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Agrément Certificate
97/3422
Product Sheet 1

SINTOFOIL WATERPROOFING SYSTEMS

SINTOFOIL SINGLE-PLY ROOF WATERPROOFING SYSTEMS

This Agrément Certificate Product Sheet(1) relates to Sintofoil Single-Ply Roof Waterproofing Systems, for use on limited access exposed flat and pitched roofs, green roofs in flat, protected zero fall and pitched roofs and roof gardens and blue roofs in flat and zero fall roofs.

(1) Hereinafter referred to as 'Certificate'.

CERTIFICATION INCLUDES:

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

KEY FACTORS ASSESSED

Weathertightness — the membranes, including joints, will resist the passage of moisture into the interior of a building (see section 6).
Properties in relation to fire — the systems may contribute to a roof being unrestricted under the national Building regulations (see section 7).
Resistance to wind uplift — the systems will resist the effects of any wind suction likely to occur in practice (see section 8).
Resistance to mechanical damage — the systems will accept, without damage, the limited foot traffic and loads associated with installation and maintenance (se section 8).
Resistance to penetration of roots — the systems will adequately resist plant root penetration (see section 10).
Durability — under normal service conditions, the systems will provide a durable roof waterproofing with a service life in excess of 35 years, and in excess of 40 years provided that it is covered by and maintained in accordance with the Certificate holder's maintenance scheme (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

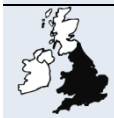
Date of Third issue: 14 May 2021

Originally certificated on 19 January 1998

Hardy Giesler
Chief Executive Officer

Regulations

In the opinion of the BBA, Sintofoil Single-Ply 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 7.5 of this Certificate.
Requirement:	**B4(2)**	**External fire spread**
Comment:		On suitable substrates, the use of the systems may enable a roof to be unrestricted under this Requirement. See sections 7.1 to 7.4 of this Certificate.
Requirement:	**C2(b)**	**Resistance to moisture**
Comment:		The membranes, including joints, will enable a roof to satisfy this Requirement. See section 6 of this Certificate.
Regulation:	**7(1)**	**Materials and workmanship**
Comment:		The systems are acceptable. See section 12 and the *Installation* part of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	**8(1)(2)**	**Durability, workmanship and fitness of materials**
Comment:		Use of the systems satisfies the requirements of this Regulation. See sections 11.1 and 12 and the *Installation* part of this Certificate.
Regulation:	**9**	**Building standards applicable to construction**
Standard:	2.6	Spread to neighbouring buildings
Comment:		The systems are restricted under clause 2.6.4(1)(2) of this Standard in some circumstances. See section 7.6 of this Certificate.
Standard:	2.8	Spread from neighbouring buildings
Comment:		When applied to a suitable substructure, the systems may enable a roof to be unrestricted under clause 2.8.1(1)(2) of this Standard. See sections 7.1 to 7.4 of this Certificate.
Standard:	3.10	Precipitation
Comment:		The membranes, including joints, will 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:	7.1(a)	Statement of sustainability
Comment:		The systems can contribute to satisfying 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 section 12 and the Installation part of this Certificate.
Regulation:	**28(b)**	**Resistance to moisture and weather**
Comment:		The membranes, including joints, will enable a roof to satisfy the requirements of this Regulation. See section 6 of this Certificate.
Regulation:	**36(b)**	**External fire spread**
Comment:		On suitable substructures, the use of the systems may enable a roof to be unrestricted under this Regulation. See sections 7.1 to 7.4 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).

Additional Information

NHBC Standards 2021

In the opinion of the BBA, Sintofoil Single-Ply 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, terraces 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 membranes in accordance with harmonised European Standard EN 13956 : 2012.

Technical Specification

1 Description

1.1 Sintofoil Single-Ply Roof Waterproofing Systems are manufactured from flexible polypropylene alloy (FPA). The membranes are available in unreinforced, glass-reinforced, polyester-reinforced versions and combined glass/polyester composite reinforced, some of which are also available with a polyester fleece backing.

