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Agrément Certificate

21/5918

Product Sheet 2

VMZINC STANDING SEAM ROOF SYSTEMS

VMZINC STANDING SEAM COMPACT ROOF SYSTEM

This Agrément Certificate Product Sheet⁽¹⁾ relates to the VMZINC Standing Seam Compact Roof System, for use as flat, curved or pitched roofs with finished slopes from 3 to 60°, with an internal humidity class of 1 to 5, where access is available for maintenance and repair only.

(1) Hereinafter referred to as 'Certificate'.

CERTIFICATION INCLUDES:

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

KEY FACTORS ASSESSED

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

Weathertightness — the system will resist the passage of wind-driven rain and snow when installed in accordance with the provisions of this Certificate (see section 7).

Thermal performance — the system can contribute to enabling a building to satisfy the requirements of the national Building Regulations (see section 8).

Condensation — the risk of condensation forming under normal service conditions is negligible (see section 9).

Behaviour in relation to fire — the use of the system may be restricted (see section 11).

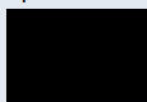
Durability — durability of the system will depend on the location, environment and coatings used (see section 14).



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

On behalf of the British Board of Agrément

Date of First issue: 28 July 2021



Hardy Giesler
Chief Executive Officer

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 MUST check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA directly.*

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Regulations

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



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

Requirement:	A1	Loading
Comment:		The system has sufficient strength and stiffness to sustain and transmit the design load in accordance with sections 6.1 to 6.7 of this Certificate.
Requirement:	B3(2)	Internal fire spread (structure)
Comment:		The system may be restricted by this Requirement. See sections 11.1, 11.2 (Wales only), 11.3 and 11.4 of this Certificate.
Requirement:	B4(2)	External fire spread
Comment:		The system may be restricted by this Requirement. See sections 11.1, 11.2 (Wales only), 11.3 and 11.4 of this Certificate.
Requirement:	C2(b)	Resistance to moisture
Comment:		The system can resist the passage of moisture to the inside of the building. See section 7 of this Certificate.
Requirement:	C2(c)	Resistance to moisture
Comment:		The system can contribute to satisfying this Requirement. See section 9 of this Certificate.
Requirement:	L1(a)(i)	Conservation of fuel and power
Comment:		The system can contribute to satisfying this Requirement, but compensating fabric measures may be required. See sections 8 and 10 of this Certificate.
Regulation:	7(1)	Materials and workmanship
Comment:		The system is acceptable. See sections 14.1 and 14.2 and the <i>Installation</i> 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 system can contribute to satisfying these Regulations when compensating fabric and/or services measures are taken. See sections 8 and 10 of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Durability, workmanship and fitness of materials
Comment:		The system can contribute to a construction satisfying the requirements of this Regulation. See sections 13, 14.1 and 14.2 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	1.1(a)(b)	Structure
Comment:		The system has sufficient strength and stiffness to transmit the design load, with reference to clause 1.1.1 ⁽¹⁾⁽²⁾ . See sections 6.1 to 6.7 of this Certificate.

Standard:	2.1	Compartmentation
Standard:	2.2	Separation
Comment:		The system may be restricted by this Standard, with reference to clauses 2.1.15 ⁽²⁾ and 2.2.10 ⁽¹⁾ . See section 11.1, 11.3 and 11.4 of this Certificate.
Standard:	2.8	Spread from neighbouring buildings
Comment:		The system is restricted by this Standard, with reference to clause 2.8.1 ⁽¹⁾⁽²⁾ . See sections 11.1, 11.3 and 11.4 of this Certificate.
Standard:	3.10	Precipitation
Comment:		The system will resist the passage of moisture to the inside of the building, with reference to clause 3.10.1 ⁽¹⁾⁽²⁾ . See section 7 of this Certificate.
Standard:	3.15	Condensation
Comment:		Roofs incorporating the system can contribute to satisfying this Standard, with reference to clauses 3.15.1 ⁽¹⁾⁽²⁾ and 3.15.3 ⁽¹⁾⁽²⁾ to 3.15.7 ⁽¹⁾⁽²⁾ . See section 9 of this Certificate.
Standard:	6.1(b)	Carbon dioxide emissions
Comment:		The system can contribute to satisfying this Standard, with reference to clauses 6.1.1 ⁽¹⁾ , 6.1.2 ⁽²⁾ and 6.1.6 ⁽¹⁾ , but compensating fabric and/or services measures may be required. See sections 8 and 10 of this Certificate.
Standard:	6.2	Building insulation envelope
Comment:		The system can contribute to satisfying this Standard, with reference to clauses 6.2.1 ⁽¹⁾⁽²⁾ , 6.2.3 ⁽¹⁾ , 6.2.4 ⁽¹⁾⁽²⁾ , 6.2.5 ⁽²⁾ , 6.2.6 ⁽¹⁾⁽²⁾ , 6.2.7 ⁽¹⁾ , 6.2.8 ⁽²⁾ , 6.2.9 ⁽¹⁾⁽²⁾ , 6.2.10 ⁽¹⁾ , 6.2.11 ⁽¹⁾⁽²⁾ , 6.2.12 ⁽²⁾ and 6.2.13 ⁽¹⁾⁽²⁾ , when compensating fabric measures are taken. See sections 8 and 10 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The system 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. See sections 8 and 10 of this Certificate.
Regulation:	12	Building standards applicable to conversions
Comment:		Comments in relation to the system under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1 ⁽¹⁾⁽²⁾ and Schedule 6 ⁽¹⁾⁽²⁾ .
(1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).		



