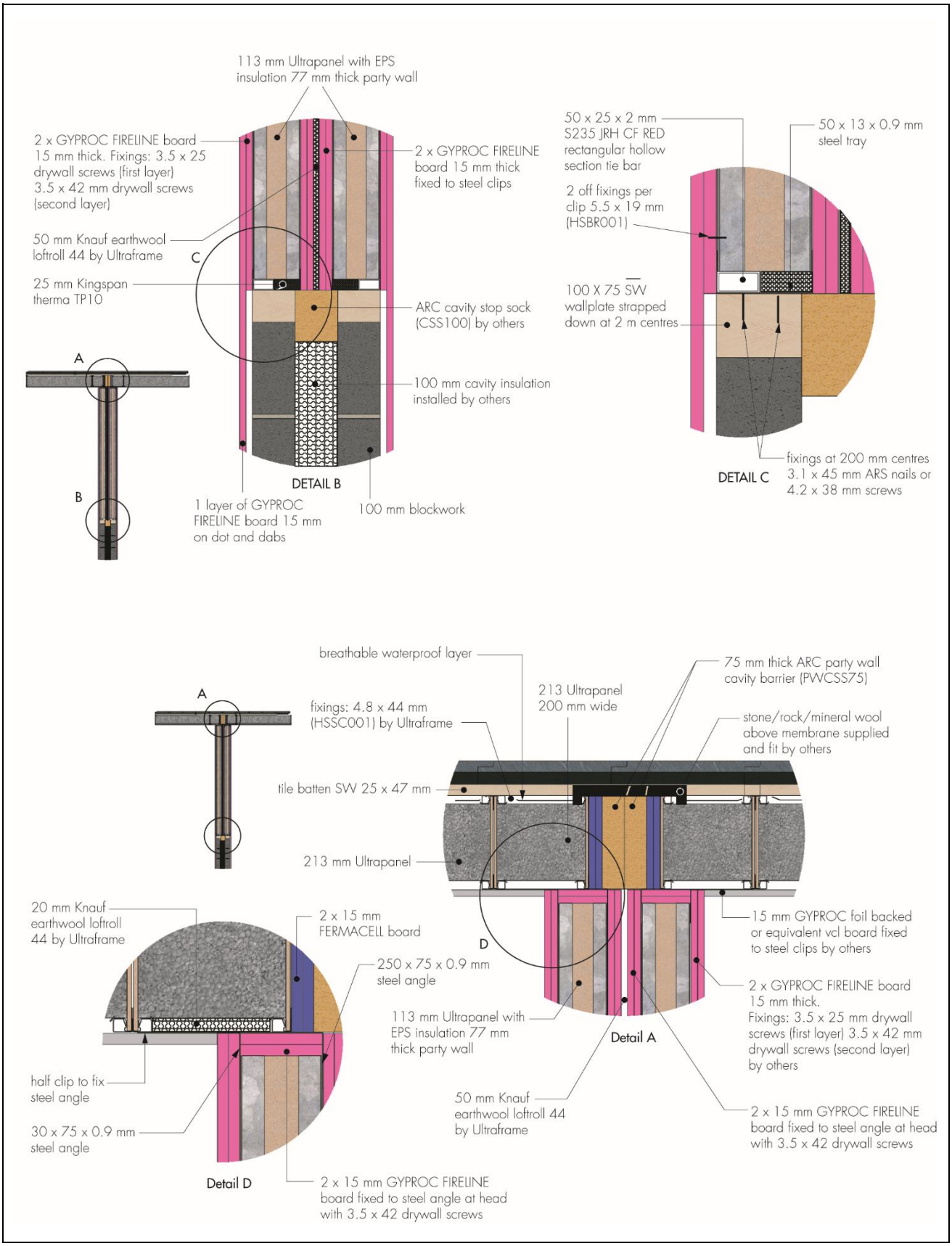
9.1 The panels are not classified as 'non-combustible' or 'of limited combustibility'.

9.2 The EPS insulation has a Class E reaction to fire classification in accordance with BS EN 13501-1 : 2007. Cavity barriers should be provided in accordance with the requirements of the documents supporting the national Building Regulations.

9.3 The performance of wall and roof constructions other than described in sections 9.5 and 9.7 of this Certificate, should be evaluated by reference to the requirements of the documents supporting the relevant national Building Regulations and / or tested by accredited testing laboratories.

9.4 Where the system is to form a junction with a compartment wall, designers must ensure that there is adequate resistance to fire spread from one compartment to another either over the roof or from within one of the compartments. See Figure 10 below.

Figure 10 Party wall details with internal boards at base and head positions



9.5 Designers should refer to the relevant national Building Regulations and guidance for detailed conditions of use, particularly in respect of requirements for cavity barriers, service penetrations and combustibility limitations for materials and components used in the overall construction.