1.2 The membranes are manufactured to the nominal characteristics given in Table 1.

Table 1 Nominal characteristics

Characteristics (units)	**Sintofoil ST**				**Sintofoil RG**				**Sintofoil RG-FB**			
Thickness (mm)	1.2	1.5	1.8	2.0	1.2	1.5	1.8	2.0	1.2	1.5	1.8	2.0
Width (m)	1.5 or 2.1		2.1		1.5 or 2.1				2.1			
Length (m)	25[(1)] or 30[(2)]		20		25[(1)] or 30[(2)]				25			
Mass per unit area (kg·m^{-2})	1.08	1.35	1.62	1.80	1.10	1.37	1.64	1.82	1.28	1.55	1.82	2.00
Watertightness	pass				pass				pass			
Tensile strength (N·m^{-2})												
– longitudinal	16				–				–			
– transverse	15				–				–			
Tensile strength (N per 50 mm)												
– longitudinal	–				600	650	750	800	600	650	750	800
– transverse	–				500	600	750	800	500	600	750	800
Elongation at break (%)												
– longitudinal	700				700				700			
– transverse	700				700				700			
Nail tear (N)												
– longitudinal	330	450	550	650	390	450	500	600	450	650	750	850
– transverse	240	450	500	600	290	400	450	550	400	600	700	800
Dimensional stability (%)												
– longitudinal	≤ 0.5				≤ 0.1				≤ 0.1			
– transverse	≤ 0.5				≤ 0.1				≤ 0.1			
Low temperature foldability (°C)	≤ –40				≤ –40				≤ –40			
Static indentation (kg) (method B)	25				25				25			
Dynamic impact (mm) (method B)	> 1000				> 1000				> 1000			
Root resistance	pass				pass				pass			
Reinforcement	unreinforced				glass				glass polyester fleece backing			

Characteristics (units)	**Sintofoil RT**				**Sintofoil RT-FB**			
Thickness (mm)	1.2	1.5	1.8	2.0	1.2	1.5	1.8	2.0
Width (m)	2.1				2.1			
Length (m)	25				25		20	
Mass per unit area (kg·m^{-2})	1.13	1.42	1.67	1.85	1.31	1.60	1.85	2.03
Watertightness	pass				pass			
Tensile strength (N·m^{-2})								
– longitudinal	–				–			
– transverse	–				–			
Tensile strength (N per 50 mm)								
– longitudinal	1100				1100			
– transverse	1100				1100			
Elongation at break (%)								
-– longitudinal	25				25			
– transverse	25				25			
Nail tear (N)								
– longitudinal	500				600			
– transverse	550				650			
Dimensional stability (%)								
– longitudinal	≤ 0.5				≤ 0.5			
– transverse	≤ 0.5				≤ 0.5			
Low temperature foldability (°C)	≤ –40				≤ –40			
Static indentation (kg) (method B)	25				≥25			
Dynamic impact (mm) (method B)	> 1200				≥ 1800			

Root resistance	pass				pass			
Reinforcement	polyester				polyester polyester fleece backing			
Characteristics (units)	**Sintofoil RC**				**Sintofoil FB**			
Thickness (mm)	1.2	1.5	1.8	2.0	1.2	1.5	1.8	2.0
Width (m)	2.1				1.5 or 2.1			
Length (m)	25		20		25[(1)] or 30[(2)]			
Mass per unit area (kg·m^{-2})	1.14	1.44	1.68	1.86	1.24	1.51	1.78	1.96
Watertightness	pass				pass			
Tensile strength (N·m^{-2}) – longitudinal – transverse	 – –				 16 15			
Tensile strength (N per 50 mm) – longitudinal – transverse	 1100 1100				 – –			
Elongation at break (%) -– longitudinal – transverse	 25 25				 700 700			
Nail tear (N) – longitudinal – transverse	 550 600				 450 400	 650 600	 800 750	 900 850
Dimensional stability (%) – longitudinal – transverse	 ≤ 0.1 ≤ 0.1				 ≤ 0.5 ≤ 0.5			
Low temperature foldability (°C)	≤ –40				≤ –40			
Static indentation (kg) (method B)	25				25			
Dynamic impact (mm) (method B)	> 1200				> 1000			
Root resistance	pass				pass			
Reinforcement	combined polyester/glass				unreinforced polyester fleece backing			

(1) Roll width 2.1 m.
(2) Roll width 1.5 m.