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

Regulation:	23(a)(i)	Fitness of materials and workmanship
Comment:	(iii)(b)(i)	The system is acceptable. See sections 14.1 and 14.2 and the <i>Installation</i> part of this Certificate.
Regulation:	28(b)	Resistance to moisture and weather
Comment:		The system can resist the passage of moisture to the inside of the building. See section 7 of this Certificate.
Regulation:	29	Condensation
Comment:		The system can contribute to satisfying this Regulation. See sections 9.1, 9.4 and 9.5 of this Certificate.
Regulation:	30	Stability
Comment:		The system has sufficient strength and stiffness to sustain and transmit the design load in accordance with sections 6.1 to 6.7 of this Certificate.

Regulation:	35(2)	Internal fire spread – Structure
Comment:		The system may be restricted by this Regulation. See section 11 of this Certificate.
Regulation:	36(b)	External fire spread
Comment:		The system may be restricted by this Regulation. See section 11 of this Certificate.
Regulation:	39(a)(i)	Conservation measures
Comment:		The system contributes to satisfying this Regulation, but compensating fabric measures may be required. See sections 8 and 10 of this Certificate.
Regulation:	40(2)	Target carbon dioxide emission rate
Comment:		The system can contribute to satisfying the requirements of this Regulation, when compensating fabric and/or services measures are taken. See sections 8 and 10 of this Certificate.

Construction (Design and Management) Regulations 2015

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

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

See section: *3 Delivery and site handling* (3.2 and 3.6) of this Certificate.

Additional Information

NHBC Standards 2021

In the opinion of the BBA, the VMZINC Standing Seam Compact Roof System, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards*, Chapter 7.1 *Flat roofs, terraces and balconies* and 7.2 *Pitched roofs*.

Technical Specification

1 Description

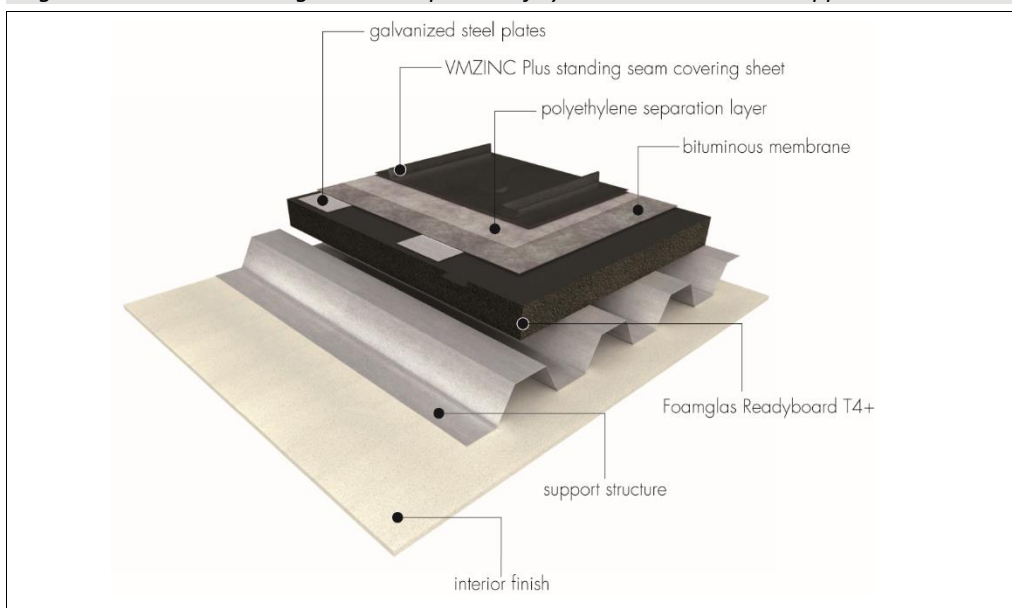
1.1 The VMZINC Standing Seam Compact Roof System, consists of the following:

- VMZINC panels
- polyethylene, polyester separation layer or VMZ Membrane
- bituminous membrane
- galvanized steel plates
- Foamglas Readyboard T4+ — cellular glass thermal insulation
- cold bitumen adhesive
- internal finish⁽¹⁾
- steel, timber or concrete deck support structure⁽¹⁾
- stainless steel fixed and sliding clips
- fixings.