Roof panels

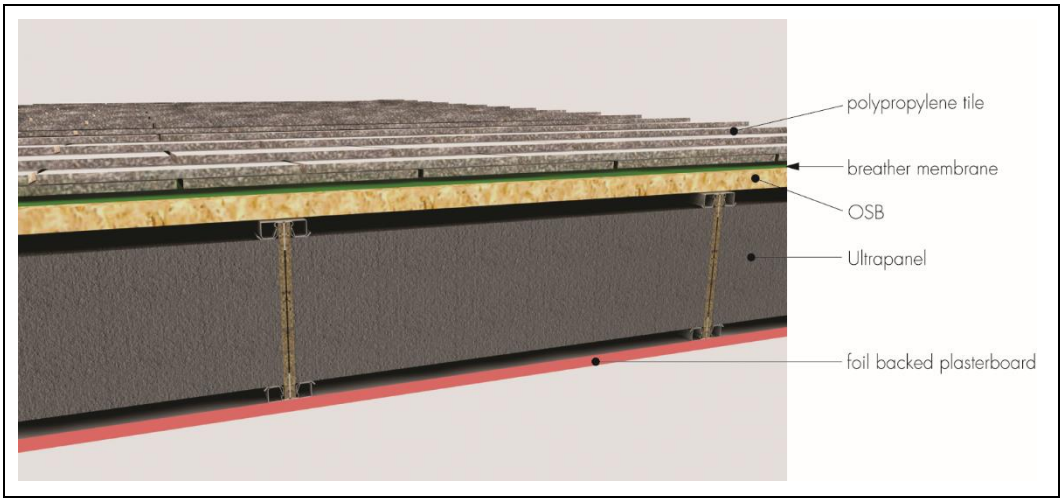
9.6 The roof construction as described in Table 7 of this Certificate and shown in Figure 11, achieved a resistance to external fire exposure of EXT.S.A.C. when tested and classified in accordance with BS 476-3 : 2004.

Table 7 Resistance to external fire exposure to BS 476-3 : 2004 for roof systems

Rating	Panel thickness (mm)	Total structure thickness (mm)	Surface weight ($kg \cdot m^{-2}$)	Roof construction (externally to internally)	Test report and Classification reference
EXT.S.A.C.(1)	213	270	33	Polypropylene tiles fixed through a polypropylene breather membrane to an 11 mm thick OSB board and Ultrapanel roof panel, with a 12.5 mm foil backed plasterboard underneath the panel.	Warrington Fire (Gent) 18905A(2)

(1) Roof pitches above 10°.
(2) Copies of the report are available from the Certificate holder.

Figure 11 Roof panel construction



9.7 The roof construction described in section 9.6 of this Certificate is not subject to any restriction in terms of proximity to boundaries (see also section 9.3).

Gable walls

9.8 Walls incorporating the wall panel systems can achieve a classification for resistance to fire of REI 30 and REI 60 when tested in accordance with BS EN 1365-1 : 2012 (in conjunction with BS EN 1363-1 : 2012) and classified in accordance with BS EN 13501-2 : 2016. The wall constructions required to achieve these classifications are described in Tables 8 and 9 of this Certificate and shown in Figures 12 to 14.

Table 8 Resistance to fire to BS EN 13501-2 : 2016 for external wall systems

Rating	Panel thickness (mm)	Total structure thickness (mm)	Load applied (kN/linear metre)	Wall construction (fire side to non-fire side)	Test report and Classification reference
REI 30	211	231	35	comprising one layer of gypsum plasterboard "Gyproc Wallboard" of 15 mm thickness, Ultrapanel wall, a layer (0.5 mm thick) of spunbonded polypropylene membrane, and braced with wall diagonal ties.	LGAI Technological Center, S.A. (APPLUS) 19/21511-2680-1(1) and 19/21511-2680
REI 30	113	132	20	comprising one layer of gypsum plasterboard "Gyproc Wallboard" of 15 mm thickness, Ultrapanel wall with PIR insulation (75 mm) and braced with wall diagonal ties.	BRE Global Fire Resistance Test report P115505-1004(1)

(1) Copies of the reports are available from the Certificate holder.

Figure 12 Fire resistance test wall structure with one layer of gypsum – exploded view

