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Agrément Certificate

15/5282

Product Sheet 1

RADMAT ESHA BITUMINOUS ROOFING SYSTEMS

ESHAFLEX TOTAL ROOF WATERPROOFING SYSTEMS

This Agrément Certificate Product Sheet⁽¹⁾ relates to EshaFlex Total Roof Waterproofing Systems, a range of polymer-modified bitumen waterproofing membranes and air and vapour control layers (AVCLs), for use on warm and cold, pitched, flat and protected zero fall roofs with limited access and loose-laid and ballasted and inverted, flat and zero fall roofs with limited access.

(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

Weathertightness — the waterproofing membranes will resist the passage of moisture to the interior of a building (see section 6).

Condensation risk — the AVCLs will adequately limit the risk of interstitial and surface condensation (see section 7).

Properties in relation to fire — the systems, when used in a suitable specification, can enable a roof to be unrestricted under the national Building Regulations (see section 8).

Resistance to wind uplift — when correctly specified, the systems will resist the effects of any likely wind suction acting on the roof (see section 9).

Resistance to mechanical damage — the systems will accept, without damage, the limited foot traffic and loads associated with installation and maintenance (see section 10).

Durability — under normal service conditions, the systems will provide a durable waterproof covering with a service life in excess of 35 years. This can be extended to in excess of 40 years with periodic maintenance (see section 12).

The BBA has awarded this Certificate to the company named above for the systems described herein. These systems have been assessed by the BBA as being fit for their 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 Third issue: 8 December 2020

Originally certificated on 9 December 2015



Hardy Giesler
Chief Executive Officer

This Certificate was amended on 22 May 2024 as part of a transition of The BBA Agrément Certificate scheme delivered under the BBA's ISO/IEC 17020 accreditation. This Certificate was issued originally under accreditation to ISO/IEC 17065. Sections marked with the symbol † are not issued under accreditation. Full conversion to the ISO/IEC 17020 format will take place at the next Certificate review. The BBA is a UKAS accredited Inspection Body (No.4345). Readers MUST check the validity of this Agrément Certificate by either referring to the BBA website or contacting the BBA directly. Any photographs are for illustrative purposes only, do not constitute advice and must not be relied upon.

British Board of Agrément

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Page 1 of 14

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Regulations

In the opinion of the BBA, EshaFlex Total Roof Waterproofing Systems, 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:	B4(1)	External fire spread
Comment:	The systems are restricted by this Requirement, in some circumstances. See section 8.5 of this Certificate.	
Requirement:	B4(2)	External fire spread
Comment:	On suitable substructures, the use of the systems can enable a roof to be unrestricted under this Requirement. See sections 8.1, 8.2, 8.3 (Wales only) and 8.4 of this Certificate.	
Requirement:	C2(b)	Resistance to moisture
Comment:	The waterproofing membranes, including joints, will enable a roof to satisfy this Requirement. See section 6 of this Certificate.	
Requirement:	C2(c)	Resistance to moisture
Comment:	The AVCLs can contribute to enabling a roof to satisfy this Requirement. See section 7 of this Certificate.	
Regulation:	7(1)	Materials and workmanship
Comment:	The systems are acceptable. See sections 12.1 and 12.2 and the <i>Installation</i> part of this Certificate.	



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Durability, workmanship and fitness of materials
Comment:	The use of the systems satisfies the requirements of this Regulation. See sections 11.1, 12.1 and 12.2 and the <i>Installation</i> part of this Certificate.	
Regulation:	9	Building standards applicable to construction
Standard:	2.6	Spread to neighbouring buildings
Comment:	The system is restricted under clause 2.6.4 ⁽¹⁾⁽²⁾ of this Standard in some circumstances. See section 8.6 of this Certificate.	
Standard:	2.8	Spread from neighbouring buildings
Comment:	The systems, when applied to suitable substructures, are classified as having a low vulnerability and can enable a roof to be unrestricted under this Standard, with reference to clause 2.8.1 ⁽¹⁾⁽²⁾ . See sections 8.1, 8.2 and 8.4 of this Certificate.	
Standard:	3.10	Precipitation
Comment:	The waterproofing membranes, including joints, can enable a roof to satisfy the requirements of this Standard, with reference to clauses 3.10.1 ⁽¹⁾⁽²⁾ and 3.10.7 ⁽¹⁾⁽²⁾ . See section 6 of this Certificate.	
Standard:	3.15	Condensation
Comment:	The AVCLs will enable a roof to satisfy this Standard, with reference to clauses 3.15.1 ⁽¹⁾ , 3.15.3 ⁽¹⁾ , 3.15.5 ⁽¹⁾ and 3.15.6 ⁽¹⁾ . See section 7 of this Certificate.	

