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BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

Agrément Certificate
96/3262
Product Sheet 2

SPEEDDECK BUILDING SYSTEMS LIMITED SECRET-FIX ROOF SYSTEMS

SPEEDZIP DOUBLE-SKIN ROOF SYSTEMS

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to SpeedZip Double-Skin Roof Systems, comprising profiled coated or uncoated aluminium alloy, aluminium halter brackets, internal perforated or unperforated walkable profiled coated steel liners with insulation, vapour control layers and accessories for fixing to substructures.

AGRÉMENT 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 sheets and components have adequate strength to resist the loads associated with installation and loading (see section 5).

Condensation risk — the risk of interstitial condensation will be minimal when the sheets are correctly jointed and sealed to each other and to abutting building elements (see section 6).

Thermal insulation — the systems contribute to the overall thermal performance of the roof construction (see section 7).

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

Durability — depending upon the type of external finishes applied the sheets should have a lifetime of at least 60 years (see section 13).

The BBA has awarded this Agrément Certificate to the company named above for the systems described herein. These systems have been assessed by the BBA as being fit for there intended use provided they are installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 27 October 2008
Originally certificated on 22 July 1996

Brian Chamberlain
Head of Approvals — Engineering

Greg Cooper
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.

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Regulations

In the opinion of the BBA, SpeedZip Double-Skin Roof Systems, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations:

The Building Regulations 2000 (as amended) (England and Wales)

Requirement:	A1	Loading
Comment:		The systems have sufficient strength and stiffness to sustain and transmit the design load in accordance with sections 5.1 to 5.3 of this Certificate.
Requirement:	B2(1)	Internal fire spread (linings)
Comment:		The exposed surfaces (seen from inside the building) of the systems have been assessed as having the surface rating class given in section 10 of this Certificate.
Requirement:	B4(2)	External fire spread
Comment:		The external surface of the sheets can be taken to have a notional AA designation when tested in accordance with BS 476-3 : 2004 and, therefore, is not subject to the limitations of a minimum distance from any point on a boundary. See section 10 of this Certificate.
Requirement:	C2	Resistance to moisture
Comment:		When subjected to the maximum design load given in this Certificate, the systems will resist passage of moisture to the inside of the building. See sections 6.1 to 6.6 of this Certificate.
Requirement:	F2	Condensation in roofs
Comment:		A roof construction incorporating these systems can be designed to satisfy this requirement. See sections 6.1 to 6.6 of this Certificate
Requirement:	L1	Conservation of fuel and power
Comment:		The thermal transmittance (U value) of the roof system is dependent on the performances (thermal conductivity) and the thickness of the insulation and the purlin and bracket spacing used. Example U values are given in sections 7.1 and 7.2 of this Certificate. Provided the U value is equal to or less than the relevant Standard U value, given in Approved Documents L1 and L2, Table 1, the Elemental Method of showing compliance can be used. Alternatively, the example Standard U values can be used when a 'trade-off' between construction elements is used or with the Target U value or Carbon Index methods or with the Whole-building or Carbon Emissions Calculation Methods. The system also limits extraneous air paths as far as is reasonably practical and, therefore, will contribute to the building complying with these Requirements. See sections 7.1 and 7.2 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The systems are acceptable. See sections 13.1 to 13.6 and the *Installation* part of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Fitness and durability of materials and workmanship
Comment:		The systems can contribute to a construction satisfying this Regulation. See sections 12.1 to 12.3, 13.1 to 13.6 and the Installation part of this Certificate
Regulation:	9	Building Standards – construction
Standard:	1.1(a)(b)	Structure
Comment:		The systems have sufficient strength and stiffness to transmit the design load, with reference to clause 1.1.1[(1)(2)], in accordance with sections 5.1 to 5.3 of this Certificate.
Standard:	2.5	Internal linings
Comment:		The exposed surfaces (seen from the inside of the building) of the system, with reference to clause 2.5.1[(1)(2)], have been assessed as having the risk classification given in section 10 of this Certificate.
Standard:	2.8	Spread from neighbouring buildings
Comment:		The sheets have an low vulnerability classification and satisfy this Standard, with reference to clause 2.8.1[(1)(2)]. See section 10 of this Certificate.
Standard:	3.10	Precipitation
Comment:		When subjected to the maximum design load given in this Certificate, the systems will resist the passage of moisture to the inside of the building, with reference to clause 3.10.1[(1)(2)]. See sections 6.1 to 6.6 of this Certificate.
Standard:	3.15	Condensation
Comment:		The systems will have a minimal risk of surface condensation or of damage due to interstitial condensation, with reference to clauses 3.15.1[(1)], 3.15.2[(1)], 3.15.3[(1)] and 3.15.4[(1)]. See sections 6.1 to 6.6 of this Certificate.

Standard:	6.2	Building insulation envelope
Comment:		With regard to clause 6.0.4[1][2], the calculated example thermal transmittance (U values) of the roof system given in sections 7.1 and 7.2 of this Certificate may be used. Roofs with a U value equal to, or less than, the maximum U value shown in clause 6.2.1[1][2], Table 1, will satisfy the Elemental Method of compliance. Alternatively, the example U values can be used to satisfy the alternative methods of compliance described in clauses 6.2.2[1][2] and 6.2.3[1][2]. Details around any openings in the roof and at junctions between the roof and other elements must satisfy clause 6.2.4[1][2]. The system limits extraneous air paths as far as is reasonably practical and the roof, therefore, will contribute to the building satisfying clause 6.2.5[1][2]. See sections 7.1 and 7.2 of this Certificate. (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).