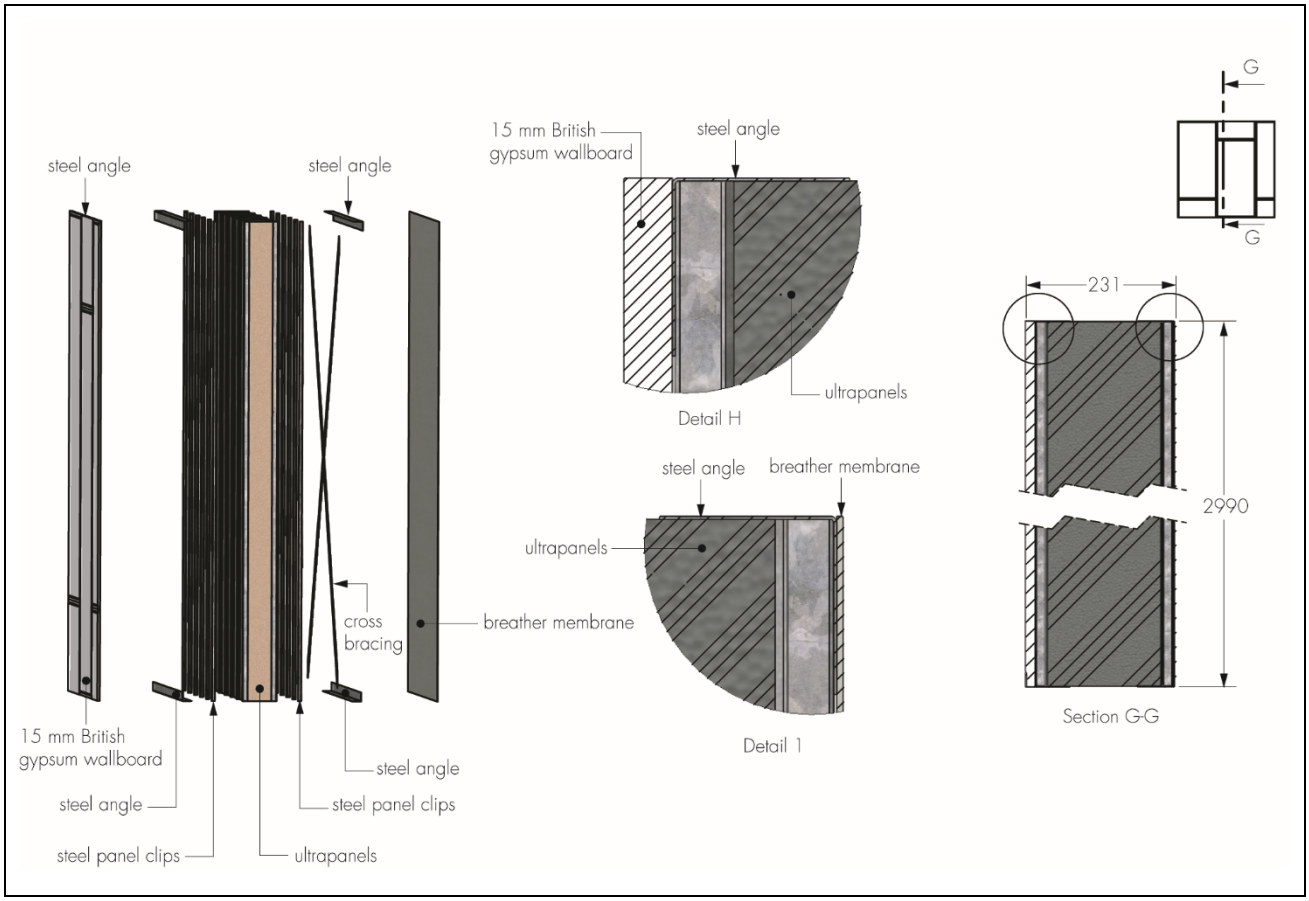


Figure 13 Fire resistance test wall structure with one layer of gypsum

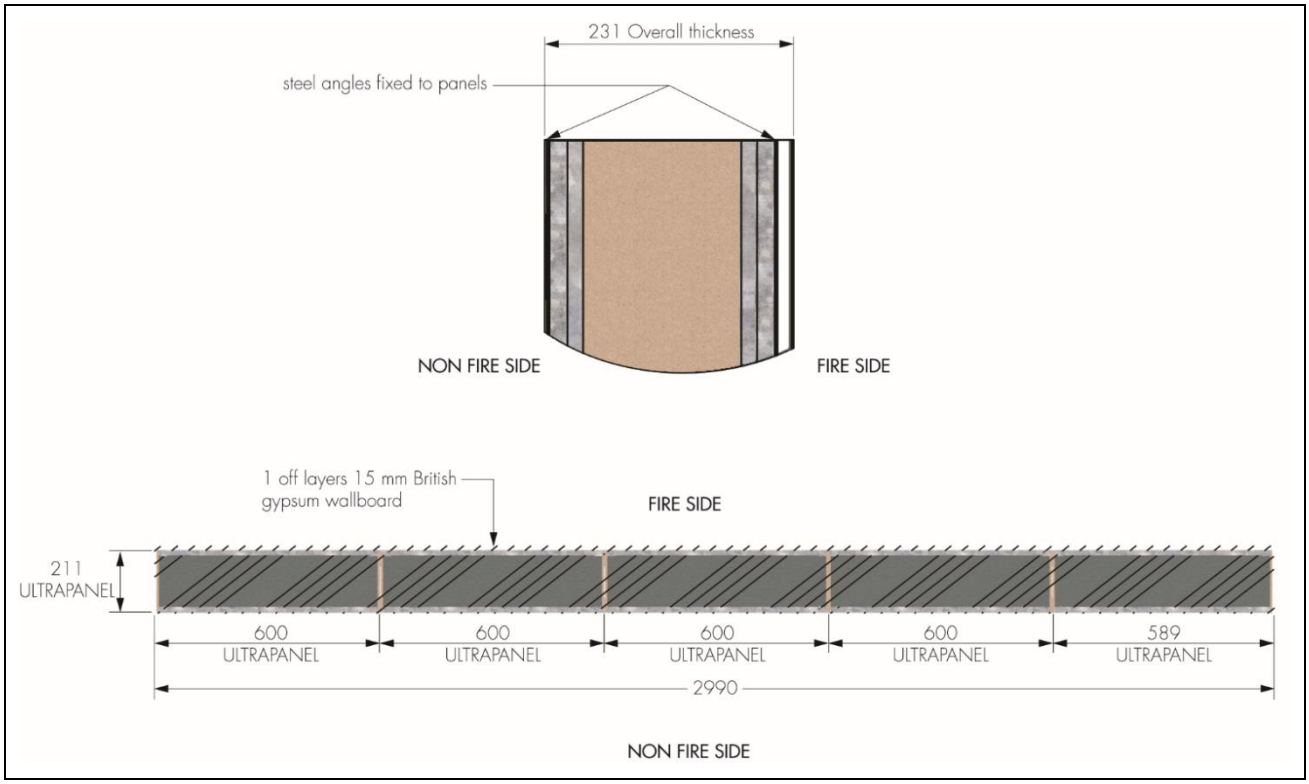
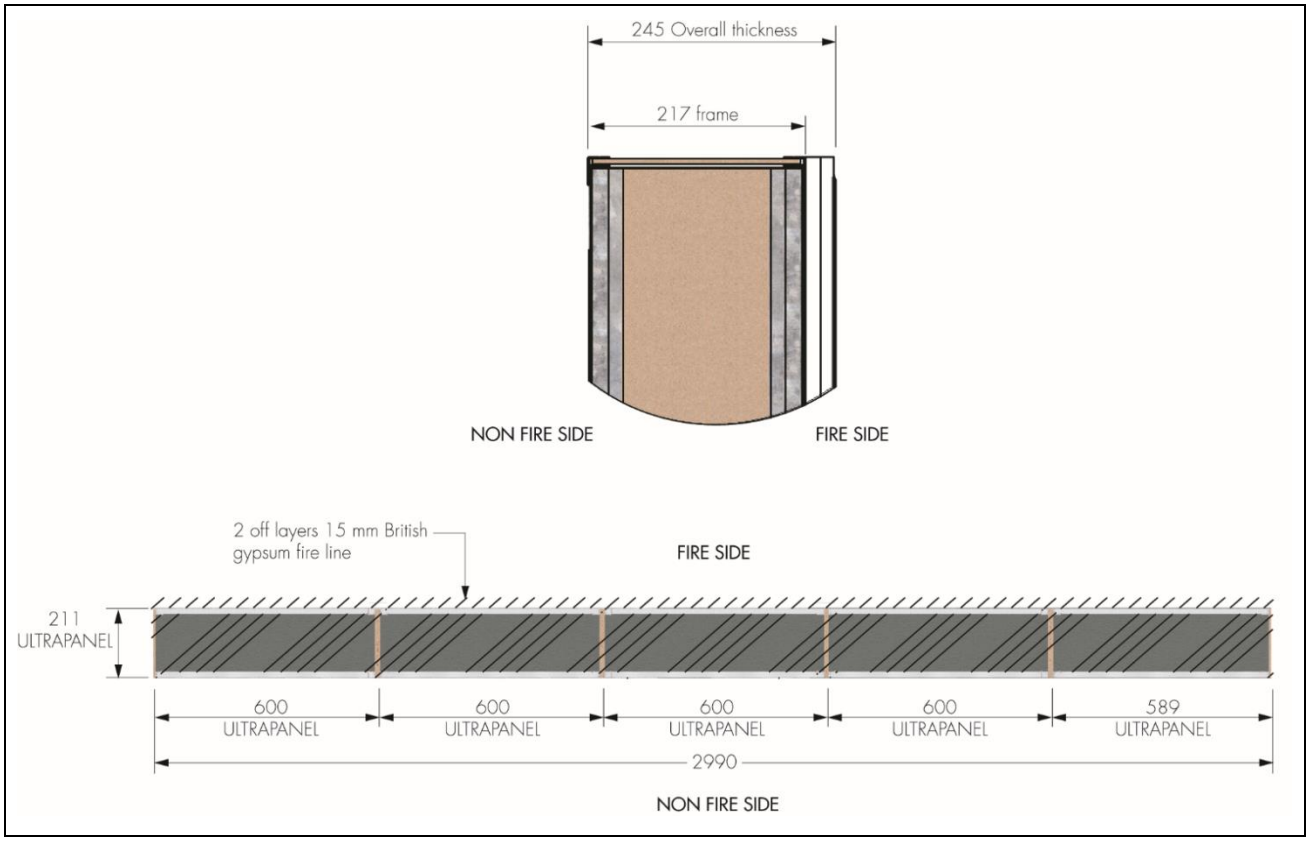


Table 9 Resistance to fire to BS EN 13501-2 : 2016 for external and party wall systems

Rating	Panel thickness (mm)	Total structure thickness (mm)	Load applied (kN/linear metre)	Wall construction (fire side to non-fire side)	Test report and Classification reference
REI 60	211	245	35	comprising two layers of gypsum plasterboard "Gyproc Fireline", each of 15 mm thickness, Ultrapanel wall and braced with wall diagonal ties.	LGAI Technological Center, S.A. (APPLUS) 19/20720-2153-1(1) and 19/20720-2153
REI 60	113	147	35	comprising two layers of gypsum plasterboard "Gyproc Fireline", each of 15 mm thickness, Ultrapanel wall with EPS insulation and braced with wall diagonal ties.	BRE Global Fire Resistance Test report P115505-1003(1)

(1) Copies of the reports are available from the Certificate holder.

