

# NSAI

Agrément

**CERTIFICATE NO. 10/0349**

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## Thermo House Roofing System

### Système pour construction Bausystem

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

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



#### PRODUCT DESCRIPTION:

This Certificate relates to the Thermo House Roofing System, which consists of a composite steel cold-formed c-channel and interlocking expanded polystyrene (EPS) panels. The composite panels provide insulation and structural support to conventional slate and tiled roofing systems. The internal finishes to the composite panels can either take the form of a NSAI Agrément approved internal plaster for use with ICF (Insulating Concrete Formwork) systems or plasterboard slabs nail or screw fixed to timber battens which, in turn, are fixed to the bottom flange of the c-channels. This Certificate certifies compliance with the requirements of the Irish Building Regulations 1997 and subsequent revisions.

#### USE:

The Thermo House Roofing System is certified for use in both domestic and commercial buildings for all roof pitches between 17.5° to 60° pitches.

Manufacturer's guidance should be sought for roof pitches outside of this range.

The system has been assessed for use as load bearing roofing panels which are simply supported on wall plates, ridge beams or intermittent purlins. The panels can be single or continuously spanning.

The roof panels are used as conventional roof rafters for traditional cut roof constructions supported on the primary support elements such as purlins and steel beams. The primary roof structure must cater for all wind uplift forces in addition to providing adequate triangulation and diagonal bracing. The Thermo House roof panel has not been assessed for use as an integral member in either trussed or framed roof designs.

**Readers are advised to check that this Certificate has not been withdrawn or superseded by a later issue by contacting NSAI Agrément, NSAI, Santry, Dublin 9 or online at <http://www.nsai.ie>**

## MANUFACTURE AND MARKETING

The product is manufactured and marketed by:

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### 1.1 ASSESSMENT

In the opinion of the NSAI Agrément, the Thermo House Roofing System when used as specified in this Irish Agrément certificate is satisfactory for the purpose defined above, and meets the requirements of the Irish Building Regulations 1997 and subsequent revisions, as indicated in Section 1.2 of this Certificate.

### 1.2 BUILDING REGULATIONS

#### REQUIREMENT:

#### *Part D - Materials and Workmanship*

**D3** – The Thermo House Roofing System, as certified in this Certificate, is comprised of proper materials fit for their intended use (see Parts 3 and 4 of this Certificate).

**D1** – The Thermo House Roofing System, used in accordance with this Certificate, meets the requirements for workmanship.

#### *Part A – Structure*

##### **A1 – Loading**

The Thermo House Roofing System, as certified in this Certificate, has adequate strength and stability to meet the requirements of this regulation (see Parts 3 and 4 of this Certificate).

#### *Part B – Fire Safety*

##### *Part B Vol 2 – Fire Safety*

##### **B1 – Means of Escape In Case of Fire**

##### **B6 – Means of warning and escape in case of fire**

The Thermo House Roofing System can be designed to meet the requirements in respect of means of escape in case of fire.

##### **B2 – Internal Fire Spread (Linings)**

##### **B7 – Internal Fire Spread (Linings)**

The NSAI Agrément approved internal plaster finish for ICF systems and plasterboard slabs used on the internal finish of the Thermo House Roofing System are non-combustible and have a Class 0 'spread of flame' rating. Surface spread of flame rating of the finished construction will be determined by the surface spread of flame rating of the lining materials used.

##### **B3 – Internal Fire Spread (Structure)**

##### **B8 – Internal Fire Spread (Structure)**

Cavity barriers may be required, as indicated in Section 3.3 of Technical Guidance Document (TGD) to Part B of the Building Regulations. (See Part 4 of this Certificate.)

##### **B4 – External Fire Spread**

##### **B9 – External Fire Spread**

The designation of the roof with respect to external fire spread is dependent on the roof covering used.

#### *Part C – Site Preparation and Resistance to Moisture*

##### **C4 – Resistance to Weather and Ground Moisture**

The Thermo House Roofing System, used in accordance with Part 3 of this Certificate, will have adequate weather resistance in all exposures, will resist the passage of moisture from whatever source and will prevent surface or interstitial condensation.

#### *Part E – Sound*

##### **E1 – Airborne Sound (Walls)**

Compartment walls and roof junctions (i.e. party walls) are designed and constructed to meet the airborne sound requirements of this Regulation.

#### *Part F – Ventilation*

##### **F1 – Means of Ventilation**

Adequate ventilation openings are provided in roofs to meet this requirement. Roofs used in the system can be designed and constructed so as to prevent any harmful effect from interstitial or inner surface condensation to comply with the requirements of BS 5250:2011+A1:2016 *Code of practice for the control of condensation in buildings*.

##### **F2 – Condensation in Roofs**

Adequate ventilation is provided in roofs to meet this requirement in respect of the prevention of condensation.

#### *Part J – Heat Producing Appliances*

##### **J3 – Protection of Building**

The panels must be protected from heat sources in accordance with the requirement. (See Part 4 of this Certificate.)

**Part L – Conservation of Fuel and Energy**  
 - Dwellings  
 - Buildings other than Dwellings

**L1 – Conservation of Fuel and Energy**

The Thermo House Roofing System, when detailed in accordance with this certificate can contribute to meeting the requirements of TGD Part L to the Building regulations.

**2.1 PRODUCT DESCRIPTION**

**2.1.1 General**

The Thermo House Roofing System consists of two steel cold formed sections encased in moulded panels of expanded polystyrene (EPS). The panels are interlocking due to their tongued and grooved profiles. The vertical joints are glued and sealed. Each individual panel is fixed down through the cold formed sections to timber wall plates, purlins and ridge beams.

The Thermo House panels are manufactured from fire retardant grade of EPS in accordance with I.S. EN 13163:2012+A2:2016, *Thermal insulation products for buildings -Factory made expanded polystyrene (EPS) products - Specification* without the use of HCFC's. The minimum density is 26kg/m<sup>3</sup>.

**2.1.2 Structure**

The structural integrity of the roofing panel is based solely on the load carrying capacity of the cold formed sections. The only structural benefit attributed to the EPS is that the EPS will provide lateral restraint to the cold formed section.

Section properties for the cold formed sections are calculated using design core thickness of steel (excluding coatings) in accordance to I.S. EN 1993-1-3:2006 *Eurocode 3, Design of steel structures. General rules. Supplementary rules for cold-formed members and sheeting* and I.S. EN 1993-1-5:2006 *Eurocode 3, Design of steel structures. Plated structural elements*.

The structural design of the member is in accordance with BS 5950-5:1998 *Structural use of steelwork in building. Code of practice for design of cold formed thin gauge sections* or designed to IS EN 1993-1-3:2006 *Eurocode 3, Design of steel structures. General rules. Supplementary rules for cold-formed members and sheeting*.

**2.1.3 Dimensional Tolerances**

The Thermo House Roofing System panels are available in a variety of lengths. Panel lengths are produced to meet the requirements of each specific project. Typically the roof panels shall be one continuous panel from ridge to eaves. The practice of butt jointing panels or splicing panels

along their length should be avoided. Each panel has an overall depth of 250mm and widths of 510mm. Dimensional tolerances for manufactured panel are outlined in Table 1. Important physical properties for the EPS are outlined in Table 2. The Roof panels are mitred to suit the angle at the eaves and ridge. The integrity of corrosion resistance for all cut cold formed section is reinstated as outlined in section 2.1.7.

