

Sika Limited

Target Marketing – Roofing

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Agrément Certificate
08/4532
Product Sheet 1

SARNAFIL WATERPROOFING MEMBRANES

SARNAFIL MECHANICALLY FASTENED ROOF WATERPROOFING MEMBRANES

This Agrément Certificate Product Sheet⁽¹⁾ relates to Sarnafil Mechanically Fastened Roof Waterproofing Membranes, comprising single-ply polymeric sheets and ancillary components for use mechanically fastened on flat or pitched 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 membranes will resist the passage of moisture into the building (see section 6).

Properties in relation to fire — the membranes will enable a roof to be unrestricted under the Building Regulations (see section 7).

Resistance to wind uplift — the membranes will resist the effects of any likely wind suction acting on the roof (see section 8).

Resistance to foot traffic — the membranes will accept the limited foot traffic and loads associated with installation and maintenance (see section 9).

Durability — under normal service conditions the Sarnafil S327-EL and Sarnafil TCS/TS77 roofing membranes will provide durable waterproof coverings with service lives in excess of 35 years and 25 years respectively (see section 11).

The BBA has awarded this Certificate to the company named above for the products described herein. These products 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 Second issue: 16 December 2013

Originally certificated on 31 March 2008

Simon Wroe
Head of Approvals — Materials

Claire Curtis-Thomas
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, Sarnafil Mechanically Fastened Roof Waterproofing Membranes, if installed, used and maintained in accordance with this Certificate, will meet or contribute to meeting 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(2) | External fire spread |
| Comment: | | On suitable substructures, the use of the membranes will enable a roof to be unrestricted under the requirements of this Regulation. See section 7 of this Certificate. |
| Requirement: | C2(b) | Resistance to moisture |
| Comment: | | The membranes, including joints, will enable a roof to meet this Requirement. See section 6.1 of this Certificate. |
| Regulation: | 7 | Materials and workmanship |
| Comment: | | The membranes are acceptable. See section 11 and the <i>Installation</i> part of this Certificate. |



The Building (Scotland) Regulations 2004 (as amended)

| | | |
|-------------|---------|--|
| Regulation: | 8(1)(2) | Fitness and durability of materials and workmanship |
| Comment: | | Use of the membranes satisfies the requirements of this Regulation. See sections 10 and 11 and the <i>Installation</i> part of this Certificate. |
| Regulation: | 9 | Building standards applicable to construction |
| Standard: | 2.8 | Spread from neighbouring buildings |
| Comment: | | On suitable non-combustible substructures, use of the membranes will be unrestricted by the requirements of this Standard, with reference to clause 2.8.1 ⁽¹⁾⁽²⁾ . See section 7 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 6.1 of this Certificate. |
| Standard: | 7.1(a) | Statement of sustainability |
| Comment: | | The membranes 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 made in relation to the membranes 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

| | | |
|-------------|---------------------|---|
| Regulation: | 23(a)(i)(iii)(b)(i) | Fitness of materials and workmanship |
| Comment: | | The membranes are acceptable. See section 11 and the <i>Installation</i> part of this Certificate. |
| Regulation: | 28(b) | Resistance to moisture and weather |
| Comment: | | The membranes, including joints, will enable a roof to meet the requirements of this Regulation. See section 6.1 of this Certificate. |
| Regulation: | 36(b) | External fire spread |
| Comment: | | On suitable substructures, the use of the membranes will be unrestricted by the requirements of this Regulation. See section 7 of this Certificate. |

Construction (Design and Management) Regulations 2007

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: 1 *Description* (1.2) and 3 *Delivery and site handling* (3.3) of this Certificate.

Additional Information

NHBC Standards 2013

NHBC accepts the use of Sarnafil Mechanically Fastened Roof Waterproofing Membranes, provided they are installed, used and maintained in accordance with this Certificate, in relation to *NHBC Standards, Part 7 Roofs, Chapter 7.1 Flat roofs and balconies*.

CE marking

The Certificate holder has taken the responsibility of CE marking the products in accordance with harmonised European Standard BS EN 13956 : 2005. An asterisk (*) appearing in this Certificate indicates that data shown is given in the manufacturer's Declaration of Performance.