(1) Outside the scope of this Certificate.

1.2 The components of the system, with a steel deck support structure, are shown in Figure 1.

Figure 1 VMZINC Standing Seam Compact Roof System with steel deck support structure



1.3 VMZINC panels are manufactured from 0.7 mm thick zinc sheets complying with BS EN 988 : 1997. Flat sheets are profiled into panels (see Figure 2) with a cover width of 430 or 600 mm and a standing seam height of 25 mm. The composition of the panels is as shown in Table 1.

Table 1 VMZINC panel composition

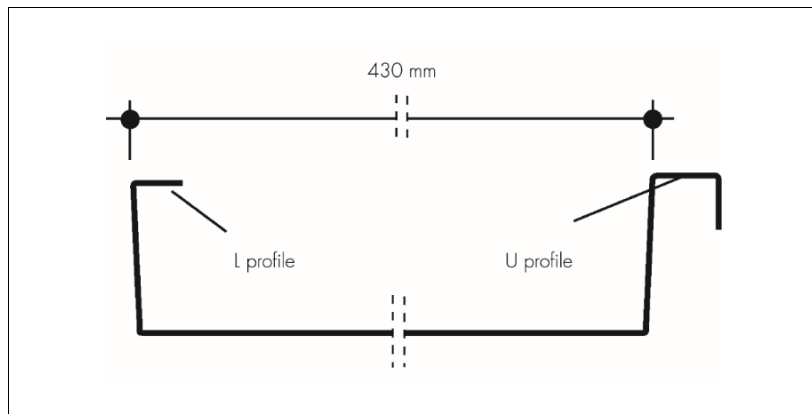
	VM ZINC PLUS (Natural)	QUARTZ-ZINC PLUS	ANTHRA-ZINC PLUS / AZENGAR PLUS	PIGMENTO PLUS
Upper surface	Mill finish – Shiny silver	Light Grey	Dark Grey	35 µm thick pigmented composite polyurethane lacquer in Red, Blue, Brown, Green, Grey, Storm Grey and Charcoal Blue.
		Zinc phosphate surface treatment		
Zinc sheet	0.7 mm zinc			
Lower surface	–	Zinc phosphate surface treatment		
	60 µm thick composite polyurethane lacquer - Cream colour			

1.4 A 0.25 mm polyethylene or polyester separation layer, or VMZ Membrane layer⁽¹⁾, is laid over the bituminous layer. Its purpose is to avoid direct contact between the VMZINC panels and the bituminous layer.

(1) Outside the scope of this Certificate.

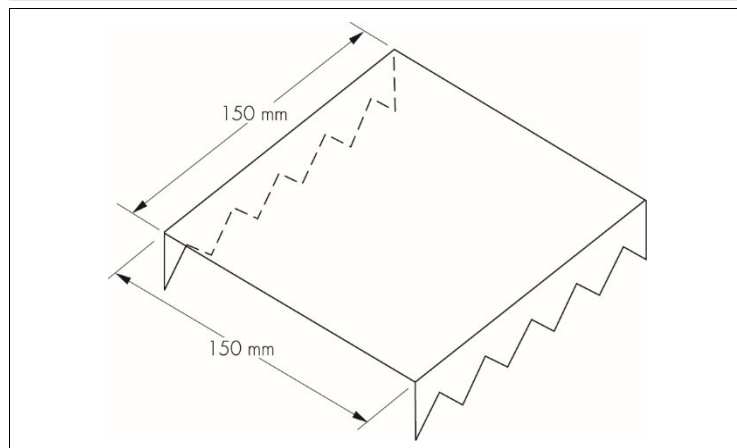
1.5 A polyester-reinforced SBS modified bituminous membrane with a minimum thickness of 3 mm is laid over the insulation. Its purpose is to distribute mechanical stresses on the whole roof surface. The membrane should comply with BS EN 13707 : 2013, and must be bonded to the whole surface of the insulation, including the galvanized steel plates.