The Building Regulations (Northern Ireland) 2000 (as amended)

Regulation:	B2	Fitness of materials and workmanship
Comment:		The systems are acceptable. See sections 13.1 to 13.6 and the *Installation* part of this Certificate
Regulation:	B3(2)	Suitability of certain materials
Comment:		The systems are acceptable. See sections 12.1 to 12.3 of this Certificate.
Regulation:	C4	Resistance to ground moisture and weather
Comment:		When subjected to the maximum design load given in this Certificate, the systems will resist the passage of moisture to the inside of the building. See sections 6.1 to 6.6 of this Certificate.
Regulation:	C5	Condensation
Comment:		The risk of harmful effects on the building due to interstitial condensation within the system will be minimal. See sections 6.1 to 6.6 of this Certificate
Regulation:	D1	Stability
Comment:		The systems have sufficient strength and stiffness to sustain and transmit the design load in accordance with sections 5.1 to 5.3 of this Certificate.
Regulation:	E3	Internal fire spread – Linings
Regulation:	E4	Internal fire spread – Structure
Comment:		The exposed surfaces (seen from the inside of the building) of the system have been assessed as having the class surface as given in section 10 of this Certificate.
Regulation:	E5	External fire spread
Comment:		The external surface of the sheets can be taken to have a notional AA designation as defined by BS 476-3 : 1958 and, therefore, is not subject to the limitation of a minimum distance from any point on a boundary. See section 10 of this Certificate.
Regulation:	F2	Conservation measures
Comment:		The thermal transmittance (U value) of the roof system is dependent on the purlin spacing used. Example U values are given in sections 7.1 and 7.2 of this Certificate. Provided the U value is equal to or less than the relevant Maximum U value given in Technical Booklet F, Table 1.2 or 1.4, an Elemental Method of showing compliance can be used. Alternatively, the example U values can be used with the Target U value Method or Calculation Method or Energy Use Method. The system also limits extraneous air paths as far as is reasonably practical and, therefore, will contribute to the building complying with this Regulation. See sections 7.1 and 7.2 of this Certificate.

Construction (Design and Management) Regulations 2008
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: 2 *Delivery and site handling* (2.1 and 2.2) and *Installation* (General) (14.2 and 14.4)

Non-regulatory Information

NHBC Standards 2008

NHBC accepts the use of SpeedZip Double Skin Roof Systems, when installed and used in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 7 *Roofs*.

Zurich Building Guarantee Technical Manual 2007

In the opinion of the BBA, SpeedZip Double Skin Roof Systems, when installed and used in accordance with this Certificate, satisfies the requirements of the *Zurich Building Guarantee Technical Manual*, Section 4 *Superstructure, Sub-section Flat roofs/pitched roofs*.

General

This Certificate relates to SpeedZip Double Skin Roof Systems, comprising profiled coated or uncoated aluminium alloy, aluminium halter brackets, internal perforated or unperforated walkable profiled coated steel liners with insulation, vapour control layers and accessories for fixing to substructures.

The systems are suitable for buildings used for industrial, commercial, retail and leisure purposes as well as residential and non-residential buildings such as schools and hospitals. The systems are for use as structural roofing with a minimum pitch of 1.5°, where access is available for maintenance and repair only.

The systems are weathertight and structurally stable within the limits set out in this Certificate and are intended to be fixed to steel or timber purlins and structural steel decking.

Other constructions

When used in assemblies other than those described (see section 3 *General*), the full system performances given in this Certificate cannot be assumed. The SpeedZip profile's structural and fire performances and durability, as detailed in this Certificate, will apply but the designer must be satisfied on other aspects of performance, ie thermal insulation, risk of condensation and acoustic performance.

Technical Specification

1 Description

1.1 The SpeedZip Double-Skin Roof Systems comprise a covering sheet (SpeedZip) attached to the roof substructure by halter brackets. The seams of adjacent sheets are mechanically zipped together over the halter bracket heads to secure the sheets to the support system without penetrating the covering sheet. The halter brackets are screwed to an IsoBar rail and bracket spacer system, itself screw-fixed to the substructure through the internal profiled coated steel liner sheet (WalkLiner). The void formed between the sheets is filled with glass or rock wool insulation.

1.2 The components of the system comprise:

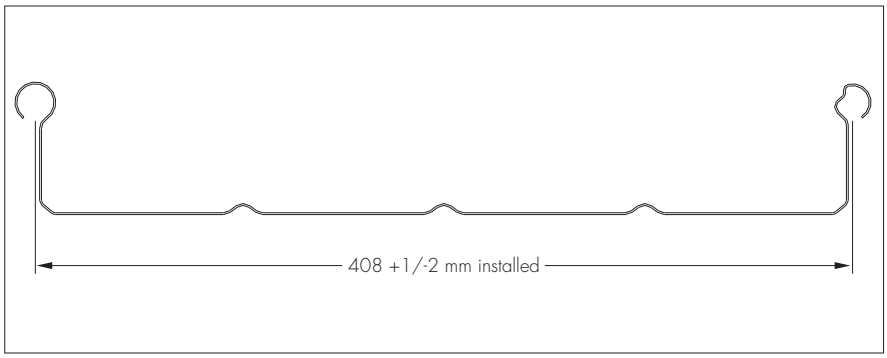
- SpeedZip profiles — formed from aluminium alloy sheet and available finished with the coatings listed in Table 1. The sheets are roll formed to the profile shown in Figure 1, in the factory or on-site, whichever is appropriate to the sheet length and site access, to the length of the roof eliminating the need for end laps

Table 1 SpeedZip profile — sheet type, coating and properties

Material specification	Coating	British Standard/BBA Certificate
0.9 mm thick(1) aluminium alloy designated EN-AW 3004 to BS EN 573-3	mill/stucco finish	BS EN 573-3
	PVF_2 coated	87/1964 (Detail Sheet 2) 93/2922 (Detail Sheet 3)
	ARS coated PRA coated	93/2922 (Detail Sheet 4) 87/1964 (Detail Sheet 3)

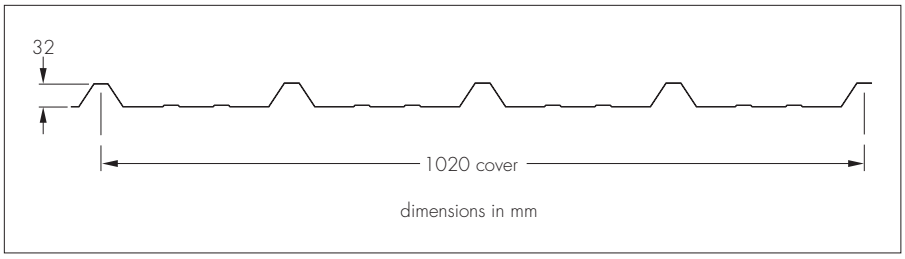
(1) The sheets are also available formed from 0.7 mm thick steel sheets, but these are outside the scope of this Certificate.