Registered Contractors Scheme⁽¹⁾

The Certificate holder operates a Registered Contractors Scheme for these products under which contractors are trained, registered and regularly reviewed by the Certificate holder to demonstrate that they are competent to carry out installation in accordance with this Certificate. Details of Registered Contractors are available from the Certificate holder. Registered Contractors are responsible for each installation of the products they undertake.

(1) The Certificate holder's records relating to their Registered Contractors Scheme will be audited annually by the BBA as part of its programme of surveillance.

Technical Specification

1 Description

1.1 Sarnafil Mechanically Fastened Roof Waterproofing Membranes comprise:

- Sarnafil S327-EL — a multi-layer roof waterproofing membrane based on PVC and incorporating UV- and flame-retardant stabilisers
- Sarnafil TCS — a multi-layer, polyester-reinforced roof waterproofing membrane based on flexible polyolefins (FPO) and incorporating UV- and flame-retardant stabilisers and a non-woven glassfibre inlay
- Sarnafil TS77 — a multi-layer, polyester-reinforced, synthetic roof waterproofing membrane based on flexible polyolefins (FPO) and incorporating UV- and flame-retardant stabiliser and a non-woven glassfibre inlay.

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

Table 1 Sarnafil Mechanically Fastened Roof Waterproofing Membranes — nominal characteristics

| Characteristic (Units) | Sarnafil S327-EL | | | | Sarnafil TCS | | | Sarnafil TS77 | | | |
|--|------------------|---------|---------|---------|--------------|-------|------|----------------|----------------|----------------|----------------|
| | | | | | | | | | | | |
| Thickness (mm) | 1.2 | 1.5 | 1.8 | 2.0 | 1.5 | 1.8 | 2.0 | 1.2 | 1.5 | 1.8 | 2.0 |
| Roll length (m) | 20 | 20 | 15 | 15 | 20 | 15 | 15 | 25 | 20 | 15 | 15 |
| Roll width (m) | 2, 3 | 2, 3 | 2, 3 | 2, 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mass per unit area (kg·m ⁻²) | 1.6 | 1.9 | 2.4 | 2.6 | 1.45 | 2.0 | 2.2 | 1.2 | 1.45 | 2.0 | 2.2 |
| Roll weight (kg) | 64 | 76 | 72 | 78 | 60 | 60 | 66 | 60 | 60 | 60 | 66 |
| Colours | various | various | various | various | grey | grey | grey | grey/ beige | grey/ beige | grey/ beige | grey/ beige |
| Watertightness* | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass |
| Impact resistance* | | | | | | | | | | | |
| hard substrate | ≥450 | 600 | 700 | ≥700 | ≥600 | ≥800 | ≥900 | ≥500 | ≥700 | ≥1000 | ≥1250 |
| soft substrate | ≥800 | 900 | 1000 | ≥1000 | ≥800 | ≥1000 | ≥900 | ≥800 | ≥900 | ≥1250 | ≥1500 |
| Elongation* (%) | | | | | | | | | | | |
| longitudinal | >12 | ≥12 | ≥12 | ≥12 | ≥13 | ≥13 | ≥13 | ≥11 | ≥13 | ≥13 | ≥13 |
| transverse | >12 | ≥12 | ≥12 | ≥12 | ≥13 | ≥13 | ≥13 | ≥11 | ≥13 | ≥13 | ≥13 |
| Tear strength* (N) (≥) | | | | | | | | | | | |
| longitudinal | 200 | 200 | 200 | 200 | 250 | 250 | 250 | 300 | 300 | 300 | 300 |
| transverse | 200 | 200 | 200 | 200 | 250 | 250 | 250 | 300 | 300 | 300 | 300 |
| Dimensional stability* (%) (≤) | | | | | | | | | | | |
| longitudinal | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 |
| transverse | 0.21 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Static load resistance* (kg) (≥) | | | | | | | | | | | |
| soft substrate | – | 20 | 20 | 20 | – | – | – | 20 | 20 | 20 | 20 |
| hard substrate | – | 20 | 20 | 20 | – | – | – | 20 | 20 | 20 | 20 |
| Foldability at low temperature* (°C) (≤) | -25 | -25 | -25 | -25 | -30 | -30 | -30 | -15 | -35 | -40 | -40 |
| Tensile strength* [N·(50 mm) ⁻¹] | | | | | | | | | | | |
| longitudinal | >1100 | >1100 | >1100 | >1100 | ≥800 | ≥900 | ≥900 | ≥900 | ≥1000 | ≥300 | ≥300 |
| transverse | >1100 | >1100 | >1100 | >1100 | ≥800 | ≥900 | ≥900 | ≥800 | ≥900 | ≥300 | ≥300 |