Dimensional Tolerances	
Length	±0.6% or ±3mm
Width	± 2 mm
Height	± 2 mm

**Table 1: Dimensional Tolerances**

**2.1.4 Roof Pitch**

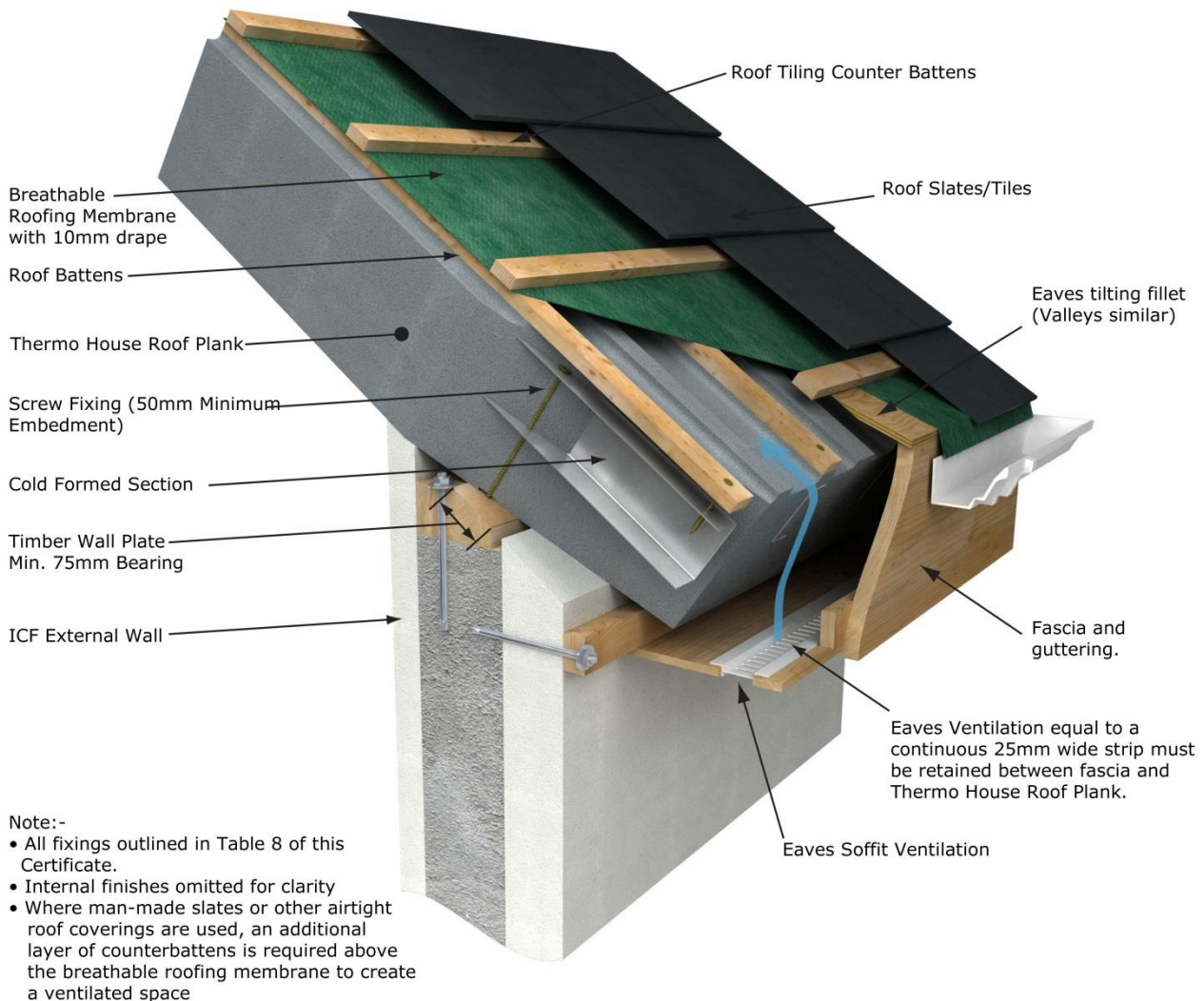
The Thermo House Roofing System has been assessed for use in pitched roof in the range or 17.5° to 60°. Designers and specifies should be mindful that the Thermo House Roofing panel may not be the governing criteria when establishing a suitable roof pitch and all additional component part of the overall roof assemble should be considered when specifying a suitable roof pitch.

**2.1.5 External Finishes**

The Thermo House Roofing System is suitable for use in conjunction with conventional concrete tile and slate tile build ups. Once the panels have been securely fixed down to wall plates, purlins and ridge beams, a continuous strip of adhesive foam is place at all joints between panels. The voids formed through the EPS during the installation of the holding down bolts are then sealed using expanding foam.

The roofing panels are then battened out with timber battens which both coincide and run parallel with each cold formed section encased in the moulded EPS panels. This ensures that roof loads and wind loads are evenly distributed to the load bearing cold formed sections. The first layer of timber battens is fixed down to the top flange of the cold formed section with self tapping Ruspert® corrosion resistant fixing or similar.





**Figure 1: Eaves Detail with ICF Wall**

Further information on all fixing used can be found in table 8 of this certificate.

An unsupported vapour permeable underlay as described in SR 82:2017, *Slating and Tiling - Code of Practice* is draped over the timber battens and the underlay is then counter battened to facilitate roof tiles or slates. Roof tiles or slates are then fixed to the counter battens as outlined in SR 82:2017.

### 2.1.6 Internal Finishes

The internal roof finishes consists of the following:

- 4mm gypsum skim coat plaster
- 12.5mm plasterboard slabs nail or screw fixed to timber battens, or 15mm thick NSAI Agrément approved internal plaster finish for use with ICF systems. Internal plaster

finishes are only suitable for use when there are no rooflights and/or inline timber trimmers.

- Vapour control layer (on warm side of timber trimmers only).
- Timber battens are fixed to the bottom flange of the cold formed section with self tapping Ruspert® corrosion resistant fixing.

When using ICF internal plaster finishes, all sealing tape must be fitted to the external side of the Thermo house roofing panel system. Inline timber trimmers for either chimney penetrations or rooflights are not suitable for use in conjunction with ICF internal plaster finishes as both details require a vapour control layer to which the plaster would not adhere to.

### 2.1.7 Cold formed sections

Cold formed sections are manufactured from coils of hot-dipped galvanised steel grade DX51D. The steel coils supplied to Thermo House comply with I.S. EN 10346:2009 *Continuously hot-dip coated steel flat products - Technical delivery conditions* and I.S. EN 10143:1993 *Continuously hot-dip coated steel sheet and strip - Tolerances on dimensions and shape*. Steel grade DX51D as defined in I.S. EN 10346:2009 is suitable for cold forming bending and profiling quality.

The surface finish is a Zinc coating having a designation of Z275. This relates to 275 g/m<sup>2</sup> of Zinc coating over both top and bottom surfaces of the hot-dipped galvanised steel coils. This ensures a minimum thickness of 15µm (microns) of zinc-coating on each side of the cold formed section.

When the corrosion resistance of a cold formed section is compromised at mitred or cut ends the corrosion resistance must be reinstated using a Zinc rich protective paint.

The structural design aspects of the manufactured cold-formed sections are discussed under section 3 of this certificate.

Property	Test Method	Value
Declared Thermal Conductivity	IS EN 12667	0.030* W/mK
Compressive Strength at 10% Deformation	IS EN 826	150* kN/m <sup>2</sup>
Water Vapour Diffusion Resistance factor	IS EN 12086	$\mu = 51.4^*$ $s_d = 2^* \text{ m}$
EPS Density	IS EN 1602	Min 24* kg/m <sup>3</sup>
Reaction to Fire	DIN 4102	B1*
Water Vapour diffusion resistance factor.	IS EN 12086	$\mu = 51.4^*$ $s_d = 2^* \text{ m}$

\* value taken from DOP

**Table 2: Properties of Expanded Polystyrene**

### 2.1.8 EPS Polystyrene

The Thermo House Roofing panel is manufactured from fire retardant grade expanded polystyrene in accordance with IS EN 13163:2012, without the use of HCFC's. The minimum density is 24kg/m<sup>3</sup>.

The EPS classification is EPS-EN 13163-T1-L1-W2-S1-P4-BS200-CS(10)150-DS(N)2-DS(70,-)1-TR200-WL(T)3. Further information on both dimensional tolerances and critical physical properties of the EPS used in the Thermo House Roofing System panels are given in Table 2.

### 2.1.9 Wall plates and support locations

The Thermo House Roofing panel can only be supported on timber wall plates or into the Thermo House proprietary eaves shoe. All other forms of support such as masonry wall or steel beam must have a timber wall plate with a minimum width of 75mm securely fixed prior to installation of the roofing panels. All timber wall plates and 'eaves shoe' must be adequately fixed down such that they can accommodate the design loads as outlined in section A of Building Regulations.

The timber wall plate must have sufficient depth to allow for full 50mm embedment of the holding down fixing screws. Timber wall plates need to be chamfered to provide a minimum bearing width of 75mm in order to limit the compressive forces on the EPS material to within acceptable tolerances. Bearing widths can be reduced when the design bearing stress associated with smaller spans exist however designers should seek guidance from the certificate holder in this regard.

Support at gable ends many often require special t-fixings as shown in Figure 4.

In all cases wall plate must be suitably anchored or strapped down prior to installation of the Thermo house roofing panels.

