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**Agrément
Certificate
No 97/3325**

Designated by Government
to issue
European Technical
Approvals

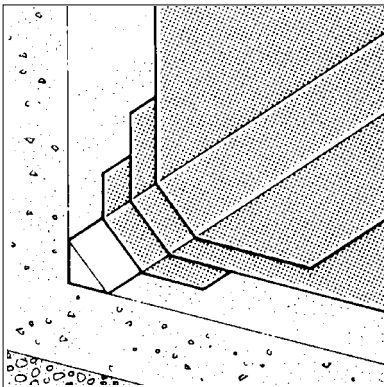
BITUTHENE MEMBRANES

Membrane d'étanchéité
Wasserdichtungsmittel

Product


• *THIS CERTIFICATE REPLACES CERTIFICATE No 90/2553 AND RELATES TO BITUTHENE SELF-ADHESIVE WATER- AND DAMP-PROOF MEMBRANES CONSISTING OF A TOP LAYER OF HIGH PERFORMANCE HDPE FILM AND A BOTTOM LAYER OF BITUMEN/POLYMER ADHESIVE.*

These Front Sheets must be read in conjunction with the accompanying Detail Sheets, which provide information for specific membranes.




Building Regulations — Detail Sheet 1

1 The Building Regulations 1991 (as amended 1994) (England and Wales)

 The Secretary of State has agreed with the British Board of Agrément the aspects of performance to be used by the BBA in assessing the compliance of damp-proof membranes with the Building Regulations. In the opinion of the BBA, Bituthene Membranes, if used in accordance with the provisions of this Certificate, will meet the relevant requirements.


Requirement:	C4	Resistance to weather and ground moisture
Comment:		Tests indicate that the products meet this Requirement. See section 5.1 of these Front Sheets.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The products are acceptable materials. See section 10 of these Front Sheets.

2 The Building Standards (Scotland) Regulations 1990 (as amended)

 In the opinion of the BBA, Bituthene Membranes, if used in accordance with the provisions of this Certificate, can satisfy or contribute to satisfying the various Regulations as listed below.

Regulation:	10	Fitness of materials
Standard:	B2.1	Selection and use of materials and components
Comment:		The products comply with this Standard.
Regulation:	17	Preparation of sites and resistance to moisture
Standard:	G2.6	Resistance to moisture from the ground
Comment:		The products can enable a floor to satisfy the requirements of this Standard. See section 5.1 of these Front Sheets.

3 The Building Regulations (Northern Ireland) 1994 (as amended 1995)

 In the opinion of the BBA, Bituthene Membranes, if used in accordance with the provisions of this Certificate, can satisfy the various Building Regulations as listed below.

Regulation:	B2	Fitness of materials and workmanship
Comment:		The products are acceptable materials. See section 10 of these Front Sheets.
Regulation:	C5	Resistance to ground moisture and weather
Comment:		Tests indicate that the materials satisfy the requirements of these Regulations. See section 5.1 of these Front Sheets.

4 General

The membranes are compatible with concrete, smooth brickwork and blockwork or screeded substrates and are resistant to those chemicals likely to occur in normal service conditions.

5 Resistance to water and water vapour



5.1 Tests confirm that the membranes and joints in the membranes, when completely sealed and consolidated, will adequately resist the passage of moisture from the ground and so meet the relevant requirements of the national Building Regulations:

England and Wales

Section 3.3 of Approved Document C4

Scotland

Regulation 17, Standard G2.6

Northern Ireland

Regulation C5.

5.2 The membranes are impervious to water and, when used and installed in accordance with this Certificate, will give a waterproof layer capable of accepting minor structural movements without damage.

6 Resistance to puncture

6.1 The membranes can be punctured by sharp objects and care should be taken in handling building materials over the exposed surface.

6.2 Provided there are no sharp objects present on the membrane surfaces prior to and during installation of the protective layer, the products will not be damaged by normal foot or site traffic.

7 Adhesion and stability

The adhesion of the membranes to the substrates and to themselves is satisfactory. The properties are such as to accommodate minor movements likely to occur under normal service conditions in the structure in which the membranes are incorporated.

8 Effects of temperature

8.1 The membranes remain flexible and capable of being formed at the minimum recommended temperatures (see section 4.4 of relevant Detail Sheet).

8.2 When installed in accordance with this Certificate (ie protected immediately after installation), the membranes should not achieve temperatures at which slippage due to softening of the adhesive layer can occur.

9 Maintenance and repair

Damage to the membranes can be adequately repaired by patching prior to the application of protection or backfilling.

10 Durability



Bituthene Membranes, when fully protected and subjected to normal service conditions, will provide effective barriers to the transmission of liquid water and water vapour for the life of the structures in which they are incorporated.

