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Designated by Government
to issue
European Technical
Approvals

**SARNAFIL MECHANICALLY FASTENED
ROOF WATERPROOFING SYSTEMS**

Système d'étanchéité
Dachabdichtungen

Product

• THIS CERTIFICATE REPLACES AND EXTENDS CERTIFICATE Nos 98/3512 AND 87/1849 AND RELATES TO SARNAFIL MECHANICALLY FASTENED ROOF WATERPROOFING SYSTEMS.

- The systems consist of single ply polymeric membranes and ancillary components, and are for use as a mechanically fastened system on flat or pitched roofs with limited access
- The systems are manufactured in Switzerland by SSC AG and marketed in the United Kingdom by Sarnafil Ltd.

Regulations**1 The Building Regulations 2000 (as amended) (England and Wales)**

In the opinion of the BBA, Sarnafil Mechanically Fastened Roof Waterproofing Systems, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements.

Requirement: **B4(2)**

External fire spread

Comment:

Data obtained from tests to BS 476-3 : 2004 indicate that on suitable non-combustible substructures the use of the membranes will enable a roof to be unrestricted under the requirements of this Regulation. See sections 11.1 and 11.2 of this Certificate.

Requirement: **C2(b)**

Resistance to moisture

Comment:

Data for water resistance on the membrane, including joints, indicate that the systems meet this Requirement. See section 8.1 of this Certificate.

Requirement: **Regulation 7**

Materials and workmanship

Comment:

The membranes are acceptable. See the sections 13.1 to 13.5 and the *Installation* part of this Certificate.

continued

continued

• The Certificate holder operates a Registered Contractors Scheme⁽¹⁾ for this product under which the contractors are trained, registered and regularly reviewed by the Certificate holder to demonstrate that they are competent to carry out installation of the product in accordance with this Certificate. Details of Registered Contractors are available from the Certificate holder. Registered Contractors are responsible for each installation of the product 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.

2 The Building (Scotland) Regulations 2004 (as amended)



In the opinion of the BBA, Sarnafil Mechanically Fastened Roof Waterproofing Systems, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Regulations and related Mandatory Standards as listed below.

<p>Regulation: 8(1)(2) Comment:</p>	<p>Fitness and durability of materials and workmanship The use of the membranes satisfies the requirements of this Regulation. See sections 12.1, 12.2 and 13.1 to 13.5 and the <i>Installation</i> part of this Certificate.</p>
<p>Regulation: 9 Standard: 2.8 Comment:</p>	<p>Building standards – construction Spread from neighbouring buildings Test data to BS 476-3 : 2004 indicate that on suitable non-combustible substructures the use of the material will be unrestricted by the requirements of this Standard, with reference to clauses 2.8.1⁽¹⁾⁽²⁾ and 2.8.2⁽¹⁾⁽²⁾. See sections 11.1 and 11.2 of this Certificate.</p>
<p>Standard: 3.10 Comment:</p>	<p>Precipitation Data for water resistance on the membranes, including joints, indicate that its use can enable a roof to satisfy the requirements of this Standard, with reference to clauses 3.10.1⁽¹⁾⁽²⁾ and 3.10.2⁽¹⁾⁽²⁾. See section 8.1 of this Certificate.</p>
<p>Regulation: 12 Comment:</p>	<p>Building standards – conversions All comments given for these systems under Regulation 9, 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).</p>

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



In the opinion of the BBA, Sarnafil Mechanically Fastened Roof Waterproofing Systems, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Building Regulations as listed below.