Standard: 7.1(a) **Statement of sustainability**
Comment: The systems 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.

Regulation: 12 **Building standards applicable to conversions**
Comment: Comments in relation to the systems 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 systems are acceptable. See sections 12.1 and 12.2 and the *Installation* part of this Certificate.

Regulation: 28(b) **Resistance to moisture and weather**
Comment: The waterproofing membranes, including joints, satisfy the requirements of this Regulation. See section 6 of this Certificate.

Regulation: 29 **Condensation**
Comment: The AVCLs can contribute to a roof satisfying this Regulation. See section 7 of this Certificate.

Regulation: 36(b) **External fire spread**
Comment: On suitable substructures, the use of the systems can enable a roof to be unrestricted under the requirements of this Regulation. See sections 8.1 to 8.4 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 sections: 1 *Description* (1.2) and 3 *Delivery and site handling* (3.3) of this Certificate.

Additional Information

NHBC Standards 2020

In the opinion of the BBA, EshaFlex Total Roof Waterproofing Systems, 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 and balconies*.

The *NHBC Standards* do not cover the use of the systems in the refurbishment of existing roofs.

CE marking

The Certificate holder has taken the responsibility of CE marking the systems components, in accordance with harmonised European Standards EN 13707 : 2013 for the bitumen sheets and EN 13970 : 2004 for the AVCLs.