Conditions of Certification

11 Conditions

11.1 Where reference is made in this Certificate to any Act of Parliament, Regulation made thereunder, Statutory Instrument, Code of Practice, British Standard, manufacturer's instruction or similar publication, it shall be construed as reference to such publication in the form in which it is in force at the date of this Certificate.

11.2 The quality of materials and the method of manufacture have been examined and found satisfactory by the BBA and must be maintained to this standard during the period of validity of this Certificate. This Certificate will remain valid for an unlimited period provided:

- (a) the specification of the product is unchanged; and
- (b) the manufacturer continues to have the product checked by the BBA.

11.3 This Certificate will apply only to the product that is installed, used and maintained as set out in this Certificate.

11.4 In granting this Certificate, the BBA makes no representation as to:

- (a) the presence or absence of patent or similar rights subsisting in the product; and
- (b) the legal right of the Certificate holder to market, install or maintain the product; and
- (c) the nature of individual installations of the product, including methods and workmanship.

11.5 It should be noted that any recommendations relating to the safe use of this product which are contained or referred to in this Certificate are the minimum standards required to be met when the product is used. They do not purport in any way to restate the requirements of the Health & Safety at Work etc Act 1974, or of any other statutory or Common Law duties of care, or of any duty of care which exist at the date of this Certificate or in the future; nor is conformity with such recommendations to be taken as satisfying the requirements of the 1974 Act or of any present or future statutory or Common Law duties 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 use of this product.



In the opinion of the British Board of Agrément, Bituthene Membranes are fit for their intended use provided they are installed, used and maintained as set out in this Certificate. Certificate No 97/3325 is accordingly awarded to Grace Construction Products Ltd.

On behalf of the British Board of Agrément

Date of issue: 3rd February 1997

Director

Electronic Copy

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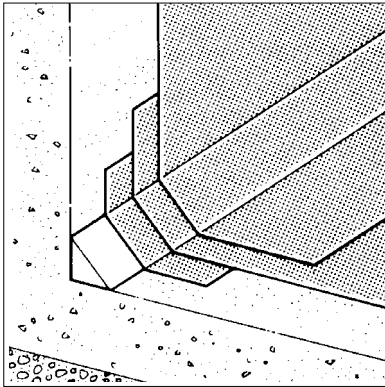
Grace Construction Products Ltd

**BITUTHENE 2000 AND 3000
MEMBRANES**

Certificate No 97/3325

DETAIL SHEET 2
Second issue*

Product



• THIS DETAIL SHEET REPLACES CERTIFICATE No 90/2553 AND RELATES TO BITUTHENE 2000 AND 3000 SELF-ADHESIVE DAMP-PROOF AND WATERPROOF MEMBRANES⁽¹⁾.

• Both membranes are for use as damp-proof and waterproof membranes for solid concrete floors.

• Bituthene 3000 is for use as a damp-proof and waterproof membrane for underground structures and for externally applied tanking below ground.

This Detail Sheet must be read in conjunction with the Front Sheets, which give the product's position regarding the Building Regulations, general information relating to the product, and the Conditions of Certification.

(1) Formerly Bituthene 500X and 1000X respectively.

Technical Specification

1 Description

1.1 Bituthene 2000 and 3000 are two-ply self-adhesive damp-proof membranes comprising a top layer of high performance, high density polythene (PE-HD) bonded to a layer of bitumen/polymer adhesive carried on a release paper.

1.2 The nominal dimensions of the membranes are shown in Table 1.

Table 1 Nominal dimensions

	2000	3000
thickness (mm)	1.0	1.5
width (m)	1	1
roll length (m)	25	20
roll weight (kg)	30	32
weight per unit area (kgm ⁻²)	1.07	1.6

1.3 Ancillary products are:

Bituthene Liquid Membrane — a liquid-applied compound for sealing irregular surfaces

Bituthene Mastic — a bituminous putty used for sealing irregularities and terminations

Bituthene Fillet — a preformed angle fillet to allow membranes to be dressed round angle corners

Primer B1 — a bituminous solution for priming substrates before application of membranes on vertical surfaces or suspended slabs

Korkpak, Servipak and Insupak — a range of protective layers.

1.4 Quality control checks are made on the incoming bitumen, including viscosity, softening point and penetration. The softening point and penetration of the polymer modified bitumen compound and the release properties of the silicone release paper are also checked.

2 Delivery and site handling

2.1 Rolls are packed with application instructions in polythene wrappers and cardboard containers marked with the roll batch number and bear the manufacturer's name and the BBA identification mark incorporating the number of this Certificate.

2.2 Rolls must be stacked on end and stored under cover below 30°C. Primer and mastic should be stored in a dry, sealed area for inflammable materials.

Bituthene damp-proof membranes will not be damaged by normal foot traffic.