<p>Regulation: B2 Comment:</p>	<p>Fitness of materials and workmanship The membranes are acceptable. See sections 13.1 to 13.5 and the <i>Installation</i> parts of this Certificate.</p>
<p>Regulation: B3(2) Comment:</p>	<p>Suitability of materials The systems are acceptable. See sections 12.1 and 12.2 of this Certificate.</p>
<p>Regulation: C4(b) Comment:</p>	<p>Resistance to ground moisture and weather Data for water resistance on the membranes, including joints, indicate that the use of the systems can enable a roof to satisfy the requirements of this Regulation. See section 8.1 of this Certificate.</p>
<p>Regulation: E5 Comment:</p>	<p>External fire spread Test data to BS 476-3 : 2004 indicate that on suitable non-combustible substructures the use of the membranes will be unrestricted by the requirements of this Regulation. See sections 11.1 and 11.2 of this Certificate.</p>

4 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: 5 *Description* (5.2) and 6 *Delivery and site handling* (6.3) of this Certificate.

Technical Specification

5 Description

5.1 Sarnafil Mechanically Fastened Roof Waterproofing Systems comprise:

• Sarnafil S327-EL membrane — manufactured by coating the polyester fabric base on both sides with a PVC plastisol coating, fused into one homogeneous sheet. The coating can be applied in several layers to achieve the required membrane thickness and is then passed through a gelation oven. Sarnafil S327 is also available with a non-woven polyester felt (300 gm²) laminated to the underside of the membrane as an integral separation layer.

• Sarnafil TS77 membrane — manufactured from a flexible polypropylene alloy compound, reinforced with a combination of glassfibre matting and synthetic scrim by extrusion coating.

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

Table 1 Nominal characteristics

Characteristics (units)	Sarnafil S327-EL			Sarnafil TS77	
Thickness (mm)	1.2	1.5	1.8	1.2	1.5
Roll length (m)	20	20	15	25	20
Roll width (m)	2, 3	2, 3	2, 3	2	2
Weight (kgm ²)	1.6	1.9	2.4	1.20	1.45
Roll weight (kg)	64	76	72	60	60
Colours	various	various	various	grey	grey

5.3 Ancillary items for use with the membranes include:

- Sarnavap 500E, 1000E, 2000E and 5000E SA polyethylene vapour control layer
- Sarnavap Jointing Tape — a double-sided tape for use in sealing the Sarnavap vapour control layers
- Sarnavap 5000E SA — self-adhered bituminous vapour control layer
- SarnaFelt types A, M and S — polypropylene-based felts for use as cushion separation layers
- Glassmat 120 — glassfibre separation layer for use with polystyrene insulation boards
- Sarnafelt Type T — polyester felt for use as a barrier to bitumen and polystyrene insulation boards
- SarnaTherm — a range of thermal insulations, comprising rigid urethane foam, phenolic foam, mineral wool, expanded polystyrene and extruded polystyrene
- Sarnaplast 2235 — an 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
- Sarnafil T Bonding Primer — a surface primer
- Sarnafil T Prep — for seam preparation prior to hot-air welding and for degreasing metal
- SarnaTred — a recycled PVC 600 mm by 600 mm by 6 mm walkway tile that is hot-air welded to the Sarnafil membrane
- SarnaSafe demarcation tape — bright yellow tape, hot-air welded to the membrane to highlight areas such as walkways, cable runs for fall arrest system roof edges, steps
- Sarnametal S or TS — a galvanized metal sheet with Sarnafil S or TS factory laminated to it, for use in prefabricated flashings and drip details
- SarnaDeck — a range of trapezoidal profiled metal decks
- Sarnalite — a range of rooflight systems
- Sarnafil Constant Force post — cable-based fall arrest and restraint system
- Sarnafil Double rainwater outlet — insulated and sealable outlet for gravity and siphonic systems
- Sarnafil T Prefabricated Corners — a range of prefabricated internal and external corner flashing pieces
- Sarnafil T Vent Pipe Flashings — prefabricated pipe flashings in a range of diameters
- Sarnafil T Post Flashings — prefabricated post flashings in a range of diameters and forms
- Sarnavap G Welding Cord — welding cord used with Sarnabar to increase wind uplift resistance at perimeters. For use with Sarnafil S
- Sarnafil T Welding Cord — welding cord used with Sarnabar to increase wind uplift resistance at perimeters. For use with Sarnafil TS
- Sarnabar — 2 mm thick, roll-formed galvanized bar, perforated at 25 mm centres for mechanical fixing
- Sarnafast Fastening System — approved by the Certificate holder for use with the system.