1.3 The membranes are available in black, light grey, lead and white. Other colours are available to order.

1.4 Ancillary items for use with the membranes include:

- Sintofoil FB-SF Adhesive — a solvent-free polyurethane adhesive for bonding Sintofoil FB membrane to compatible substrates
- Sintofoil Sheet Laminated Metal — metal sheets laminated with Sintofoil film, for use in producing profiles for perimeter flashings, connections, fixings and gutters
- Sintofoil moulded items — a range of preformed corners, pipe collars, roof drains and decorative profiles, moulded from Sintofoil compound
- Sintofoil Insulation Adhesive — a polyurethane adhesive for bonding compatible insulation boards to substrate
- Sintofoil Flashing/Substrate Adhesive — a solvent-based synthetic rubber adhesive for use at vertical areas and flashing details
- Sintofoil Fuse Prep Plus — a solvent-based cleaner for cleaning lap areas prior to welding aged or dirty Sintofoil membranes
- Sintofoil Waterstop Mastic — a butyl mastic, for use at non-exposed compression seals (for example, drains and terminations)
- Sintofoil Rubber Sealant — a silicone rubber, used to seal drains and termination bars
- Sintofoil fixings — including:
  - 45 mm polyamide locking plate (for use with membrane)
  - 75 mm polypropylene plate combined with a light grey 5.5 mm thread fastener, offering a corrosion resistance of greater than 15 Kesternich cycles (for use with insulation)

  - 40 mm by 80 mm polymeric plate equipped with a 'thermal shut' tube, available in various lengths with a 4.8 mm thread fastener (for steel/wood decks) or a 6.1 mm thread fastener (for concrete decks)
- Sintofoil Walkways — metal sheets laminated with Sintofoil film. The film extends on three sides (selvedges) to allow welding to the field membrane and connection between the walkway sheets
- Sintofoil Standing Seam Profile — a decorative pre-formed seam welded to the membrane to give the appearance of seamed metal roofing.

2 Manufacture

2.1 The system membranes are manufactured by extrusion of FPA and lamination.

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 system of Imper Italia SrL has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 by Bureau Veritas (Certificate IT209130).

3 Delivery and site handling

3.1 The membranes are delivered to site in rolls packaged in polythene film bearing a self-adhesive tag with product identification, size and production reference date. Each pallet also bears a label with the Certificate holder's name, membrane identification, size and number of rolls.

3.2 Rolls must be stored in their packaging in a cool, dry area on a clean, level surface, and kept under cover. Rolls must only be unwrapped at the time of installation.

3.3 The Certificate holder has taken the responsibility of classifying and labelling the 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 Sintofoil Single-Ply Roof Waterproofing Systems.

Design Considerations

4 General

4.1 Sintofoil Single-Ply Roof Waterproofing Systems are satisfactory for use as waterproofing on limited access roofs in the following specifications:

- Sintofoil RC, RG, RG-FB RT, RT-FB and ST in mechanically fastened systems on flat and pitched roofs
- Sintofoil FB, RG-FB and RT-FB in fully-adhered systems on flat and pitched roofs
- Sintofoil RG in green roof systems on flat, zero fall and pitched roofs
- Sintofoil RG in roof garden systems on flat and zero fall roofs
- Sintofoil RG in loose-laid and ballasted on flat and zero fall roofs
- Sintofoil RG and ST protected membrane systems on flat and zero fall roofs
- all grades in blue roofs on flat and zero fall roofs.

4.2 Decks to which the systems are to be applied must comply with the relevant requirements of BS 6229 : 2018,

BS 8217 : 2005 and, where appropriate, *NHBC Standards* 2021, Chapter 7.1.

4.3 The following terms are defined for the purpose of this Certificate as:

- roof garden (intensive) — a roof with a substantial layer of growing medium with planting that can include shrubs and trees, and generally accessible to pedestrians
- green roof (extensive) — a roof with a shallow layer of growing medium planted with low-maintenance plants such as mosses, sedums, grasses and some wildflower species.

