Hemsec Sips Ltd
Stoney Lane
Rainhill
Prescot
Merseyside L35 9LL
Tel: 0151-426 7171 Fax: 0151-493 1331
e-mail: contact@hemsec.com
website: www.hemsecsips.com

Agrément Certificate
06/4374
Product Sheet 1

HEMSEC SIPS PANELS

HEMSEC SIP LOADBEARING WALL AND ROOF PANELS

This Agrément Certificate Product Sheet(1) relates to Hemsec SIP Loadbearing Wall and Roof Panels, structural insulated panels manufactured from OSB/3 and rigid polyurethane insulation for use above the damp-proof course in domestic and non-domestic applications up to three storeys high (plus room in the roof) as the loadbearing inner leaf of an external cavity wall or as part of separating walls, internal loadbearing walls and pitched roofs.

(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

Strength and stability — the wall and roof panels have adequate strength to resist the loads associated with installation and in-service loading (see section 6).

Thermal performance — walls and roofs constructed from the panels can achieve U values specified in the national Building Regulations (see section 7).

Air permeability — dwellings incorporating the panels can achieve adequate air barrier continuity provided there is effective sealing around junctions, openings and penetrations (see section 8).

Behaviour in relation to fire — with adequate protection, panels used in external walls and separating walls will meet the required fire resistance periods given in the relevant Building Regulations (see section 10).

Resistance to airborne sound — test data indicates that separating walls, with additional plasterboard and soundproof linings and detailing as shown in this Certificate, will provide sufficient sound resistance (see section 12).

Durability — provided the installation remains weathertight, the panels will have a 60-year minimum service life provided that they are protected by the external and internal finishes (see section 15).

The BBA has awarded this Certificate to the company named above for the product described herein. This product 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 Fourth issue: 21 October 2014

Brian Chamberlain
Head of Approvals — Engineering

Claire Curtis-Thomas
Chief Executive

The BBA is a UKAS accredited certification body — Number 113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk

Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

British Board of Agrément
Bucknalls Lane
Watford
Herts WD25 9BA
tel: 01923 665300
fax: 01923 665301
e-mail: clientservices@bba.star.co.uk
website: www.bbacerts.co.uk

©2014

Regulations

In the opinion of the BBA, the Hemsec SIP Loadbearing Wall and Roof Panels, if installed, used and maintained in accordance with this Certificate, will meet or contribute to meeting 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
Requirement:	A3	Disproportionate collapse
Comment:		Walls and roofs constructed from the panels will have sufficient strength and stiffness when designed in accordance with sections 6.1 to 6.4 of this Certificate.
Requirement:	B3(1)(2)(3)	Internal fire spread (structure)
Comment:		The panels with the requisite lining can meet this Requirement. See sections 10.1 and 10.6 of this Certificate.
Requirement:	C2(c)	Resistance to moisture
Comment:		The panels can adequately limit the risk of surface condensation and contribute to minimising the risk of interstitial condensation. See sections 9.1 to 9.3 of this Certificate.
Requirement:	E1	Protection against sound from other parts of the building and adjoining buildings
Comment:		When installed with suitable flanking elements, separating walls incorporating the panels can meet this Requirement. See sections 12.1 to 12.3 of this Certificate.
Requirement:	E2(a)	Protection against sound within a dwelling-house etc.
Comment:		A single-leaf, non-loadbearing partition, incorporating suitable plasterboard linings, can meet this Requirement. See section 12.2 of this Certificate.
Requirement:	L1(a)(i)	Conservation of fuel and power (New dwellings)
Requirement	L2(a)(i)	Conservation of fuel and power (New buildings other than dwellings)
Comment:		The panels contribute to meeting this Requirement. See sections 7.1 to 7.4, 8.1 and 8.2 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The panels are acceptable. See sections 15.1, 15.2 and the *Installation* part of this Certificate.
Regulation:	26	CO2 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 panels contribute to meeting these Regulations. See sections 7.1 to 7.2 of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)	Durability, workmanship and fitness of materials
Comment:		The panels can contribute to a construction meeting this Regulation. See sections 15.1, 15.2 and the *Installation* part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	1.1(a)	Structure
Comment:		Walls and roofs incorporating the panels will have sufficient strength and stiffness when designed and constructed in accordance with sections 6.1 to 6.4 of this Certificate, with reference to clauses 1.1.1[(1)] and 1.1.2[(1)] of this Standard.
Standard:	2.1	Compartmentation
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)] to 2.2.3[(1)] of this Standard. See sections 10.1, 10.5 and 10.6 of this Certificate.
Standard:	2.3	Structural protection
Comment:		Walls using the appropriate lining can achieve a period of fire resistance of 'medium' duration, with reference to clause 2.3.1[(1)] of this Standard. See sections 10.1, 10.5 and 10.6 of this Certificate.
Standard:	2.4	Cavities
Comment:		Walls and roofs using an appropriate cavity barrier can satisfy this Standard, with reference to clauses 2.4.1[(1)] to 2.4.7[(1)]. See section 10.6 of this Certificate.
Standard:	2.6	Spread to neighbouring buildings
Comment:		Walls using the appropriate lining can achieve a period of fire resistance of 'medium' duration, with reference to clause 2.6.1[(1)] of this Standard. See sections 10.1, 10.5 and 10.6 of this Certificate.
Standard:	3.15	Condensation
Comment:		The panels can adequately limit the risk of surface condensation and will contribute to minimising the risk of interstitial condensation, with reference to clauses 3.15.1[(1)] to 3.15.4[(1)] of this Standard. See sections 9.1 to 9.3 of this Certificate.
Standard:	5.1	Noise separation
Standard	5.2	Noise reduction between rooms
Comment:		When installed with suitable flanking elements, separating walls satisfy this Standard, with reference to clauses 5.1.1[(1)], 5.1.2[(1)], 5.1.4[(1)] and 5.1.6[(1)]. See sections 12.1 to 12.3 of this Certificate.

Standard:	6.1(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		The panels contribute to meeting these Standards. Refer to clauses 6.1.2[1], 6.1.6[1], 6.2.1[1], 6.2.4[1] and 6.2.5[1] of these Standards. See sections 7.1 to 7.4, 8.1 and 8.3 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The product can contribute to meeting 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. In addition, the product can contribute to a construction meeting a higher level of sustainability as defined in this Standard, with reference to clauses 7.1.4[1][2] [Aspects 1[1][2] and 2[1]], 7.1.6[1][2] [Aspects 1[1][2] and 2[1]] and 7.1.7[1][2] [Aspect 1[1][2]]. See sections 7.1 to 7.4 of this Certificate.

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

The Building Regulations (Northern Ireland) 2012

Regulation:	**23(a)(i)(iii)(b)**	**Fitness of materials and workmanship**
Comment:		The panels are acceptable. See sections 15.1 and 15.2 and the *Installation* part of this Certificate.
Regulation:	**29**	**Condensation**
Comment:		The panels can contribute to minimising the risk of interstitial condensation. See sections 8.1, 8.2 and 9.1 to 9.3 of this Certificate.
Regulation:	**30**	**Stability**
Comment:		Walls and roofs constructed from the panels will have adequate strength and stiffness to satisfy this Regulation. See sections 6.1 to 6.4 of this Certificate.
Regulation:	**35**	**Internal fire spread — Structure**
Comment:		The panels can satisfy this Regulation. See sections 10.1 and 10.6 of this Certificate.
Regulation:	**39(a)**	**Conservation measures**
Regulation:	**40**	**Target carbon dioxide emissions Rate**
Comment:		The panels contribute to meeting these Regulations. See sections 7.1 to 7.4, 8.1 and 8.2 of this Certificate.
Regulation:	**49**	**Protection against sound from other parts of the building and from adjoining buildings**
Regulation:	**50**	**Protection against sound within a dwelling or room for residential purposes**
Regulation:	**51**	**Reverberation in the common internal parts of a buildings containing flats or rooms for residential purposes**
Comment:		When installed with suitable flanking elements, separating walls can satisfy this Regulation. See sections 12.1 to 12.3 of this Certificate.