5.4 Quality control checks are carried out on incoming raw materials, during production and on the finished product. Checks on the final product include:

- thickness
- lamination
- tensile strength and elongation

- heat resistance test
- mechanical impact test
- gelation test.

6 Delivery and site handling

6.1 The membranes are delivered to site in rolls packaged in polyethylene bearing a label with product identification, stock number, lot number, bulk roll number, area, date code and the BBA identification mark incorporating the number of this Certificate.

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

6.3 Ancillary items classified under *The Chemicals (Hazard Information and Packaging for Supply) Regulations 2002* (CHIP3) are given in Table 2 along with flashpoints. These products bear the appropriate hazard warning.

Table 2 Adhesive characteristics

Material	Flashpoint (°C)	Classification
Sarnacol 2235	<21	Highly flammable
Sarnafil T Primer 501	8	Highly flammable, harmful and irritant
Primer 110	-10	Extremely flammable, harmful
Sarnafil T Prep	<21	Highly flammable, irritant

Design Data

7 General

7.1 Sarnafil Mechanically Fastened Roof Waterproofing Systems are satisfactory for use as a mechanically fixed roof waterproofing layer on pitched and flat roofs with limited access.

7.2 Limited access roofs are defined for the purpose of this Certificate as those roofs that are subjected 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.

7.3 Flat roofs are defined for the purpose of this Certificate as those roofs 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 of the roof is available, including overall and local deflection, direction of falls, etc.

7.4 Decks to which this system is to be applied must comply with the relevant requirements of BS 8217 : 2005 and BS 6229 : 2003, and, where appropriate, *NHBC Standards 2007*, Chapter 7.1 or *Zurich Building Guarantee Technical Manual 2007*, Section 4, *Superstructure*, Sub-section *Flat roofs* (pages 266 and 268).

7.5 Insulation materials used in conjunction with the system must be one of the following:

- as described in the relevant clauses of BS 8217 : 2005
- the subject of a current BBA Certificate and be used in accordance with and within the limitations of that Certificate.

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

8 Weathertightness



8.1 Data confirm that the membrane, and joints in the membrane, 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 C2(b), Section 6.0.

Scotland

Mandatory Standard 3.10, clauses 3.10.1⁽¹⁾⁽²⁾ and 3.10.2⁽¹⁾⁽²⁾.

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

Northern Ireland

Regulation C4(b).

8.2 The membrane is impervious to water and when used as described in this Certificate, will achieve a weathertight roof capable of accepting minor structural movement without damage.

9 Resistance to wind uplift

9.1 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.

9.2 The number of fixings used should be established by reference to the wind uplift forces calculated in accordance with BS 6399-2 : 1997 on the basis of the maximum permissible loads.

9.3 The Certificate holder provides a design service which takes into account all the relevant information supplied and gives assistance for the preparation of drawings for the positioning of fastening bars or washers, and the number of fixings required. The Certificate holder takes the liability for the calculations of the design of the mechanically fastened system.

10 Resistance to foot traffic

Data indicate that the membrane can withstand, without damage, the limited foot traffic and light concentrated loads associated with the installation and maintenance operations. Reasonable care should be taken, however, to avoid sharp objects or concentrated loads. Anywhere regular traffic is envisaged, ie maintenance of lift equipment, a walkway should be provided using concrete slabs supported on bearing pads.