1.3 Ancillary items necessary for installation of the system and included in this assessment are:

- Sarnabar — 2 mm thick, roll-formed galvanized bar, perforated for mechanical fixing
- Sarnafast Fastening System — approved by the Certificate holder for use with the membranes.

1.4 Other items or components which may be used with the products, but outside the scope of this Certificate, are:

- Sarnavap 500E, 1000E and 2000E — polyethylene vapour control layers
- Sarnavap Jointing Tape — double-sided tape for use in sealing the Sarnavap vapour control layers
- Sarnavap 5000E SA — self-adhered bituminous vapour control layer

- Sarnatherm — a range of thermal insulations comprising rigid urethane foam, expanded polystyrene and extruded polystyrene
- Sarnaplast 2235 — elastomeric, one-part silicone sealant for sealing edges and perimeter upstand flashings
- Primer 110 — surface primer for use on substrates prior to application of Sarnaplast 2235 on absorbent substrates/metal/Sarnafil T/TC membranes
- Sarnafil T Prep — seam preparation for use prior to hot-air welding Sarnafil TG76 and degreasing metal
- Sarnavap G/S Welding Cord — welding cord used with Sarnabar to increase wind uplift resistance at perimeters, for use with Sarnafil S membranes
- Sarnafil T Welding Cord — welding cord used with Sarnabar to increase wind uplift resistance at perimeters, for use with Sarnafil TCS and TS77 membranes
- SarnaTred Walkway pads — for roof maintenance/access.

2 Manufacture

2.1 The products are manufactured by extrusion coating plasticised PVC and FPO into sheets. The sheets are then heat laminated with a reinforcing scrim in between.

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 Sika Limited has been assessed and registered as meeting the requirements of BS EN ISO 9001: 2008 and BS EN ISO 14001 by SGS (Certificate 31982).

2.4 The product is manufactured in Switzerland and marketed in UK by the Certificate holder.

3 Delivery and site handling

3.1 Membranes are delivered to site in rolls packaged in polythene bearing a label with product identification, stock number, lot number, bulk roll number, area, date code and the BBA logo incorporating the number of this Certificate.

3.2 Rolls should be stored in a cool, dry area on a clean, level surface, and kept under cover. They should only be unwrapped from packaging at the time of installation and unused membrane should be returned to its packaging until required.

3.3 The properties of the adhesives in relation to *The Chemicals (Hazard Information and Packaging for Supply) Regulations 2009* (CHIP4)/*Classification, Labelling and Packaging of Substances and Mixtures (CLP Regulations) 2009* are given in Table 2. These products should be stored in accordance with *The Dangerous Substances and Explosive Atmospheres Regulations 2002*.

Table 2 Adhesive and Primer characteristics

| Material | Flashpoint (°C) | Classification |
|-----------------|-----------------|--|
| Sarnaplast 2235 | N/A | Irritant |
| Primer T 501 | 7 | Highly flammable/Harmful and Dangerous for the environment |
| Primer 110 | -19 | Highly flammable/Harmful |
| Sarnafil T Prep | -4 | Highly flammable/Irritant |

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Sarnafil Mechanically Fastened Roof Waterproofing Membranes.

Design Considerations

4 General

4.1 Sarnafil Mechanically Fastened Roof Waterproofing Membranes are satisfactory for use as mechanically-fixed roof waterproofing layers on flat and pitched roofs with limited access.