Construction (Design and Management) Regulations 2007

Construction (Design and Management) Regulations (Northern Ireland) 2007

Information in this Certificate may assist the client, CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

See sections: 3 *Delivery and site handling* (3.3) of this Certificate

Additional Information

NHBC Standards 2014

NHBC accepts the use of the Hemsec SIP Loadbearing Wall and Roof Panels, when installed and used in accordance with this Certificate, in relation to *NHBC Standards*, Part 6, Chapter 6.2 *External timber framed walls*.

General

Hemsec SIP Loadbearing Wall and Roof Panels, are for use above the damp-proof course in domestic applications up to three storeys high (plus room-in-roof) as the loadbearing inner leaf of an external cavity wall. They can also be incorporated as part of a separating wall, as internal walls and in roof constructions.

The panels may also be used as infill panels in single or multi-storey framed buildings, subject to design constraints on height and method of fixing to structural frames. The Certificate holder should be consulted for suitable details.

It is essential that the system is designed in accordance with the Certificate holder's recommendations. All constructions incorporating the system must be assessed and approved by a chartered engineer. Installation must be carried out by approved contractors.

1 Description

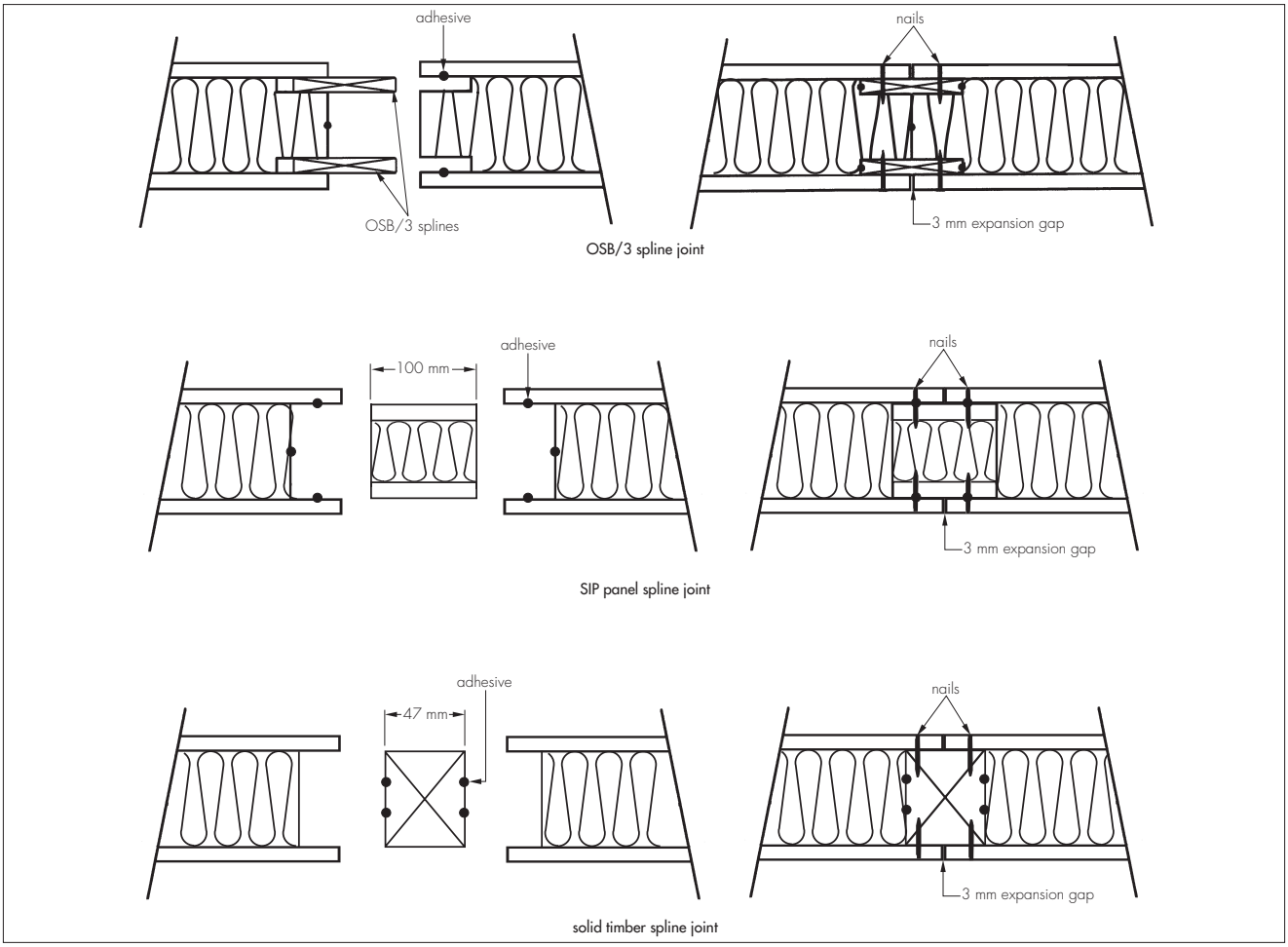
1.1 Hemsec SIP Loadbearing Wall and Roof Panels are structural elements consisting of internal and external skins of oriented strand board, Type 3 (OSB/3) to BS EN 300 : 2006, with an insulation core of closed cell polyurethane (PUR). The panels have nominal characteristics of:

overall thickness (mm)	100(1), 125, 150, 175, 200, 225, 250
OSB thickness (mm)	11, 15
insulation thickness (mm)	70 to 228
insulation density (kg·m^{-3})	42
overall maximum panel size (m)	6.5 x 1.22
weight (kg·m^{-2})	22.1 to 29.0

(1) For use as internal non-loadbearing partition wall only

1.2 The panels are connected by the use of OSB/3 splines, 11 mm or 15 mm by 100 mm by 1200 mm or timber splines, 47 mm thick C16 grade to suit panel thickness (cut to length as required), located in preformed rebates within the PUR core (see Figure 1). Openings are formed with pre-cut panels. Timber framing and inserts for openings and at junctions are installed on site.

Figure 1 Typical details of spline connections



1.3 Ancillary items to defined specifications and for use with the panels, but outside the scope of this Certificate include:

- sole plate (using 15 mm OSB/3)— 70, 95, 120, 150, 170, 195 and 222 mm by 50, mm deep, C24 timber to BS EN 338 : 2009, preservative treated for hazard class 2 to BS 8417 : 2011, used to locate and support the bottom of the panel
- sole plate (using 11 mm OSB/3)— 78, 103, 128, 153, 178, 203 and 228 mm by 50, mm deep, C24 timber to BS EN 338 : 2009, preservative treated for hazard class 2 to BS 8417 : 2011, used to locate and support the bottom of the panel
- head plate (using 15 mm OSB/3)— 70, 95, 120, 150, 170, 195 and 222 mm by 50 mm, Grade C16 treated softwood
- head plate (using 11 mm OSB/3)— 78, 103, 128, 153, 178, 203 and 228 mm by 50 mm, Grade C16 treated softwood
- edge timber — minimum 50 mm by 70 mm, grade C16 treated timber for use around openings

- lintels — treated softwood timber to Structural Engineer's design
- framing for openings (supporting lintels) — treated softwood timber to Structural Engineer's design
- polyurethane adhesive — Apollo 7150
- fasteners — SIPS type screws
- nails —2.8 mm diameter, galvanized for use with nail gun
- L-shaped fixing cleats
  — top of panel fixing with slotted holes in each face
  — bottom of panel fixing with slotted hole in longer face and fixed hole in shorter face
- coach bolts (M10 by 150 mm BZP carbon steel), spreader plate, nut and washer (50 mm diameter) for panel cleat fixing
- cleat anchor bolts to Structural Engineer's design.

Note:

Timbers may be treated with an Alkaline Copper Quaternary (ACQ) preservative by vacuum pressure, an organic solvent preservative by double vacuum or diffusion treatment.