1 Description

1.1 EshaFlex Total Roof Waterproofing Systems consist of the following waterproofing membranes and AVCLs:

- Eshaflex 370 FireSafe — a 250 g·m⁻² polyester reinforced, SBS polymer-modified bitumen membrane with a mineral finished upper surface with a 75 mm wide, mineral-free selvedge and a grooved lower surface finished with a thermofusible polyethylene film for use as an EXT.FAA⁽¹⁾ rated capsheet
- EshaFlex 370 Black Mineral — a 195 g·m⁻² polyester-fibre glass reinforced, SBS polymer-modified bitumen membrane with a grooved lower surface finish with a thermofusible film and an upper surface finish of black mineral, for use as a capsheet in systems which are partially and fully adhered by torch application
- EshaFlex 370 Grey Mineral — a 195 g·m⁻² polyester-fibre glass reinforced, SBS polymer-modified bitumen membrane with a grooved lower surface finish with a thermofusible film and an upper surface finish of grey mineral, for use as a capsheet in systems which are partially and fully adhered by torch application
- EshaFlex 370 MF Black Mineral — a 230 g·m⁻² polyester-fibre glass reinforced, SBS polymer-modified bitumen membrane capsheet with a grooved lower surface finish with a thermofusible film and an upper surface finish of black mineral, for use as a capsheet in mechanically fastened applications where overlaps are sealed by torch application
- EshaFlex 370 Plain — a 180 g·m⁻² polyester-fibre glass reinforced, SBS polymer-modified bitumen membrane with a grooved lower surface finish with a thermofusible film and an upper surface finish of sand, for use as a base and capsheet in ballasted applications, and as a base sheet in systems which are fully adhered by torch application
- EshaFlex 370 SA Black Mineral — a 230 g·m⁻² polyester-fibre glass reinforced, SBS polymer-modified bitumen membrane with a self-adhesive lower surface covered with release film and an upper surface finish of black mineral, for use as a capsheet in fully adhered applications
- EshaTherm TK60 Black Mineral — a 230 g·m⁻² polyester-fibre glass reinforced, SBS polymer-modified bitumen membrane with a thermofusible film on the lower surface and an upper surface finish of black mineral, for use as a capsheet in systems which are partially adhered by torch application
- EshaTherm TK40 — a 200 g·m⁻² glass fabric reinforced SBS modified bitumen with a strip-applied adhesive and release film on the lower surface, and a sand upper surface, for use as a venting layer in partially adhered systems by heat-activation, resulting in approximately 60% adhesion area
- EshaVent — a 60 g·m⁻² glass fleece reinforced SBS polymer-modified bitumen with a self-adhesive perforated aluminium foil lower surface covered with release film and a sanded upper surface, for use as a venting layer in systems which are partially adhered by heat-activation, resulting in an adhesion area of approximately 40%
- EshaBase SA — a 200 g·m⁻² glass fabric reinforced SBS polymer-modified bitumen membrane with a self-adhesive lower surface covered with release film and a PE film upper surface, for use as a fully bonded base sheet
- EshaBase SA Sand — a 200 g·m⁻² glass fabric reinforced SBS polymer-modified bitumen membrane with a self-adhesive lower surface covered with release film and a sand-finished upper surface, for use as an AVCL or a fully bonded base sheet
- EshaBase SA Alu 3mm — a 200 g·m⁻² glass fabric reinforced and aluminium/polyester SBS polymer-modified laminate with a self-adhesive lower surface covered with release film and a sand-finished upper surface, for use as an AVCL
- EshaBase SA Alu 4.2mm — a 200 g·m⁻² glass fabric reinforced and aluminium/polyester SBS polymer-modified laminate with a self-adhesive lower surface covered with release film and a sand-finished upper surface, for use as an AVCL
- EshaBase Alu — a 60 g·m⁻² glass fleece reinforced and aluminium/polyester oxidised modified bitumen with a thermofusible film on the lower surface and a sand-finished upper surface, for use as a torch-on AVCL
- AluBase XL — a reinforced aluminium foil/fibre-glass net coated with a bitumen compound for use as a self-adhesive AVCL
- Esha SA Primer — a solvent-based bituminous primer for preparing substrates prior to application of the self-adhesive membranes
- EshaPrimer — a quick-drying bitumen primer for preparing substrates prior to the application of the torch-on membranes
- Radmat Red Primer — high penetration synthetic primer for preparing substrates prior to the application of self-adhesive AVCL's.

(1) Fire test report, reference 19565F, conducted by Warrington Fire, Gent. Report available from the Certificate holder.

1.2 The nominal characteristics of the waterproofing membranes and AVCLs are given in Tables 1 and 2 respectively.

Table 1 Nominal characteristics of membranes

Characteristic (unit)	EshaFlex waterproofing membranes			
	370 Black	370 Grey	370 MF Black	370
Thickness (mm)	4.5	4.5	4.5	3.8
Roll width (m)	1	1	1	1
Roll length (m)	7.5	7.5	7.5	7.5
Mass per unit area (kg·m ⁻²)	4.9	4.9	4.9	4.1
Roll weight (kg)	36.8	36.8	36.8	30.8
Tensile strength (N per 50 mm)				
longitudinal	700	700	800	700
transverse	700	700	700	700
Elongation (%)				
longitudinal	18	18	25	18
transverse	25	25	25	25
Nail tear strength (N)	300	300	350	300
Watertightness (at 10 kPa)	pass	pass	pass	pass
Low temperature flexibility (°C)	≤ -20	≤ -20	≤ -20	≤ -20
Upper surface finish	Black mineral	Grey mineral	Black mineral	Sand
Lower surface finish	Grooves and thermofusible film	Self-adhesive covered with release film	Thermofusible film	Lower surface finish

Characteristic (unit)	EshaFlex waterproofing membranes		
	370 Fire Safe	370 SA Black	TK60 Black
Thickness (mm)	4.5	4.2	4.5
Roll width (m)	1	1	1
Roll length (m)	7	7.5	7.5
Mass per unit area (kg·m ⁻²)	5.2	4.2	4.9
Roll weight (kg)	38	30.8	36.8
Tensile strength (N per 50 mm)			
longitudinal	1250	800	700
transverse	900	700	700
Elongation (%)			
longitudinal	50	25	18
transverse	55	25	25
Nail tear strength (N)	—	350	300
Watertightness (at 10 kPa)	pass	pass	pass
Low temperature flexibility (°C)	-10	≤ -20	≤ -20
Upper surface finish	Mineral	Black mineral	Black mineral
Lower surface finish	Grooves and thermofusible film	Self-adhesive covered with release film	Thermofusible film