Figure 1 SpeedZip profiles



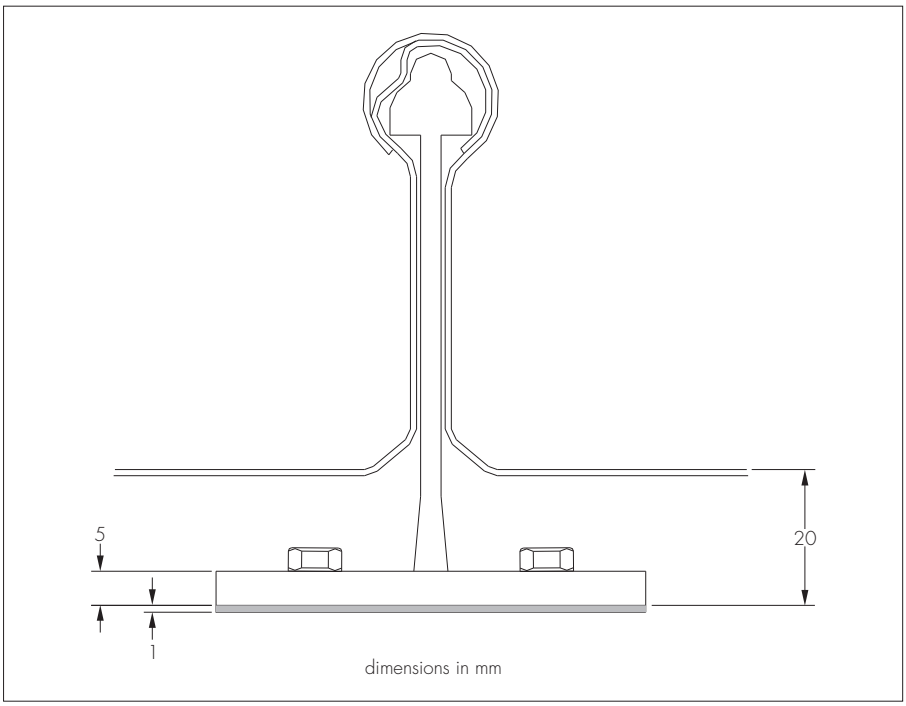
- WalkLiner sheet — roll formed to the profile shown in Figure 2 from 0.65 mm/0.7 mm thick steel to BS EN 10147 : 2000, grade Fe 220 G Z. The reverse surface is finished with a 10 µm thick polyester, and the visible external surface with a 22 µm thick white polyester

Figure 2 Typical WalkLiner profile



- Extruded aluminium halter brackets — 80 mm deep with an integral 1 mm thick EPDM isolator pad (giving an 81 mm overall depth). The base is supplied with pre-punched holes (see Figure 3)

Figure 3 Halter bracket



- IsoBar (see Figure 4) — roll-formed, high-tensile steel profiled rail with steel support brackets. The brackets are available in a range of depths, slotting into and engaging within the rail and have an integral isolator pad. The rails and brackets are formed from galvanized steel to BS EN 10147 : 2000, grade Fe PO2 G Z275. Details are given in Tables 2 and 3

Figure 4 IsoBar and support bracket

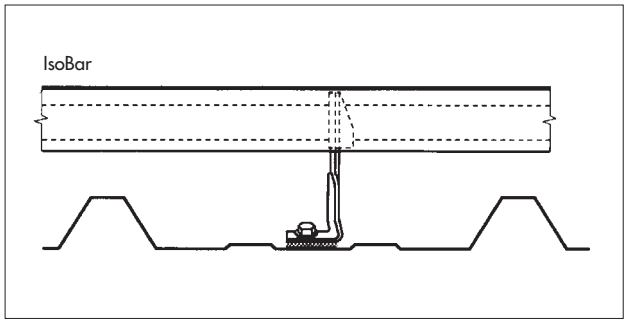


Table 2 Bracket details

	IsoBar bracket
material thickness (mm)	1.5
depth[1] (mm)	80 to 250 in increments of 10

(1) Other sizes are available.

Table 3 Rail details

	IsoBar
overall size (mm)	40 x 40
material thickness (mm)	1.25
cover length (mm)	3060
weight (kgm^{-1})	1

- WalkLiner seals — SD Seal 50 mm by 1.0 mm film/butyl over side laps, 5 mm by 6 mm butyl beads within end laps with stitching screws used at spans over 1.8 m
- insulation — non-combustible mineral wool or glassfibre in accordance with BS 476-4 : 1970, declared thermal conductivity ($\lambda_{90/90}$ *value*)[1] of 0.040 $Wm^{-1}K^{-1}$ or lower

(1) In accordance with BS EN 13162 : 2001.

- pan-perforated WalkLiner (for use with perforated WalkLiner systems) — steel 0.65 mm/0.7 mm thick to BS EN 10147 : 2000, grade Fe E 220 G Z. Coatings: reverse side — polyester 10 µm thick; exposed side — bright white polyester 22 µm thick
- SpeedDeck acoustic batts (for use in with perforated WalkLiner systems) — 193 mm by 31 mm black-tissue-faced mineral wool (rock), semi-rigid slabs (60 kgm^{-3})
- Top-hat spacer stool (for use in with perforated WalkLiner systems) — 31 mm high, 60 mm by 60 mm in 2 mm thick steel to BS EN 10147 : 2000, grade Fe E 350 G Z275. Spaced at 765 mm centres
- StramCheck vapour control layer — reinforced polyethylene membrane (minimum 250 gm^{-2}), joints lapped and sealed with 1.5 mm by 20 mm butyl strip sealant.

1.3 Accessories used with the system include:

- flashings — made to suit each individual project
- fasteners
  - halter brackets — 6.3 mm diameter self-drilling, self-tapping austenitic stainless steel screws
  - WalkLiner to purlins and IsoBar to purlins — 5.5 mm diameter self-drilling, self-tapping carbon steel screws with bonded washers
  - flashings – sealed rivets or screws of compatible material
  - 4.8 mm diameter rivet for making fixed point
- halter bracket gauging template
- gable hook
- filler blocks for ridge and eaves
- zipping tool
- gable channel 20 mm by 40 mm
- ridge dam flashing.
- gable tee
- eaves angle 20 mm by 40 mm

1.4 Other accessories that can be used with the systems but are outside the scope of this Certificate include:

- GRP rooflights
- fall arrest systems
- gutters
- walkway systems.
- gutter support brackets

1.5 Quality control checks include:

- dimensions
- coating thickness
- chemical composition
- panel dimensions.
- mechanical properties

2 Delivery and site handling

2.1 Factory produced sheets are delivered in banded bundles of 1 tonne maximum carrying a label bearing the BBA identification mark incorporating the number of this Certificate.