### 2.1.10 Holding down bolts.

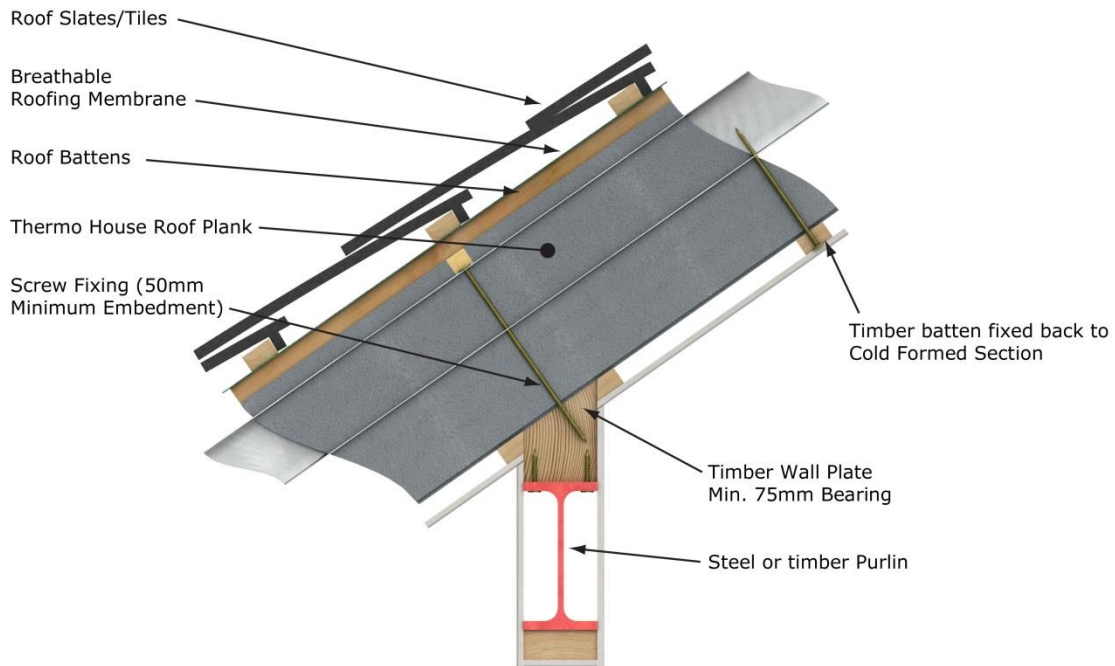
To provide resistance to wind uplift, each individual Thermo House Roofing panel must be anchored down to a timber wall plate at each support point. Holding down bolts or fixing is provided through both cold formed sections in each panel. Roofing panels are positioned and, once the installer is satisfied with the line and level of the panel, the installer will first glue the panel then pre-drill directly through the cold formed sections and secure the assembly with an 8.0 Ø x 280 long fixing screw. The screw fixings must have a minimum embedment length of 50mm.

### 2.1.11 Timber batten fixing

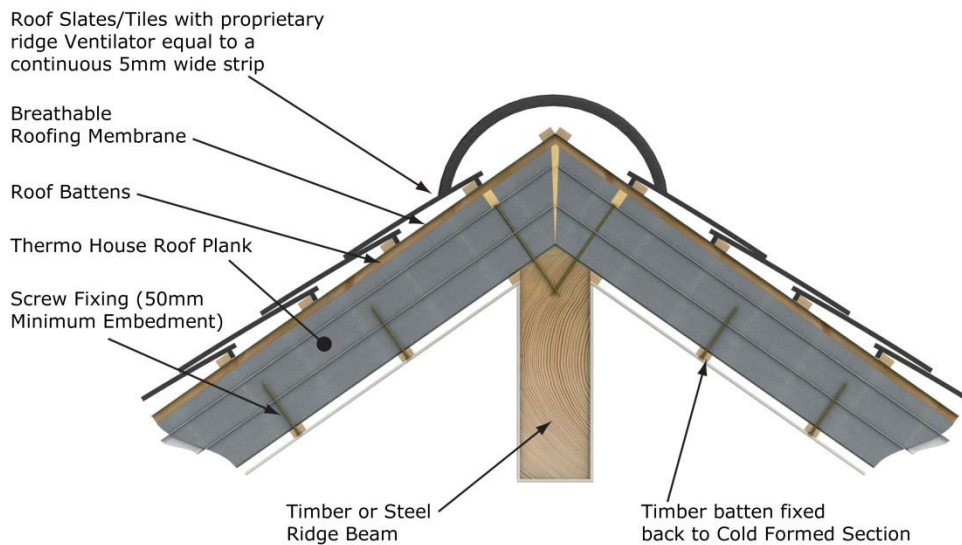
The first layer of timber battens which run parallel with the roofing panels on top and perpendicular on the soffit of the assembly shall be fixed using self tapping Ruspert® corrosion resistant fixing.

Counter battens shall be fixed to roof battens with universal woodscrew in accordance with the requirements of SR 82:2017.

A full list of suitable roof fixing is listed in Table 8 of this certificate.



**Figure 2: Typical Steel Purlin connection**



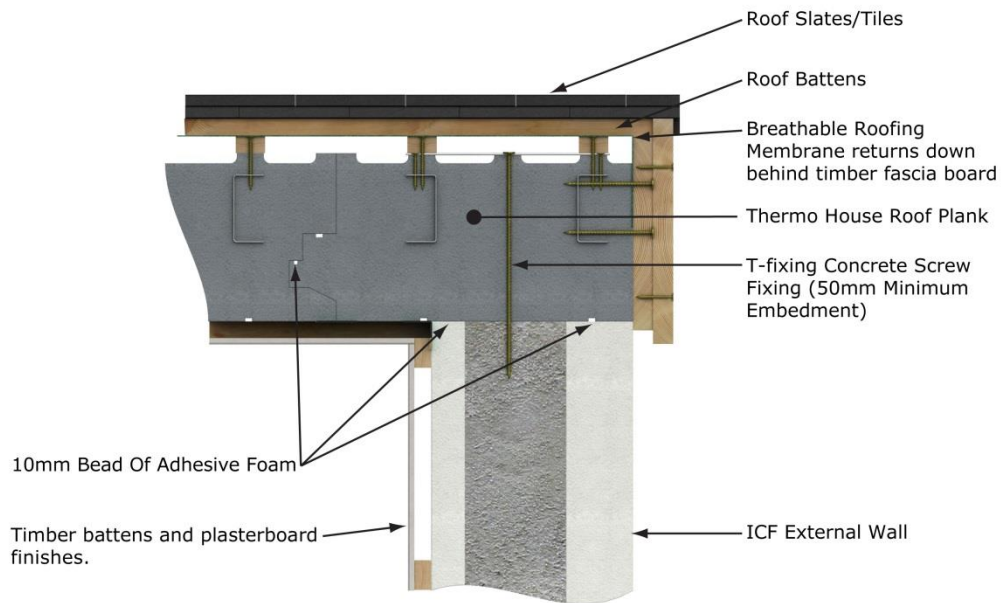
**Figure 3: Typical Timber Ridge connections**

### 2.1.12 Eves Shoe

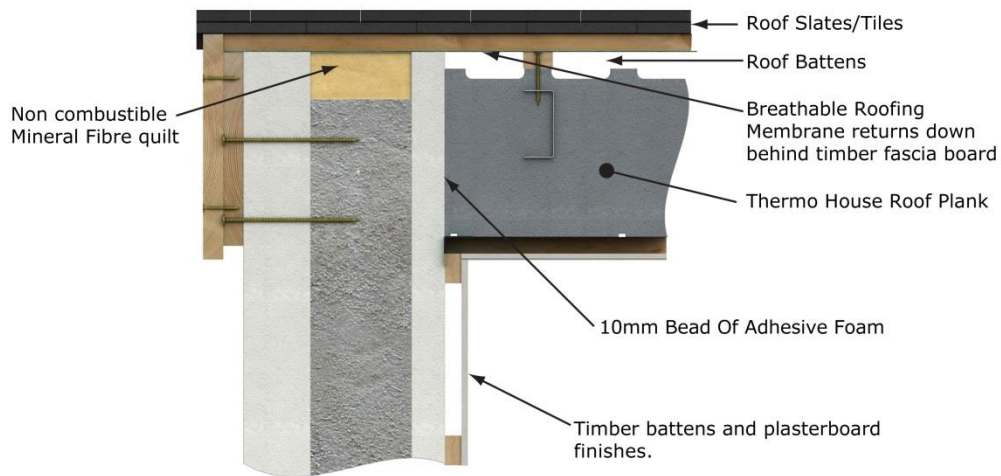
Holding down bolts for the Thermo Houses proprietary 'Eves Shoe' must be mechanically anchored at eave's level. The eves shoe is predominately use in conjunction with ICF type constructions but can be modified for conventional masonry construction.