4.4 Blue roofs are defined for the purpose of this Certificate as flat roofs designed to allow controlled attenuation of rain fall during heavy and storm events, as part of sustainable urban drainage systems (SUDS). Guidance for the design and construction of blue roofs is available in the *NFRC Technical Guidance Note for the construction and design of Blue Roof – Roofs and podiums with controlled temporary water attenuation.*

4.5 Limited access roofs are defined for the purpose of this Certificate as those subjected only to pedestrian traffic for maintenance of the roof covering, cleaning of gutters, etc. Where traffic in excess of this is envisaged, special precautions, such as additional protection to the membranes, must be taken.

4.6 Flat roofs are defined for the purpose of this Certificate as those having a minimum finished fall of 1:80(1). 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.

(1) *NHBC Standards* 2021 require a minimum fall of 1:60 for green roofs and roof gardens.

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

4.8 Zero fall roofs are defined for the purpose of this Certificate as those having a finished fall of between 0 and 1:80(1) degrees. Recommendations for the design of roof falls are available in the Liquid Roofing and Waterproofing Association (LRWA) Note 7 — *Specifier Guidance for Flat Roof Falls*.

(1) *NHBC Standards* 2021 require a minimum fall of 1:60 for green roofs and roof gardens.

4.9 Structural decks to which the system is to be applied must be suitable to transmit the dead and imposed loads experienced in service. Allowance needs to be made for loading deflections to ensure that the free drainage of water is maintained.

4.10 Imposed loads, dead loading and wind load specifications should be 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.

4.11 Recommendations for the design of green roofs and roof garden specifications are available within the latest edition of *The GRO Green Roof Code — Green Roof Code of Best Practice for the UK*.

4.12 The drainage system for zero fall roofs, green roofs or roof gardens 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
- dead loads for green roof and roof gardens can increase if the drains become partially or completely blocked causing waterlogging of the drainage layer.

4.13 Insulation system or materials used in conjunction with the system must be:

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

4.14 The NHBC requires that the roof membranes, once installed, be inspected in accordance with of *NHBC Standards* 2021, Chapter 7.1, Clause 7.1.12, including the use of an appropriate integrity test, where required. Any damage to the membrane is repaired in accordance with section 17 of this Certificate and reinspected.

5 Practicability of installation

Installation of the membranes must only be carried out by contractors trained and approved by the Certificate holder.

6 Weathertightness

The membranes, including joints, when completely sealed and consolidated, will adequately resist the passage of moisture into the building and enable a roof to comply with the requirements of the national Building Regulations.

7 Properties in relation to fire

7.1 When tested to DD CEN/TS 1187 : 2012, Test 4, and classified to BS EN 13501-5 : 2016, the following specifications achieved a classification of $B_{ROOF}(t4)$ and so are unrestricted with respect to proximity to a boundary under the national Building Regulations:

- a flat roof consisting of an 18 mm plywood deck, a 0.2 mm polyethylene air and vapour control layer (AVCL), a mechanically fastened polyisocyanurate (PIR) insulation board (applicable thickness range 60 to 250 mm) and Sintofoil RG-FB (1.2 or 1.5 mm thick) bonded with Sintofoil FB-SF adhesive at an application rate of 400 to 600 $g \cdot m^{-2}$(1)
- a flat roof consisting of an insulated sandwich panel consisting of steel facings with organic colour coating either side (bottom steel facing 0.6 mm thick, applicable thickness range of top steel facing 0.6 to 1.2 mm and valid for all colours) with a PIR insulation core (applicable thickness range 60 to 200 mm) and Sintofoil RG-FB 1.2 mm thick bonded with Sintofoil FB-SF adhesive at an application rate of 400 to 600 $g \cdot m^{-2}$(2).

(1) Fire test report and classification report references 19532B and 19532C respectively, issued by Warringtonfire Gent. A copy of the report is available from the Certificate holder.
(2) Fire test report and classification report references 19532G and 19532H respectively, issued by Warringtonfire Gent. A copy of the report is available from the Certificate holder.