Figure 14 Fire resistance test wall structure with two layers of gypsum



9.9 In England, Wales and Northern Ireland, the panel constructions in Tables 8 and 9 of this Certificate may be used on buildings 1 m or more from a boundary, and with no storey more than 5 m (see Table 8) or 14 m (see Table 9) above the ground.

9.10 In Scotland, the panel constructions in Tables 8 and 9 of this Certificate may be used on buildings more than 1 m from a boundary and with no storey more than 7.5 m (see Table 8) or 11 m (see Table 9) above the ground, but not on any entertainment or assembly building with a total storey area more than 500 m², or on any hospital or residential care building with a total storey area more than 200 m².

Party walls

9.11 Constructions comprising two leaves of the panel construction, as shown in Table 9, separated by 100 mm cavity, are acceptable for uses as separating elements. See also sections 9.4 and 9.5 of this Certificate. This construction should not be used in party walls in Scotland. See Figure 10.

10 Weathertightness

10.1 The system, with additional membrane, will provide temporary weather protection but a weathertight construction relies on the roof finishes (roof tiles, battens etc).

10.2 When the panels are used to form the inner leaf of an external cavity wall, the outer masonry leaf must be designed and constructed in accordance with BS EN 1996-1-1 : 2005, BS EN 1996-2 : 2006 and BS EN 1996-3 : 2006 and their UK National Annexes and PD 6697 : 2019, and must incorporate damp-proof courses and cavity trays as appropriate. A breather membrane is required with this type of construction.

10.3 Roofing should be detailed in accordance with BS 5534 : 2014 to ensure moisture is prevented from coming into contact with the panels.

10.4 The weathertightness of the system will not be adversely affected by normal service deflections.

11 Air permeability

11.1 The panels can contribute to achieving adequate resistance to unwanted air infiltration provided there is effective sealing around junctions.

11.2 A proportion of completed buildings in a development are subject to pre-completion airtightness testing. Exceptions for small developments can be found in the documents supporting the national Building Regulations.

12 Maintenance

Although maintenance is not envisaged for the panels, regular checks should be carried out on the finishes to ensure that any damage is detected and repaired as soon as possible.

13 Durability

13.1 The panels will have comparable durability to that of hardboard to BS EN 13986 : 2004, of OSB/3 to BS EN 300 : 2006, and of steel to BS EN 10346 : 2015. Therefore, provided the installation remains weathertight and damp-proof, a design life of at least 60 years may be expected.

13.2 The EPS and mineral wool insulations are rot proof, dimensionally stable and, when installed with the overlays specified in this Certificate, will remain effective as an insulating material for the life of the building in which it is incorporated.

13.3 Timber used in areas that could be at risk, such as joints, should be preservative-treated in accordance with the recommendations given in BS 8417 : 2011. However, this is outside the scope of this Certificate.

14 Reuse and recyclability

The steel and timber components of the roof and wall panel systems can be recycled.

Installation

15 General

15.1 Installation of roof and gable wall panel systems must be carried out by trained and approved competent roofing installers/contractors and must comply with the details given in the Certificate holder's installation manual and the provisions of this Certificate. Guidance and drawings can be provided by the Certificate holder for contractors who are unfamiliar with the systems.

15.2 The installation process includes a pre-site visit by the Certificate holder's contract managers to ensure that the site manager is familiar with the system and that a Risk Assessment and Method Statement (RAMS) is undertaken in order to reduce risks on site. One week before installation, the actual plot where the roof is to be fitted will be visited to undertake pre-construction checks eg the wall plate to be fitted correctly. At the same time, length/width will be checked, along with cross check dimensions.

15.3 The walls supporting the wall plate must be within levelled tolerance to +/- 20 mm, the diagonals must be equal to ensure squareness within a tolerance of +/- 20. Lengths of all walls must be within the tolerance of +/- 20 mm.

16 Procedure

16.1 The eaves beams are fixed to the pre-fitted timber wall plate and the tie bars are installed across the roof, fixed at each end to the eaves beams.

16.2 The spandrel walls are erected on the gable and /or on the party walls, starting with the central panel and working outwards. The panels are fixed to the wall plate.

16.3 The ridge beam is placed in position and levelled using the spandrel walls as supports. The roof panels are then installed across the roof, starting at each end and working towards the middle. Panels must be fixed to the eaves and ridge beam, and any intermediate beams, using the supplied fixings and in accordance with the fixing pattern given in the design drawings. Short panels may be included to accommodate rooflights or dormers. Each adjoining pair of panels must be fixed together using the steel clips on both sides and secured using two fixings at four positions at 130 mm centres from the bottom. The ridge is fixed also by two fixings in four positions which start at 20 mm from the top and then at 50 mm centres.

16.4 The outer leaf of masonry can then be erected. It should be tied to the steel clips using standard wall ties at the appropriate spacing. A breather membrane may be required in the cavity (outside the scope of the Certificate).

16.5 The roof finishes (roofing membrane, tile battens and roof tiles to the desired specification) are installed, fixed to the steel clips.