Figure 2 Panel profile



1.6 The galvanized steel plates are 150 by 150 mm and have a thickness of 1.5 mm and a coating of Z350 (see Figure 3). The plate provides a fixing point for the fixed and sliding clips. The galvanized steel plate with its serrated edge is pressed into the insulation and bonded to the top surface.

Figure 3 Galvanized steel plates



1.7 The Foamglas Readyboard T4+ boards are 1200 mm long by 600 mm wide, in a range of thicknesses between 100 and 180 mm, in 10 mm increments. The boards comprise an insulation core, an upper facing of thermofusible polyethylene and a mineralised glass fibre mat as a lower facing. The upper and lower facing are bonded to the insulation core using bitumen 85/25 or 110/30.

1.8 Cold bitumen adhesive, type (eg PC11), is used to attach the insulation boards to the structural deck. The adhesive has a density of $1150 \text{ kg}\cdot\text{m}^{-3}$. In buildings with humidity class 4 or 5, PC11 is also used for sealing joints between the insulation boards.

1.9 The steel deck support structure should comply with BS EN 10346 : 2015. The crown width of the trapezoidal sheet should not be less than 40% of the profile width. The structural engineer responsible should confirm that the assumed loadings are correct and that the steel deck is suitable.

1.10 The selection of an appropriate timber deck support structure should be in accordance with BS 8103-3 : 2009. The timber deck must have a minimum thickness of 15 mm for solid softwood boards or plywood, and 18 mm for particle boards or oriented strand board (OSB). Wood-based panels should comply with BS EN 13986 : 2004.

1.11 The support structure is fixed to steel or timber purlins (outside the scope of the Certificate).

1.12 The panels are secured with stainless steel fixed, and sliding, clips to the roof substructure, which are fixed to the galvanized steel plates. The sliding clips are used for providing the necessary thermal movement for the zinc sheets.

1.13 The fixed clips are manufactured from stainless steel grade X5 CrNi 18-10 (1.4301) complying with BS EN 10088-2 : 2014 (see Figure 3). The thickness of the stainless steel is 0.4 mm and the clips have two 5.4 mm diameter holes for fixing.

1.14 The sliding clips are manufactured from stainless steel grade X10 CrNi 18-8 complying with BS EN 10088-2 : 2014 (see Figure 4). The thickness of the stainless steel is 0.6 mm for the fixed part and 0.4 mm for the sliding part. The clips have three 5.4 mm diameter holes for fixing.

Figure 4 Fixed clip and sliding clip



1.15 Galvanized steel fastening screws are used for attaching the fixed or sliding clips to the galvanized steel plates, and are 4.2 mm in diameter and 25 mm in length.

2 Manufacture

2.1 The zinc material is refined and manufactured by hot rolling into sheet and coil form.

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

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

3 Delivery and site handling

3.1 The VMZINC panels must be transported and stored vertically by resting on the L profile in specially designed containers in dry conditions at a constant temperature.

3.2 The panels weigh $5.8 \text{ kg}\cdot\text{m}^{-2}$. Care is required when handling long lengths of panels, particularly at height.

3.3 Any damage to components before or during installation will affect the durability of the roof system.

3.4 Insulation boards are delivered to site on pallets in polyethylene wrapping. For long-term protection these must be stored indoors or under a waterproof covering. The insulation must be dry during installation.

3.5 Steel or timber deck elements should be handled in accordance with the recommendations of their suppliers.

3.6 Protective clothing should be worn as required and all relevant health and safety regulations should be observed.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the VMZINC Standing Seam Compact Roof System.

Design Considerations

4 Use

4.1 The VMZINC Standing Seam Compact Roof System is satisfactory for use as structural roofing in flat, curved or pitched installations with a finished fall between 3 and 60° in buildings with an internal humidity class 1 to 5, where access is available for maintenance and repair only.

4.2 If architectural features such as fittings or rooflights are required on the roof, special care and attention is necessary to ensure that, in common with all metal roofs, they have been correctly detailed and fitted. Openings to such details are outside the scope of this Certificate.

4.3 When used in accordance with this Certificate, the system is weathertight and structurally stable.

5 Practicability of installation

The system is designed to be installed by a competent roofing contractor, experienced with this type of system, in accordance with the Certificate holder's installation manual.

6 Structural performance



6.1 The structural design must be carried out by a suitably qualified structural engineer.

6.2 Structural steel decks should be designed in accordance with BS EN 1993-1-1 : 2005 together with its UK National Annex.

6.3 Structural timber decks should be designed in accordance with BS EN 1995-1-1 : 2004 and its UK National Annex. BS 8103-3 : 2009 should also be considered.