7.2 When tested to DD ENV 1187 : 2002, Test 4, and classified to BS EN 13501-5 : 2005, a system comprising 0.75 mm thick profiled steel deck, a 50 mm thick layer of rock wool insulation and one layer of 1.2 mm thick, reinforced Sintofoil RG, mechanically fastened(1), achieved a classification of $B_{ROOF}(t4)$ when tested flat and so is unrestricted with respect to proximity to a boundary under the national Building Regulations.

(1) Classification report reference 326237 issued by Exova Warringtonfire. A copy of the report is available from the Certificate holder.

7.3 In the opinion of the BBA, a roof incorporating the systems will also be unrestricted under the national Building Regulations with respect to proximity to a boundary in the following circumstances:

- protected with an inorganic covering listed in the Annex of Commission Decision 2000/553/EC,
- a roof garden covered with a drainage layer of gravel 100 mm thick and a soil layer 300 mm thick
- irrigated green roofs and roof gardens.

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

7.5 The systems, when used in pitches of greater that 70°, should not be used on buildings in England and Wales that have a storey at least 18 m above ground level and which 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.

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

7.7 If allowed to dry, plants used in a roof garden may allow flame spread across the roof. This should be taken into consideration when selecting the plants. Appropriate planting irrigation and/or protection must be applied to ensure that the overall fire-rating of the roof is not compromised.

8 Resistance to wind uplift

8.1 In mechanically fastened systems, the number of fixings and their position will depend on:

- wind uplift forces to be resisted
- the pull-out strength of fixing screws
- elastic limit of the membrane
- appropriate safety factors.

8.2 The number of fixings used must be established by reference to the wind uplift forces calculated by a suitably experienced and competent individual in accordance with BS EN 1991-1-4 : 2005 and its UK National Annex, on the basis of the maximum permissible loads.

8.3 Test data from wind uplift testing and small scale testing are given in Table 2.

Table 2 Admissible load per fastener

Fastener type	Washer/sleeve	Substrate	Membrane	Admissible load per fastener – W_{adm} (N)
PS 4.8 mm	TPP 80 x 40 plate	0.75 mm profiled metal sheet	ST RG	654(1) 464(1)
BS 5.5 mm	PP 45 plate	0.75 mm profiled metal sheet	ST RG	726(2) 726(2)
BS 5.5 mm	TPP 80 x 40 plate	0.75 mm profiled metal sheet	ST RG	581(1) 581(1)
BS 4.8 mm	TPP 80 x 40 plate	0.75 mm profiled metal sheet	ST RG	654(2) 464(1)
HD 6.1 mm	PP 45 plate	0.75 mm profiled metal sheet	ST RG	515(1) 515(1)
HD 6.1 mm	TPP 80 x 40 plate	Concrete	ST RG	640(1) 454(1)
BNRF 5.7 mm	TPP 80 x 40 plate	Concrete	ST RG	660(2) 469(1)
HD 6.1 mm	PP 45 plate	Concrete	ST RG	640(1) 454(1)

(1) Value calculated from small scale resistance to wind uplift testing.
(2) Value calculated from full scale resistance to wind uplift testing.

8.4 The adhesion of a fully adhered system to a prepared concrete or wood substrate is sufficient to resist the effects of wind forces, elevated temperature and thermal shock conditions likely to occur in practice. Satisfactory adhesion to other substrates must be confirmed by test.

8.5 Where the systems are fully adhered to insulation boards, the resistance to wind uplift will be dependent on the cohesive strength of the insulation and the method by which it is secured to the roof deck. This must be taken into account when the insulation material is selected.

8.6 The ballast requirements for loose-laid and ballasted systems must be calculated by a suitably experienced and competent individual in accordance with the relevant parts of BS EN 1991-1-4 : 2005 and its UK National Annex. When using gravel ballast, the system must always be loaded with a minimum depth of 50 mm of aggregate. In areas of high-wind exposure, the Certificate holder's advice must be sought. Alternatively, concrete slabs on suitable supports can be used.