2.2 Coils for site rolling are delivered in rolls each bearing a label identifying the material grade thickness and paint finish, if applicable.

2.3 Bundled sheets over 13.6 m long, should be handled using lifting equipment with a spreader beam with slings set at every lifting point on the spreader beam[1] (nominally 2.5 m apart).

(1) The spreader beam is supplied by the Certificate holder.

2.4 If storing on site, the sheets or coils should be kept clear of the ground, protected from the weather, supported at 2 m intervals and stacked with a slight fall to shed rainwater. The coils should be laid on pallets or other suitable supports.

2.5 The performance of the roof system is dependent upon the integrity of the insulation and vapour control layer and/or the sealed liner system. Care must be taken to handle and store them in accordance with the recommendations:

- vapour control layers – rolls must be handled carefully to avoid puncturing and must not be stored on end. For long-term storage the rolls should be dry during installation
- glass- or rock-fibre wool quilt – should be stored indoors or under a waterproof covering and kept dry during installation.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on SpeedZip Double-Skin Roof Systems.

Design Considerations

3 General

3.1 The SpeedZip 400 Double-Skin Roof Systems are satisfactory for use as a structural roof system, for steel and timber substructures, with slopes down to 1.5°, where access is available for maintenance and repair only.

3.2 If architectural features, through fittings or rooflights are required on the roof, special care and attention is necessary to ensure that, in common with all metal roofs, these features have been correctly detailed and fitted.

3.3 The system can be fixed to steel or timber purlins. However, the design information given in this Certificate is relevant only to fixing to mild steel purlins. The adequacy of fasteners to timber purlins must be checked against the requirements of BS 5268-2 : 2002 by a chartered structural engineer or suitably qualified person. Advice from the Certificate holder should be sought to determine the type of fasteners and design data required.

4 Practicability of installation

Installation is carried out in accordance with the Certificate holder's instructions, by experienced roofing contractors. Guidance can be provided by the Certificate holder for contractors who are unfamiliar with the system.

5 Structural performance

5.1 The sheets have adequate strength and stiffness to sustain specified loads. Load/span values are given in Table 4.

5.2 When evaluating the design loads, the wind loads must be calculated in accordance with the recommendations of BS 6399-2 : 1997, and the imposed snow loads must be checked in accordance with the recommendations of BS 6399-3 : 1988.

5.3 The profiled sheets are capable of withstanding impacts associated with normal handling, installation and service.

Table 4 Loads in relation to span[1]

Load (kNm^{-2})	Span[2] (m)										
	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
Wind load	–3.33	–3.03	–2.78	–2.56	–2.38	–2.22	–2.08	–1.95	–1.85	–1.75	–1.67
UDL	2.82	2.56	2.35	2.17	2.01	1.88	1.76	1.66	1.57	1.48	1.41
Snow load	4.29	3.90	3.58	3.30	3.07	2.86	2.68	2.53	2.39	2.26	2.15

(1) The values listed are safe loads – the factors of safety used are: 1.4 for wind loads, 1.6 for imposed loads, 1.05 for snow loads and 2.0 on attachment.

(2) The values are derived assuming: spans are continuous over several supports, two stainless-steel screws are used to fix each bracket into the IsoBar rail and the deflection limit is L/90 for wind loads and L/200 for imposed loads. The installed system is classified as 'Class B non-fragile assembly' in accordance with ACR[M]001:2005.

6 Condensation risk

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

Surface condensation

6.2 The internal temperature at which surface condensation will occur on the internal surfaces of the roof is dependent on both the internal relative humidity and the external temperature. It has been shown by computer modelling that the risk of condensation occurring on the internal surfaces (including those below the thermal bridges formed by the spacer system) is negligible.

6.3 In buildings likely to experience high internal relative humidities (eg building internal humidity class 5) there is a minimal risk of intermittent condensation forming on the fixing screws penetrating the purlin. The designer should anticipate the areas of the structure that could be at risk from sustained sources of humidity and take the necessary measures to prevent any such problems (see section 6.5).

Interstitial condensation

6.4 The system has been assessed by computer modelling for the risk of damage and harmful effects on the building due to interstitial condensation. The modelling predicts that for buildings in internal humidity classes 1 to 4 (see Table 5), under the normal climatic conditions experienced in the UK, interstitial condensation is unlikely to be a significant problem and, therefore, the risk of reducing the thermal and structural performance of the roof system due to interstitial

condensation will be limited. This assessment is only valid provided the following details are carried out in accordance with the Certificate holder's instructions (see Figure 5) and this Certificate:

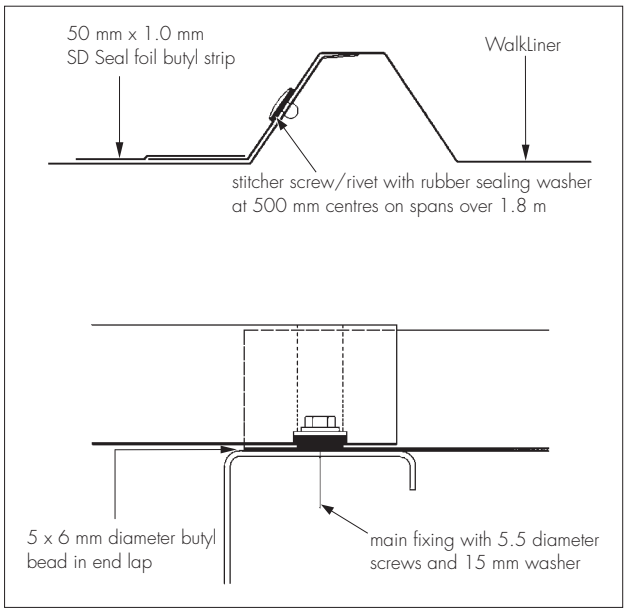
- the vapour control layer (the liner and/or StramCheck vapour control layer) remains undamaged, is continuous over ridges and hips, and is sealed at penetrations/abutments
- vapour control layer laps are adequately sealed
- for installations without the separate StramCheck vapour control layer, the liner panel laps are adequately sealed
- the ribs of the profile are ventilated by air passing along them from and to open areas at the eaves and the ridge.