4.2 Limited access roofs are defined for the purpose of this Certificate as those subject only to pedestrian traffic for maintenance of the roof covering and cleaning of gutters. Where traffic in excess of this is envisaged, special precautions, such as additional protection to the membrane, must be taken (see section 9).

4.3 Flat roofs are defined for the purpose of this Certificate as those having a minimum finished fall of 1:80. Pitched roofs are defined as those having falls in excess of 1:6. For design purposes, twice the minimum finished fall should be assumed, unless a detailed analysis is available, including overall and local deflection and direction of falls.

4.4 Decks to which the membranes are to be applied must comply with the relevant requirements of BS 8217 : 2005 and BS 6229 : 2003, and, where appropriate, *NHBC Standards 2013*, Chapter 7.1.

4.5 Insulation systems or materials used in conjunction with the membranes must either be as described in the relevant clauses of BS 8217 : 2005, or be the subject of a current BBA Certificate and be used in accordance with, and within the limitations of, that Certificate.

4.6 The Sarnafil S327-EL membrane can be adversely affected by contact with bituminous or coal tar products, or polystyrene insulation boards. In these cases, a felt-backed membrane or a suitable separating layer must be used. Where doubt arises, the advice of the Certificate holder should be sought.

5 Practicability of installation

The membranes should only be installed by members of the Certificate holder's Registered Contractors Scheme (see the *Additional Information* part of this Certificate).

6 Weathertightness



6.1 Results of tests confirm that the membranes and joints between them, when completely sealed and consolidated, will adequately resist the passage of moisture to the inside of the building and so meet the requirements of the national Building Regulations:

England and Wales — Approved Document C, Requirement C2(b), Section 6.

Scotland — Mandatory Standard 3.10, clauses 3.10.1 and 3.10.7.

Northern Ireland — Regulation 28(b).

6.2 The membranes are impervious to water and will provide a weathertight roof capable of accepting minor structural movement without damage.

7 Properties in relation to fire



7.1 The following will be unrestricted:

- a system comprising a 19 mm thick plywood deck, one layer of Sarnavap vapour control layer, one layer of 80 mm Kingspan TR26 insulation and one layer of Sarnafil S327-EL membrane mechanically fastened with Sarnafast fixings
- a system comprising a 19 mm thick plywood deck, one layer of Sarnavap vapour control layer, one layer of 85 mm thick PIR insulation and one layer of Sarnafil S327-EL membrane mechanically fastened with Sarnafast fixings
- a system comprising a 19 mm thick plywood deck, one layer of Sarnavap vapour control layer, one 75 mm thick mineral wool insulation and one layer of Sarnafil S327-EL membrane mechanically fastened with Sarnafast fixings
- a system comprising an 18 mm thick plywood deck, one layer of Sarnavap 500E vapour control layer, one layer of 100 mm PIR insulation and one layer of Sarnafil TCS membrane, mechanically fastened
- a system comprising a 19 mm thick OSB deck, one layer of Sarnavap 1000E vapour control layer, one layer of 140 mm rockwool insulation and one layer of Sarnafil TS77 membrane, mechanically fastened.

7.2 The designation of other specifications (eg on combustible substrates) should be confirmed by:

England and Wales — test or assessment in accordance with Approved Document B, Appendix A, clause A1

Scotland — test to conform to Mandatory Standard 2.8, clause 2.8.1

Northern Ireland — test or assessment by a UKAS-accredited laboratory, BRE or an independent consultant with appropriate experience.

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
- the elastic limit of the membrane
- appropriate safety factors.

8.2 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 the maximum permissible loads.

8.3 The Certificate holder provides a design service which takes into account all the relevant information supplied and provides a specification for the positioning of fastening bars or washers, and the number of fixings required. Responsibility for the calculations of the design of the mechanically fastened system lies with the Certificate holder.

9 Resistance to foot traffic

Results of tests indicate that the membranes can accept the limited foot traffic and light concentrated loads associated with installation and maintenance. Reasonable care should be taken to avoid puncture by sharp objects or concentrated loads. Where traffic in excess of this is envisaged, such as maintenance of lift equipment, a walkway should be provided using SarnaTred walkway pads or concrete slabs on paving support pads.