3 General

3.1 Bituthene 2000 membrane is satisfactory for use as a damp-proof membrane under concrete, screed and floor slabs, in accordance with CP 102 : 1973, Section 2.

3.2 Bituthene 3000 membrane is satisfactory for use as a damp-proof and waterproof membrane for podium slabs, roofs to underground car parks, etc and for tanking below ground, in accordance with BS 8102 : 1990.

Installation

4 General

4.1 The membranes must be installed in accordance with the relevant requirements of CP 102 : 1973, Section 2, or BS 8102 : 1990 and the manufacturer's instructions. Additional guidance on the use of dpm materials is available in BS 8000 : Part 4 : 1989.

4.2 All surfaces to which Bituthene is applied should have a smooth finish, ie they should be free from cavities, projections and mortar deposits. Surfaces should be dry and free from dust and frost. Concrete surfaces should be dense. In basement construction vertical surfaces should be primed with Primer B1 at a rate of 10 m² per litre to 12 m² per litre prior to the application of Bituthene.

4.3 Vertical surfaces of brickwork and blockwork should be dry and rendered to provide an even surface. Brickwork or blockwork not rendered must be flush pointed to give a smooth surface without sudden changes in level. Vertical surfaces should be primed with Primer B1 at a rate of 10 m² per litre to 12 m² per litre.

4.4 Bituthene can be installed in all normal site conditions provided the air temperature is not below 4°C to prevent the risk of surface condensation. At temperatures below 4°C measures must be taken to prevent the risk of moisture contamination, and in no circumstances should the product be installed in temperatures below -5°C.

4.5 The membranes should be covered by a screed or other protective layer as soon as possible after installation. If blockwork protection is used, care must be taken to avoid damage to the membrane during construction.

4.6 Provided sharp objects are not present prior to and during installation of the protective layer,

5 Procedure

5.1 The release paper is removed prior to applying the membrane (adhesive side) to the prepared substrate. In all cases, the sheet is laid, the membrane must be pressed firmly from the middle to prevent trapping air. Joints are made by overlapping adjacent sheets with a minimum overlap 50 mm at edges and ends for 3000 grade and 25 mm for 2000 grade.

5.2 All lap joints must be pressed and rolled to form a continuous bond and ensure watertightness.

6 Applications

External tanking (see Figures 1, 2, 3 and 4)

6.1 When the foundation block extends beyond the concrete structure the membrane should be applied to the horizontal surface and extended up the outer face of the wall and cut into it. At the internal angle a Bituthene Fillet or mortar fillet should be covered with a 300 mm wide reinforcing strip of Bituthene before the membrane is laid.

6.2 The membranes must be protected against puncture during backfilling, or subsequently by the backfill, by providing a layer of concrete, screed, brickwork or blockwork immediately after installation. Alternatively, a layer of Servipak, or Insupak may be used.

Internal tanking (see Figure 5)

6.3 At internal angles a Bituthene Fillet or mortar fillet should be covered with a 300 mm wide reinforcing strip of Bituthene before the membrane is laid.

6.4 The horizontal Bituthene should be loaded with screed or concrete to resist uplift pressure. The vertical Bituthene should be protected with a brick or block wall set a minimum of 20 mm from the membrane. The cavity should be filled with compacted mortar to support the membrane and resist water pressure.

Solid concrete floors (see Figure 6)

6.5 It is essential that the damp-proof membrane in the floors should be continuous with the damp-proof course in the surrounding walls. This is achieved by continuing the membrane up internal wall surfaces to tie in with the damp-proof course. A sand/cement screed should be laid immediately after installation to prevent damage.