Table 5 Building internal humidity classes

Humidity class	Building type[1]
1	Storage areas
2	Offices, shops
3	Dwellings with low occupancy
4	Dwellings with high occupancy, sports halls, kitchens, canteens, buildings heated with unflued gas heaters
5	Special buildings, eg laundries, breweries, swimming pools

(1) As referenced in ISO 13788 : 2001 and BS 5250 : 2002. In buildings or areas of a building with special internal design conditions, a hygrothermal assessment of the proposed roof system should be undertaken using the guidance given in BS 5250 : 2002, BS 5720 : 1979, BS 5925 : 1991 and BS 6229 : 2003, to establish whether special provisions are required.

Figure 5 WalkLiner side lap and end lap sealing details



6.5 For those conditions that apply in section 6.3, a breather membrane might be required within the roof system, and/or additional ventilation or air-conditioning within the building may be required to maintain the internal conditions within acceptable limits (see Table 5). Advice should be sought from the Certificate holder's technical department.

7 Thermal insulation

7.1 The thermal transmittance (U values) for example constructions are given in Tables 6 and 7. These have been calculated using an insulation thermal conductivity ($\lambda_{90/90}$ *value*) of 0.040 $Wm^{-1}K^{-1}$, 0.037 $Wm^{-1}K^{-1}$and 0.035 $Wm^{-1}K^{-1}$ respectively with SpeedZip 400.

Table 6 U values — unperforated WalkLiner[1]

Insulation thickness (mm)	Thermal conductivity λ ($Wm^{-1}K^{-1}$)	Spacing of purlins (centre to centre)[2] (m)								
		1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8
180	0.040	0.26	0.26	0.26	0.26	0.25	0.25	0.25	0.25	0.25
	0.037	0.24	0.24	0.24	0.24	0.24	0.23	0.23	0.23	0.23
	0.035	0.23	0.23	0.23	0.23	0.23	0.22	0.22	0.22	0.22
200	0.040	0.23	0.23	0.23	0.23	0.23	0.23	0.22	0.22	0.22
	0.037	0.22	0.22	0.22	0.21	0.21	0.21	0.21	0.21	0.21
	0.035	0.21	0.21	0.20	0.20	0.20	0.20	0.20	0.20	0.20
220	0.040	0.21	0.21	0.21	0.21	0.21	0.20	0.20	0.20	0.20
	0.037	0.20	0.20	0.19	0.19	0.19	0.19	0.19	0.19	0.19
	0.035	0.19	0.19	0.18	0.18	0.18	0.18	0.18	0.18	0.18
240	0.040	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.18	0.18
	0.037	0.18	0.18	0.18	0.18	0.17	0.17	0.17	0.17	0.17
	0.035	0.17	0.17	0.17	0.17	0.17	0.16	0.16	0.16	0.16
270	0.040	0.17	0.17	0.17	0.17	0.17	0.16	0.16	0.16	0.16
	0.037	0.16	0.16	0.16	0.16	0.15	0.15	0.15	0.15	0.15
	0.035	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.14	0.14
	0.032	0.14	0.14	0.14	0.14	0.14	0.13	0.13	0.13	0.13
300[3]	0.040	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
	0.037	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
	0.035	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.13	0.13

(1) The U values are calculated in accordance with BS EN ISO 10211-2 : 2001 and are based upon a double-skin system made up of 32 mm deep WalkLiner, IsoBar bracket and rail system and the λ values for rock or glass-fibre insulation. A change to any of these components will change the U value achieved.

(2) IsoBar brackets at maximum 765 mm centres.

(3) With top-hat spacers.

Table 7 U values — perforated WalkLiner[1]

Insulation + acoustic batt thickness (mm)	Thermal conductivity λ ($Wm^{-1}K^{-1}$)	Spacing of purlins (centre to centre)[2] (m)								
		1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8
150 + 30	0.040	0.27	0.26	0.26	0.26	0.26	0.25	0.25	0.25	0.25
	0.037	0.25	0.25	0.25	0.24	0.24	0.24	0.24	0.24	0.23
	0.035	0.24	0.24	0.23	0.23	0.23	0.23	0.23	0.23	0.22
180 + 30	0.040	0.23	0.22	0.22	0.22	0.22	0.22	0.21	0.21	0.21
	0.037	0.21	0.21	0.21	0.21	0.20	0.20	0.20	0.20	0.20
	0.035	0.20	0.20	0.20	0.20	0.20	0.19	0.19	0.19	0.19
200 + 30	0.040	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.19	0.19
	0.037	0.19	0.19	0.19	0.19	0.19	0.18	0.18	0.18	0.18
	0.035	0.18	0.18	0.18	0.18	0.18	0.18	0.17	0.17	0.17
220 + 30	0.040	0.19	0.19	0.18	0.18	0.18	0.18	0.18	0.18	0.18
	0.037	0.18	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
	0.035	0.17	0.17	0.16	0.16	0.16	0.16	0.16	0.16	0.16
250 + 30	0.040	0.17	0.17	0.16	0.16	0.16	0.16	0.16	0.16	0.16
	0.037	0.16	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
	0.035	0.15	0.15	0.15	0.15	0.14	0.14	0.14	0.14	0.14
270 + 30	0.040	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
	0.037	0.15	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
	0.035	0.14	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.13

(1) The U values are calculated in accordance with BS EN ISO 10211-2 : 2001 and are based upon a double-skin system made up of 32 mm deep WalkLiner, IsoBar bracket and rail system and the λ values for rock or glass-fibre insulation. A change to any of these components will change the U value achieved.

(2) IsoBar brackets at maximum 765 mm centres.

7.2 Thermal bridging at the junctions of the system and the external wall and around openings such as rooflights must be limited. The performance of the junction will be dependent on building elements not covered by this Certificate and a suitable assessment of all junction details should be carried out.

8 Air leakage

8.1 The airtightness of the system is reliant on the careful sealing of the liner or vapour control layer. The airtightness of a roof system is dependent on maintaining the integrity of seal throughout. In addition to sealing at all joints, the liner or vapour control layer must be suitably sealed at the perimeter and all penetrations. Details of sealing at eaves, ridges, hips, valleys and penetrations must be in accordance with the Certificate holder's instructions and this Certificate.

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

8.3 For non-domestic buildings of 1000 m^2 gross floor area or more, air leakage tests in accordance with CIBSE TM 23 : 2000[1] should be carried out to confirm an acceptable airtightness.