### 2.1.13 Jointing/Adhesive Foam

The jointing/adhesive foam is placed as a continuous 10mm bead along the full length of the lower groove in the previously fixed panel before the insertion of the tongue of the next panel. Any gaps on the ridge joint should be filled with expansion foam.



**Figure 4: Typical Gable End Detail Option A**



**Figure 5: Typical Gable End Detail Option B**

#### 2.1.14 Ridge/Apex Straps

Ridge straps are available however are seldom required. Ridge straps shall be formed from steel complying with the requirements of BS 1449: Part 1, hot dipped galvanized after cutting, formed and holing or stainless steel complying with the requirements of BS 1554 grades 302, 304, 315, 316, 321 or 347.

#### 2.1.15 Chimney

Chimneys are not part of the Thermo House Roofing System and are not covered by this

Certificate. However, the system can incorporate an NSAI Agrément approved pre-fabricated chimney system, a conventional masonry chimney or flue. The requirements of Clause 2.15 of TGD to Part J of the Building Regulations require that combustible material such as polystyrene insulation have at least the following separation distance:

- a) 200mm from a flue, or
- b) 40mm from the outer surface of a brick or blockwork chimney or fireplace recess.



All penetration such as chimney flues must be trimmed out by providing additional purlin or primary structural support members. (See figure 8).

#### **2.1.16 Ancillary Items**

- Low expanding foam adhesive.
- Hot knife.
- Jointing/adhesive foam
- Fixing at battens, wallplates/purlins.
- Ridge/Apex straps.
- Timber battens.
- Ceiling render.
- Anchor bolts
- PVC pipe sleeves for penetrations
- Fire stops.
- Vapour control layer.
- Breathable vapour barrier.

### **2.2 MANUFACTURE**

Both the cold formed sections and the EPS Thermo House Roofing panels are manufactured by Thermo House Ltd. Production is controlled at different stages through inspections and quality control checks.

### **2.3 DELIVERY, STORAGE AND MARKING**

Panels are delivered to site strapped in bales. All components are clearly labelled with product type and production date allowing full traceability of supply.

Thermo House Roof System components should not deteriorate in normal storage conditions so long as they remain in their packaging protected from the environment prior to use. Storage must be on firm, level and dry ground, and if the components are to be stored outside, they should be protected from the weather by a secured covering.

Thermo House Roof System materials should be protected from prolonged exposure to direct sunlight and must not be exposed to plastic materials containing plasticizers or to volatile aggressive solvents. The polystyrene must not come into contact with aggressive chemicals or deleterious agents e.g. diesel oil, petrol, various cleaning solvents, hydrocarbons, membranes containing coal tar pitches or building products containing solvents.

The panels are easily handled on site and the EPS may be readily cut or trimmed with a knife or fine toothed saw through the EPS. The cold formed sections are cut with a 'Large blade circular saw' or 'Reciprocating saw'. Corrosion protection is reinstated to the cut ends of all cold formed section. Reasonable care must be taken, however, to prevent damage to forms before, during and after installation. The forms must not be punctured, split, deformed or unduly compressed before use.

## **2.4 INSTALLATION**

### **2.4.1 General**

Thermo House Ltd. undertakes responsibility for the design and manufacture of the system. An approved Technical Manual is available (see Section 3). Site construction is undertaken using approved trained installers in accordance with the Thermo House Roof Installation Manual. Fire stopping shall be installed in accordance with the Thermohouse Installation manual.

### **2.4.2 Main Contractor**

The main contractor is responsible for the proper construction of wall plates and purlins within the tolerances specified by Thermo House. Wall plates and purlins are mitred to the required angle to receive the roof panels. All strapping, holding down fixings, DPC's and bracing elements must be secured prior to installation of the Thermo House Roofing System.

The alignment and fixing of the Thermo proprietary eaves shoe is the responsibility of the installer.

The main contractor on site is responsible for providing scaffolding to wall plate level and all access necessary for the safe erection of the structure. Thermo House also provide the main contractor with project specific building details on the construction of their Thermo House Roof System.

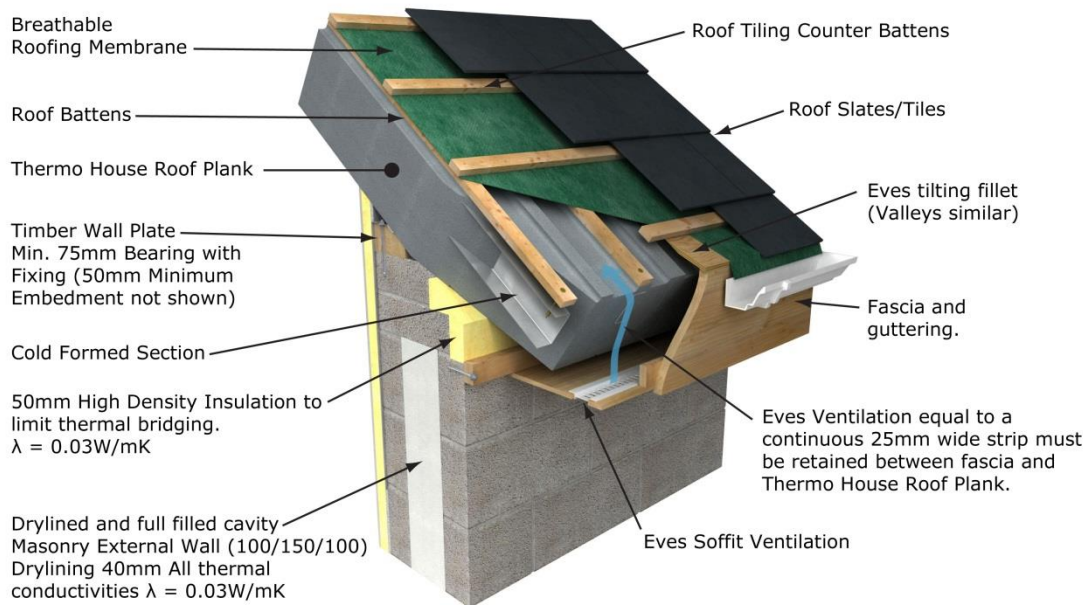
### **2.4.3 Underlay, Slating and Tiling**

A breathable roof underlay must be used in conjunction with the Thermo House Roofing System. The installation of the breathable roof underlay must be as outlined in Figure 1. The underlay is supported between the roof support battens and the roof tiling battens.

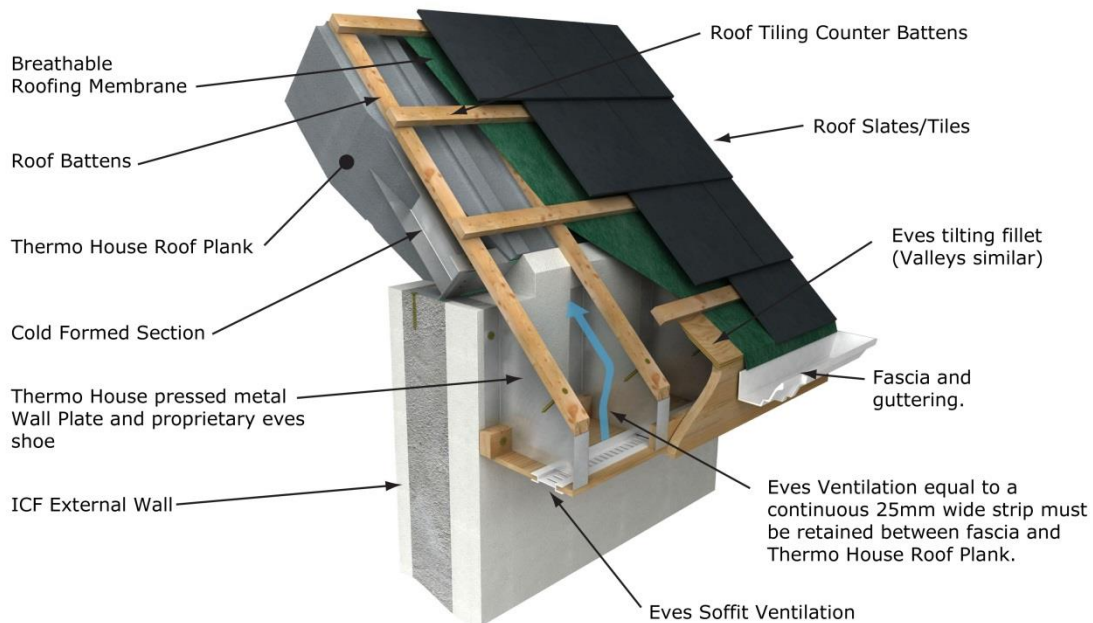
Roof ventilation should be carried out in accordance with Part F of the Building Regulations and the recommendations of BS 5250:2011+A1:2016. When man-made slates or other airtight roof coverings are used, an additional layer of counter battens is required above the breathable roofing membrane to create a ventilated space. In addition eaves vent tiles are provided to supply adequate ventilation to this unobstructed free air space between the roof tile and the breathable roofing membrane.