Figure 1 Bituthene on brickwork/blockwork

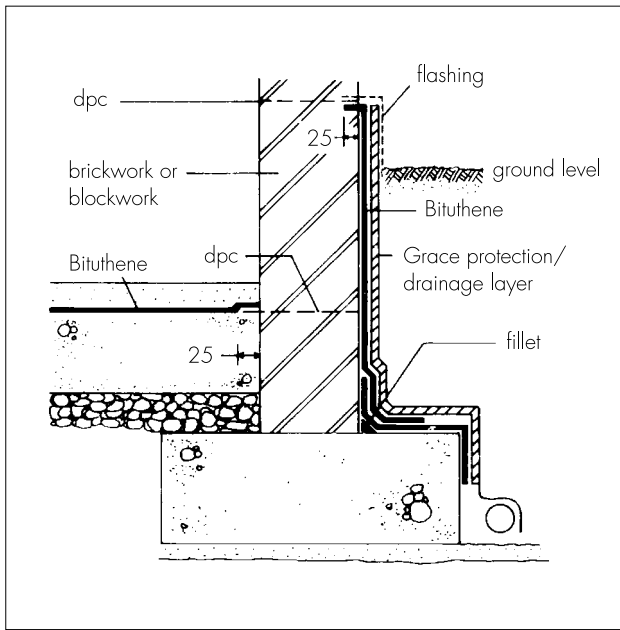


Figure 4 Reversed external tanking

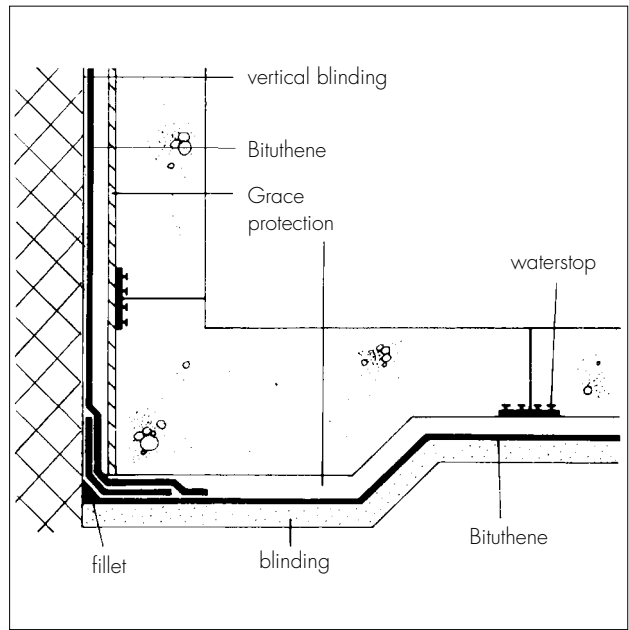


Figure 2 Bituthene on brickwork/blockwork

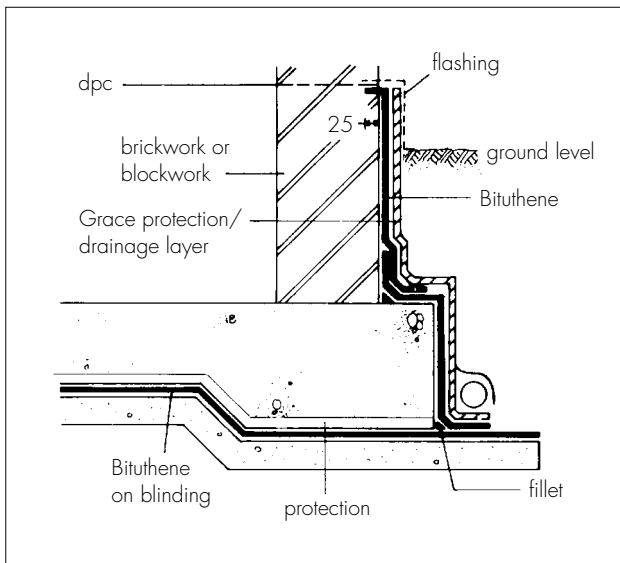


Figure 5 Internal vapourproofing

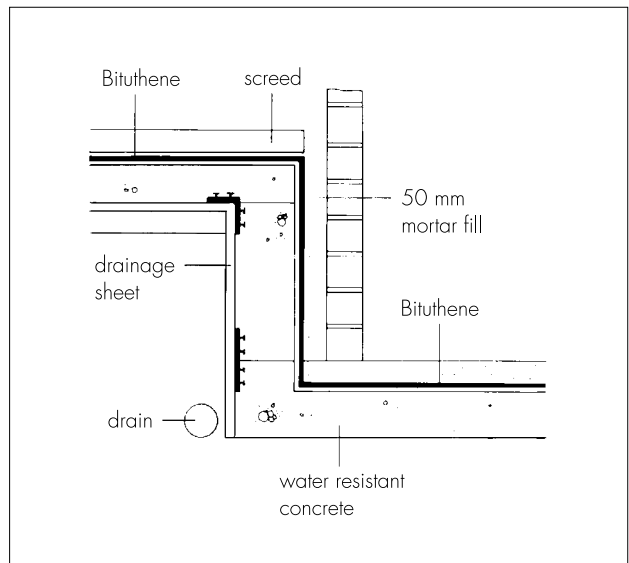


Figure 3 Bituthene external tanking

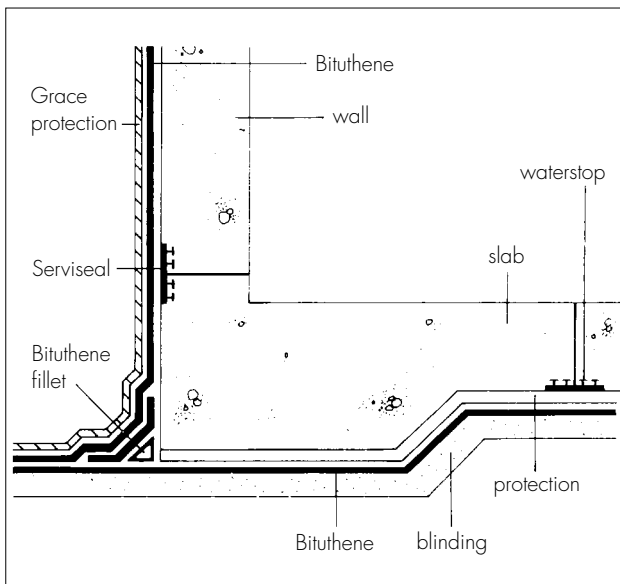
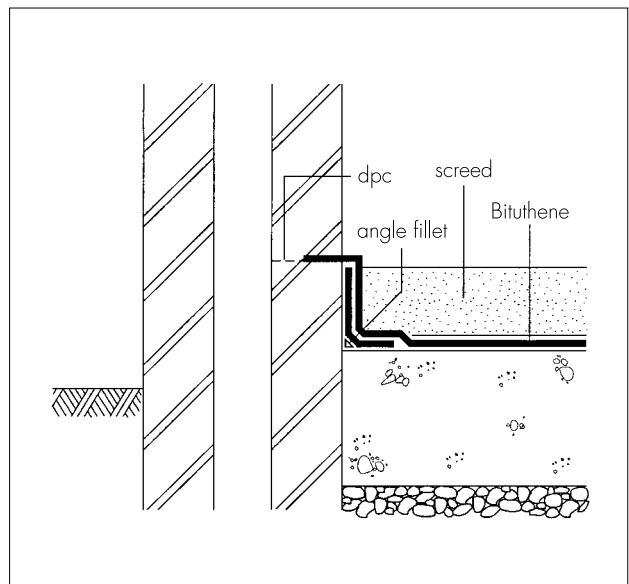


Figure 6 Solid concrete floor



Technical Investigations

The following is a summary of the technical investigations carried out on Bituthene 2000 and 3000 Membranes.

7 Tests

Samples of the membranes were obtained from the manufacturer for testing. The results of the tests carried out by the BBA, which are typical values for the material, are summarised in Tables 2, 3 and 4.

Table 2 Physical properties — general

Test (units)	Method*	Mean results	
		2000	3000
Weight per unit area (kgm ⁻²)	Direct measurement	1.07	1.47
Ring and ball softening point (°C)	BS 2000 : Part 58	—	114
Water vapour permeability (75% RH/25°C) (gm ⁻² per day)	BS 3177	0.39	0.23
Water vapour resistance (75% RH/25°C) (MNsg ⁻¹)	BS 3177	—	891