11 Properties in relation to fire



11.1 When tested in accordance with BS 476-3 : 2004:

- a system comprising 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 TS77-12E membrane mechanically fixed, achieved an EXT.F.AC rating

- a system comprising 19 mm thick plywood deck, one layer of Sarnavap Ecovap vapour control layer, one 80 mm Kingspan TR26 insulation and one layer of Sarnafil S327-12EL membrane, mechanically fixed with Sarnafast fixing achieved an EXT.S.AB rating
- a system comprising 19 mm thick plywood deck, one layer of Sarnavap vapour control layer, one 85 mm thick PIR insulation and one layer Sarnafil S327-12EL membrane, mechanically fastened with Sarnafast fixings achieved an EXT.F.AC rating
- a system comprising 19 mm thick plywood deck, one layer of Sarnavap vapour control layer, one 75 mm thick mineral wool insulation and one layer of Sarnafil S327-12EL thick (3 m wide) membrane mechanically fixed with Sarnafast fixings, achieved an EXT.F.AC rating.

11.2 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, clauses 2.8.1⁽¹⁾⁽²⁾ and 2.8.2⁽¹⁾⁽²⁾.

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

Northern Ireland

Test or assessment by a UKAS accredited laboratory, BRE or an independent consultant with appropriate experience.

12 Maintenance



12.1 Roofs covered with the system should be the subject of annual inspections, as is good practice with single-layer waterproofing systems, to ensure continued security and performance, especially those roofs without ballast.

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

13 Durability



13.1 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 of any coating.

Sarnafil S

13.2 Accelerated ageing tests and performance in use confirm that satisfactory retention of physical properties is achieved. All available evidence indicates that a Sarnafil S roofing system, used in the context of this Certificate, should have a life in excess of 35 years.

13.3 A planned maintenance cycle and inspections by the Certificate holder under the Sarnafil Quality Management System 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 thicker membranes, specific maintenance requirements, eg maintenance coating or localised replacement or repair (see section 12).

13.4 The product has been in use in Switzerland and the United Kingdom 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 this 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 life in excess of 40 years can be achieved with periodic maintenance as stated in section 13.3.

Sarnafil TS77

13.5 Sarnafil TS77 has 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. All available evidence indicates that Sarnafil TS77 should have a life in excess of 25 years.

Installation

14 General

14.1 Installation of Sarnafil Mechanically Fastened Roof Waterproofing Systems 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.

14.2 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, concrete nibs. When used over a rough substrate, a suitable protection layer should be placed over the substrate.

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

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

14.5 Installation should not be carried out during wet weather (eg rain, fog, snow).

15 Procedure

15.1 The membrane should be 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.

15.2 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.

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

15.4 At a vertical flashing, and penetration of 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 PVC cord to the membrane beyond the last fastening.

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

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

Steel decks

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

15.8 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 deck

15.9 Concrete decks will require pre-drilling. The diameter of the holes should not be less than 6 mm and nylon dowels or self-tapping anchors are recommended. Fastening must be installed in accordance with the Certificate holders instructions.

15.10 When re-roofing on concrete decks, dowels must be anchored for their full length in solid concrete. This should be noted particularly when using cement screeds or intermediate layers.

Timber decks

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

15.12 Fastening bars must be fixed by screws (nails are not suitable for this purpose), acceptable loads on each screw and corresponding space between screws in each case are calculated before installation.