The slating or tiling should be in accordance with SR82:2017. Workmanship must be in accordance with BS 8000-6:1990 *Workmanship on building sites, Code of practice for slating and tiling of roofs and claddings*.





**Figure 6: Eaves Detail to typical cavity Wall**



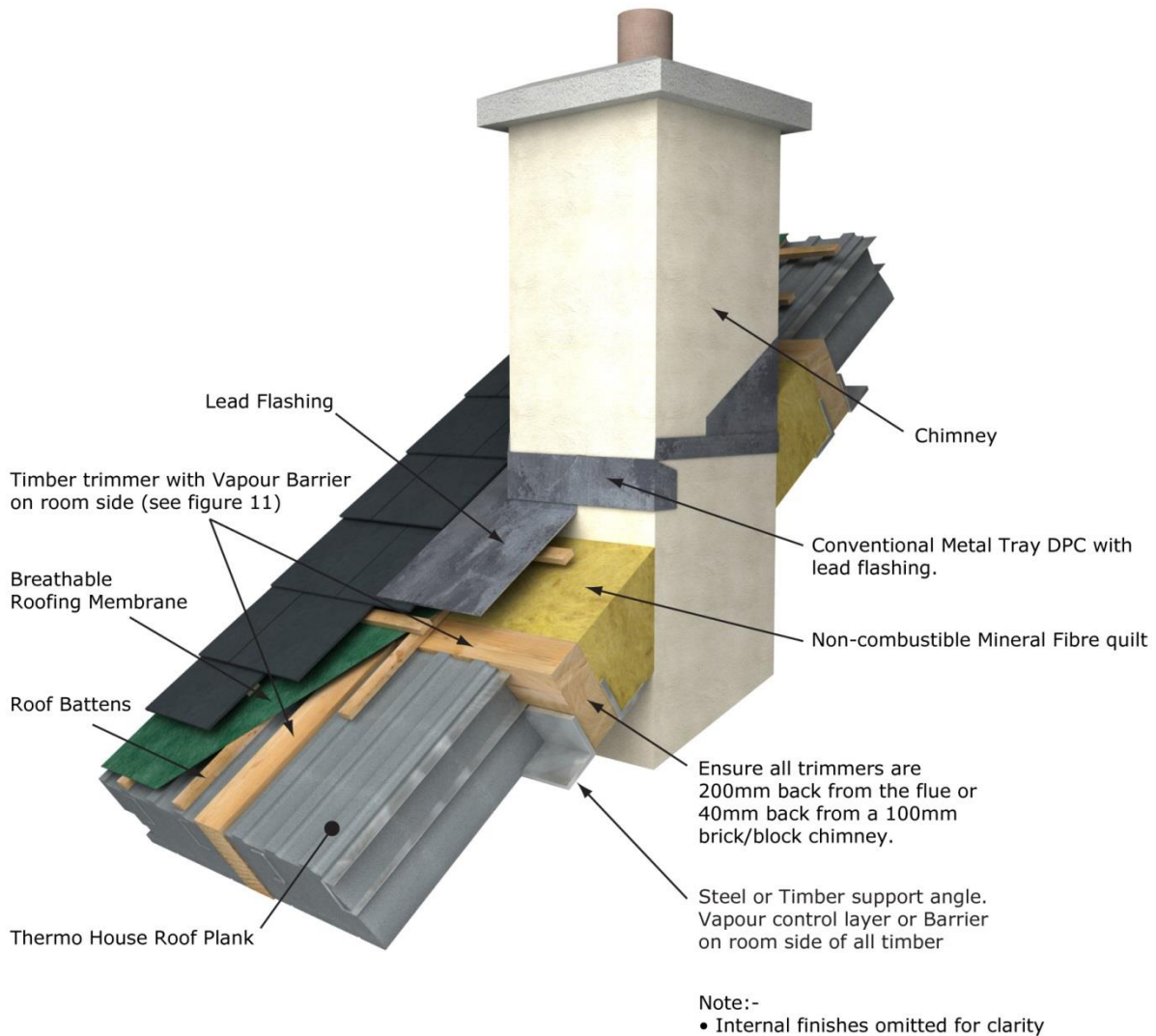
**Figure 7: Eaves Detail to ICF with 'Eves Shoe'**

#### 2.4.4 General provisions

- The Thermo House Roofing panel must be adequately separated from any heat source such as chimneys and flues.
- All Thermo House Roof installations may be made airtight through the correct use of jointing tape and the provision of isolated vapour barriers. Gaps between the roofing planes and gable walls should be avoided. When gaps are unavoidable, these should be filled with expanding foam of a similar thermal

resistance as the EPS used in the roofing panels. Jointing tape should then be installed over the complete junction to ensure air tightness.

- Service penetrations can be accommodated within the zones between cold formed sections of the Thermo House Roofing panel. All gaps around service penetrations must be filled and the air tightness integrity must be reinstated.



**Figure 8: Chimney penetration Details**

- If it is necessary to form larger opes that would clash with the cold formed sections within the thermo house roofing panels, then these larger opes must be trimmed out as indicated in Figure 8, 10 and 11.
- Prior to installation of roof underlay, all jointing tapes, cavity barriers and fire stops must be provided.
- Thermo House Roofing panel must be fixed through both cold formed sections of each individual panel. Fixing must be provided at all support points.
- The practice of butt jointing panels or splicing panels along their length should be avoided.

#### 2.4.5 Openings/Services

Service penetrations for extracts or vent pipes should be installed between the cold formed sections of a panel and not at the rebated joint between two panels. If the ope for a service penetration is large enough to clash with a cold formed section then inline timber trimmers must be used to frame out similar to chimney and

rooflight opes. Expanding foam and sealing tapes must be used to reinstate full air tightness once service ducts or penetrations are installed.

Electrical cables should be ducted (to avoid plasticizer migration). The cables must be placed in PVC conduit and must be sized to minimise heat build-up with resulting fire risk, in accordance with I.S. 10101:2020 *National rules for electrical installations*, and ET 207:2003 *Guide to the national rules for electrical installations as applicable to domestic and similar situations*).

Electrical services can be fixed within the void created by the timber battens on the soffit of the roofing panels. Where chases are made in the polystyrene they should be kept to a minimum and need to be located at appropriate distances from separating walls. The Thermo House Roofing system is not suitable for recessed lighting.

**3.1 STRENGTH & STABILITY**

**3.1.1 General**

The Thermo House Roofing panel is intended for use where Architect’s drawings are available and satisfy the Building Regulations, the Architect and Engineer design team of the developer are responsible for the architectural drawings and overall building design to comply with the Building Regulations. Thermo House Ltd., through the use of an experienced Chartered Structural Engineer, is responsible for the structural design of the Thermo House Roofing panel.

A range of prescriptive designs are outlined in table 4 by Chartered Structural Consulting Engineers which addresses the structural requirements for the Thermo House Roofing panel for houses meeting the criteria given in table 6. For all other cases outside the scope of table 4 and 6, Thermo House Ltd., if requested, will provide a structural design and issue a certificate of compliance at the completion of the project. If requested, Thermo House Ltd. will liaise with the engineer for the developer and provides the necessary loading information for the design of wall plates, purlins and ridge supports.

**3.1.2 Loading**

The vertical imposed loads should not exceed the following:

Element	Loading	
Roof	Distributed Load	0.75 kN/m <sup>2</sup>
Ceiling	Distributed Load	0.75 kN/m <sup>2</sup>

**Table 3: Vertical Imposed Loads**

The vertical dead loads should be calculated based on the self weight of materials to be used in construction, and reference should be made to BS 648:1964 *Schedule of weights of building materials* in this regard.

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

- Eurocode 1 - *Actions on structures*
- Eurocode 3 - *Design of steel structures*

Fixings and frequency of anchor bolts must be as per the Thermo House Technical Manual.

Design snow and wind loads must be based on TGD to Part A of the Building Regulations. The

maximum characteristic wind loading pressure for the Thermo House Roofing panel are detailed in table 4 of this certificate for a number of different exposure categories.