Low temperature flexibility (°C):	MOAT 31 : 6D		
unaged		< -20 ⁽¹⁾	-25
heat aged ⁽²⁾		—	-25
heat aged ⁽³⁾		—	-25
water soak ⁽⁴⁾		—	-25
UV aged ⁽⁵⁾		—	-25

(1) -20°C lowest temperature tested.

(2) Heat aged 14 days at 60°C.

(3) Heat aged 56 days at 60°C.

(4) Water soak 28 days at 23°C.

(5) UV aged for 500 hours QUV.

— not tested

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

Table 3 Physical properties — directional

Test (units)	Method*	Mean results			
		2000		3000	
		Long	Trans	Long	Trans
Tensile strength (N per 50 mm):	BS 2782 : 1975 : 320A				
unaged		186	186	182	241
heat aged ⁽¹⁾		—	—	222	264
heat aged ⁽²⁾		—	—	218	284
water soak ⁽³⁾		—	—	187	237
UV aged ⁽⁴⁾		—	—	216	267
Elongation at maximum load (%):	BS 2782 : 1976 : 320A				
unaged		462	406	134	103
heat aged ⁽¹⁾		—	—	173	104
heat aged ⁽²⁾		—	—	160	106
water soak ⁽³⁾		—	—	152	103
UV aged ⁽⁴⁾		—	—	170	110
Tear resistance (nail tear) (N)	MOAT 27 : 5.4.1	91.6	89.6	77	92
Tear resistance (trouser tear) (N)	BS 2782 : 1976 : 360B	29.1	49.4	49.8	59.4

(1) Heat aged 14 days at 60°C.

(2) Heat aged 56 days at 60°C.

(3) Water soak 28 days at 23°C.

(4) UV aged for 500 hours QUV.