1.4 Other items used in the wall and roof construction, but outside the scope of this Certificate, include:

- Glulam purlins
- standard nails — in accordance with BS EN 1995-1-1 : 2004
- sole plate anchor bolts — to engineers' design
- joist hangers — with top plate support as specified for the project with maximum eccentric loading from the joist within the wall panel (fixings to be to the Certificate holder's instructions)
- dry lining battens — minimum 50 mm wide by 10 mm or 25 mm deep softwood
- wall ties — Simpson Strong-tie BTS4 TEK wall-tie kits using ABC Spax stainless steel, flange-head, Pozi-drive screws 30 mm by 4 mm
- counter battens — treated softwood counter battens, minimum 50 mm wide by 25 mm deep
- tiling/slate battens — sizing as per BS 5534 : 2014
- vapour permeable membrane — for use as a roof tile underlay
- breather membrane — approved for use in wall construction
- cavity closers
- cavity barriers
- sealant
- plasterboard
- Gyproc Fireline plasterboard.

2 Manufacture

2.1 The polyurethane (PUR) foam is bonded to OSB/3 skins in a factory and delivered on site as a completed panel.

2.2 To ensure product quality is consistently maintained to the required specification, 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 non-conformities
- 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 ensure that standards are maintained and that the product or system remains as Certificated.

3 Delivery and site handling

3.1 The panels are delivered in shrink-wrap, with edge protectors and banded packaging used for initial transit and temporary protection. Each panel bears the BBA identification mark incorporating the number of this Certificate. They should be stored flat (no more than 10 panels high for up to 100 mm thickness, 8 high for 125 mm thickness, 7 high for 150 mm thickness, 6 high for 175 mm thickness, 5 high for 200 mm and 225 mm and 4 high for 250 mm thickness) over suitable stillage to a slight fall (to allow rain run-off). Bearers should be at maximum 600 mm centres (end bearers no more than 150 mm from end of panel), and aligned vertically between individual packs in accordance with the Certificate holder's guidelines.

3.2 The components should be stored inside, or in dry, sheltered conditions at least 150 mm off the ground, and covered with opaque polyethylene sheeting or tarpaulin until the panels and components are ready to be erected.

3.3 Some individual panels can be lifted by two persons, large panels and packs of panels must be lifted by mechanical means. Temporary timber blocks must be used to protect panel edges during lifting operations.

3.4 The panels can withstand the normal loads associated with site handling and installation. Damaged panels should not be used.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Hemsec SIP Loadbearing Wall and Roof Panels.

Design Considerations

4 General

4.1 Hemsec SIP Loadbearing Wall and Roof Panels are suitable for use as loadbearing panels in pitched roofs, separating walls, inner leaves of external walls, and also as non-loadbearing partitions, in dwellings up to three storeys high (plus room-in-roof). All structural calculations should be undertaken by a Chartered Structural Engineer who should contact the Certificate holder for full design guidance. All production drawings should be carried out by the Certificate holder or approved designers.

4.2 The panels may also be used, in conjunction with the specified cleats (see section 18.10) and fixings, as infill panels in single or multi-storey framed buildings, subject to design limitations. The upper cleat is designed to allow movement within the structural frame due to expansion/contraction or differential movement. The number of cleats per panel will depend on the maximum design wind loading and must be verified by a suitably qualified Chartered Structural Engineer.

4.3 When panels are used to construct the inner leaf of an external cavity wall, the outer masonry leaf and all masonry below the damp-proof course (dpc) must be built in accordance with BS EN 1996-1-2 : 2005 and, when used as roof panels, roof tiles and slates applied in accordance with BS 5534 : 2014.

4.4 Openings for windows and doors are created by using appropriately sized panels which allow the timber framings and lintels to be installed on site.

4.5 Foundations and floors (outside the scope of this Certificate) must be approved for use by the Certificate holder's technical staff and should be suitably level and square to accept the wall panels.

5 Practicability of installation

The product should only be installed by installers who have been trained and approved by the Certificate holder.

6 Strength and stability

General

6.1 The wall and roof panels will have adequate strength and stiffness when used in accordance with the provisions of this Certificate. Due consideration must also be given to any fire-resistance restrictions (see section 10.1).

6.2 The permissible design values to be used when evaluating the design resistance of the panels are given in Tables 1 and 2.

Wall panels

6.3 The permissible design load values for the effective span of the panels, based on the results of tests undertaken using 125 mm thick panels with 11 mm and 15 mm thick OSB/3 skins and analysis carried out in accordance with BS 5268-2 : 2002 or BS EN 1995-1-1 : 2004, are given in Table 3.

Roof panels

6.4 The permissible design load values for the effective span of the panels, based on the results of tests undertaken for 175 mm thick panels with 11 mm and 15 mm thick OSB/3 skins and analysis carried out in accordance with BS 5268-2 : 2002, are given in Table 4.

6.5 The strength of all connection details which tie walls to other structural elements (such as walls, floors, roofs) must be evaluated and provide adequate stability for the overall building design. The specification and design for these items must be determined by the Structural Engineer responsible for the overall design of the building. Guidance on the design of connection details may be obtained from the Certificate holder.

6.6 Lintels and framing around openings form an integral part of the loadbearing wall panels (see Figure 2). The sizing of lintels must be determined by the engineer responsible for the design.

6.7 As part of the structural design, consideration should be given to the support of eccentric loads imparted by central heating systems or kitchen appliances.

6.8 Stainless steel wall ties, Type 5 or 6 to BS DD 140-2 : 1987, can be directly attached to the OSB/3 face of the panel using stainless-steel screw fasteners.

6.9 From test results, using a M10 by 150 mm BZP (carbon steel) coach bolt to connect the cleats described and detailed in section 18.10, a design pull-out resistance of 3 kN can be used. For other types of cleated connections or fixing arrangements testing may be required to arrive at a design pull-out resistance figure or specific design calculations carried out by a suitably qualified engineer.

Table 1 Structural Properties of 125 mm thick Wall Panels with 11 mm or 15 mm OSB Sheathing

	Permissible values (per metre length)	
Strength	11mm OSB	15mm OSB
Bending strength (M) (kNm)	5.3	5.7
Shear strength (V) (kN)	5.9	6.1
Axial strength (N) kN)	65.0	75.0
Racking Strength (R) kN)	3.4	3.4

Table 2 Structural Properties of 125 mm thick Wall Panels with 11 mm or 15 mm OSB Sheathing

Stiffness / metre width	11mm OSB	15mm OSB
EI_{inst} [Nmm^2]	$1.42*10^{11}$	$1.80*10^{11}$
GA_{inst} [N]	$5.50*10^5$	$7.50*10^5$

Notes for Tables 1 and 2

- the above values are for SIP units in Service Class 2 conditions, panels should not be used in Service Class 3 exposure conditions. The Table may also be used for 150 mm and 180 mm thick walls.
- the permissible values given in the above table for use with BS 5268-2 : 2002, are applicable to dead loading; for medium term load/combinations multiply by 1.1, short term load/combinations multiply by 1.3 and very short term load/combinations multiply by 1.5.
- the values are derived from short-term loading tests. When assessing deflections, the Structural Engineer must take into account simple bending & shear deflections and the effects of creep for which the factor k_{def} should be taken as 2.25
- for axial loading the maximum eccentricity from the panel centreline shall not exceed *d/3* where d is the panel thickness and the panel height between lateral restraints shall not exceed 3.0 m.
- bending and axial loading should be combined in accordance with the appropriate design code, however where the axial load does not exceed 60 kN this can be ignored and the panel checked only for the action causing moment effects.
- racking strength is based on 2.4 m high panels with joints glued and nailed at 100 mm centres, for design to BS 5268-6.1 and 6.2, the resistance may be modified by factors K_{105} to K_{106} and K_{204} to K_{205} respectively, in accordance with the code requirements; for panel vertical loadings of up to 10.4 kN·m. Where the vertical load exceeds 10.4 kN·m, further advice should be sought.
- racking strength design to BS EN 1995-1-1 : 2004 shall be in accordance with Method B, the design racking strength may be modified by the *ki,q* factor for the panel vertical load.
- the characteristic racking strengths are interim values until guidance has been given in relating the test results to BS EN 1995-1-1 : 2004 requirements.
- the provision of holes or notches (eg for services, windows) will affect the design assumptions further advice must be sought from the Certificate holder.