Where timber elements are used they are designed in accordance with Eurocode 5 - *Design of timber structures*.

Panel designs are based on the wind exposure map provided in the TGD to Part A of the Building Regulations. For very exposed sites on hills above the general level of the surrounding terrain, the system can be specifically designed to withstand the unusually high wind loading. This is likely to involve a reduction of allowable single and double span values as outlined in table 4 and in effect will result in a greater frequency of primary support.

**3.1.3 Stability**

The roof panels are used as conventional roof rafters for traditional cut roof constructions supported on the primary support elements such as purlins, wall plates and steel beams.

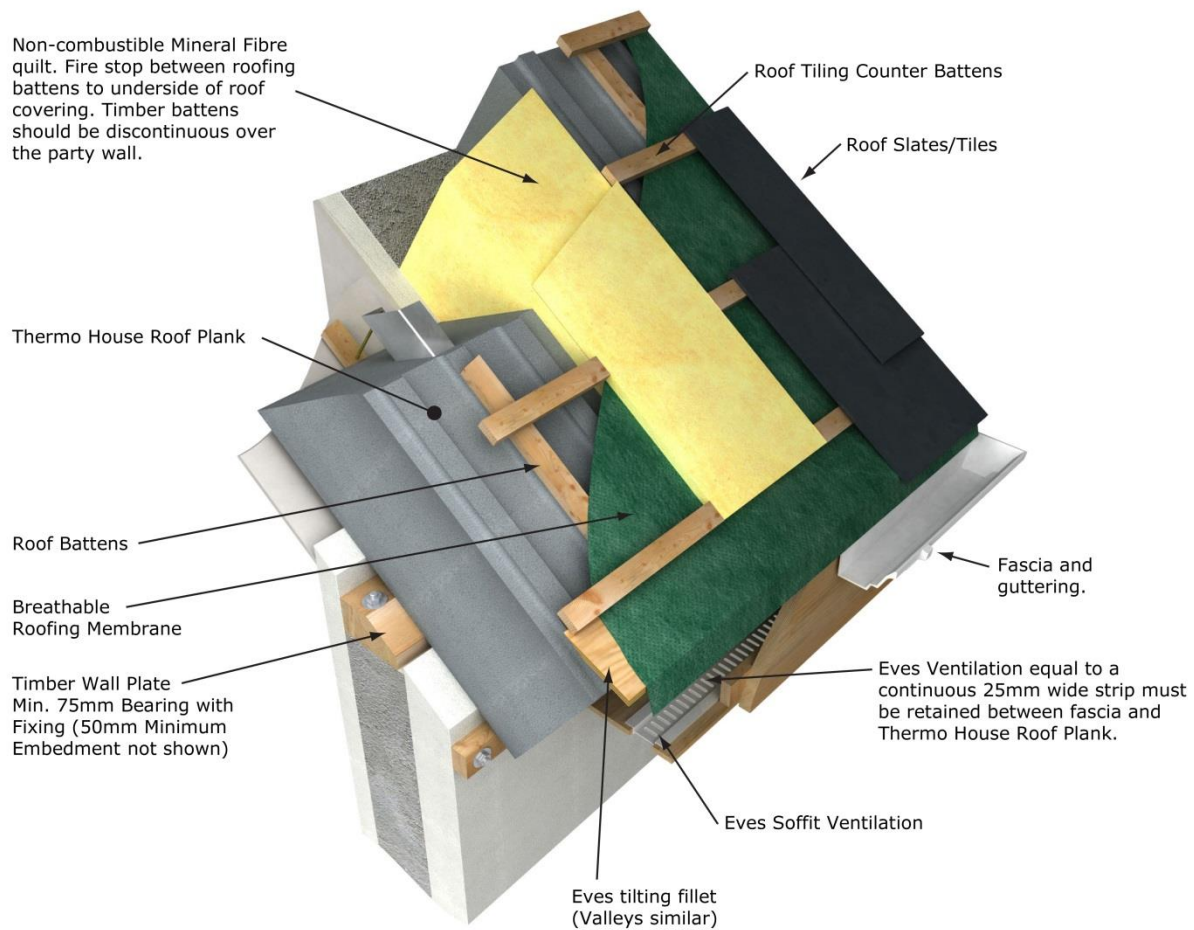
The primary roof structure must be capable of accommodating all lateral and wind uplift forces. The primary supports must be adequately sized to accommodate lateral forces which arise due to lack of triangulation of a cut roof.

Thermo House Ltd can provide site by site specific data on maximum loads both vertical and horizontal, however it is the responsibility of the client/developers engineer to ensure that the primary structure in the form of wall plates, purlins and ridge beams are adequately sized to accommodate all design loads.

**3.2 CE MARKING**

The manufacturer has taken the responsibility of CE marking the product in accordance with harmonised standard I.S. EN 13165:2012+A2:2016, Thermal insulation products for buildings - Factory made rigid polyurethane foam (PU) products - Specification. An asterisk (\*) appearing in this Certificate indicates that data shown is given in the manufacturer’s Declaration of Performance.

Reference should be made to the latest version of the manufactures DoP for current information on any essential characteristics declared by the manufacturer



**Figure 9: Fire Stopping at Party Wall**

### 3.2 STRUCTURAL FIRE SAFETY

#### 3.2.1 Internal Fire Spread (Linings)

The NSAI Agrément approved internal plaster finish for ICF systems and plasterboard slabs used on the internal finish are non-combustible and have a Class 0 'spread of flame' rating. Surface spread of flame rating of the finished construction will be determined by the surface spread of flame rating of the lining materials used.

#### 3.2.2 Internal Fire Spread (Structure)

Primary structural support elements must be installed in accordance with the requirements of Technical guidance document to Part B of Building Regulations.

#### 3.2.3 Containment of fire

The plasterboard internal lining for use with the thermo House Roofing Systems have a spread of flame rating equivalent to Class 0. In accordance with the requirements of Appendix A Table A1 of TGD to part B of the Building Regulations there is no requirement for a roof element to contain a fire.

At the boundary or party wall junction between two adjacent dwellings the integrity of the dividing wall must extend up through the roof structure as indicated in Figure 9.

### 3.3 WEATHERTIGHTNESS

The weathertightness of the building relies upon the correct installation of the breathable vapour barrier as outlined in both this certificate and SR 82:2017. Service penetrations through the breathable vapour barrier should reinstate the full integrity of this layer through the use of preparatory roofing skirts and double sided sealing tape.

Rooflights can be accommodated and incorporated into the Thermo House roofing system and designers should provide details of their selected rooflight to the certificate holder as not all rooflights on the market are suitable for the Thermo House roofing system. See Figure 11.



Table of Maximum Spans for Single Span Roof							
Roof Finish	Wind Load Type	Roof Slope					
		10°	20°	30°	40°	50°	60°
		Span (m)					
Slate Roof	Exposure 1	3.63	3.45	3.36	3.34	3.32	3.42
	Exposure 2	3.46	3.36	3.25	3.22	3.17	3.26
	Exposure 3	3.26	3.30	3.17	3.13	3.08	3.15
Tiled Roof	Exposure 1	3.48	3.33	3.26	3.25	3.24	3.36
	Exposure 2	3.43	3.25	3.16	3.14	3.11	3.20
	Exposure 3	3.36	3.19	3.09	3.07	3.02	3.11
Table of Maximum Spans for Double Span Roof							
Roof Finish	Wind Load Type	Roof Slope					
		10°	20°	30°	40°	50°	60°
		Span (m)					
Slate Roof	Exposure 1	4.06	3.85	3.75	3.73	3.70	3.82
	Exposure 2	3.86	3.75	3.63	3.59	3.54	3.64
	Exposure 3	3.64	3.68	3.54	3.50	3.44	3.52
Tiled Roof	Exposure 1	3.89	3.71	3.64	3.64	3.62	3.75
	Exposure 2	3.84	3.63	3.53	3.51	3.47	3.58
	Exposure 3	3.75	3.57	3.45	3.42	3.38	3.47
<b>Notes</b>							
1. Relevant only to structures less than 250 m OD Malin Head							
2. Wind Load - exposure 1 -refers to basic wind speed of 23 m/s or less - exposure 2 -refers to basic wind speed of 23-24 m/s - exposure 3 -refers to basic wind speed of greater than 24 m/s							
3. The span is measured along the slope of the roof							

**Table 4 – Load Span Tables**

Thermo House Panel properties	
Max Moment Capacity	5.45 KNm/m
Max Moment of Inertia	108.31 cm <sup>4</sup> /m