Table 2 Nominal characteristics of vapour control levels

Characteristic (unit)	EshaBase Vapour Control Layers				
	SA Sand	SA Alu 3mm	SA Alu 4.2mm	Alu	AluBase XL
Thickness (mm)	2	3	4.2	4	0.60
Roll width (m)	1	1	1	1	1
Roll length (m)	10	7.5	7.5	5	40
Roll weight (kg)	20	32	36.8	25	28
Tensile strength (N per 50 mm)					
longitudinal	1250	1250	1250	500	600
transverse	2000	1250	1250	375	600
Elongation (%)					
longitudinal	5	5	5	3	5
transverse	5	5	5	3	5
Nail tear strength (N)	—	400	400	150	190
Watertightness (at 60 kPa)	pass	pass	pass	pass	pass
Water vapour permeability ($\text{m}^2 \cdot \text{s}^{-1} \cdot \text{Pa}^{-1} \cdot \text{kg}^{-1}$)	20,000	$\geq 8.12 \times 1012$	$\geq 8.12 \times 1012$	$\geq 8.12 \times 1012$	—
Equivalent air layer thickness S_d (m)	—	—	—	—	>1500

1.3 INSTA-STIK is a moisture-curing polyurethane adhesive for use in bonding insulation boards to the AVCLs and other insulation boards. The Certificate holder's advice should be sought on the suitability of the adhesive for specific insulation.

1.4 Other materials for use with the systems, but which are outside the scope of this Certificate, include:

- EshaStik — a moisture-curing polyurethane insulation board adhesive
- ProTherm PIR Bond and ProTherm PIR Bond Tapered — a rigid polyisocyanurate (PIR) foam-cored insulation board, faced with a polypropylene fleece on both surfaces
- ProTherm PIR TORCH and ProTherm PIR TORCH Tapered — a rigid PIR foam-cored insulation board, faced with bitumen-coated glass tissue on the upper surface and polypropylene fleece on the lower
- ProTherm PIR FIR FOIL and ProTherm PIR FOIL Tapered — a rigid PIR foam-cored insulation board, with an aluminium foil face composite on both surfaces
- ProTherm PIR Comp Tapered — EPS/PIR composite board, with mineral-filled glass fibre tissue on the upper surface and polypropylene fleece on the lower
- ProTherm MW — dual-density non-combustible mineral wool insulation manufactured from renewable volcanic stone
- ProTherm FoamGlas — a non-combustible insulation board manufactured from graded recycled glass and natural raw materials
- ProFast — a range of mechanical fasteners for insulation, and for membrane and trim attachment
- ProFlow — a range of gravity rainwater outlets
- ProLight — a range of polycarbonate and glass rooflights
- ProSafe — a range of roof safety products.

2 Manufacture

2.1 The waterproofing membranes and AVCLs are manufactured by saturating and coating the reinforcement with SBS modified bitumen, then calendaring to the correct thickness.

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.

2.3 The management systems of the manufacturer of the bitumen membranes and AVCLs have been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 and BS EN ISO 14001 : 2015 by KIWA (Certificate K74027/02).

3 Delivery and site handling

3.1 The systems components are delivered to site in rolls shrink-wrapped on pallets bearing the product name and production batch details.

3.2 Rolls must be stored vertically on a clean, level surface, away from excessive heat and under cover.

3.3 The Certificate holder has taken the responsibility of classifying and labelling the systems components under the *CLP Regulation (EC) No 1272/2008 on the classification, labelling and packaging of substances and mixtures*. Users must refer to the relevant Safety Data Sheet(s).

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Eshaflex Total Roof Waterproofing Systems.