6.4 Structural concrete decks should be designed in accordance with BS EN 1992-1-1 : 2004 and its UK National Annex.

6.5 When evaluating design loads, the wind actions must be calculated in accordance with the recommendations of BS EN 1991-1-4 : 2005 and BS EN 1991-1-1 : 2002 and their UK National Annexes, and the imposed snow loads must be checked in accordance with recommendations of BS EN 1991-1-3 : 2003 and its UK National Annex. The design engineer must ensure the deck is suitable for the expected loadings.

6.6 The system can accommodate the thermal insulation that supports it to withstand impacts associated with normal handling, installation and services provided they are installed in accordance with the Certificate holder's installation manual.

6.7 The distance between fixings must be designed on a project-specific basis, taking into account the connection resistance between the panels and the fixing clips and the pull-out resistance from the substrate (see section 6.8). The bond strength between the thermal insulation and the structural deck should also be considered (see section 6.9). Wind actions should be determined in accordance with BS EN 1991-1-4 : 2005 and its UK National Annex. Attention should be paid to increased pressure coefficients at edges and corners.

6.8 The design resistances against wind actions for the connections of the VMZINC panels are shown in Table 2. The values given consider the connection resistance between the panel and fixing clips, as well as the connection resistance between the fixing clips and galvanized steel plates and between the galvanized steel plates and thermal insulation.

Table 2 Design resistance against the wind action of the connections of the 430 mm wide VMZINC panels

	Distance between fixing (mm) ⁽¹⁾				
	150	165	250	330	500
Wind action resistance (kN·m ⁻²) ⁽²⁾	6.9	6.3	4.1	3.1	2.0

(1) Distance measured perpendicular to the eaves.

(2) Each connection can resist a wind action of 0.45 kN with a partial factor of 2 for the panels.

6.9 The design bond strength between the insulation and a steel deck substrate is 4.3 kN·m⁻².

6.10 In the structural design, the maximum mid-span deflection of the roof should be limited to

- L/90 (permanent actions, plus variable actions)
- L/240 (permanent actions, plus variable actions) for steel decks
- L/300 (permanent actions, plus variable actions) for aluminium decks
- L/500 (permanent actions), where L is the width of the VMZINC panel.

7 Weathertightness



7.1 When installed in accordance with the Certificate holder's instructions and this Certificate, the system is weathertight when used on roofs with finished falls of 3 to 60°. For curved roofs, the minimum fall at the ridge must be at least 3° over the first metre.

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

8 Thermal performance



8.1 Calculations of the thermal transmittance (U-value) of the system should be carried out in accordance with BS EN ISO 6946 : 2017 and BRE Report BR 443 : 2006, on a project-specific basis.

8.2 Declared design thermal conductivity (λ_o) for the Foamglas Readyboard T4+ can be taken as 0.041 W·m⁻¹·K⁻¹⁽¹⁾. Thermal conductivity design values for other roof components can be taken from BS EN ISO 10456 : 2007.

(1) Based on $\lambda_{90/90}$ values.

8.3 Typical U values of the roof structure are shown in Table 3.

Table 3 Typical U values of the roof structure

Insulation thickness (mm)	U value (W·m ⁻² ·K ⁻¹)		
	Steel deck ⁽¹⁾	Timber deck ⁽¹⁾	Concrete deck ⁽¹⁾
160	0.25	0.24	0.24
180	0.22	0.22	0.22

(1) 150 mm reinforced concrete slab, 15 mm timber deck, 1.5 mm steel deck and 4.2 mm stainless steel fixing screws.

Junctions

8.4 Care must be taken in the overall design and construction of junctions with other elements and openings to minimise thermal bridges and air infiltration. Detailed guidance can be found in the documents supporting the national Building Regulations.

9 Condensation



9.1 In common with all metal roof constructions, there is a risk of condensation. This can arise either as surface condensation at thermal bridges or interstitial condensation within the roof construction.

Surface condensation



9.2 The temperature at which surface condensation will occur on the internal surfaces of the roof is dependent on the internal relative humidity and the internal and external temperatures.

9.3 The risk of surface condensation and mould growth for a particular construction should be assessed in accordance with BS EN ISO 13788 : 2012. Temperature factors should not be less than the critical values given in BRE Information Paper IP 1/06, Tables 1 and 2. Additional guidance in connection with this can be found in BS 5250 : 2011 and the MCRMA/EPIC publication *Design guide for Metal Roofing and Cladding to comply with energy requirements of UK Building Regulations*.

Interstitial condensation



9.4 The system has been assessed in accordance with BS 6229 : 2018, BS EN ISO 13788: 2012 and BS 5250 : 2011 for the risk of damage to the building due to interstitial condensation. Under normal climatic conditions experienced in the UK, interstitial condensation is unlikely to be a significant problem for building internal humidity classes 1 to 5, providing the joints between the insulation boards are fully sealed.