**Table 5 – Panel properties**

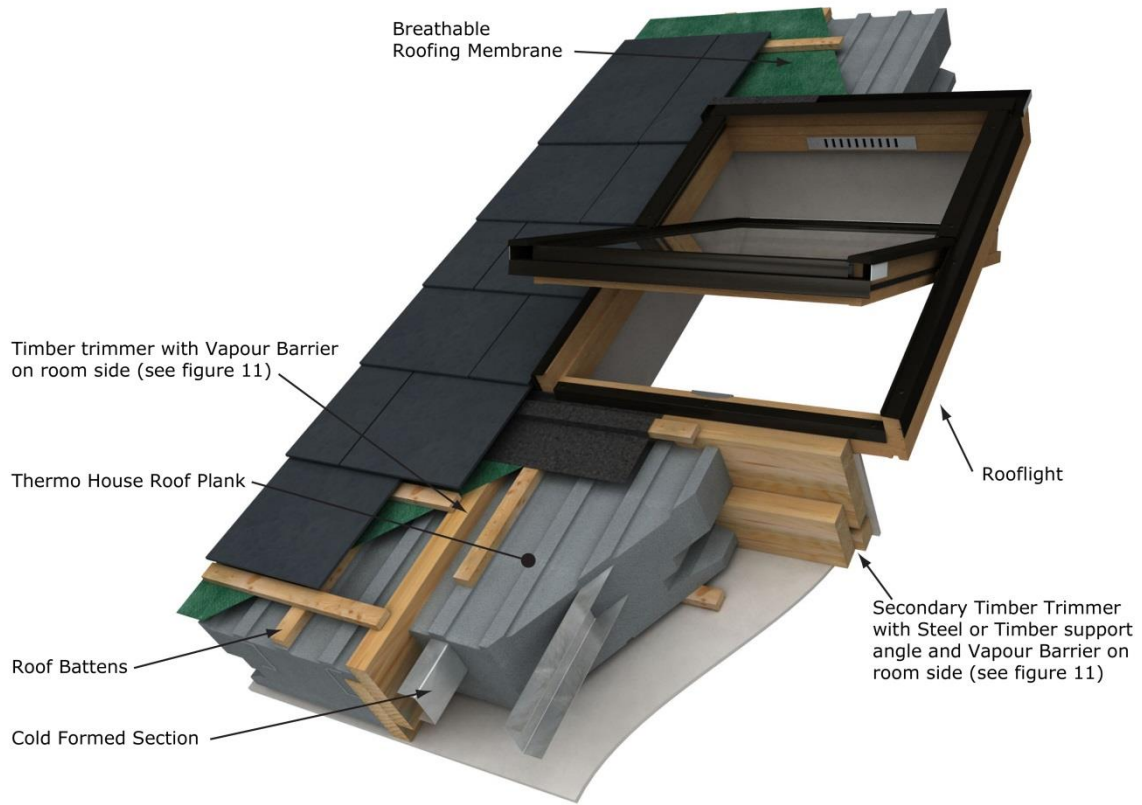
Loadings			
Slated Roof Dead Loading	kN/m <sup>2</sup>	Tiled Roof Dead Loading	kN/m <sup>2</sup>
Roof Slates(15mm avg tk, 30kN/m <sup>3</sup> )	0.45	Roof Slates (35mm avg tk,20kN/m <sup>3</sup> )	0.70
Thermo Panel	0.12	Thermo Panel	0.12
Battens & Felt	0.05	Battens & Felt	0.05
Ceiling and services	0.25	Ceiling and services	0.25
Total Dead	0.87	Total Dead	1.12
Wind Loading		Live Loads	
Exposure 1	1.33	Live Loading	0.60
Exposure 2	1.65	Snow Loading	0.60
Exposure 3	1.89	Max Live Loading	0.60
Note:- For load conditions outside the scope of this table, designer should contact the certificate holder			

**Table 6 – Panel Loading**

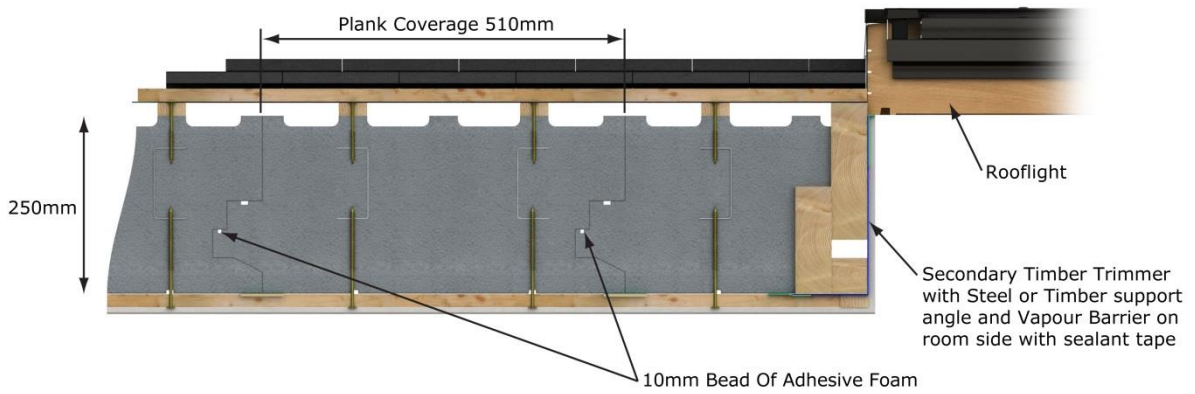
Typical requirements for rooflights are detailed in the thermo house installation manual.

As mentioned in section 2.4.4 of this certificate the practice of butt jointing panels or splicing

panels along their length should be avoided. If butt jointing panels is unavoidable additional adhesive foam must be use as per Thermo House instructions.



**Figure 10: Rooflight**



**Figure 11: Rooflight Details**

#### 4.1 BEHAVIOUR IN RELATION TO FIRE

**Combustibility** - Although the Thermo House Roofing panel is a product of limited combustibility, when used in the context of this Certificate the increase in fire load in the building consequent to its use, is negligible.

The use of the Thermo House Roofing panel will not affect the fire rating obtained by the tiled/slatted roof when assessed or tested to BS 476:Part 3:2004 *Fire tests on building materials and structures – Classification and method of test for external fire exposure to roofs*.

Thermo House Roofing panel is manufactured without the use of CFC's and HCFC's, there is no release of such gas on burning.

##### 4.1.1 Fire Barriers

At the junction of compartment walls and party walls, The compartment wall, should be carried up to the underside of the *roof deck and be fire stopped with resilient non-combustible fire stopping material over the full width of the wall* (see Figure 9).

If a fire penetrates a roof near a compartment wall there is a risk that it will spread over the roof to the adjoining compartment. To reduce that risk, the junction between a compartment wall and a roof should be constructed in accordance with the following:

A zone of the roof at 1.5 m wide on both sides of the wall should have a covering of class B<sub>ROOF</sub> (t4) (European class) or AA, AB or AC (National class) (see table A5 to Appendix A) on a non-combustible (see table A8 to Appendix A) substrate or deck.

##### 4.1.2 Toxicity

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

#### 4.2 THERMAL INSULATION

The Thermo House Roofing panels are a form of hybrid construction where insulation is included between the steel cold formed sections and

further insulation is placed on the outside and inside of the steel cold formed sections to reduce thermal bridging through the steel.

The elemental U-value of Thermo House Roofing system has been calculated to the requirements of I.S EN ISO 10211:2017, *Thermal bridges in building construction - Heat flows and surface temperatures - Detailed calculations*. The Thermo House Roofing system meets and exceeds the U-value requirements of TGD to Part L of the Building Regulations. Elemental U-values and thermal conductivity values are outlined in table 7 of this certificate.

##### 4.2.1 Limiting Thermal Bridging

The linear thermal transmittance ( $\psi$ ) or Psi describes the additional heat loss associated with junctions and around openings. The Thermo House Roofing System has been assessed and when detailed in accordance with this certificate, these thermally bridged junctions comply with the requirements of the applicable Table D1/D2 of appendix D of TGD to Part L of the Building Regulations. Certified ' $\Psi$ ' values for bridged junctions are provided in the certificate holder's installation manual and can be used in calculating the 'y' factor for a dwelling.

When all ' $\Psi$ ' values for an entire dwelling are equal to or better than the values outlined in the applicable Table D1/D2 of Appendix D of TGD to Part L then an improved 'y' factor of 0.08 can be entered into the DEAP Building Energy Rating (BER) software package. This is as a result of lower heat loss from thermal bridging.