Design Considerations

4 General

4.1 EshaFlex Total Roof Waterproofing Systems are satisfactory for use as:

- as partially bonded single- and two-layer waterproofing in warm and cold specifications on flat, pitched roofs and protected zero fall roofs with limited access
- as fully bonded single- and two-layer waterproofing in warm and cold specifications on flat, pitched roofs and protected zero fall roofs with limited access
- as mechanically fastened single-ply waterproofing in warm and cold specifications flat, pitched roofs and protected zero fall roofs with limited access
- loose-laid and ballasted as a two-layer waterproofing on flat and zero fall roofs with limited access
- on inverted, flat and zero fall roofs with limited access.

4.2 The mineral surfaced membranes are suitable for use, where appropriate, can be used as an exposed capsheet or in detail work.

4.3 Decks to which the membranes are to be applied must comply with the relevant requirements of either BS 6229 : 2018 or BS 8217 : 2005 and, where appropriate, *NHBC Standards 2020*, Chapter 7.1.

4.4 Limited access roofs are defined for the purpose of this Certificate as those subjected only to pedestrian traffic for maintenance of the roof covering and cleaning of gutters etc. Where traffic in excess of this is envisaged, additional protection to the membrane must be provided (see section 10 of this Certificate and the relevant clauses of the Certificate holder's installation instructions).

4.5 Flat roofs are defined for the purpose of this Certificate as those having a minimum finished fall of 1:80. For design purposes, twice the minimum finished fall should be assumed unless a detailed analysis of the roof is available, including overall and local deflection, direction of falls, etc.

4.6 Pitched roofs are defined for the purpose of this Certificate as those having a fall greater than 1:6.

4.7 Zero fall roofs are defined for the purpose of this Certificate as those having a finished fall which can vary between 0 and 1:80. Reference should also be made to the appropriate clauses in the Liquid Roofing and Waterproofing Association (LRWA) Note 7 *Specifier Guidance for Flat Roof Falls* and the Single Ply Roofing Association (SPRA) *Single Ply: Design Guide*.

4.8 For loose-laid and ballasted and inverted roofs, structural decks to which the systems are to be applied must be suitable to transmit the dead and imposed loads experienced in service.

4.9 Dead loads, wind loading and imposed loads are calculated by a suitably experienced and competent individual in accordance with BS EN 1991-1-1 : 2002, BS EN 1991-1-3 : 2003 and BS EN 1991-1-4 : 2005, and their UK National Annexes.

4.10 In loose-laid and ballasted and inverted roof specifications, the ballast requirements should be calculated by a suitably experienced and competent individual (see section 9.4).

4.11 The drainage systems for inverted roofs and zero fall roofs must be correctly designed, and the following points should be addressed:

- provision made for access for maintenance purposes
- for zero fall roofs, it is particularly important to identify the correct drainage points, to ensure that drainage is sufficient and effective
- additional guidance for inverted roof specifications is given in BBA Information Bulletin No 4 *Inverted roofs – Drainage and U value corrections*.

4.12 Insulation materials to be used in conjunction with the systems must be in accordance with the Certificate holder's instructions and be either:

- as described in the relevant clauses of BS 6229 : 2018, or
- the subject of a current BBA Certificate and used in accordance with, and within the scope of, that Certificate.

5 Practicability of installation

Installation must only be carried out by installers trained and approved by the Certificate holder.

6 Weathertightness



The waterproofing membranes, including joints, when completely sealed and consolidated, will adequately resist the passage of moisture into the interior of a building and so satisfy the requirements of the national Building Regulations.

7 Condensation risk



The AVCLs provide an effective control to the passage of liquid water and water vapour.

8 Properties in relation to fire



8.1 The following systems, when tested to DD CEN/TS 1187 : 2012, Test 4, achieved B_{ROOF}(t₄):

- a 19 mm exterior plywood substrate primed with EshaPrimer, a 120 mm thick ProTherm PIR insulation board bonded with EshaStik adhesive, a layer of EshaVent fully bonded onto primed ProTherm PIR insulation board with EshaPrimer, and a torch-applied layer of EshaFlex 370 Black Mineral⁽¹⁾
- an 18 mm thick plywood primed with bitumen primer, a bituminous vapour control layer, 120 mm thick PIR insulation board (facings glass tissue and bituminised glass tissue), a partially bonded bitumen underlay and EshaFlex 370 FireSafe⁽²⁾
- an 18 mm plywood substrate primed with Radmat Red Primer, a layer of Alubase XL, a 130 mm thick ProTherm PIR insulation board, a layer of EshaFlex 370 Plain and a torch-applied layer of EshaFlex 370 FireSafe⁽³⁾
- an 18 mm plywood substrate primed with Radmat Red Primer, a layer of Alubase XL, a 130 mm thick ProTherm PIR insulation board, a layer of EshaTherm TK40 and a torch-applied layer of EshaFlex 370 FireSafe⁽⁴⁾.