16 Jointing and flashing procedure

Hot-air welding

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

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

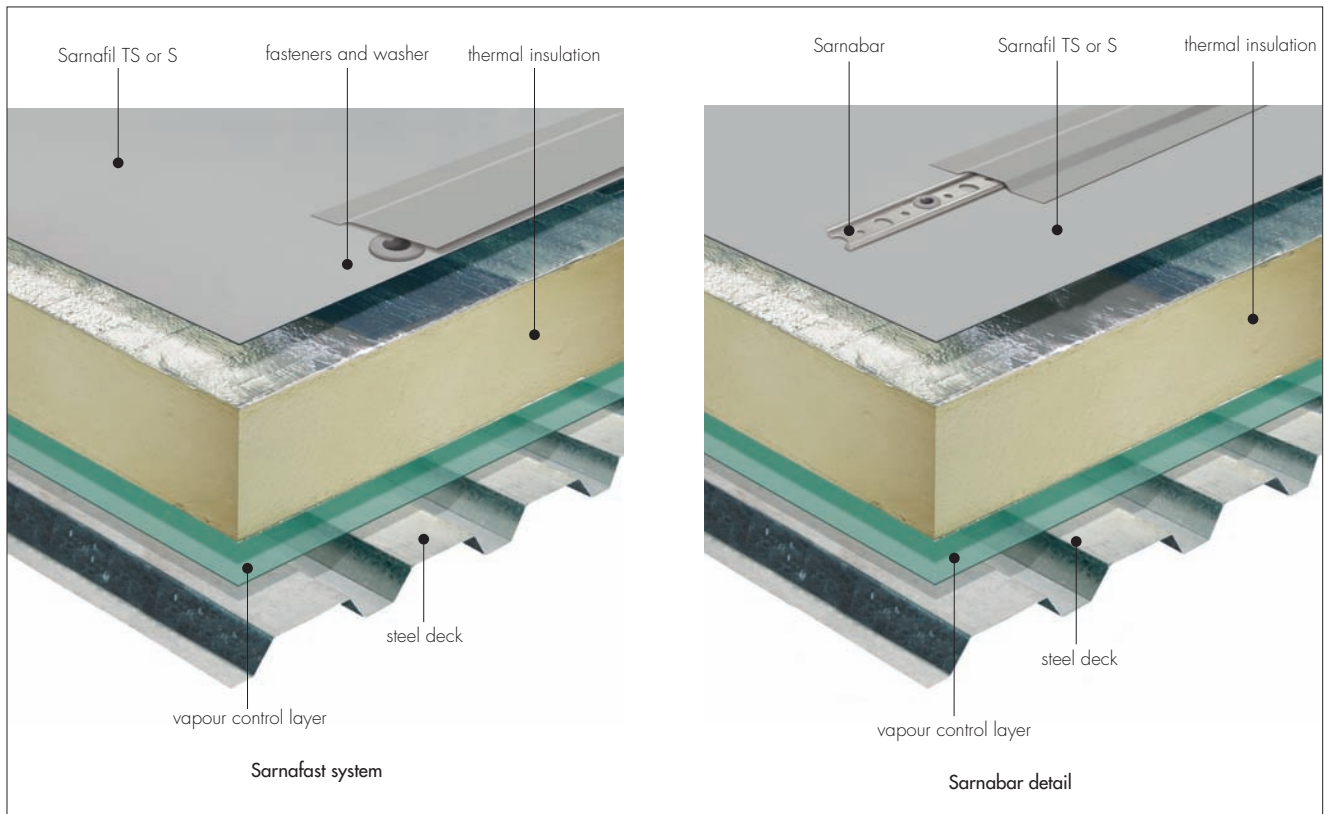
16.3 The welded width of the joint must be a minimum of 25 mm. Care should be taken that overheating of the membrane does not occur, as possible damage of the membrane may result.

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

Flashing

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

Figure 1 Fixing detail



Technical Investigations

The following is a summary of technical investigations carried out on Sarnafil Mechanically Fastened Roof Waterproofing Systems.

17 Tests

Data from tests carried out or assessed by the BBA are summarised in Tables 3 to 7.

Table 3 Physical properties — directional Sarnafil S327

Test (units)	Method ⁽¹⁾	Mean results	
		Long ⁽²⁾	Trans ⁽³⁾
Tensile strength (Nmm ⁻²)	BS 2782-3.320A speed : 500 mm min ⁻¹	20.1	16.9
unaged		20.6	23.5
heat aged ⁽⁴⁾		23.7	17.7
UV aged ⁽⁵⁾		20.1	17.9
water soak ⁽⁶⁾			
Elongation (%)	BS 2782-3.320A speed : 500 mm min ⁻¹	20	20
unaged		10	10
heat aged ⁽⁴⁾		20	20
UV aged ⁽⁵⁾		20	20
water soak ⁽⁶⁾			
Resistance to tearing (N)	MOAT 27 : 5.4.1	430	405
Dimensional change (free) (%)	MOAT 27 : 5.1.6.1	0.16	0.21