(1) CIBSE TM 23 : 2000 *Testing buildings for air leakage.*

9 Weathertightness

9.1 When installed in accordance with the Certificate holder's instructions, the system is weathertight when used on roofs with finished fall down to 1.5° and within exposure conditions related to recommended maximum design wind pressures.

9.2 The weathertightness of the product will not be adversely affected by normal service deflections.

10 Performance in relation to fire

The sheets have a notional AA designation as defined by BS 476-3 : 1958 provided the blanket insulation installed has a 'noncombustible' classification when tested in accordance with BS 476-4 : 1970.

The Certificate holder has LPCB approval number 738a/02 for certain SpeedZip systems. The certification is outside the scope of this certificate and details should be sought from the Certificate holder.

Table 8 Calculated results for sound insulation

Insulation	Nominal insulation density (kgm^{-3})	Insulation thickness (mm)	Weighted sound reduction index R_w (dB)
rock fibre quilt	23	180	44.8
rock fibre quilt	23	200	45.4
rock fibre quilt	23	220	46.0
glass quilt	12	180	43.8
glass quilt	12	200	44.4
glass quilt	12	220	44.8

11 Acoustic performance

11.1 Where sound insulation properties are required, the guidance given in BS 8233 : 1999 should be followed. Particular care should be taken to ensure that the roof construction is properly sealed at wall junctions.

11.2 The results of computer modelling and testing sound insulation of 0.9 mm aluminium SpeedZip Double-Skin systems with unperforated WalkLiner are shown in Table 8.

11.3 SpeedZip roof designs incorporating rooflights will have sound insulation properties especially dependent on the sound insulation performance of the rooflights.

11.4 Tested sound absorption values to ISO 354 : 1985 and BS 3638 : 1987 for constructions with perforated WalkLiner are available from the Certificate holder.

12 Maintenance

12.1 The system should be inspected regularly (at least once a year) for accidental damage to the roof sheets and their coatings, 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.

12.2 In industrial and coastal areas it may be necessary to clean the installation periodically 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 any environment.

12.3 Damaged sheets can be removed and replaced. The Certificate holder should be contacted for details.

13 Durability

13.1 The durability of SpeedZip sheets will depend upon the coating material, the immediate environment, aspect faced and use. Colour changes will be slight and uniform on any one elevation. Over time, uncoated aluminium will develop a patina which may not be even. Aluminium is a natural material and develops a protective oxidised surface which gives it a very long durability. The colour and consistency of the oxidised surface cannot be guaranteed. If appearance is of prime importance, the designer should consider one of the pre-painted aluminium finishes available.

13.2 Maintenance painting may be necessary to restore the appearance of coated sheets, or to extend their design life and should be considered at the intervals described in Table 9.

13.3 For coated SpeedZip sheets, if the building has an exposed eaves detail and is in an aggressive environment, or if there are corrosive conditions inside, a more durable specification of the reverse-side coating should be used. Details can be obtained from the manufacturer.

13.4 SpeedZip sheets are supplied in continuous lengths from ridge to eaves or eaves to eaves. End laps and their risk of leakage and corrosion are neither possible nor permissible.

13.5 A planned maintenance cycle (see section 12) should be introduced if any extended design life is required. The manufacturer can recommend a suitable system for maintenance painting. In addition, specific requirements apply to mill- and stucco-finished uncoated aluminium (see section 13.6).

13.6 Mill- and stucco-finished uncoated aluminium sheets must not come into contact with the materials listed. Where problems of incompatibility are likely to occur, barriers (eg paints, bimetallic separating tapes or pads, appropriate to the materials and environment) should be incorporated:

in any conditions

- ungalvanized mild steel
- brass
- copper and its alloys
- timber treated with fire retardants
- mortar
- alkali-bearing materials

in damp conditions

- timber preserved with copper or fluoride compounds
- other metals (ie bimetallic contact)

in marine environments

- lead
- stainless steel

in industrial environments

- lead.

Table 9 Service life

Sheet material	Minimum service life (years)	
	Environment	
	Rural or suburban	Industrial or marine
Plain stucco mill aluminium	40	25
PVdF coated aluminium alloy(1)	30	20
Polyurethane coated aluminium alloy(1)	20	15

(1) Full details of durability are given in Agrément Certificate 87/1964, Detail Sheets 2 and 3 and Certificate 93/2922 Detail Sheets 3 and 4.

Installation

14 General

14.1 Installation of the SpeedZip 400 Roof Systems is carried out in accordance with the Certificate holder's instructions, by experienced roofing contractors. Guidance can be provided by the Certificate holder for contractors who are unfamiliar with the system.

14.2 The SpeedZip aluminium external sheet should be treated with care. Protective boarding should be used in any area where work is carried out. Regular access areas should be protected by boarding.

14.3 Locating and setting out halter brackets should be in strict accordance with Certificate holder's specified tolerances to allow free movement and avoid damage being caused to roof sheets through thermal movement.

14.4 Roof surfaces can be slippery when wet and the designer, contractors and others should consider these characteristics when they prepare the Health and Safety Plan for the contract.

14.5 To maintain the appearance of all SpeedZip materials only the ribs should be walked on.

15 Installation

Roof liner and spacer system

15.1 The WalkLiner panels are positioned to a gauge of 1020 ± 4 mm, with all joints lapped, and fixed to the roof purlins with 5.5 mm diameter self-drilling and self-tapping screws plus 15 mm diameter bonded washers in every pan. Air seal solid filler blocks (50 mm) are located beneath the profile at details (such as eaves, ridges, hips and valleys) and secured in place by at least two screws per pan. The panels are sealed at side laps and junctions with 50 mm wide SDSeal and with 5 mm by 6 mm butyl bead at end laps. At spans over 1.8 m, the panel side laps are riveted or screw stitched. Any swarf or debris is removed from the panels as work proceeds and before the installation is covered with StramCheck Vapour Control Layer, where required, laid with the slope and made continuous by lapping all joints by a minimum 75 mm and sealing with 1.5 mm by 20 mm butyl strip sealant. The vapour control layer should be continuous over ridges/hips and sealed to penetrations/abutments. For preference, the vapour control layer should drain (externally) at eaves. The vapour control layer should drape into the liner profile. If the vapour control layer is pulled taut over the liner ribs, 30 mm must be added to the depth of the IsoBar brackets to maintain the insulation zone.

15.2 IsoBar brackets are fixed at maximum 765 mm centres through the WalkLiner panels to the purlins. Anti-sway brackets are required at each end of a spacer line and at 30 m maximum intervals between. The mineral wool blanket is packed tightly around and under the IsoBar spacer, without gaps.