- (1) Fire test report, reference 352035, conducted by Exova Warringtonfire. Report available from the Certificate holder.
- (2) Fire test and classification reports, reference 19673H and 19673J respectively, conducted by Warringtonfire, Gent. Report available from the Certificate holder.
- (3) Fire test and classification reports, references 19565E and, 19565G, conducted by Warringtonfire, Gent. Report available from the Certificate holder.
- (4) Fire test and classification reports, references 19565J, 19565L, conducted by Warringtonfire, Gent. Report available from the Certificate holder.

8.2 The systems, when used in protected or inverted roof specifications, including an inorganic covering listed in the Annex of Commission Decision 2000/553/EC, can also be considered to be unrestricted .



8.3 When used on flat roofs with one of the surface finishes defined in The Building Regulations (Wales), Appendix A, Table A5, Part iii, or The Building Regulations (Northern Ireland), Table 5.6, Part IV (and listed below), the roof is deemed to be of classification B_{ROOF}(t4):

- bitumen-bedded stone chipping covering the whole surface to a depth of not less than 12.5 mm
- bitumen-bedded tiles of a non-combustible material
- sand cement screed, or
- macadam.



8.4 The designation of other specifications should be confirmed by reference to the requirements of the documents supporting the national Building Regulations.



8.5 The systems, when used in pitches of greater than 70°, excluding upstands, should not be used on buildings in England and Wales that have a storey at least 18 m above ground level and contain: one or more dwellings, an institution, a room for residential purposes (excluding any room in a hostel, hotel or boarding house), student accommodation, care homes, sheltered housing, hospitals or dormitories in boarding schools.



8.6 The systems, when used in pitches of greater than 70°, excluding upstands, should not be used on buildings in Scotland that have a storey at least 11 m above ground level.

9 Resistance to wind uplift

9.1 The adhesion of the fully bonded membranes is sufficient to resist the effects of wind suction, elevated temperature and thermal shock conditions. Wind uplift calculations for the partially bonded systems using Eshatherm TK40 or EshaVent layers should be based on the following maximum values:

- Eshatherm TK40 4 kPa
- EshaVent 2 kPa.

9.2 When the membranes are mechanically fixed, the resistance to wind uplift is provided by mechanical fasteners secured to the deck and passing through the membrane. The number of fixings and their position will depend on:

- wind uplift forces to be resisted
- pull-out strength of fasteners
- elastic limit of the sheet
- appropriate safety factors.

9.3 The number of fixings used should be established by reference to the wind uplift forces calculated in accordance with BS EN 1991-1-4 : 2005 and its UK National Annex, on the basis of maximum permissible loads of 0.68 kN per fixing for single-layer systems and 0.40 kN per fixing for multi-layer systems.

9.4 The ballast requirements for loose-laid and inverted systems must be calculated in accordance with the relevant parts of BS EN 1991-1-4 : 2005 and its UK National Annex. The membranes should always be ballasted with a minimum depth of 50 mm of aggregate (20 to 40 grade gravel). In areas of high-wind exposure, the Certificate holder's advice should be sought. Alternatively, concrete slabs on suitable supports can be used.

9.5 When tested for wind uplift, a total roof waterproofing system using INSTA-STIK to bond mineral wool insulation to an AVCL and to bond two layers of the insulation achieved a wind uplift value of 5 kPa.

10 Resistance to mechanical damage

10.1 The systems will accept, without damage, the limited foot traffic and light concentrated loads associated with installation and maintenance. Where traffic in excess of this is envisaged, such as for maintenance of lift equipment, a walkway must be provided (for example, using concrete slabs supported on bearing pads or the manufacturer's walkway sheets). Reasonable care must be taken to avoid puncture of the membranes by sharp objects or concentrated loads.