Table 3 Structural Properties of 125 mm thick Wall Panels with 11 mm or 15 mm OSB Sheathing

	Span of panel (m)						
11mm OSB Sheathing	2.0	2.5	3.0	3.5	4.0	4.5	5.0
Permissible load (kN·m^{-2})	5.90	4.72	3.93	3.37	2.65	2.09	1.70
Load at maximum deflection of span/333 (kN·m^{-2})	4.08	2.09	1.21	0.76	0.51	0.36	0.24
Load at maximum deflection of span/200 (kN·m^{-2})	5.90	3.48	1.88	1.02	0.60	0.37	0.24
15 mm OSB Sheathing							
Permissible Load (kN·m^{-2})	6.19	4.95	4.13	3.54	2.89	2.28	1.85
Load at maximum deflection of span/333 (kN·m^{-2})	5.21	2.67	1.54	0.97	0.65	0.46	0.31
Load at maximum deflection of span/200 (kN·m^{-2})	8.68	3.48	1.88	1.02	0.60	0.37	0.24

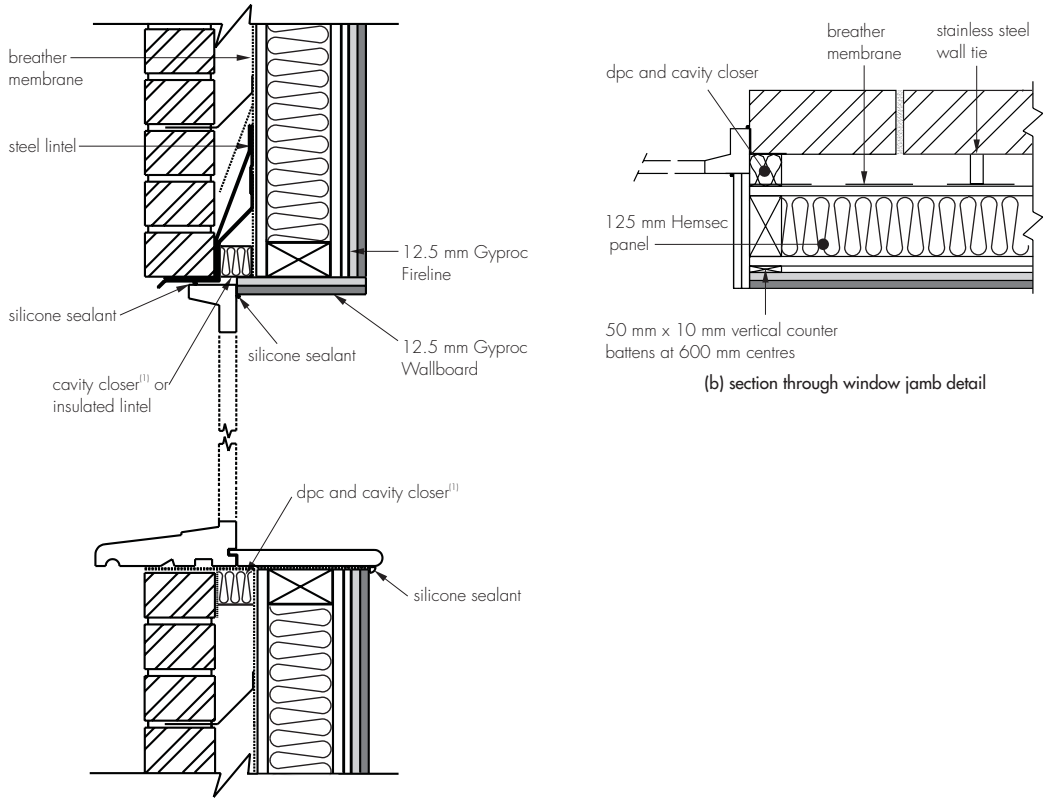
Table 4 Structural Properties of 175 mm thick Roof Panels with 11 mm or 15 mm OSB Sheathing

	Span of panel (m)						
11mm OSB Sheathing	2.0	2.5	3.0	3.5	4.0	4.5	5.0
Permissible Load (kN·m^{-2})	14.00	8.96	6.22	4.57	3.50	2.77	2.24
Load at maximum deflection of span /333 (kN·m^{-2})	8.44	4.32	2.50	1.57	1.05	0.74	0.50
Load at maximum deflection of span /200 (kN·m^{-2})	14.00	7.20	3.89	2.10	1.23	0.77	0.50
15mm OSB Sheathing							
Permissible Load (kN·m^{-2})	14.00	8.96	6.22	4.57	3.50	2.77	2.24
Load at maximum deflection of span /333 (kN·m^{-2})	10.95	5.61	3.24	2.04	1.37	0.96	0.65
Load at maximum deflection of span/200 (kN·m^{-2})	14.00	8.96	5.05	2.72	1.60	1.00	0.65

Notes for Tables 3 and 4:

- the above values are for SIP units in Service Class 2 conditions, panels should not be used in Service Class 3 exposure conditions
- the permissible values given in the above table for use with BS 5268-2 : 2002, are applicable to dead loading; for medium term load/combinations multiply by 1.1, short term load/combinations multiply by 1.3 and very short term load/combinations multiply by 1.5.
- the values are derived from short-term loading tests. When assessing deflections, the Structural Engineer must take into account simple bending, shear deflection and the effects of creep for which the factor k_{def} should be taken as 2.25
- the values are for simply supported spans with a uniformly distributed load; information on other conditions is available from the Certificate holder.
- the provision of holes or notches (eg for services, windows) will affect the design assumptions further advice must be sought from the Certificate holder.
- Table 3 loading can be applied directly to wall panels having an axial load of upto 60 kN·m applied with a maximum eccentricity from the panel centreline of *d/3* where *d* is the panel thickness and a panel height between lateral restraints not exceeding 2.7 m.

Figure 2 Typical opening details



(1) Minimum frame overlap of window to be 30 mm. Minimum resistance of part of closer overlapped by frame to be 0.45 m^2·K·W^{-1}.

7 Thermal performance

7.1 The thermal performance of each building incorporating the system must be evaluated in accordance with the relevant national Building Regulations and is the responsibility of the overall designer of the building.

7.2 Calculations of the thermal transmittance (U value) for a particular wall construction can be carried out in accordance with the 'combined method' in BS EN ISO 6946 : 2007 and BRE Report 443 : 2006. The following thermal conductivity values (W·m^{-1}·K^{-1}) may be used to conduct a 'combined method' calculation:

Polyurethane insulation core	(λ_D)
70 to 80 mm thick	0.030
≤80 mm to <120 mm	0.029
>120 mm	0.028
OSB/3	0.13

7.3 The overall U value will depend on the construction adopted, the Certificate holder can provide further details on request.

7.4 Junctions with other elements should be designed to limit heat loss. Detailed guidance in this respect and on limiting heat loss by air infiltration can be found in:

England and Wales — Approved Documents to Part L (see also SAP 2009, Appendix K, and the *iSBEM User Manual*).

Scotland — Accredited Construction Details (Scotland)

Northern Ireland — Accredited Construction Details (version 1.0)

8 Air permeability

8.1 Buildings can achieve adequate resistance to heat loss by air infiltration provided there is effective sealing around junctions between units during site assembly. Care should be taken to ensure that junctions with other elements and openings comply with the relevant guidance for airtightness as given in the relevant documents referred to in section 7.4.

8.2 In England, Wales and Northern Ireland, completed buildings are subject to pre-completion testing for airtightness in accordance with the requirements of Approved Documents L1A and L2B (section 20A), Technical Booklet F1 (sections 2.59 to 2.69) and Technical Booklet F2 (sections 2.72 to 2.77) respectively.