9.5 The risk of interstitial condensation should be established in accordance with BS 5250 : 2011 and BS 6229 : 2018 using the system properties in Table 4 of this Certificate and a water vapour resistivity of $40,000 \text{ MN}\cdot\text{s}\cdot\text{g}^{-1}\cdot\text{m}^{-1}$ for the Foamglas Readyboard T4+.

Table 4 Water vapour diffusion resistance properties

Layer	Standing Seam centres (mm)	Resistance (MN.s/g)	Equivalent air layer thickness s_d (m)
VMZINC Panel	600	787	157
VMZINC Panel	430	564	113
3 mm thick polyester reinforced bituminous membrane	n/a	750	150
0.25 separating layer of polyethylene or polyester	n/a	500 or 300	100 or 60

10 Air permeability



10.1 The airtightness of the system is reliant on the joints of the upper bituminous membrane and the joints between the thermal insulation board. The airtightness of a roof system is dependent on maintaining the integrity of the seal throughout. In addition to sealing at all joints, the bituminous membrane and the thermal insulation boards must be suitably sealed at the perimeter and all penetrations. Details of sealing at all laps, eaves, ridges, hips, valleys and penetrations must be in accordance with the Certificate holder's instructions.

10.2 The airtightness of the building will also be dependent on the performance of other building elements. Provided these incorporate appropriate design details and building techniques, air infiltration through the building fabric should be minimal and the building reasonably airtight.

10.3 A proportion of completed buildings are subject to pre-completion testing for airtightness in accordance with the requirements of documents supporting the relevant national Building Regulations.

11 Behaviour in relation to fire



11.1 The Certificate holder has not declared a resistance to external fire exposure to BS EN 13501-5 : 2016 or BS 476-3 : 2004 for the system.



11.2 In Wales and Northern Ireland, designers may refer to the relevant documents supporting the national Building Regulations for certain roof specifications that can achieve a notional B_{ROOF} (t4) designation without testing and are consequently unrestricted.



11.3 This designation of a roof system can be affected by components other than the roof, eg insulation materials, substrates/decking and membranes. This construction should therefore be evaluated by reference to the requirements of the documents supporting the relevant national Building Regulations and any consequent restrictions imposed by those documents, on a case-by-case basis. In the absence of a designation, the system should not be used within 20 metres of a boundary (24 metres in Scotland).

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

12 Acoustics performance

Test data to BS EN ISO 717-1 : 2013 indicating the sound reduction indices, is given in Table 5. The tests were carried out on roof structures with a 0.75 mm steel deck.

Table 5 Sound reduction indices (indicative values)

Foamglas Readyboard thickness (mm)	Sound reduction index R_w (dB) (C ; C _{tr})
80	37 (-2 ; -7)
120 ⁽¹⁾	38 (-2 ; -8)

(1) Two insulation boards (60 mm thickness) combined.

13 Maintenance and repair



13.1 The system should be inspected regularly for accidental damage to the roof sheets and also for any build-up of dirt and debris. Damage must be repaired, and accumulated dirt and debris removed. The frequency of inspections will depend on the environment and use of the building.

13.2 In industrial and coastal areas, it may be necessary to periodically clean the installation by hosing with water and a neutral detergent to restore its appearance and to remove corrosive deposits. It may be necessary to clean soffits in all environments.

13.3 Damaged sheets must be removed and replaced. The advice of the Certificate holder should be sought.

14 Durability



14.1 The durability of VMZINC panels will depend upon the coating material, the immediate environment, aspect faced and use. Roofing constructed with the zinc sheets will have a service life of 100 years in rural and urban environments. A shorter service life will be given if particular local conditions are chemically corrosive, eg in the immediate vicinity and downwind of coastal areas, manufacturing facilities such as chemical works, cement works, copper foundries or coal mines.

14.2 Contact of the VMZINC panels with metals such as copper, unprotected or ungalvanized steel and natural lead must be prevented. Direct contact with products such as fresh concrete, plaster, bitumen or mortar should also be avoided.

14.3 In common with natural zinc, the appearance of the product will change with time due to weathering of the surface, as the zinc forms a mixture of adherent conversion products. The rate and nature of change will depend on the product chosen, environment of the site, the roof pitch and the climatic conditions experienced, but the appearance should remain consistent over any one elevation.

15 Reuse and recyclability

The system component is made of zinc, which can be 100% recyclable. However, detailed advice should be sought from the Certificate holder when considering reuse.