10.2 The systems are capable of accepting minor structural movement while remaining weathertight.

11 Maintenance



11.1 The systems should be the subject of six monthly inspections and maintenance in accordance with BS 6229 : 2018, Chapter 7, to ensure continued satisfactory performance.

11.2 A planned maintenance cycle, including inspections by the Certificate holder, should be introduced if an extended service life is required. The Certificate holder can advise on methods of extending the service life. This could include the use of thicker membranes, specific maintenance requirements or localised replacement and repair.

11.3 Where damage has occurred it should be repaired in accordance with section 16 of this Certificate and the Certificate holder's instructions.

12 Durability



12.1 Under normal service conditions, the systems will provide a durable roof waterproofing with a service life in excess of 35 years.

12.2 The service life can be extended to in excess of 40 years with periodic maintenance as stated in section 11.2.

12.3 When using the mineral surface membranes, it is possible that some localised loss of mineral surfacing may occur after some years in areas where complex detailing of the roof design is incorporated.

Installation

13 General

13.1 Installation of EshaFlex Total Roof Waterproofing Systems must be carried out in accordance with this Certificate, the Certificate holder's instructions and the relevant clauses of BS 8000-0 : 2014, BS 8000-4 : 1989 and BS 8217 : 2005.

13.2 Substrates to which the systems are to be applied must be sound, dry and clean, and free from sharp projections such as nail heads and concrete nibs.

13.3 Installation must not be carried out during inclement weather (eg rain, fog or snow). When the temperature is below 5°C, suitable precautions against surface condensation must be taken.

13.4 Detailing must be formed in accordance with the Certificate holder's instructions.

13.5 If the roof is likely to be subject to uncontrolled pedestrian access, the substructure must satisfy the requirements of BS 8217 : 2005, and, to prevent damage to the roof covering, one of the appropriate surface finishes referred to in clause 6.12 of that Standard must be used.

13.6 At falls in excess of 5° (1:11), the provision for mechanical fixings as required by BS 8217 : 2005 should be observed. For slopes above 10° (1:5.7), the Certificate holder's advice should be sought.

13.7 The installation of the insulation boards must be carried out in accordance with the insulation manufacturer's instructions.

13.8 Detailing should be carried out in accordance with the Certificate holder's instructions.

14 Procedure (AVCL)

14.1 When required, EshaBase SA Alu, EshaBase SA Sand and AluBase XL are self-adhesive membranes and must be installed in accordance with the Certificate holder's instructions.

14.2 When using EshaBase Alu membrane, bonding is achieved by melting the lower surface of the membrane using a standard roofer's torch.

14.3 When using the self-adhesive membranes, the substrates should be primed with Esha SA Primer.

14.4 The membrane must be heated carefully, ensuring that the thermofusible film is completely melted as work proceeds, and pressed down onto the prepared substrate, ensuring that a continuous 5 mm bead of bitumen is extruded from all edges and that a full bond is achieved.

14.5 Side laps must be a minimum of 80 mm, following the manufactured selvedge, and end laps a minimum of 100 mm.

14.6 At features such as roof perimeters and upstands, the membrane must be dressed up to ensure a minimum 100 mm overlap with the waterproofing to envelop the insulation.

15 Procedure (Membrane)

Fully bonded

15.1 Bonding for the torch-on membranes is achieved by melting the lower surface using a standard roofer's torch and pressing the membrane down. A bead of molten material must exude from all laps to indicate a satisfactory seal and must be levelled out using a heated trowel. Care must be taken not to overheat the coating.

15.2 For the self-adhesive membranes, the protective release film is removed, and the membrane applied in small areas at a time ensuring the membrane is pressed down and no air is trapped. Overlaps are welded using a hot air welding gun.

15.3 Side laps must be a minimum of 80 mm and end laps a minimum of 100 mm.

Partially bonded

15.4 Either Eshatherm TK40 or EshaVent layers are installed in accordance with the Certificate holder's instructions over the substrate prior to the installation of the waterproofing layers.