— not tested

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

Table 4 Service performance

Test (units)	Method*	Mean results	
		2000	3000
Low temperature unrolling	MOAT 27 : 5.4.3	—	no damage
Resistance to water pressure (6 metre head)	MOAT 27 : 5.1.4	—	no penetration
Static indentation: concrete EPS	MOAT 27 : 5.1.9	L ₂ L ₂	L ₄ L ₃
Dynamic indentation: perlite EPS	MOAT 27 : 5.1.10	l ₁ —	l ₂ l ₂
Vertical pull-off (Nmm ⁻²): control heat aged ⁽¹⁾	DOT spec Part C (vii)	—	0.24 ⁽²⁾ 0.31 ⁽²⁾
Peel strength (N): control heat aged ⁽¹⁾	MOAT 27 : 5.1.3	—	105.4 ⁽²⁾ 77.2 ⁽²⁾
Slippage	MOAT 27 : 5.1.7	—	5 mm after 7 days
Substrate movement (cracking test)	DOT spec appendix B Part C (iv)	—	no cracks
Tensile strength of joints (N): control heat aged ⁽¹⁾ water soak ⁽³⁾	MOAT 27 : 5.2.2 MOAT 27 : 5.2.3 MOAT 27 : 5.2.4	— — —	130.6 ⁽²⁾ 182.0 ⁽²⁾ 133.0 ⁽²⁾
Resistance to water pressure of joints (6 metre head)	MOAT 27 : 5.1.4	no penetration	—

(1) Heat aged 28 days at 60°C.

(2) Cohesive failure of adhesive layer during test.

(3) Water soak 7 days at 60°C.

— not tested

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

8 Other investigations

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

8.2 Visits were made to sites in progress to assess the practicability of installation.

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

8.4 Data from previous assessments, leading to the issue of Certificate No 90/2553, were re-examined.

Bibliography

BS 2000 *Methods of test for petroleum and its products*

Part 58 : 1988 *Determination of softening point of bitumen. Ring and ball method*

BS 2782 *Methods of testing plastics*

Part 3 *Mechanical properties*

Methods 320A to 320F : 1976(1986) *Tensile strength, elongation and elastic modulus*

Method 360B : 1991 *Determination of tear resistance of plastics film and sheeting by the trouser tear method*

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

BS 8000 *Workmanship on building sites*

Part 4 : 1989 *Code of practice for waterproofing*

BS 8102 : 1990 *Code of practice for protection of structures against water from the ground*

CP 102 : 1973 *Code of practice for protection of buildings against water from the ground*

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

MOAT No 31 : 1984 *Special Directives for the Assessment of Reinforced Homogeneous Waterproof Coverings of Styrene-Butadiene-Styrene (SBS) Elastomer Bitumen*

Department of Transport Checks and Tests for the Approval of Waterproofing Systems for Concrete Decks to Highway Bridges



On behalf of the British Board of Agrément

Date of issue: 8th March 2000

Chief Executive

*Original Detail Sheet issued on 3rd February 1997. This revised version includes product name changes.

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Grace Construction Products Ltd

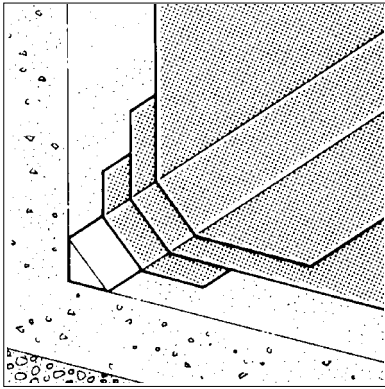
**BITUTHENE 4000 AND 8000
MEMBRANES**

Certificate No 97/3325

DETAIL SHEET 3

Second issue*

Product



• THIS DETAIL SHEET RELATES TO BITUTHENE 4000⁽¹⁾ AND 8000 MEMBRANES FOR USE IN WATERPROOFING AND DAMP-PROOFING UNDERGROUND STRUCTURES.

- The systems can be installed at a minimum temperature of -10°C .
- The systems include a moisture tolerant primer system to allow application in damp or marginal weather conditions and to 'green' concrete.

This Detail Sheet must be read in conjunction with the Front Sheets, which give the product's position regarding the Building Regulations, general information relating to the product, and the Conditions of Certification.

(1) Formerly Bituthene 4100X.

Technical Specification

1 Description

1.1 Bituthene 4000 and 8000 Membranes consists of a two-ply self-adhesive damp-proof membrane comprising a top layer of high performance, high density polyethylene (PE-HD) bonded to a layer of 'ultra-sticky' bitumen/polymer adhesive carried on a release paper. The polyethylene carrier layer, used in Bituthene 8000, is grey coloured to reduce solar heat gain when in-situ prior to installation of protection.

1.2 Primer B2 is a bituminous solution for priming 'green' concrete and damp substrates. The flashpoint for the primer is 25°C .