8.7 When used, soil and ballast must not be of a type that will be removed or become delocalised due to wind scour experienced on the roof.

8.8 It should be recognised that the type of plants used in roof gardens could significantly affect the expected wind loads experienced in service.

9 Resistance to mechanical damage

9.1 Data indicate that the systems can withstand, without damage, the limited foot traffic and light concentrated loads associated with the installation and maintenance operations. However, care must be taken to avoid sharp objects or concentrated loads. Where regular traffic is envisaged, eg maintenance of lift equipment, a walkway must be provided using either Sintofoil Walkways (mechanically fastened or adhered systems) or concrete slabs supported on bearing pads.

9.2 The system is capable of accepting minor structural movement while remaining weathertight.

10 Resistance to penetration of roots

The membranes are resistant to root penetration and can be used in roof waterproofing systems for roof gardens and green roofs.

11 Maintenance

11.1 The roof 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 Guidance for the maintenance of green roofs and roof gardens is available within the latest edition of The GRO Green Roof Code – Green Roof Code of Best Practice for the UK.

11.4 Any damage must be repaired in accordance with section 17 of this Certificate and the Certificate holder's instructions.

12 Durability

12.1 Under normal conditions, the systems will have a service life in excess of 35 years.

12.2 Provided the roof is covered by and maintained in accordance with the Certificate holder's maintenance scheme, the systems will have a service life in excess of 40 years.

13 Reuse and recyclability

The membranes comprise polypropylene and polyester, which can be recycled.

Installation

14 General

14.1 Installation of Sintofoil Single-Ply Roof Waterproofing Systems must be carried out by trained and approved installers working in accordance with the Certificate holder's instructions, the relevant clauses of BS 6229 : 2018, BS 8000-0 : 2014 and BS 8000-4 : 1989, the Single Ply Roofing Association (SPRA) *Single Ply : Design Guide* and this Certificate.

14.2 Conditions on site should be the same as those required for normal roof waterproofing work. Deck surfaces must be dry, clean and free from sharp projections such as nail heads and concrete nibs. When used over a rough substrate in loose-laid, protected roof or mechanically fastened systems, a suitable protection layer must be placed over the substrate.

14.3 Installation must not be carried out during wet weather (eg rain, fog, snow) or when the temperature is below 5°C unless suitable precautions are taken in accordance with the Certificate holder's instructions.

15 Procedure

Fully-adhered system

15.1 The Sintofoil FB is unrolled onto the substrate, without ripples and with a 70 mm overlap.

15.2 The membrane is folded back and Sintofoil FB-SF adhesive applied to the membrane and substrate at a rate of 0.4 to 0.6 $kg \cdot m^{-2}$.

15.3 The adhesive must be allowed to dry until tacky (15 to 45 minutes dependent on weather conditions) prior to membrane application.

15.4 Flashing and lap jointing must be carried out as described in section 16.

Mechanically fastened system

15.5 The membrane is unrolled onto the substrate, without ripples, with a 120 mm overlap.

15.6 The membrane is secured within the lap area using fasteners and seam plates. The maximum distance between each fastening assembly must be 280 mm and the minimum distance between the plates and sheet edge must be 15 mm.

15.7 Flashing and lap jointing must be carried out as described in section 16.

Loose-laid and ballasted and protected roof systems

15.8 The membrane is unrolled onto the substrate, without ripples and with a 70 mm overlap, and mechanically fastened at perimeters. Flashing and lap jointing must be carried out as described in section 16.

15.9 When used in a loose-laid and ballasted system, a suitable protection layer must be laid over the membrane prior to the application of the ballast. When used in protected roof systems, a suitable filter layer must be laid over the insulation.

15.10 Loose-laid applications must be covered by at least a 50 mm depth of well-rounded gravel. In areas of high wind exposure, paving slabs set on a suitable support may be considered (eg pads).

15.11 When using a loose-laid specification, the design of the deck should take into account the extra dead loading of the weight of the aggregate and/or paving.

16 Jointing and flashing procedure

16.1 Joints are made by hot-air welding, wherever possible by automatic methods rather than by a hand-held hot-air gun. The temperature should be set in accordance with the Certificate holder's instructions.