10 Maintenance



10.1 Membranes must be the subject of annual inspections and maintenance to ensure continued performance. Exposed membrane must be free from the build-up of silt, unwanted vegetation and other debris.

10.2 A planned maintenance cycle, including inspections by the Certificate holder at minimum intervals of every five years, 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 specific maintenance requirements or localised replacement and repair.

10.3 Any damage should be repaired in accordance with section 16 and the Certificate holder's instructions.

11 Durability



11.1 The durability of all roofing materials is dependent on the roof design, installation, immediate environment, maintenance and use. Other specific factors assessed by the BBA relating to the durability of individual products include formulation, thickness, and life to first maintenance.

Sarnafil S327-EL

11.2 Accelerated ageing tests and performance in use confirm that satisfactory retention of physical properties is achieved. Available evidence indicates that a Sarnafil S327-EL roofing system, used in the context of this Certificate, should have a service life in excess of 35 years.

11.3 The products have been in use in Switzerland and the UK since 1964 and 1980 respectively. The BBA has examined the oldest available sites where a material of similar composition has been installed. Tests conducted on naturally aged material taken from existing sites and naturally aged material which has been subjected to further ageing conditions confirm satisfactory retention of properties, indicating that a service life in excess of 40 years can be achieved with periodic maintenance as stated in section 10.

Sarnafil TCS/TS77

11.4 Sarnafil TCS/TS77 have been used in Switzerland and the UK since 1989 and 1992 respectively. Accelerated weathering tests and performance in use confirm satisfactory retention of physical properties is achieved. Available evidence indicates that the membrane should have a service life in excess of 25 years.

12 Reuse and recyclability

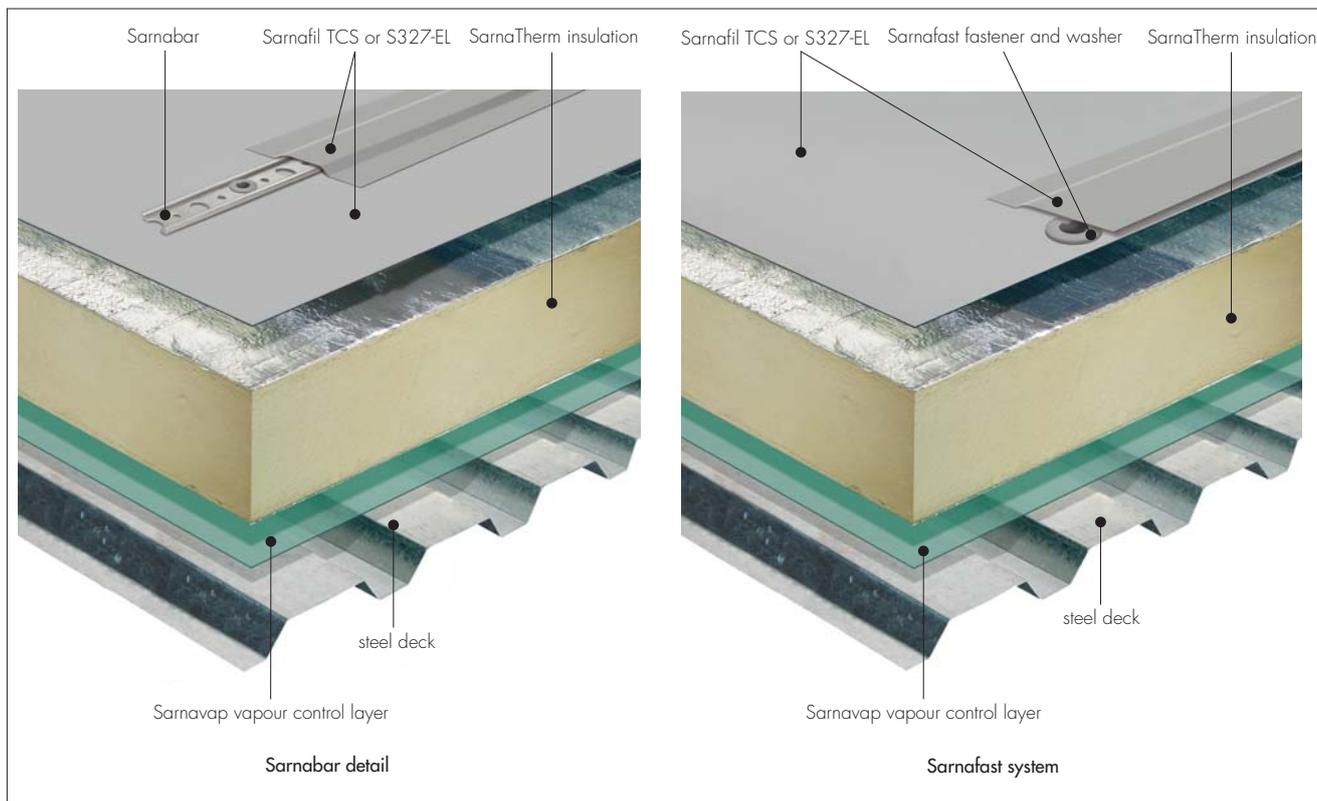
The products comprise polyvinyl chloride, flexible polyolefins, polyester and glass which can be recycled.