1.3 The nominal dimensions of the membranes are:

thickness (mm)	1.5
width (m)	1
roll length (m)	20
roll weight (kg)	32
weight per unit area (kgm^{-2})	1.6

1.4 Ancillary products are:

Bituthene Liquid Membrane, a liquid-applied compound for sealing irregular surfaces

Bituthene Mastic, a bituminous putty used for sealing irregularities and terminations

Bituthene Fillet, a preformed angle fillet to allow membranes to be dressed round angle corners

Korkpak Servipak and Insupak — a range of protective layers.

1.5 Quality control checks are made on the incoming bitumen, including viscosity, softening point and penetration. The softening point and penetration of the polymer modified bitumen compound and the release properties of the silicone release paper are also checked.

2 Delivery and site handling

2.1 Rolls of the membranes are packed with application instructions in polythene wrappers and cardboard containers marked with the roll batch number, and bear the manufacturer's name and the BBA identification mark incorporating the number of this Certificate.

2.2 Primer B2 is delivered to site in 5 or 25 litre drums. The primer is flammable with a flashpoint below 32°C , and must therefore be stored in accordance with the Highly Flammable Liquids and Liquefied Petroleum Gases Regulations 1972.

2.3 Rolls must be stacked on end and stored under cover below 30°C . The mastic should be stored in a dry, sealed area for inflammable materials.

Design Data

3 General

Bituthene 4000 and 8000 Membranes are satisfactory for use as damp-proofing and waterproofing for podium slabs, roofs to underground car parks, etc and for tanking below ground, in accordance with BS 8102 : 1990.

Installation

4 General

4.1 The membranes must be installed in accordance with the relevant requirement of BS 8102 : 1990 and the manufacturer's instructions. Additional guidance on the use of dpm materials is available in BS 8000 : Part 4 : 1989.

4.2 All surfaces to which the membranes are applied should have a smooth finish, ie they should be free from cavities, projections and mortar deposits. Surfaces should be free from dust, standing water, condensation and frost. Concrete surfaces should be dense. Vertical surfaces of brickwork and blockwork should be rendered to provide an even surface. Brickwork or blockwork not rendered must be flush pointed to give a smooth surface without sudden changes in level.

4.3 Surfaces, apart from horizontal surfaces under base slabs, should be primed with Primer B2 at a rate of 10 m² per litre to 12 m² per litre prior to the application of Bituthene.

4.4 The systems can be installed at temperatures between -10°C and 35°C. At temperatures below 4°C measures should be taken to ensure all surfaces are free from frost and ice. The Primer B2 allows application of the system to 'green' concrete, and in damp or marginal weather conditions. The system should not be applied externally during rain or snow.

4.5 The membrane should be covered by a screed or other protective layer as soon as possible after installation. If blockwork protection is used, care must be taken to avoid damage to the membrane during construction.

4.6 Provided sharp objects are not present prior to and during installation of the protective layer, the damp-proof membranes will not be damaged by normal foot traffic.

5 Procedure

5.1 The release paper is removed prior to applying the membrane (adhesive side) to the

prepared substrate. In all cases, as the sheet is laid, the membrane should be brushed onto the surface to ensure good initial bond and to prevent trapping air. Joints are made by overlapping adjacent sheets with a minimum overlap 50 mm at edges and ends.

5.2 All lap joints must be pressed and rolled to form a continuous bond and ensure watertightness.

5.3 At external and internal angles a 300 mm wide reinforcing strip of Bituthene should be applied before the membrane is laid. In addition, at internal angles a Bituthene or mortar fillet should be installed prior to the reinforcing strip.

5.4 For internal structures the membrane must be protected against puncture during backfilling, or subsequently by the backfill, by providing a layer of concrete, screed, brickwork or blockwork immediately after installation. Alternatively, a layer of Servipak, or Insupak may be used.

5.5 For internal structures the horizontal Bituthene should be loaded with screed or concrete to resist uplift pressure. The vertical Bituthene should be protected with a brick or block wall set a minimum of 20 mm from the membrane. The cavity should be filled with compacted mortar to support the membrane and resist water pressure.

Technical Investigations

The following is a summary of the technical investigations carried out on the Bituthene 4000 and 8000 Membranes.

6 Tests

Samples of the Bituthene 4000 were obtained from the manufacturer for testing. The results of the tests carried out by the BBA, which are typical values for the material, are summarised in Tables 1, 2 and 3.

Table 1 Physical properties — general

Test (units)	Method*	Mean result
Weight per unit area (kgm ⁻²)	Direct measurement	1.46
Water vapour permeability (gm ⁻² per day)	BS 3177 (75% RH/25°C)	0.31
Water vapour resistance (MNsg ⁻¹)	BS 3177 (75% RH/25°C)	662
Low temperature flexibility (°C):	MOAT 31 : 6D	
unaged		< -20 ⁽¹⁾
heat aged ⁽²⁾		< -20 ⁽¹⁾
water soak ⁽³⁾		< -20 ⁽¹⁾

(1) Lowest temperature tested.