16.2 The welding area must be dry and clean. If the membrane in the welding area is oxidised due to prolonged outdoor exposure, it should be cleaned using Sintofoil Fuse Prep Plus in accordance with the Certificate holder's instructions.

16.3 The welded width of the joint must be a minimum of 30 mm. Care must be taken to ensure that overheating of the membrane does not occur, as scorching and carbonisation of the membrane will result.

16.4 The seam must be tested with a suitable metal probe and any weakness immediately repaired.

Flashing

16.5 Flashing and detailing must be formed in accordance with the Certificate holder's instructions.

17 Repair

In the event of accidental damage, repairs can be carried out by cleaning the area around the damage and applying a patch of the membrane as described in the relevant parts of section 16 and the Certificate holder's instructions.

Technical Investigations

18 Tests

18.1 An assessment was made of data to EN 13956 : 2012 in relation to:

- thickness
- mass per unit area
- flatness
- straightness
- peel resistance of joint
- shear resistance of joints
- tensile strength
- elongation at break
- dynamic indentation
- static indentation
- dimensional stability
- low temperature foldability
- resistance to root penetration.

18.2 An assessment was made of data to ETAG 006 : 2000 on the mechanically fastened system in relation to:

- full scale resistance to wind uplift
- small scale resistance to wind uplift.

18.3 Tests were carried out on samples of the membranes and the results evaluated to determine:

- nail tear resistance
- peel from substrate
- water vapour resistance
- the effect of exposure to UV
- the effect of heat ageing
- long term natural ageing.

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 Existing data on fire performance of the reinforced membrane were evaluated.

19.3 Visits to existing installations were carried out to assess the in-service performance of the exposed systems. Samples were also taken from one of the installations and subjected to accelerated laboratory ageing and testing.

Bibliography

BS 6229 : 2018 *Flat roofs with continuously supported flexible waterproof coverings — Code of practice*

BS 8000-0 : 2014 *Workmanship on construction sites — Introduction and general principles*
BS 8000-4 : 1989 *Workmanship on building sites — Code of practice for waterproofing*

BS 8217 : 2005 *Reinforced bitumen membranes for roofing — Code of practice*

BS EN 1991-1-1 : 2002 *Eurocode 1 : Actions on structures — General actions — Densities, self-weight, imposed loads for buildings*
NA to BS EN 1991-1-1 : 2002 UK National Annex to *Eurocode 1 : Actions on structures — General actions — Densities, self-weight, imposed loads for buildings*

BS EN 1991-1-3 : 2003 + A1 : 2015 *Eurocode 1 : Actions on structures — General actions — Snow loads*
NA + A2 : 2018 to BS EN 1991-1-3 : 2003 + A1 : 2015 UK National Annex to *Eurocode 1 : Actions on structures — General actions — Snow loads*

BS EN 1991-1-4 : 2005 + A1 : 2010 *Eurocode 1 : Actions on structures — General actions — Wind actions*
NA to BS EN 1991-1-4 : 2005 + A1 : 2010 UK National Annex to *Eurocode 1 : Actions on structures — General actions — Wind actions*

BS EN 13501-5 : 2005 +A1 : 2009 *Fire classification of construction products and building elements — Classification using data from external fire exposure to roofs tests*
BS EN 13501-5 : 2016 *Fire classification of construction products and building elements — Classification using data from external fire exposure to roofs tests*

BS EN ISO 9001 : 2015 *Quality management systems — Requirements*

EN 13956 : 2012 *Flexible sheet for waterproofing — Plastic and rubber sheets for roof waterproofing — Definitions and characteristics*

DD ENV 1187 : 2002 +A1 : 2005 Test methods for external fire exposure to roofs

DD CEN/TS 1187 : 2012 Test methods for external fire exposure to roofs

ETAG 006 : 2000 *Guideline for European Technical Approval of Systems of Mechanically Fastened Flexible Roof Waterproofing Membranes*

20 Conditions

20.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page – no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document – it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

20.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

20.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

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

20.5 In issuing this Certificate the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

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- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

20.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.

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