8.3 In Scotland, completed dwellings are subject to testing air permeability in accordance with the requirements of Mandatory Standard 6.2 (clause 6.2.5). Alternatively, where a default design value of 15 $m^3 \cdot m^{-2} \cdot h^{-1}$ at 50 Pa is stated in demonstrating compliance under Mandatory Standard 6.1, testing is not required.

9 Condensation risk

Surface condensation

9.1 The risk of surface condensation in roofs and external walls, and at junction and opening details (see relevant figures), will be minimal.

Interstitial condensation

9.2 The risk of interstitial condensation will be minimal when the panels are used in conjunction with a vapour check plasterboard lining, or other suitably installed vapour control layer. For the purposes of calculating condensation risk, in accordance with BS 5250 : 2002, vapour diffusion factors (μ) of 60 may be used for the external and internal OSB/3 skins.

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

10 Behaviour in relation to fire

10.1 When tested to BS 476-21 : 1987, the wall panel elements achieved the results given in Table 5.

Table 5 Fire performance[1]

Performance	Axial load ($kN \cdot m^{-1}$)	Construction
FR60	13	125 mm thick Hemsec panel with vertical 10 mm by 50 mm softwood battens fixed at 600 mm centres, 12.5 mm Gyproc Fireline plasterboard fixed to the battens and 12.5 mm Gyproc Wallboard fixed by 3.5 mm by 50 mm bugle-headed screws at 300 mm centres on the exposed face.

(1) These tests were conducted on panels with an ultimate capacity of 285 $kN \cdot m^{-1}$. The design load for such panels is taken as 38 $kN \cdot m^{-1}$ and, therefore, the fire test panels were subjected to 31% of the design load.

10.2 Assessment of test results and design details shows that wall panels are suitable for use in external walls (with service loads up to the stated values in Table 4), not less than one metre from a relevant boundary, and in separating walls that require fire resistance periods not less than:

external walls — 60 minutes[1] (from inside)

separating walls — 60 minutes[1] (from either side)

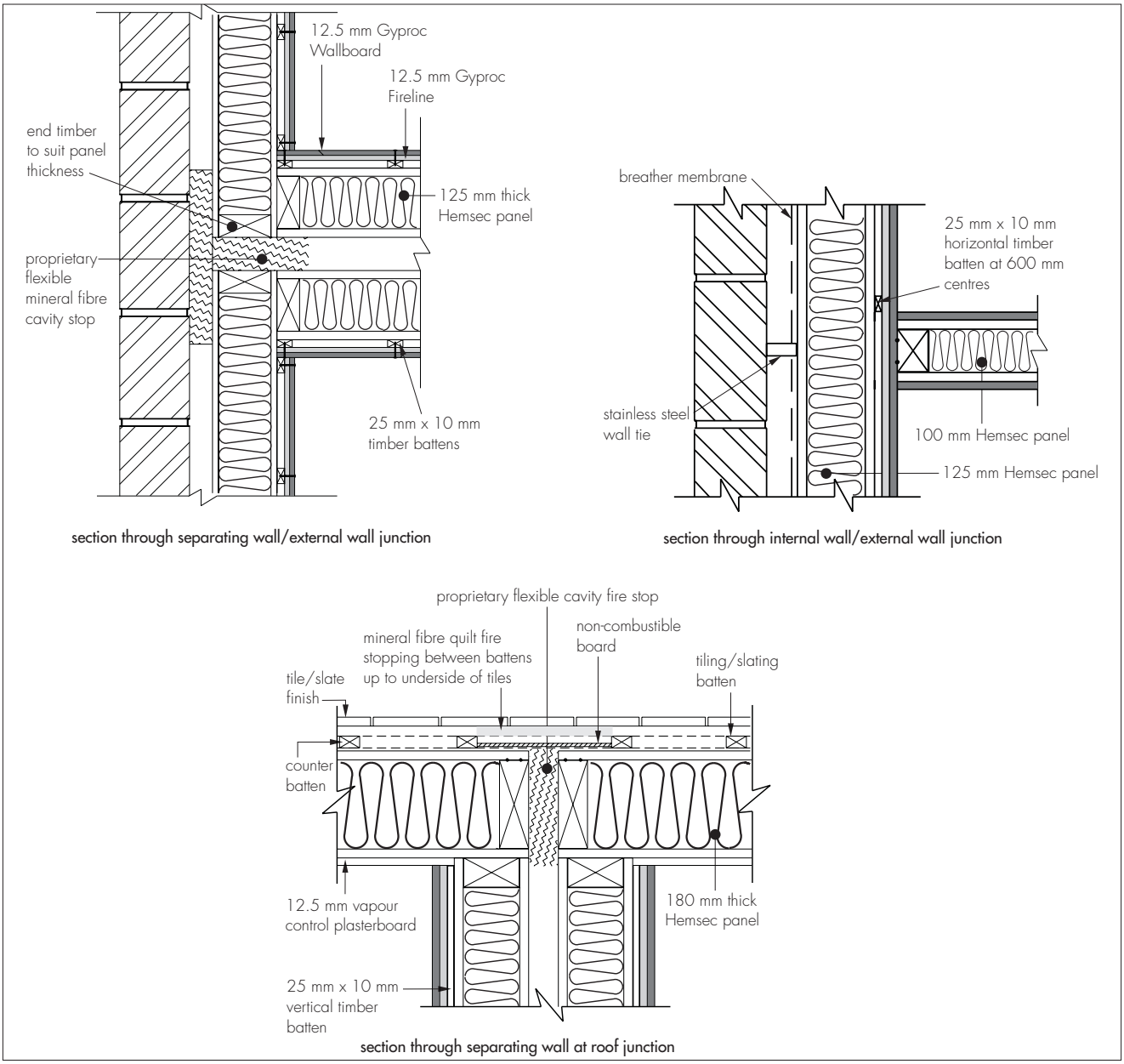
(1) 'Medium' duration in Scotland.

10.3 The OSB/3 panel skins have a Class 3[2] surface spread of flame designation.

(2) 'High risk' in Scotland

10.4 Junctions between the panels in external and separating walls will adequately maintain the fire resistance of the separating wall through use of fire stops (see Figure 3).

Figure 3 Typical separating wall detail (fire-stopping)



10.5 The panels can form part of a separating wall between dwellings in Scotland in accordance with the exceptions permitted by Mandatory Standard 2.2, clause 2.2.7[3].

10.6 Constructions incorporating the panels must include suitable provision for cavity barriers and for fire stopping at junctions with other elements in accordance with the requirements of national Building Regulations (see Figure 3).

10.7 Where any other form of wall construction incorporating the wall panels (including any service penetrations) is subject to fire-resistance requirements, it is the responsibility of the user to provide details of an appropriate assessment or test carried out by a UKAS (United Kingdom Accreditation Service) approved testing laboratory.

10.8 The external fire rating of any roof incorporating the panels will depend on the specification of the roof covering used.

11 Proximity of flues and appliances

When installing the product in close proximity to certain flue pipes and/or heat producing appliances, the provisions of the national Building Regulations are acceptable:

England and Wales — Approved Document J

Scotland — Mandatory Standard 3.18, clauses 3.18.1[1] to 3.18.6[1]

(1) Technical Handbook (Domestic)

Northern Ireland — Technical Booklet L.

12 Resistance to airborne sound

12.1 Laboratory test data relating to measurements made in accordance with BS EN ISO 140-3 : 1995 indicate that the wall constructions have the resistances to airborne sound transmission stated (see Table 6).

Table 6 Airborne sound insulation (dB) — Laboratory test results

Construction	Decibel rating (dB)
Separating wall	R_w (C_i;C_{tr}) = 57 (–2;–7) therefore: $R_w - C_{tr}$ = 50
Internal wall	R_w = >40

12.2 Test data to BS EN ISO 140-3 : 1995 indicate that in the national Building Regulations, the single-leaf internal wall acoustic (non-loadbearing) constructions can provide satisfactory resistance to airborne sound transmission within a dwelling for walls between a WC or bathroom and another room (see Table 6).