16.6 The required internal lining of gypsum boards (see section 9) is installed.

16.7 Figures 15 to 18 show a typical installation procedure

Figure 15 Eaves beam / spandrel / roof interface – external and internal views

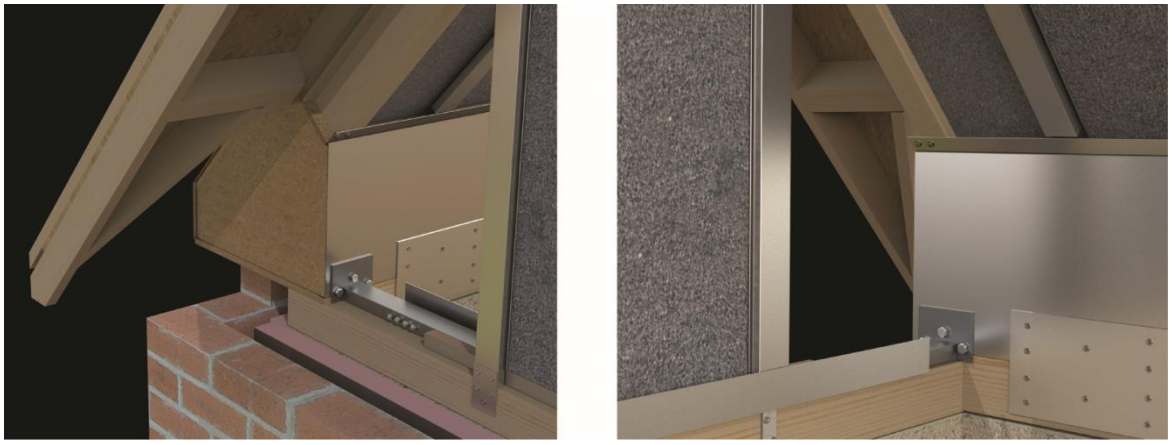


Figure 16 Eaves beam / soffit

Figure 17 Ridge / roof gable panel installation

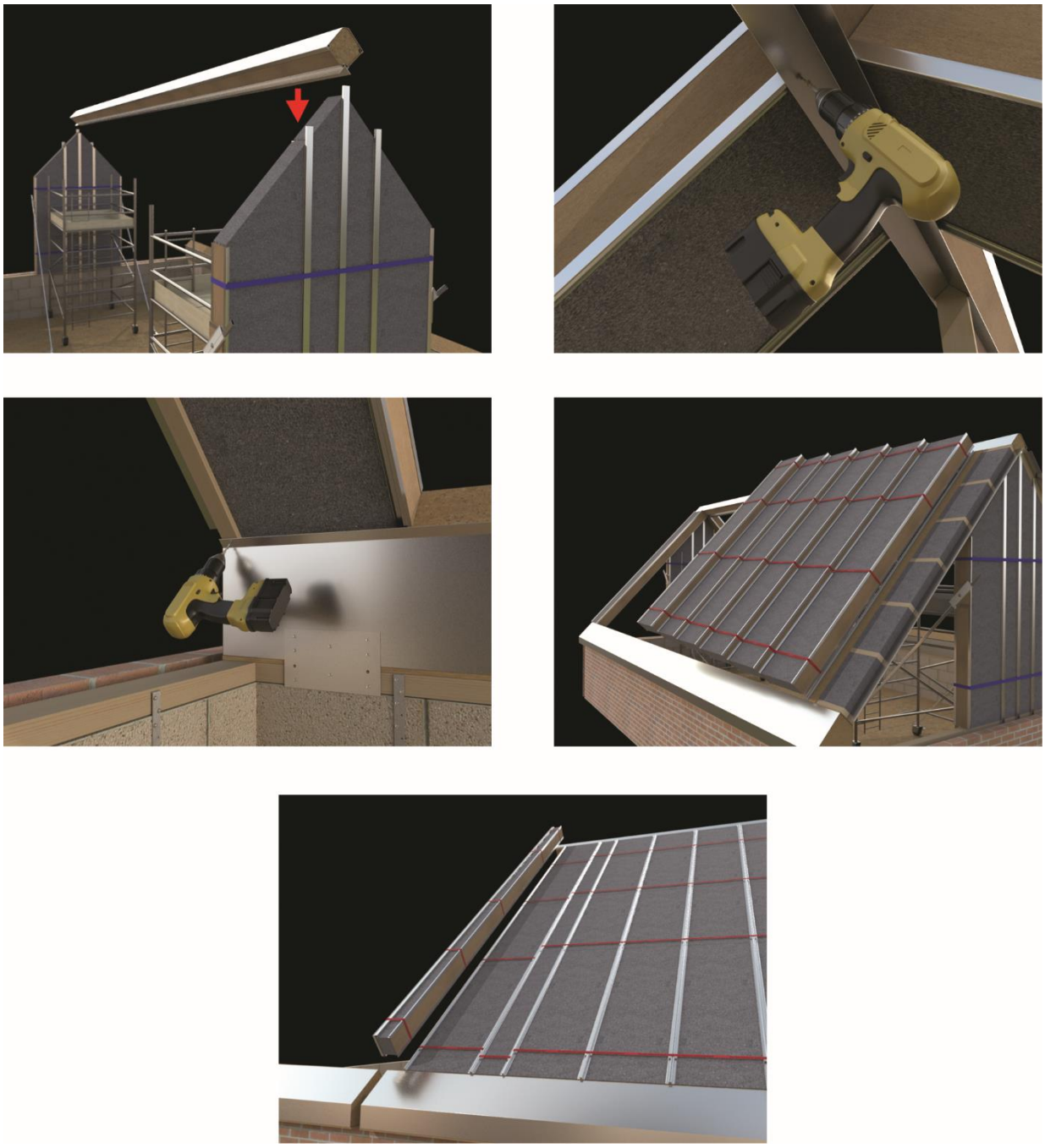
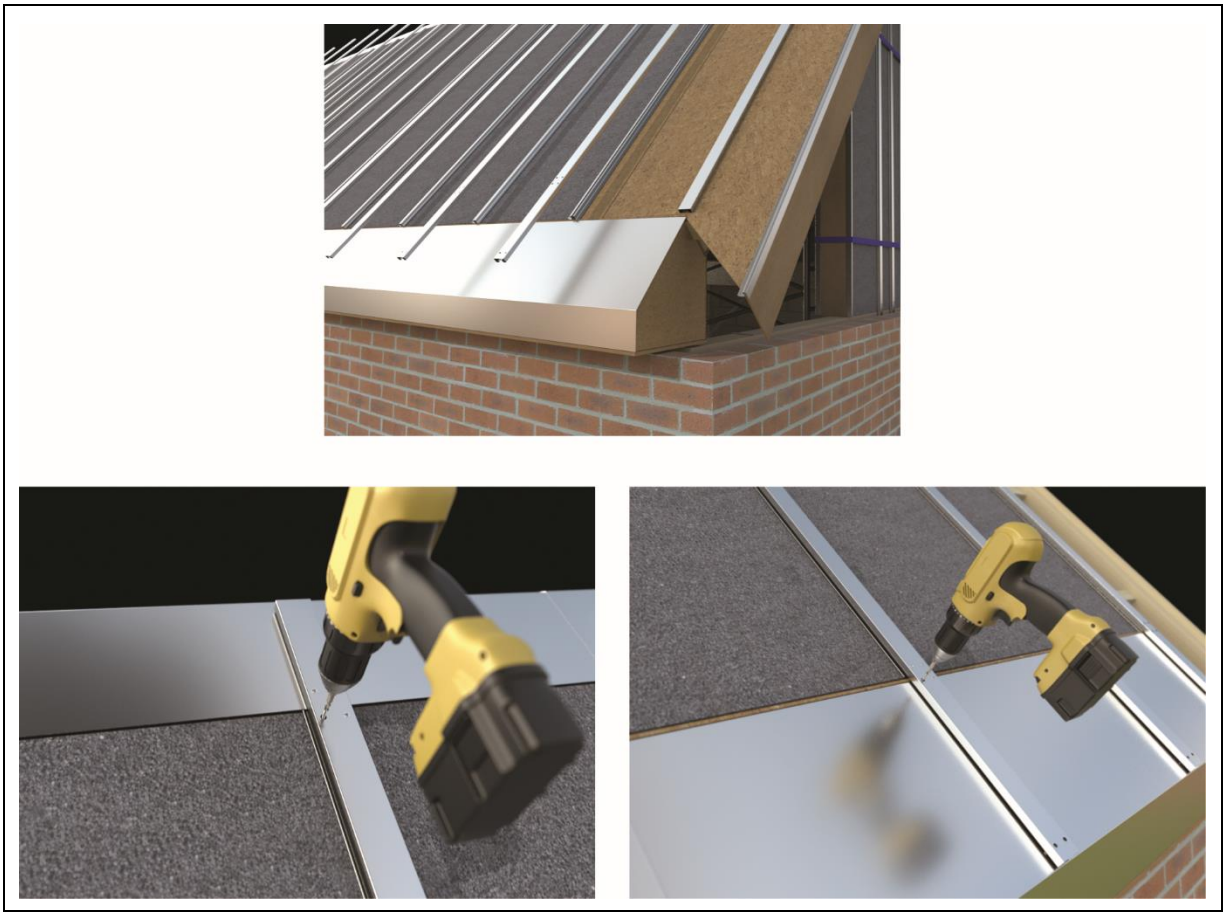


Figure 18 Roof panels clipped and fixed



Technical Investigations

17 Tests

Tests were carried out and the results assessed to determine:

- structural adequacy of the roof and wall system (lateral stability based on the racking resistance, axial, shear and bending capacity, snow and wind action resistance of the system)
- external fire exposure to roof and fire resistance tests in accordance to BS 476-3 : 2004 and BS EN 1365-1 : 2012 respectively.

18 Investigations

18.1 The manufacturing process was evaluated, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

18.2 An assessment was made of:

- fire performance
- practicability of installation
- condensation risk and thermal transmittance
- primary fixings pull out and pull through performance

- structural calculations analysis to relative Eurocodes based on the test results of the system members to prove the following:
  - structural resistance of the tie bar to the imposed axial forces
  - structural lateral resistance of the wall panel diagonal bars

- resistance of the fixings to the imposed actions, including uplift of the roof from the supporting wall, tying of the panels to beams, lateral forces on the roof system, fixing of roofing battens and finishes
- resistance of the panels (used as gable wall panels) to imposed vertical, horizontal loads and self-weight of the system.