Installation

16 General

16.1 Installation of the VMZINC Standing Seam Compact Roof System is carried out by competent roofing contractors experienced with this type of system, in accordance with the Certificate holder's instructions manual. Guidance can be provided by the Certificate holder for contractors who are unfamiliar with the system. Typical build-up details can be seen in Figure 5.

Support structures

16.2 The steel deck support structure must be installed in accordance with the supplier's recommendations.

16.3 For curved roofs, information on the minimum allowed radius should be sought from the steel deck supplier.

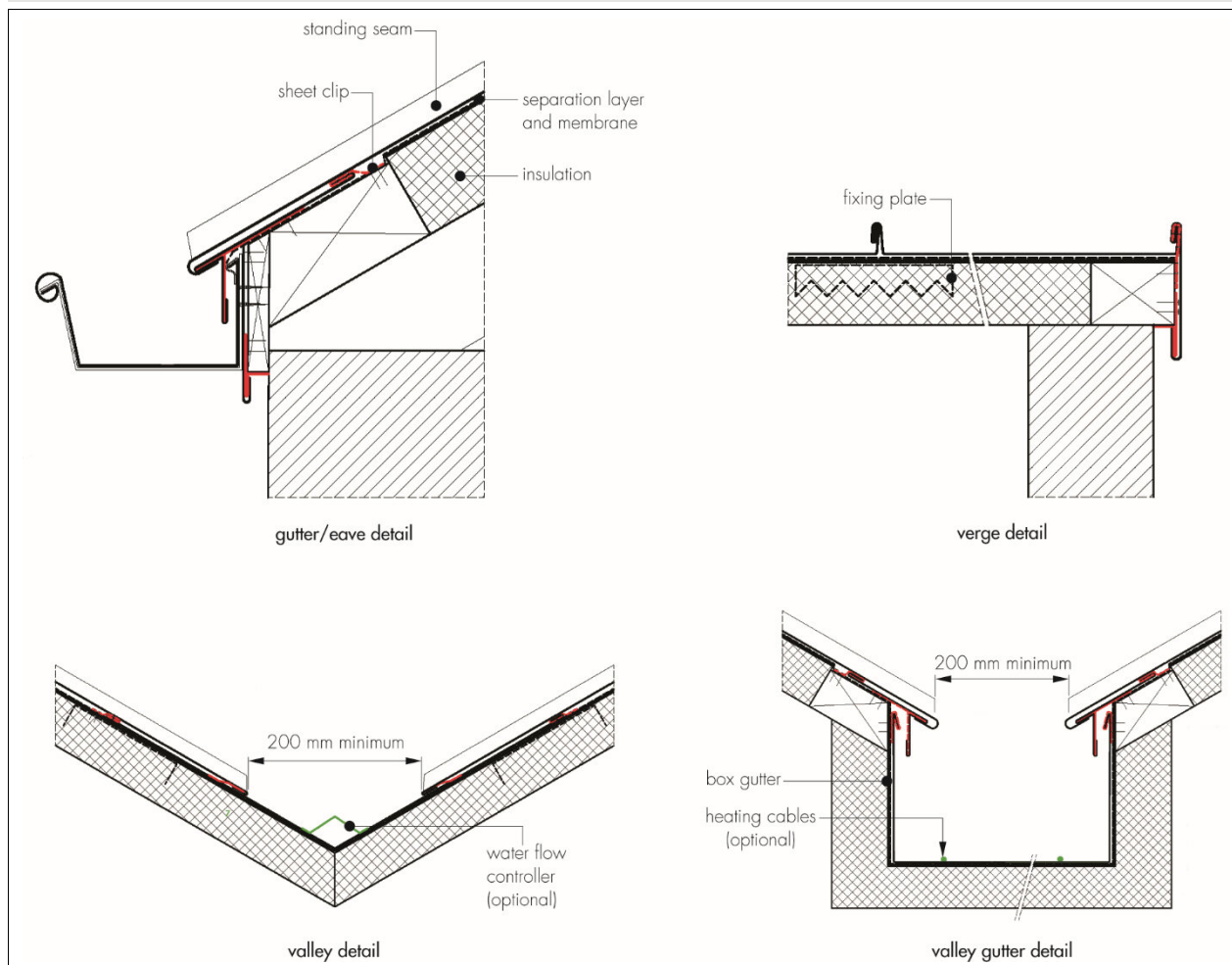
16.4 Timber decks constructed from solid softwood boards can be tongue-and-groove or the boards can be laid with a gap of 3 to 5 mm. For curved roofs, the radius of the roof must be greater than 250 times the board thickness.