12.3 Acoustic testing should be carried out on completed buildings in accordance with the relevant Building Regulations as follows:

England and Wales — Approved Document E, Section 1

Scotland — Mandatory Standard 5.1, clause 5.1.2(1)

Northern Ireland — Technical Booklet G.

(1) Technical Handbook (Domestic).

12.4 It is essential that care is taken in design and during installation to avoid direct paths for airborne sound transmission and to minimise paths for flanking sound transmission.

13 Weathertightness

13.1 When the panels are used to form the inner leaf of an external cavity wall, the outer leaf must be designed and constructed in accordance with BS EN 1996-1-2 : 2005 incorporating damp-proof courses and cavity trays positioned in accordance with the latter Code. A breather membrane is required with this form of construction.

13.2 When used with other outer leaf construction, cladding or render systems, the final weather resistance of the building is dependent upon the efficient positioning and sealing of all joints. The guidance given in BRE Report 262 : 2002, Section 3, should be followed with regard to rain penetration in that the designer selects a construction appropriate to the local wind-driven rain index, paying due regard to the design detailing, workmanship and materials to be used.

13.3 Roofing should be in accordance with BS 5534 : 2014 to ensure moisture is prevented from coming into contact with the roof panels or construction quoted in this Certificate.

13.4 The performance of windows and doors installed within the panels is not covered by this Certificate.

14 Maintenance and repair

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.

15 Durability

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

15.2 Timber used in areas that could be at risk, eg sole plates, should be preservative-treated in accordance with the recommendations given in BS 8417 : 2011.

16 Reuse and recyclability

The product comprises OSB/3 panels and polyurethane foam which can both be recycled.

17 General

17.1 Erection of Hemsec SIP Loadbearing Wall and Roof Panels must comply with the details given in the Certificate holder's construction manual and the provisions of this Certificate.

17.2 The main contractor must ensure that the accuracy of the foundation is in accordance with the Certificate holder's instructions. In particular, the following details must be within the tolerance of ± 5 mm:

- the level of the foundation or other bearing support
- the overall width and length of the building footprint
- the diagonals used for checking the overall squareness of the building.

17.3 When used as an infill panel, the main contractor must ensure that the accuracy of the structural frame is in accordance with the Certificate holder's acceptable tolerances, including:

- panels to be held in place with the specified brackets
- a 25 mm gap to be left at the head of the infill panel to allow for expansion/differential movement. The gap should be filled with compressed mineral wool insulation.

17.4 Guidance in the procedure for installing the infill panels is limited due to the variations in the structural frame construction and detailing. Erection methods for lifting the infill panels into place and the specification and design of brackets, fixings and tolerances will therefore need to be determined by the project engineer for each structure in which the infill panels are used.

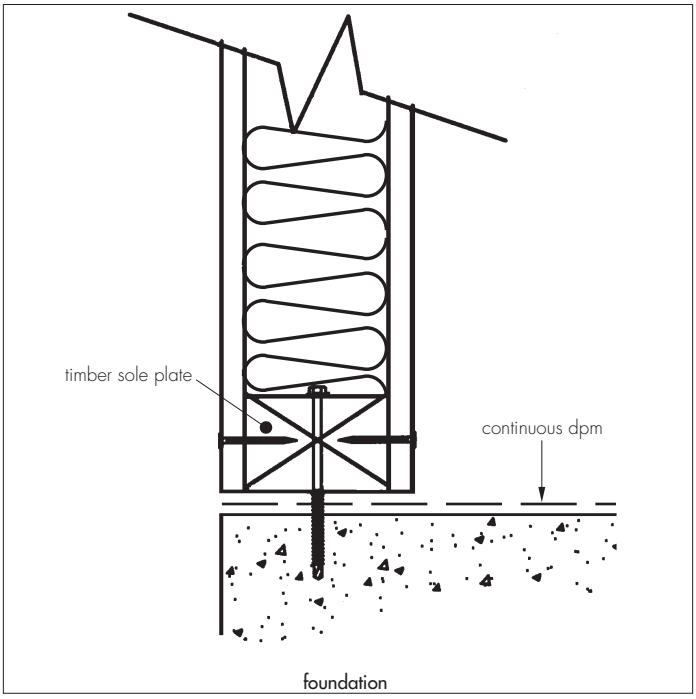
18 Procedure

Foundation construction

18.1 A suitable damp-proof course (dpc) is laid on top of the foundation.

18.2 A 50 mm deep, treated timber sole plate (see Figure 4) is positioned over the dpc and fixed to the foundation using fixings as approved by the Certificate holder and the Chartered Engineer's requirements. Typically, a holding down bolt arrangement should be used for securing into a concrete raft foundation, strapping where required onto masonry. Sole plates for internal walls are secured using appropriate screws. If required, sole plates can be adjusted using high-density polyethylene shims and proprietary injection mortar grouting is introduced to seal against air infiltration.

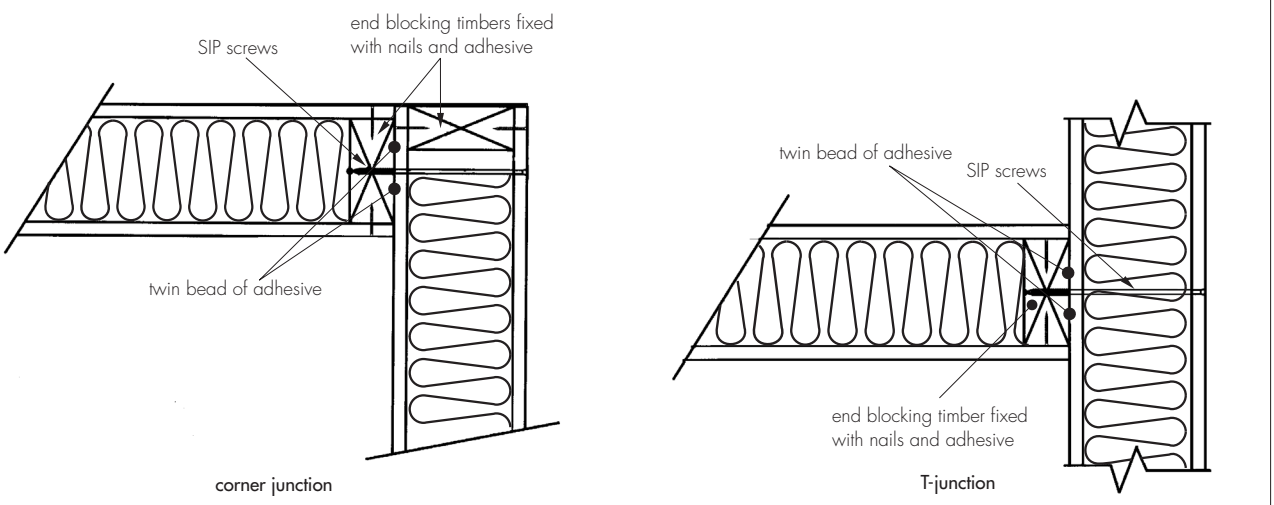
Figure 4 Typical sole plate fixing detail (panel only)



Ground-floor construction

18.3 A bead of adhesive is run along the top of sole plate. Starting at one corner (see Figure 5), the first panel is positioned correctly on the sole plate, plumbed vertical and fixed to the sole plate section with galvanized ring-shank nails at a maximum of 100 mm centres approved by the Certificate holder, through the OSB inner and outer skins. Apollo 7150 adhesive is run inside each recess and the splines inserted. This forms the standard basis for connecting all ground-floor panel runs or corner junctions. Panels are temporarily braced to maintain stability. Beads of adhesive are applied to the bottom and vertical recesses of subsequent panels and fitted together, plumbed and secured with nails as described.