' $\Psi$ ' values for other junction outside the scope of this certificate should be assessed by a NSAI registered Thermal Modeller or equivalent competent person in accordance with the requirements of BRE IP1/06, *Assessing the effects of thermal bridging at junctions and around openings* and BRE Report BR 497, *Conventions for calculating linear thermal transmittance and temperature factors*.

##### 4.2.2 Air Infiltration

Air permeability pressure testing is a requirement under TGD to Part L 2017.

The Thermo House Roofing system will significantly contribute to the reduction of un-designed air permeability/leakage from a building when installed in accordance with the requirements of this certificate. To ensure the full thermal benefit and to avoid excessive heat losses it is necessary to install peripheral seals

Building element	Required Elemental U-value (W/m <sup>2</sup> K)	Calculated U-value (W/m <sup>2</sup> K)
Pitched Roof - insulation on slope	0.20	0.15
Thermal conductivity, $\lambda_{90/90}$ , of EPS	0.030* W/mK	

**Table 7: Elemental U-Values and Thermal Conductivity**

Fixing Requirements For Typical (single) Roof Panel					
Ref	Description	Size	Location	Quantity	Reference
A	Supplied With Roof HSS Drill Bit	Dia. 6.5 x 200	Pre-Drill Roof Panel	1	THR-004
B	Supplied With Roof 8x280 & 6x180 Screws	Dia. 8.0 x 280 Dia. 6.0 x 180	Roof Panel Fixing	2/support	THR-004 THR-008b THR-010
C	Supplied on Request Wing Drill Tek Screw	Dia. 5.5 x Length Calculated	External Batton fixing	7 per m <sup>2</sup>	THR-005
D	Supplied on Request Wing Drill Tek Screw	Dia. 5.5 x Length Calculated	Internal Batton fixing	7 per m <sup>2</sup>	THR-009a
E	Supplied on Request Tek Stitching Screw	Dia. 6.3 x 22	Galv. Shoe to Panel	2	THR-008a
F	Supplied on Request Tek Stitching Screw	Dia. 6.3 x 22	Facia/Soffit Bracket To Galv. Shoe	2	THR-008a
G	Supplied on Request Frame Anchor	Dia. 8.0 x 60	Galv.Shoe to Wall	2	THR-008a
H	Supplied on Request Frame Anchor	Dia. 8.0 x 140	Facia Bracket to Wall	2	THR-008a
I	Supplied With Adhesive foam	75ml Can	Panel - Panel rebait	10mm bead/m	THR-006

**Table 8: Schedule of approved fixings.**

around windows, doors, services, floors, roof and all building junctions which penetrate the envelop of the building in accordance with clause 1.3.4 *Building Envelope Air Permeability* of Part L of the Building Regulations.

#### 4.2.3 Mould Growth and Surface Condensation

The key factor used in assessing the risk of mould growth or internal surface condensation in the vicinity of thermal bridges is the temperature factor ( $f_{Rsi}$ ). The Thermo House Roofing system has been assessed and when detailed in accordance with this certificate, these thermally bridged junctions comply with the requirements of Section D2 of appendix D of TGD to Part L of the Building Regulations.  $f_{Rsi}$  values are given in certificate holders installation manual and these values surpass the 0.75 requirement as outlined in TGD to Part L. As a result the risk of internal surface condensation and mould growth in the vicinity of thermal bridges is minimal.

#### 4.3 CONDENSATION

In order to eliminate the risk of interstitial condensation jointing tapes and vapour control barriers must be provided as outlined in section 4.3.1 of this certificate. Adequate roof ventilation must be provided to the cold side of the insulation in order to meet the requirements of TGD to Part F of the Building Regulations.

#### 4.3.1 Interstitial Condensation Roof

Due to the relatively high water vapour diffusion resistance factor (see table 2) of the EPS it is unlikely that moist humid air from within the living space will condense within the Thermo House roofing panel.

At the location where timber trimmers bridge the insulation layer, and frame out for chimney or roof light penetrations, a vapour control membrane must be provided on the warm side of the timbers to prevent humid air from passing from the living space into these timber trimmers. As a result of this requirement is not possible to accommodate roof lights and chimney penetrations when using the NSAI Agrément approved Internal Plaster System unless calculations under the guidance of BS 5250:2011+A1:2016 predict no interstitial condensation within the roof construction and pass the risk criteria in I.S. EN ISO 13788 *Hygrothermal performance of building materials and building elements - Internal surface temperature to avoid critical surface humidity and interstitial condensation - Calculation methods*.

#### 4.3.2 Condensation in Roof

A breathable vapour control layer should be used over the whole roof area. Adequate provision for roof ventilation must be made. Roof ventilation should be provided in accordance with Part F of



the Building Regulations and the recommendations of BS 5250:2011+A1:2016. It is important that the ventilation paths are not obstructed.

#### **4.3.3 Means of Ventilation**

Adequate means of designed natural or mechanical ventilation must be provided in order to regulate the moisture content or relative humidity of the air within the living space. The Thermo House Roofing systems can accommodate ventilation roof penetrations. Ducting associated with mechanical ventilation systems, should be concealed within service ducts. Under no circumstances should ducting or services be recessed into the EPS of the Thermo House Roofing system.

#### **4.4 WEATHERTIGHTNESS**

In all situations timber battens are fitted directly over the steel cold formed sections of the roofing panels. These timber battens can be considered to be the top edge of either a conventional timber or prefabricated roof truss and as a result all subsequent roof membranes, tiling battens, valley boards, counter flashings, slates and tiles should be installed as outlined in SR 82:2017.

#### **4.5 DURABILITY**

Roofs based on the Thermo House Roofing panel system, subject to maintenance, when constructed in accordance with the manufacturer's instructions and this Certificate will have a minimum design life of at least 60 years in accordance with BS 7543: 2015 *Guide to Durability of Building Elements, products and components*.

#### **4.6 PRACTICABILITY**

A Technical Manual, Installation Manual incorporating Health & Safety guidelines are provided by Thermo House Ltd. Erection of the Thermo House Roofing panel System must be by approved trained installers.

#### **4.7 SOUND TRANSMISSION**

When detailed in accordance with this certificate, the Thermo House Roofing System will meet the requirements of TGD to Part E of the Building Regulations with respect to limiting the flanking transmission of sound at the party wall roof junction between two attached dwellings.

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

- Structural strength and stability
- Behaviour in fire
- Resistance to airborne sound transmission
- Elemental U-Value calculations
- Thermal transmittance values
- Condensation risk analysis
- Air tightness testing.
- Site erection controls

#### **OTHER INVESTIGATIONS**

- The manufacturing process was examined including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.
- Site visits were conducted to assess the practicability of installation.
- Bought-in components were assessed for suitability for use.
- Structural load testing of Thermo House Roofing Panels.
- Assessment of the effects of creep on the expanded polystyrene and wall plate interface.
- No failures of the product in use have been reported to the NSAI Agrément.

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

- (a) the specification of the product is unchanged.
- (b) the Building Regulations and any other regulation or standard applicable to the product/process, its use or installation remains unchanged.
- (c) the product continues to be assessed for the quality of its manufacture and marking by NSAI.
- (d) no new information becomes available which in the opinion of the NSAI, would preclude the granting of the Certificate.
- (e) the product or process continues to be manufactured, installed, used and maintained in accordance with the description, specifications and safety recommendations set out in this certificate.
- (f) the registration and/or surveillance fees due to IAB are paid.

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

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

- (a) the absence or presence of patent rights subsisting in the product/process; or
- (b) the legal right of the Certificate holder to market, install or maintain the product/process; or
- (c) whether individual products have been manufactured or installed by the Certificate

holder in accordance with the descriptions and specifications set out in this Certificate.

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

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

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

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

## NSAI Agrément

This Certificate No. **10/0349** is accordingly granted by the NSAI to **Thermo House Ltd.** on behalf of The Irish Agrément Board.

Date of Issue: **September 2010**

Signed



**Kevin D. Mullaney**  
Director of NSAI Certification

Readers may check that the status of this Certificate has not changed by contacting NSAI Agrément, NSAI, 1 Swift Square, Santry, Dublin 9, Ireland. Telephone: (01) 807 3800. Fax: (01) 807 3842. [www.n sai.ie](http://www.n sai.ie)

**Revision:**

- **January 2018:** Product specification updated to reflect manufactures Declaration of Performance.
- **07<sup>th</sup> November 2023:** References to Building Regulations updated.