16.5 Wood-based panels can be either tongue-and-groove or square edged. Movement gaps at abutments with rigid upstands should be not less than 10 mm and gaps between square edge boards should not exceed 3 mm. For curved roofs, information on the minimum allowed radius should be sought from the wood-based panel supplier.

16.6 The difference in level between solid softwood boards or wood-based panels should not exceed 2 mm at joints.

16.7 All substrates must be clean and dry, in order to provide an adequate bond to the thermal insulation boards.

Figure 5 Typical installation details



17 Procedure

17.1 For steel decks, a C-profile metal flashing is attached to the substrate at the eaves. For timber and concrete decks, a C-profile metal flashing or timber batten in a depth equivalent to the thermal insulation is used.

17.2 For steel decks, two strips of PC11 cold adhesive are applied on the crown of the trapezoidal sheets. For timber and concrete decks, PC11 cold adhesive strips at centres of 150 mm are applied. Each strip should be 20 mm wide and 3 mm thick, to achieve a rate of $0.6 \text{ kg} \cdot \text{m}^{-2}$.

17.3 The insulation boards are laid and bonded (using glue) to the deck with staggered joints. In buildings with humidity class 4 or 5, a strip of PC11 cold adhesive is used to seal the joints between the insulation boards to ensure a vapour-tight layer. Joints at parameters and penetrations must also be sealed with PC11. The difference in level between the insulation boards should not exceed 5 mm at joints.

17.4 For curved roofs, the thermal insulation boards can be cut to the right length using the formula⁽¹⁾:

$$L = 0.003 \times \frac{R}{T}$$

where:

L = length of the board

T = thickness of board

R = radius of curve.

(1) All units in metres.

17.5 Galvanized steel plates are pressed into the thermal insulation and bonded to the melted top surface of the Foamglas Readyboard T4+ using a gas torch. The frequency and layout of the plates is subject to structural design and depends on the wind uplift forces.

17.6 A minimum 3 mm thick polyester reinforced bituminous membrane is torch-applied on the entire roof surface with a minimum overlap of 25 mm in both directions.

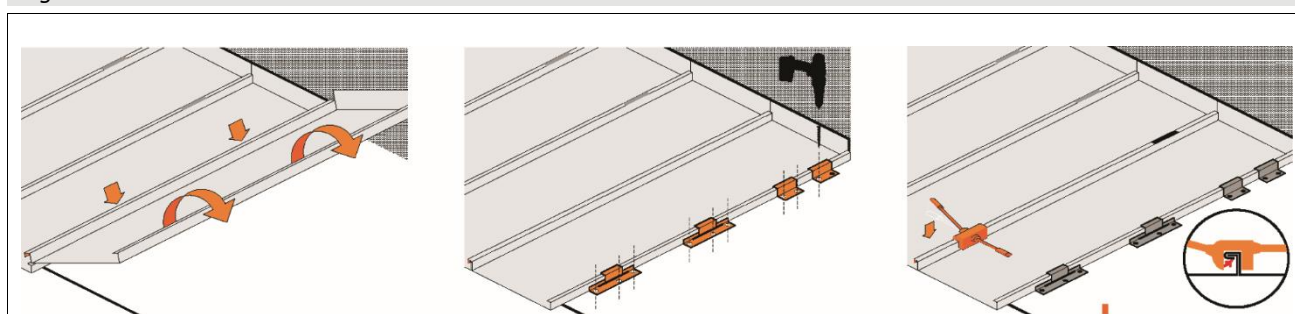
17.7 A separating layer of polyethylene or polyester is laid on the top of the bituminous membrane.

17.8 Sliding or fixed clips are attached to each galvanized steel plate with fastening screws.

17.9 Installation of the panels (see Figure 5) can begin on either side of the roof. Dormers, chimneys or other obstacles should be taken into account when deciding the layout.

17.10 The joints between the panels must be sealed using a double lock seam. Crimping can be done using an electric or hand crimper. Crimping is not recommended when the zinc temperature is below 7°C unless the crimper is equipped with a heater.

Figure 6 Seam detail



Technical Investigations

18 Tests

18.1 Tests were carried out and the results assessed to determine:

- acoustic performance
- resistance to water vapour diffusion through standing seams.

18.2 An assessment was made of data relating to:

- resistance to wind load
- weathertightness
- thermal performance
- condensation risk
- air permeability
- behaviour in relation to fire
- durability.

18.3 Calculations were carried out to determine:

- typical U values in accordance with BS EN ISO 6946 : 2017
- risk of interstitial condensation in accordance with BS EN ISO 13788 : 2012 and BS 5250 : 2011.

19 Investigations

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

19.2 A visit was made to a site to assess the practicability of installation.

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