15.3 The full insulation and membrane construction should be continued over ridges and hips. Gaps or omissions should be avoided.

SpeedZip acoustic constructions with perforated WalkLiner

15.4 The perforated WalkLiner is installed and secured to the purlins and the strippable film removed. The top-hat spacer stools are installed in the pan of the WalkLiner at Isobar bracket positions and fixed using two hex-head screws. Where compartment walls meet the perforated WalkLiner, due consideration should be given to fillers within the roof construction.

15.5 The acoustic batts are installed in the pan of the WalkLiner (black-tissue face against the perforations) with close butt joints, cut around top-hat spacers.

15.6 The StramCheck Vapour Control layer is laid, preferably to drain externally at eaves, and laps sealed with 1.5 mm by 20 mm butyl strip, sealed to penetrations, perimeters and made continuous over such components as ridges and hips. Penetrations (such as pipes, vents and rooflights) are sealed both internally and externally. The IsoBar spacer is fixed using the screws supplied and the insulation is installed tightly around and under the IsoBar, without gaps.

Setting out tolerances

15.7 To accommodate thermal movement, and to ensure that unwanted fixed points are not introduced, it is essential that the halter bracket is set out to provide a consistent plane to allow sheets to move freely in a straight line. It is important, therefore, to ensure that the halter brackets are aligned within the steelwork tolerances[1] described in Figures 6, 7 and 8.

(1) Steelwork tolerances should be in accordance with *Best Practice for the Specification and Installation of Metal Cladding and Secondary Steelwork*, by MD Heywood (SCI Publication P346 – The Steel Concrete Institute), section 4.4.

Figure 6 Tolerances on plan – straight and curved SpeedZip

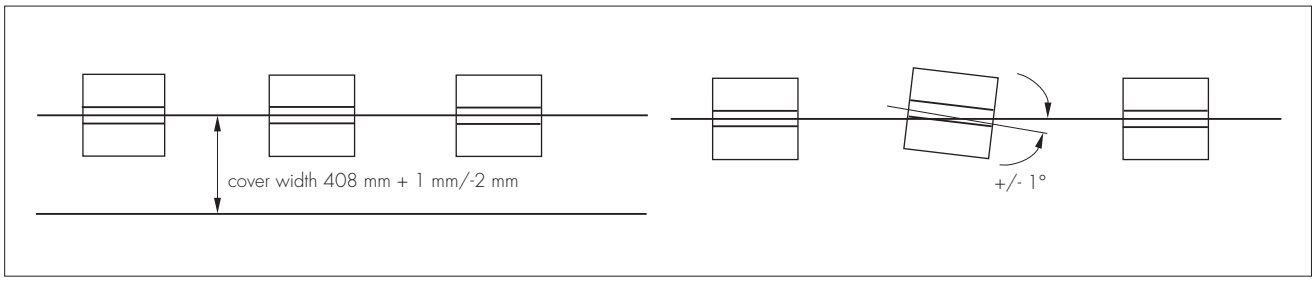


Figure 7 Tolerances on vertical alignment – for straight roofs

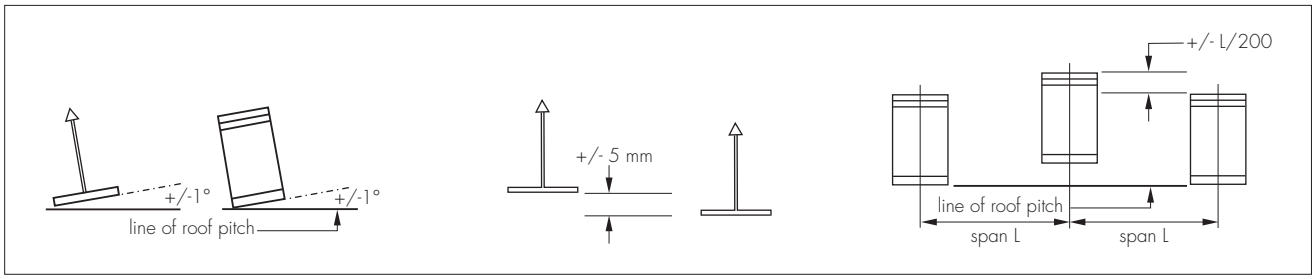
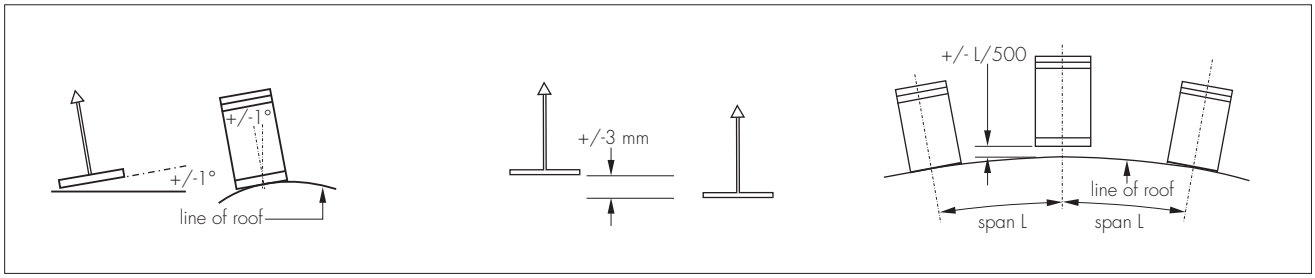


Figure 8 Tolerances on vertical alignment – for curved roofs



Fixing sequence

15.8 A straight line is established at the verge, at an angle of 90° to the eaves line. The first line of halter brackets is installed to this line, using the two stainless steel fixings provided per halter bracket — the gable hook is also secured with one of these screws.

15.9 The gauging template is used to set out the next and subsequent rows of halter brackets, and adjustments made if creep occurs. The alignment of each row should be checked at every 10 m.

15.10 The first SpeedZip profile is placed in position with the male rib on the first row of halter brackets and the female rib at the eaves or gable end. For 300 mm at either end of the sheet, tongs are used to squeeze the female rib. The whole rib is zipped using the zipping tool and the one fixed point installed using the 4.8 mm diameter rivet.

15.11 The next sheet is placed in position with the female rib positioned tightly over the male rib. The female rib is zipped to make a tight seam.