- (1) The test documents are detailed in the *Bibliography*. Numbers in the table refer to sections/parts of the various documents.
- (2) Longitudinal or machine direction.
- (3) Transverse or cross-direction.
- (4) Heat aged at 56 days in an oven at 80°C.
- (5) UV aged 500 light hours using UVB 313 lamps cycling 4 hours UV/45°C and 4 hours condensation at 40°C.
- (6) Water soak 28 days water soak at 23 ± 2°C.

Table 4 Physical properties — directional TS77 (1.2 mm thick)

Test (units)	Method ⁽¹⁾	Mean results	
		Long ⁽²⁾	Trans ⁽³⁾
Tensile strength (N 50 mm ⁻¹)	MOAT 60 : 4.8 (200 mm min ⁻¹)	1240	1199
unaged		1104	1192
heat aged ⁽⁴⁾		1238	1150
UV aged ⁽⁵⁾			
Strain at maximum load (%)	MOAT 60 : 4.8 (200 mm min ⁻¹)	19	21
unaged		21	22
heat aged ⁽⁴⁾		20	21
UV aged ⁽⁵⁾			
Water absorption (%)	MOAT 46 : 6j	4.4	
Dimensional stability (%)	MOAT 27 : 5.1.6	-0.12	-0.04
Tear strength (nail) (N)	MOAT 55 : 4.231 (100 mm min ⁻¹)	510	600
-10°C		540	620
+18°C		420	490
+40°C			

- (1) The test documents are detailed in the *Bibliography*. Numbers in the table refer to the sections/parts of the various documents.
- (2) Longitudinal direction.
- (3) Transverse direction.
- (4) Heat aged 90 days at 80°C.
- (5) UV aged in accordance with ASTM G53 : 1996 UVB 313 lamps, 4 hours at 45°C and 4 hours condensation at 50°C for 1000 light hours.

Table 5 Physical properties — general Sarnafil S327

Test (units)	Method ⁽¹⁾	Mean result
Apparent density (kgm ⁻³)	BS 2782-6.620A	1250
Water vapour permeability (gm ⁻² day ⁻¹)	BS 3177 (at 25°C/75% RH)	3.5
Ash content (%)	ISO 1270	5.3

- (1) The test documents are detailed in the *Bibliography*. Numbers in the table refer to sections/parts of the various documents.

Table 6 Service performance — Sarnafil TS77 (1.2 mm thick)

Test (units)	Method ⁽¹⁾	Mean result
Static indentation concrete EPS	MOAT 27 : 5.1.9	L ₄ L ₄
Dynamic indentation perlite EPS	MOAT 27 : 5.1.10	I ₃ I ₃
Water vapour permeability (gm ⁻² 24 h ⁻¹)	BS 3177 (25°C/75% RH)	0.55
Water vapour resistance (MNsg ⁻¹)	BS 3177 (25°C/75% RH)	373
Water pressure	MOAT 27 : 5.1.4	pass
Resistance to folding at low temperature (°C)	DIN 53361	
unaged		-25
UV aged ⁽²⁾		-25
heat aged ⁽³⁾		-25
Air pressure on joint	MOAT 27 : 5.2.1	pass
Tensile strength of joints (N 50 mm ⁻¹)	MOAT 27 : 5.2.2/3/4 (200 mm min ⁻¹)	
control		910
heat aged ⁽⁴⁾		880
water soak ⁽⁵⁾		700
'T' peel (N)	MOAT 46 : 6P	
unaged		414
heat aged ⁽⁴⁾		418

(1) The test documents are detailed in the *Bibliography*. Numbers in the table refer to the sections/parts of the various documents.