15.5 The waterproof layers are fully bonded to the venting layer (see sections 15.1 and 15.2).

15.6 Side laps must be a minimum of 80 mm and end laps a minimum of 100 mm.

Mechanically fastened

15.7 The membrane should be laid flat onto the substrate without folds or ripples and fixed to the deck using the ProFast system through the overlap of the membrane.

15.8 The position of the bars or washers and the number of fixing screws required must be in accordance with the fixing specifications provided by the Certificate holder. Side laps must be a minimum of 120 mm and end laps must be a minimum of 100 mm. The laps must be welded by torching the lower surface and pressing the membrane down. A bead of molten material must exude from all laps to indicate a satisfactory seal and must be levelled out using a heated trowel. Care must be taken not to overheat the coating.

Loose-laid

15.9 Side laps must be a minimum of 80 mm and end laps must be a minimum of 100 mm. The laps must be welded by torching the lower surface and pressing the membrane down. A bead of molten material must exude from all laps to indicate a satisfactory seal and must be levelled out using a heated trowel. Care must be taken not to overheat the coating.

15.10 In loose-laid systems, the membranes must be ballasted to combat the effects of wind uplift. This can be achieved by:

- laying a 0.2 mm thick polyethylene protective sheet or non-woven polyester sheet covered by at least 50 mm of well-rounded gravel (gravel size 15/30 mm)
- laying a 0.2 mm thick polyethylene or non-woven polyester sheet (minimum mass $300 \text{ g}\cdot\text{m}^{-2}$) covered by a 20 mm thick layer of sand overlaid with a layer of concrete paving slabs⁽¹⁾.

(1) If paving on plastic pads, the sand is not required.

16 Repair

In the event of damage, the capsheets can be effectively repaired, after cleaning the surrounding areas, with a patch of the appropriate capsheet bonded over the damaged area with an overlap of the undamaged membrane by 80 mm in all directions, in accordance with the Certificate holder's instructions.

Technical Investigations

17 Tests

17.1 Tests were carried out on the vapour control layers to EN 13970 : 2004 and the results assessed to determine:

- mass per unit area
- thickness
- delamination strength
- tensile strength and elongation
- water vapour transmission.

17.2 A wind-uplift test of a system consisting of a plywood deck primed with Radmat Red Primer and EshaBase SA Alu self-adhesive vapour control layer was conducted, and the results assessed for resistance to wind uplift.

17.3 A wind-uplift test of a system consisting of a plywood deck, an EshaBase SA Alu self-adhesive vapour control layer, a ProTherm PIR insulation board partially adhered with polyurethane insulation adhesive, bonded to EshaVent and torch bonded EshaFlex 370 roof waterproofing system was conducted, and the results assessed for resistance to wind uplift.

17.4 A wind-uplift test consisting of a plywood deck primed with Radmat Red Primer, an AluBase XL self-adhesive vapour control layer, a PIR Insulation board partially adhered with polyurethane insulation adhesive, torch bonded to EshaTherm TK40 and torch bonded Eshaflex Mineral 370 capsheet was conducted, and the results assessed for wind uplift.

17.5 An assessment was made of test data on membranes to determine:

- mass per unit area
- thickness, length and width
- tensile strength and elongation
- nail tear strength
- watertightness
- dimensional stability
- water vapour permeability
- low temperature flexibility on unaged samples and on samples heat aged for 1 week at 80°C and 12 weeks at 70°C
- flow resistance on unaged samples and on samples heat aged for 12 weeks at 70°C.

18 Investigations

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

18.2 Fire test data relating to external fire performance of the systems were evaluated.

18.3 Wind-uplift test data of the mechanically fastened single-layer and multi-layer systems were assessed.

18.4 Wind-uplift test data of the INSTA-STIK adhesive in conjunction mineral wool and PIR insulation boards were assessed.

18.5 Data resulting from the issue of BBA Certificate 89/2338 and KOMO Certificate K66713/01 were examined.

18.6 Data on existing sites was used to assess the durability of the waterproofing membranes.

18.7 An assessment of the surveillance and maintenance scheme for extension of roof service life.

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