Installation

13 General

13.1 Installation of Sarnafil Mechanically Fastened Roof Waterproofing Membranes (see Figure 1) must be carried out by trained and approved installers working in accordance with the relevant clauses of the Certificate holder's instructions and BS 8000-4 : 1989.

Figure 1 Typical installations



13.2 Conditions on site should be those for normal roof waterproofing work. Deck surfaces must be dry, clean and free from sharp projections such as nail heads or concrete nibs. When used over a rough substrate, a suitable protection layer should be laid first.

13.3 In all cases, a vapour control layer should be used directly over the deck. When internal temperatures and humidity conditions will exceed 22°C with 50% relative humidity, special precautions should be taken and the Certificate holder must be consulted.

13.4 Insulation boards should be fixed to the substrate in such a way as not to impair the performance of the waterproofing membrane.

13.5 Installation should not be carried out during wet weather (ie rain, fog or snow).

14 Procedure

14.1 The membrane is laid flat onto the substrate without folds or ripples, and fixed to the deck either using Sarnabars fixed by screws through the membrane or by the Sarnafast system (see Figure 1) through the overlap of the membrane.

14.2 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.

14.3 The Sarnabar is waterproofed by heat welding 200 mm wide strips of Sarnafil membrane over the bar onto the main membrane (see Figure 1).

14.4 At a vertical flashing, and at penetration to the roof, the horizontal membrane requires additional fastening bars. On the perimeter, the membrane must be secured against tearing by welding a 4 mm diameter G/S or T Welding Cord to the membrane beyond the last fastening.

14.5 For continuous fixing the fastening bars are positioned with a 10 mm gap to allow for expansion. Ends of the bars should be fixed with screws.

14.6 If the laps are to be hand welded, fastening bars must run at 90° to the side laps.

Steel decks

14.7 Steel decks must be manufactured from galvanized steel with a minimum thickness of 0.7 mm.

14.8 On main roof areas Sarnabars must always run at 90° to the profiled metal deck corrugations, and mechanically fastened using self-drilling and self-tapping screws and tubes in accordance with the Certificate holder's instructions.

Reinforced concrete decks

14.9 Concrete decks will require pre-drilling. Fastening must be installed in accordance with the Certificate holder's instructions.

14.10 When re-roofing on concrete decks, fastenings must be into the concrete, particularly when using cement screeds or intermediate layers.

Timber decks

14.11 Fastening bars must be positioned above, and fixed to, beams or joists. If this is not possible, they must be positioned across the direction of timber planks, provided the planks are sufficiently fastened to withstand the imposed wind loads.

14.12 Fastening bars must be fixed using the Certificate holder's approved fasteners (nails are not suitable for this purpose). Acceptable loads on each fastener and corresponding space between fasteners in each case are calculated before installation.

15 Jointing and flashing

15.1 Jointing is by electrically heated hot-air welding. The temperature must be set in accordance with the Certificate holder's instructions.