(1) Lowest temperature tested -40°C.

(2) UV aged 1000 hours in the UV 313, UV at 45°C, condensation at 50°C.

(3) Heat aged 84 days at 80°C.

(4) Heat aged 28 days at 80°C.

(5) Water soak 28 days at 60°C.

Table 7 Service performance — Sarnafil S327

Test	Method ⁽¹⁾	Result
Resistance to water pressure	MOAT 27 : 5.1.4	no penetration
Dynamic impact hard substrate soft substrate	MOAT 27 : 5.1.10	I ₄ I ₄
Static indentation hard substrate soft substrate	MOAT 27 : 5.1.9	L ₄ L ₄
Low temperature flexibility (20 mm ø mandrel to -20°C)	MOAT 27 : 5.4.2	satisfactory
Effectiveness of joints	MOAT 27 : 5.2.1	satisfactory

(1) The test document is detailed in the *Bibliography*. Numbers in the table refer to parts of the document.

18 Investigations

18.1 Existing data on fire performance to BS 476-3 : 2004 was examined.

18.2 The manufacturing processes were examined, 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 of the Sarnafil TS77 and Sarnafil S systems.

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

18.5 Wind uplift data on mechanically fixed systems from WSP Aachen, tested in accordance with MOAT No 55 : 1991, were examined.

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 a material of similar formulation to Sarnafil S327 unaged, naturally-aged and accelerated aged material.

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.

Bibliography

BS 476-3 : 2004 *Fire tests on building materials and structures — Classification and method of test for external fire exposure to roofs*

BS 3177 : 1959 *Method for determining the permeability to water vapour of flexible sheet materials used for packaging*

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

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

BS 2782-3.320A to 320F : 1976 *Methods of testing plastics — Mechanical properties — Tensile strength, elongation and elastic modulus*

BS 2782-6.620A to 620D : 1991 *Methods of testing plastics — Dimensional properties — Determination of density and relative density of non-cellular plastics*

BS 8000-4 : 1989 *Workmanship on building sites — Code of practice for waterproofing*

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

ISO 1270 : 1975 *Plastics — PVC resins — Determination of ash and sulphated ash*

MOAT No 27 : 1983 *General Directive for the Assessment of Roof Waterproofing Systems*

MOAT No 46 : 1988 *Special Directives for the Assessment of Roof Waterproofing Systems with Non-reinforced Vulcanized EPDM*

MOAT No 55 : 1991 *UEAtc Supplementary guide for the assessment of mechanically fastened roof waterproofing*

MOAT No 60 : 1997 *Technical Guide for the approval of reinforced and/or backed roof waterproofing systems made of plasticised PVC Sheeting incompatible with bitumen*

DIN 53361 June 1982 *Testing artificial leather and similar sheet materials. Determination of behaviour when folded at low temperature*

ASTM G 53 : 1996 *Standing practice for operating light and water-exposure apparatus (fluorescent UV-condensation type) for exposure of nonmetallic compounds*

Conditions of Certification

19 Conditions

19.1 This Certificate:

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

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

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

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

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

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- individual installations of the product/system, including the nature, design, methods and workmanship of or related to the installation
- the actual works in which the product/system is installed, used and maintained, including the nature, design, methods and workmanship of such works.

19.5 Any information relating to the manufacture, supply, installation, use and maintenance of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used and maintained. It does not purport in any way to restate the requirements of the Health & Safety at Work etc Act 1974, or of any other statutory, common law or other duty which may exist at the date of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the manufacture, supply, installation, use and maintenance of this product/system.



In the opinion of the British Board of Agrément, Sarnafil Mechanically Fastened Roof Waterproofing Systems are fit for their intended use provided they are installed, used and maintained as set out in this Certificate. Certificate No 08/4532 is accordingly awarded to Sarnafil Ltd.

On behalf of the British Board of Agrément

Head of Approvals
— Material

Chief Executive

Date of issue: 31st March 2008