15.12 To ensure insulation is kept dry, only that to be covered in one installation session should be installed.

15.13 Should a seam need to be unzipped and later re-zipped, if the seam does not re-seam correctly, it must be covered by an omega cover strip.

15.14 Typical eaves, gable and ridge details are shown in Figures 9, 10 and 11.

Figure 9 Eaves detail

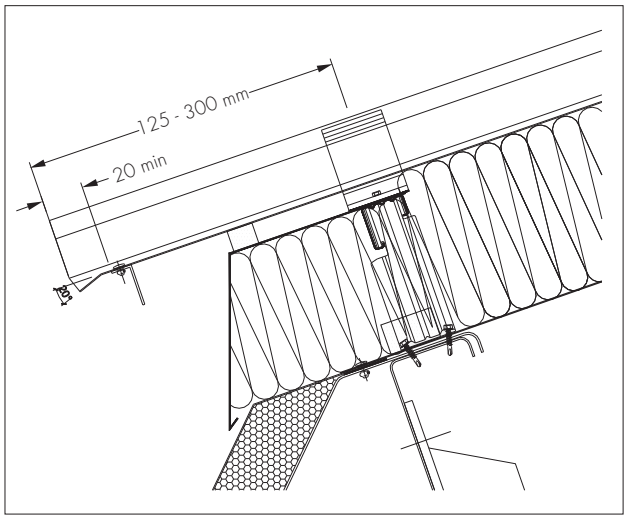


Figure 10 Gables detail

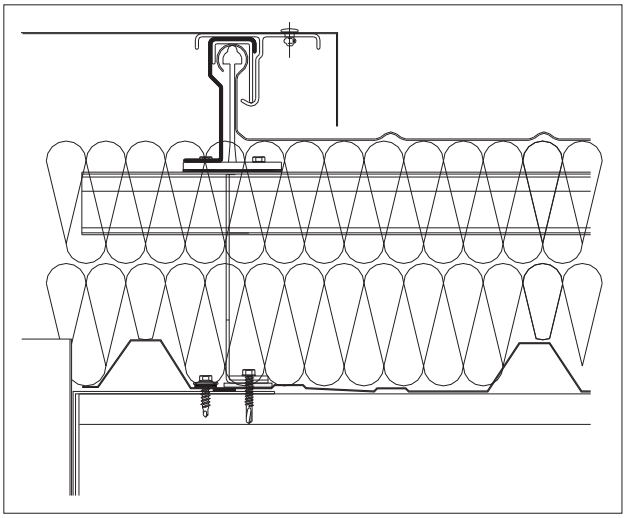
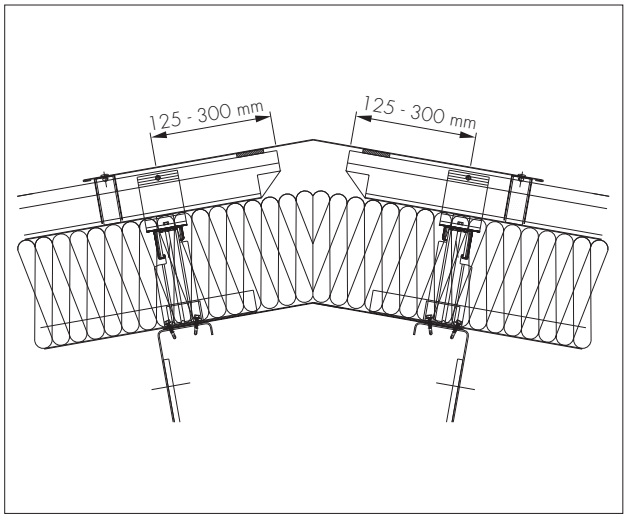


Figure 11 Ridge detail



16 Tests

Tests were carried out on the product to establish:

- resistance to dead and imposed (snow) loading
- uniformly distributed loads
- resistance to impact
- sound absorption and sound transmission performance
- resistance to wind loading
- behaviour of fixings and profile under static and cyclic loading
- behaviour under concentrated loads
- airtightness of liner.

17 Investigations

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

17.2 An assessment was made of:

- fire resistance
- condensation risk
- weathertightness of fixed cladding and details.
- practicability of installation
- thermal transmittance

17.3 Existing information, relating to the durability of the system, performance in fire and compatibility of materials in contact, has been examined.

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

Bibliography

BS 476-3 : 1958 *Fire tests on building materials and structures — External fire exposure roof test*
BS 476-3 : 2004 *Fire tests on building materials and structures — Classification and method of test for external fire exposure to roofs*
BS 476-4 : 1970 *Fire tests on building materials and structures — Non-combustibility test for materials*

BS 3638 : 1987 *Acoustics measurement of sound absorption in a reverberation room*

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

BS 6399-2 : 1997 *Loading for buildings — Code of practice for wind loads*
BS 6399-3 : 1988 *Loading for buildings — Code of practice for imposed roof loads*

BS 8233 : 1999 *Sound insulation and noise reduction for buildings — Code of practice*

BS EN 10147 : 2000 *Continuously hot-dip zinc coated structural steels strip and sheet — Technical delivery conditions*

BS EN ISO 10211-2 : 2001 *Thermal bridges in building construction — Calculation of heat flows and surface temperatures — Linear thermal bridges*

ISO 354 : 1985 *Acoustics — Measurement of sound absorption in a reverberation room*

18 Conditions

18.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is granted only to the company, firm or person named on the front page — no other company, firm or person may hold or claim any entitlement to this Certificate
- 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.

18.2 References in this Certificate to any Act of Parliament, Statutory Instrument, Directive or Regulation of the European Union, British, European or International Standard, Code of Practice, manufacturers' instructions or similar publication, are references to such publication in the form in which it was current at the date of this Certificate.

18.3 This Certificate will remain valid for an unlimited period provided that the product/system and the manufacture and/or fabrication including all related and relevant 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.

18.4 In granting this Certificate, the BBA is not responsible for:

- 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
- individual installations of the product/system, including the nature, design, methods and workmanship of or related to the installation
- the actual works in which the product/system is installed, used and maintained, including the nature, design, methods and workmanship of such works.

18.5 Any information relating to the manufacture, supply, installation, use and maintenance 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 and maintained. It does not purport in any way to restate the requirements of the Health & Safety at Work etc Act 1974, or of any other statutory, common law or other duty which may exist at the date 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. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the manufacture, supply, installation, use and maintenance of this product/system.

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