15.2 The welding area must be dry and clean. If Sarnafil T Prep is used, it must be allowed to flash off totally prior to welding. If the membrane in the weld area has become contaminated, it must be cleaned in accordance with the Certificate holder's instructions.

15.3 The welded width of the joint must be a minimum of 25 mm. Care must be taken to ensure overheating of the membrane does not occur, as possible damage to the membrane may result.

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

15.5 Flashing and detailing are formed in accordance with the Certificate holder's instructions.

16 Repair

Repairs must be carried out by cleaning the area around the damage and applying a patch as described in the Certificate holder's instructions.

Technical Investigations

17 Tests

The following tests were carried out on samples of the membranes and the results assessed:

- on Sarnafil S327-EL
 - tensile strength
 - elongation
 - resistance to tearing
 - dimensional stability
 - heat ageing (56 days at 80°C) followed by tensile strength and elongation
 - UV ageing (500 light hours using UVB 313 lamps cycling 4 hours UV at 45°C and 4 hours condensation at 40°C) followed by tensile strength and elongation
 - water soak (28 days) followed by tensile strength and elongation
 - apparent density
 - water vapour permeability
 - ash content
 - dynamic impact on hard and soft substrate
 - static indentation on hard and soft substrate
 - low temperature flexibility
 - effectiveness of joints
- on Sarnafil TS77
 - tensile strength
 - elongation
 - water absorption
 - dimensional stability
 - tear strength at -10°C, 18°C and 40°C
 - heat ageing (90 days at 80°C) followed by tensile strength and elongation
 - UV ageing (500 hours using UVB 313 lamps cycling 4 hours UV at 45°C and 4 hours condensation at 40°C) followed by tensile strength and elongation
 - static indentation on EPS and concrete
 - dynamic indentation on EPS and concrete
 - water vapour permeability

- water vapour resistance
- water pressure
- low temperature folding
- air pressure on joints
- tensile strength of joints
- 'T' peel of joints
- heat ageing (84 days at 80°C) followed by low temperature folding
- UV ageing (100 hours using UVB 313 lamps cycling 4 hours UV at 45°C and 4 hours condensation at 50°C) followed by low temperature folding
- heat ageing (28 days at 80°C) followed by tensile strength of joints
- water soak (28 days at 60°C) followed by tensile strength of joints
- on Sarnafil TCS
 - dynamic impact on hard and soft substrate
 - static indent on hard and soft substrate
 - tensile strength of joints.

18 Investigations

18.1 Existing data on fire performance were evaluated.

18.2 The manufacturing processes were evaluated, including methods of quality control. Details were also obtained of the quality and composition of the materials used.

18.3 A visit to a site in progress was carried out to assess the practicability of installation.

18.4 Visits were made to existing sites in the UK to assess the performance in use of Sarnafil S327-EL system.

18.5 Wind uplift data on mechanically-fixed systems were assessed.

18.6 A reassessment of the *Durability* statement was based on visits to existing sites in Switzerland and in the UK and the results of tests conducted on unaged, naturally-aged and accelerated-aged material of similar formulation to Sarnafil S327-EL.

18.7 A reassessment of the *Durability* statement was based on visits to existing sites in Europe and on the results of tests conducted on Sarnafil TS77 unaged and naturally-aged material.

18.8 A user survey was carried out to assess the performance of products in use.

Bibliography

BS 6229 : 2003 *Flat roofs with continuously supported coverings — Code of practice*

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 1992-1-1 : 2004 *Eurocode 2 : Design of concrete structures — General rules and rules for buildings*

NA to BS EN 1992-1-1 : 2004 *UK National Annex to Eurocode 2 : Design of concrete structures — General rules and rules for buildings*

BS EN 13956 : 2005 *Flexible sheet for waterproofing — Plastic and rubber sheets for roof waterproofing — Definitions and characteristics*

BS EN ISO 9001 : 2008 *Quality management systems — Requirements*

BS EN ISO 14001 : 2004 *Environmental management systems — Requirements with guidance for use.*

19 Conditions

19.1 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.

19.2 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.

19.3 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.

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

19.5 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:

- 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
- 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.

19.6 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.