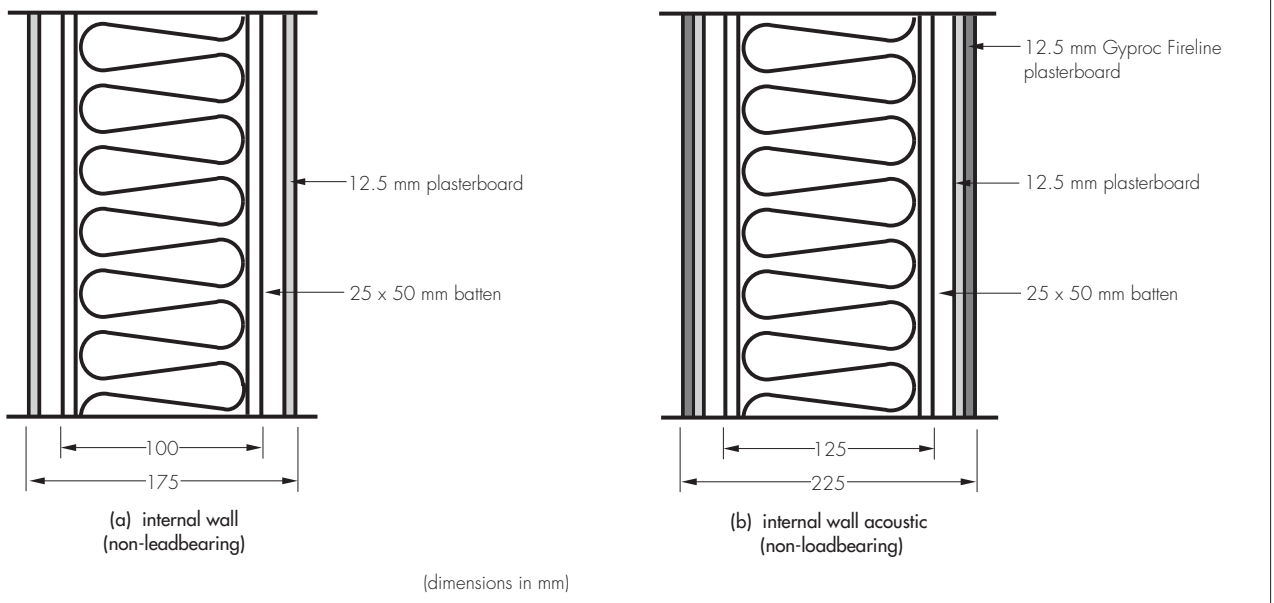
Figure 5 Typical corner and T-junction (panel only)



Internal wall construction

18.4 The detail of types of internal wall that can be constructed from the panels is given in Figure 6.

Figure 6 Internal wall specification

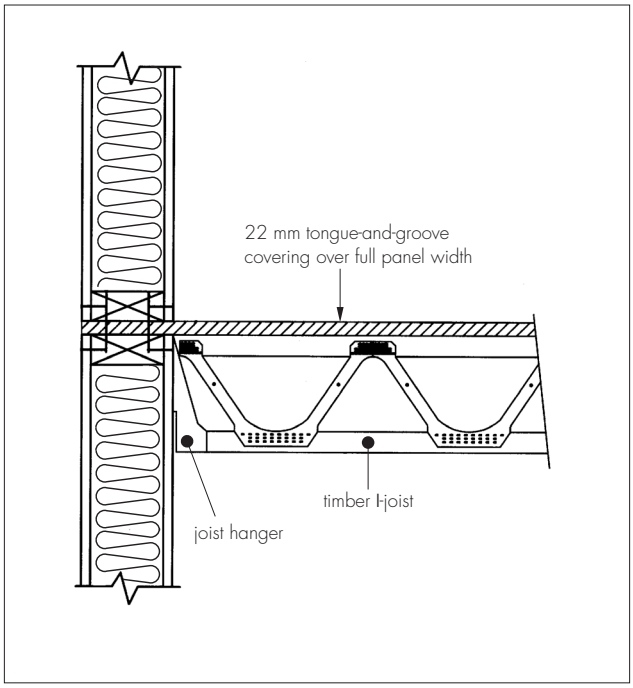


First floor and room-in-roof construction

18.5 Engineered or traditional timber floor joists are supported on joist hangers, fixed by nailing into the head plate using galvanized ring-shank nails or screws approved by the Certificate holder (see Figure 7).

18.6 A 50 mm deep timber bottom plate (see Figure 8) is nailed through the floor decking into the head plate. The procedure used for the ground-floor construction is followed.

Figure 7 Typical first floor junction (panel detail only)



Roof construction

18.7 A wall plate is fixed onto the top of the head plate with the top angled to suit the pitch of the roof.

18.8 Roof panels are positioned working from one gable wall to the other. Panels are joined (as for the wall construction) and fixed through to the structural supporting timber members using SIP screws or the Certificate holder's approved screw fasteners to the engineer's design requirements. Typical ridge and eaves details are shown in Figures 8 and 9.

18.9 The construction of the roof is outside the scope of the Certificate but the normal construction is:

- the panels are overlaid with a vapour permeable membrane
- treated softwood counter battens, minimum 25 mm deep by 50 mm wide, are then fixed through to the roof panel using stainless-steel screws
- tiling laths and slates or tiles are applied in accordance with the relevant recommendations of BS 5534 : 2014.

Figure 8 Ridge detail (panel only)

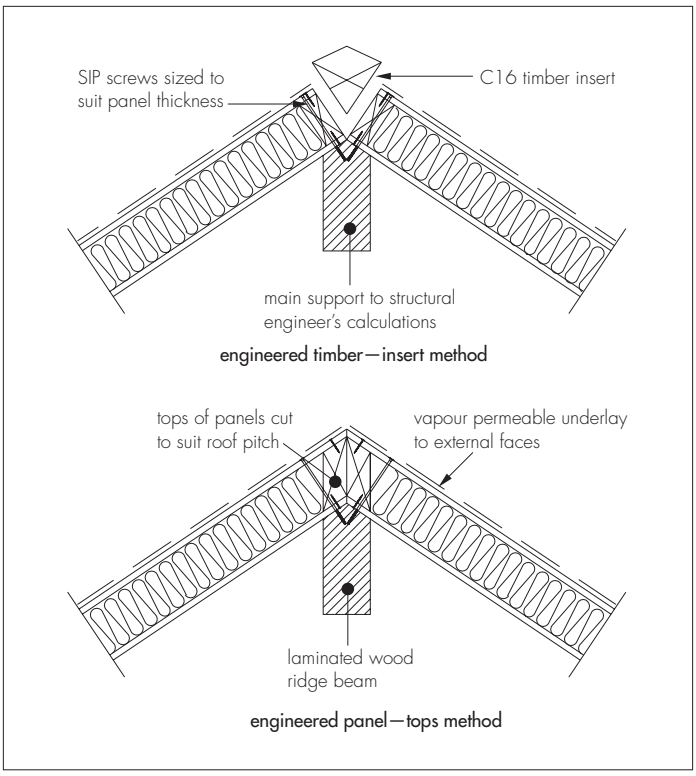
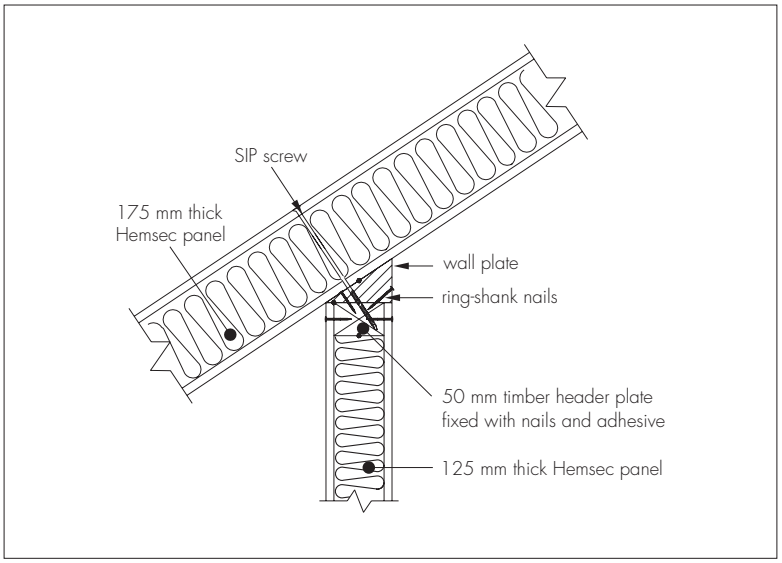