18.3 Existing information relating to the durability of the system, performance in fire and compatibility of materials in contact was assessed.

18.4 A visit was carried out to a site to assess the practicability of installation.

Bibliography

BRE Report BR 262 : 2002 *Thermal insulation : avoiding risks*

BRE Report BR 443 : 2006 *Conventions for U-value calculations*

BRE Report BR 497 : 2007 *Conventions for calculating linear thermal transmittance and temperature factors*

BRE Digest 369 *Condensation and dampness: A collection of BRE expert guidance on assessing and treating dampness in buildings*

BRE Information Paper IP 1/06 *Assessing the effects of thermal bridging at junctions and around openings*

BS 476-3 : 2004 *Fire tests on building materials and structures – Classification and method of test for external fire exposure to roofs*

BS 5250 : 2011 + A1 : 2016 *Code of practice for control of condensation in buildings*

BS 5534 : 2014 *Slating and tiling for pitched roofs and vertical cladding – Code of practice*

BS 8417 : 2011 + A1: 2014 *Preservation of wood – Code of practice*

BS EN 300 : 2006 *Oriented strand boards (OSB) – Definitions, classification and specifications*

BS EN 338 : 2016 *Structural timber – Strength classes*

BS EN 1090-1 : 2009 + A1: 2011 *Execution of steel structures and aluminium structures – Requirements for conformity assessment of structural components*

BS EN 1363-1 : 2012 *Fire resistance tests – General requirements*

BS EN 1365-1 : 2012 *Fire resistance tests for loadbearing elements*

BS EN 1990 : 2002 + A1 : 2005 *Eurocode 0 – Basis of structural design*

BS EN 1991-1-3 : 2003 *Eurocode 1: Actions on structures; Part 1-3: General actions – Snow Loads*
NA to BS EN 1991-1-3 : 2003 UK National Annex to *Eurocode 1: Actions on structures; Part 1-3: General actions – Snow Loads*
BS EN 1991-1-4 : 2005 *Eurocode 1: Actions on structures; Part 1-4: General actions – Wind Loads*
NA to BS EN 1991-1-4 : 2005 + A1 : 2010 UK National Annex to *Eurocode 1: Actions on structures; Part 1-4: General actions – Wind Loads*

BS EN 1996-1-1 : 2005 + A1 : 2012 *Eurocode 6 – Design of masonry structures – General rules for reinforced and unreinforced masonry structures*
NA to BS EN 1996-1-1 : 2005 + A1 : 2012 UK National Annex to *Eurocode 6 – Design of masonry structures – General rules for reinforced and unreinforced masonry structures*
BS EN 1996-1-2 : 2005 *Eurocode 6 – Design of masonry structures – General rules – Structural fire design*
NA to BS EN 1996-1-2 : 2005 UK National Annex to *Eurocode 6 – Design of masonry structures – General rules – Structural fire design*

BS EN 1996-2 : 2006 *Eurocode 6 – Design of masonry structures – Design considerations, selection of materials and execution of masonry*
NA to BS EN 1996-2 : 2006 UK National Annex to *Eurocode 6 – Design of masonry structures – Design considerations, selection of materials and execution of masonry*
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BS EN 10346 : 2015 *Continuously hot-dip coated steel flat products for cold forming – Technical delivery conditions*

BS EN 13162 : 2012 + A1 : 2015 *Thermal insulation products for buildings – Factory made mineral wool (MW) products – Specification*

BS EN 13163 : 2012 + A2 : 2016 *Thermal insulation products for buildings – Factory made expanded polystyrene – Specification*

BS EN 13165 : 2012 + A2 : 2016 *Thermal insulation products for buildings – Factory made rigid polyurethane foam (PU) products – Specification*

BS EN 13501-1 : 2007 *Fire classification of construction products and building elements – Classification using data from reaction to fire tests*
BS EN 13501-2 : 2016 *Fire classification of construction products and building elements – Classification using data from fire resistance tests, excluding ventilation services*

BS EN 13859-1 : 2014 *Flexible sheets for waterproofing – Definitions and characteristics of underlays – Underlays for discontinuous roofing*

BS EN 13859-2 : 2014 *Flexible sheets for waterproofing – Definitions and characteristics of underlays – Underlays for walls*

BS EN 13986 : 2004 + A1 : 2015 *Wood-based panels for use in construction – Characteristics, evaluation of conformity and marking*

BS EN 14190 : 2014 *Gypsum board products from reprocessing – Definitions, requirements and test methods*

BS EN 14308 : 2015 *Thermal insulation products for building equipment and industrial installations – Factory made rigid polyurethane foam (PUR) and polyisocyanurate foam (PIR) products – Specification*

BS EN ISO 6946 : 2017 *Building components and building elements – Thermal resistance and thermal transmittance – Calculation methods*

BS EN ISO 9001 : 2015 *Quality management systems – Requirements*

PD 6697 : 2019 *Recommendations for the design of masonry structures to BS EN 1996-1-1 and BS EN 1996-2*

19 Conditions

19.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page – no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document – it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

19.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

19.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

19.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

19.5 In issuing this Certificate the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

19.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.