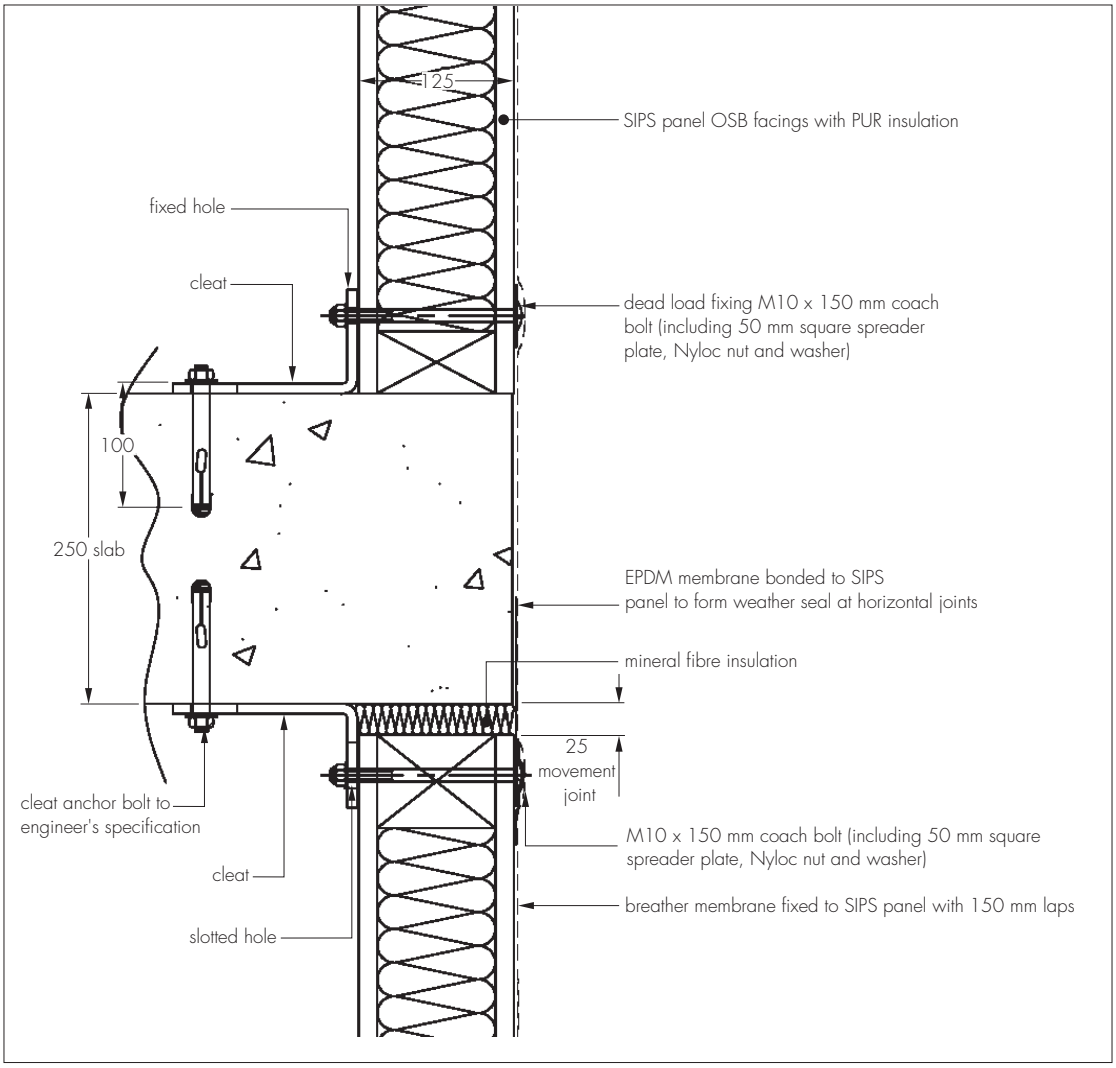
Figure 9 Eaves detail (panel only)



Infill panel construction

18.10 The panels are attached to the frame using L-shaped metal fixing cleats, fixed to the top and bottom of the infill panel. The top cleat has slotted holes in each leg, to allow for movements within the structural frame due to expansion/ contraction or differential movement, and to allow for the insertion of a compressible sealant or insulation between panel head and frame. The bottom cleat has a slotted hole in the longer leg to allow any lateral movement necessary for alignment with adjacent panels, but a fixed hole in the shorter face. Generally, coach bolts M10 by 150 mm BZP (carbon steel with 50 mm washer) are used to attach the cleats to the top and bottom of the infill panels. Typically anchor bolts are used to attach the cleats to a concrete slab. A typical example of the method of fixing is shown in Figure 10.

Figure 10 Typical example of panel fixing using cleats



19 Tests

Tests were carried out to determine:

- racking resistance in accordance with BS 5268-6.1 : 1996 and BS EN 594 : 1996
- resistance to axial and eccentric loads
- pull-out strength of wall fixings
- fire-resistance to BS 476-21 : 1987
- flexural strength.
- thermal conductivity values to BS EN 12667 : 2001

20 Investigations

An examination was made of technical data relating to:

- structural properties and design calculations
- airborne sound insulation tests
- thermal performance.

21 Other investigations

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

21.2 A visit was made to a site in the UK to assess the installation process.

Bibliography

BRE Digest 369 *Interstitial condensation and fabric degradation*

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

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

BS 476-21 : 1987 *Fire tests on building materials and structures — Methods for determination of the fire resistance of loadbearing elements of construction*

BS 5250 : 2002 *Code of practice for control of condensation in buildings*

BS 5268-2 : 2002 *Structural use of timber — Code of practice for permissible stress design, materials and workmanship*

BS 5268-3 : 2006 *Structural use of timber — Code of practice for trussed rafter roofs*

BS 5268-6.1 : 1996 *Structural use of timber — Code of practice for timber frame walls — Dwellings not exceeding four storeys*

BS 5268.6.2 : 2001 *Structural use of timber. Code of practice for timber frame walls. Buildings other than dwellings not exceeding four storeys*

BS 5534 : 2014 *Code of practice for slating and tiling (including shingles)*

BS 8417 : 2011 *Preservation of wood — Code of practice*

BS DD 140-2 : 1987 *Wall ties — Recommendations for design of wall ties*

BS EN 300 : 2006 *Oriented Strand Boards (OSB) — Definitions, classification and specifications*

BS EN 338 : 2009 *Structural timber — Strength classes*

BS EN 594 : 1996 *Timber structures — Test methods — Racking strength and stiffness of timber frame wall panels*

BS EN 1365-1 : 1999 *Fire resistance tests for loadbearing elements — Walls*

BS EN 1995-1-1 : 2004 Eurocode 5 : *Design of timber structures — General — Common rules and rules for buildings*

BS EN 1996-1-2 : 2005 Eurocode 6 : *Design of masonry structures — General rules — Structural fire design*

BS EN 12667 : 2001 *Thermal performance of building materials and products — Determination of thermal resistance by means of guarded hot plate and heat flow meter methods — Products of high and medium thermal resistance*

BS EN ISO 140-3 : 1995 *Acoustics — Measurement of sound insulation in buildings and of building elements — Laboratory measurement of airborne sound insulation of building elements*

BS EN ISO 6946 : 2007 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*

22 Conditions

22.1 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.

22.2 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.

22.3 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.

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

22.5 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.

22.6 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.

British Board of Agrément
Bucknalls Lane
Watford
Herts WD25 9BA
tel: 01923 665300
fax: 01923 665301
e-mail: clientservices@bba.star.co.uk
website: www.bbacerts.co.uk
©2014