(2) Heat aged 56 days at 60°C.

(3) Water soak 28 days at 23°C.

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

7 Other investigations

Table 2 Physical properties — directional

Test (units)	Method*	Mean results	
		Long ⁽¹⁾	Trans ⁽²⁾
Tensile strength (N per 50 mm)	BS 2782 : 320A	194	279
Elongation at maximum load (%)	BS 2782 : 320A	244	185
Tear resistance (nail tear) (N)	MOAT 27 : 5.4.1	77	92
Tear resistance (trouser tear) (N)	BS 2782 : 360B	49.8	59.4

(1) Longitudinal direction.
(2) Transverse direction.

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

Table 3 Service performance

Test (units)	Method*	Mean result
Low temperature unrolling	MOAT 27 : 5.4.3	no damage
Resistance to water pressure (6 metre head)	MOAT 27 : 5.1.4	no penetration
Static indentation: concrete EPS	MOAT 27 : 5.1.9	L ₂ L ₂
Dynamic indentation: perlite EPS	MOAT 27 : 5.1.10	I ₃ I ₃
Peel strength (Nmm ⁻¹): unaged heat aged ⁽²⁾ water soak ⁽³⁾ damp concrete ⁽⁵⁾ application at -10°C 'green' concrete ⁽⁷⁾ 'green' concrete ⁽⁸⁾	MOAT 27 : 5.1.3	76.5 ⁽¹⁾ 41.8 ⁽¹⁾ 58.6 ⁽⁴⁾ 52.6 ⁽⁶⁾ 41.9 ⁽⁴⁾ 86.0 ⁽¹⁾ 82.4
Slippage	MOAT 27 : 5.1.7	no slippage
Tensile strength of joints (N): control heat aged ⁽²⁾ water soak ⁽⁹⁾	MOAT 27 : 5.2.2 MOAT 27 : 5.2.3 MOAT 27 : 5.2.4	117 ⁽¹⁾ 157 ⁽¹⁾ 129 ⁽¹⁾

(1) 100% cohesive failure in adhesive.
(2) Heat aged 28 days at 60°C.
(3) Water soak 28 days at 30°C.
(4) Mixed cohesive failure.
(5) Concrete block immersed in water for 24 hours, removed and allowed to drain for half an hour prior to priming.
(6) 80% cohesive failure in adhesive.
(7) Concrete cured for 3 days.
(8) Concrete cured for 7 days.
(9) Water soak 7 days at 60°C.

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

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

7.2 Data from testing of other grades of Bituthene were used to assess the ageing characteristics.

7.3 Bituthene 8000 was assessed on the basis of the test results obtained for Bituthene 4000.

Bibliography

BS 2782 *Methods of testing plastics*
Part 3 *Mechanical properties*
Methods 320A to 320F : 1976(1986) *Tensile strength, elongation and elastic modulus*
Method 360B : 1991 *Determination of tear resistance of plastics film and sheeting by the trouser tear method*

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

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

BS 8102 : 1990 *Code of practice for protection of structures against water from the ground*

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

MOAT No 31 : 1984 *Special Directives for the Assessment of Reinforced Homogeneous Waterproof Coverings of Styrene-Butadiene-Styrene (SBS) Elastomer Bitumen*



On behalf of the British Board of Agrément

Date of issue: 8th March 2000

Chief Executive

**Original Detail Sheet issued on 3rd February 1997. This revised version includes product name change and inclusion of Bituthene 8000.*



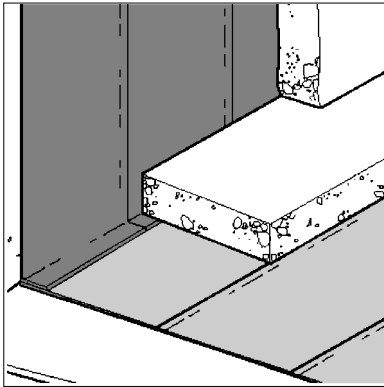
Grace Construction Products Ltd

Certificate No 97/3325

**PREPRUFE 160R AND 300R
WATERPROOFING MEMBRANES**

DETAIL SHEET 4
Second issue*

Product



• THIS DETAIL SHEET RELATES TO PREPRUFE 160R AND 300R WATERPROOFING MEMBRANES FOR USE IN WATERPROOFING AND DAMP-PROOFING UNDERGROUND STRUCTURES.

- The system bonds to poured concrete to form an integral seal to prevent water migration.
- The system requires no priming, fillets or protection boards.
- Bituthene and Preprufe are registered trade marks to W R Grace Limited.

This Detail Sheet must be read in conjunction with the Front Sheets, which give the product's position regarding the Building Regulations, general information relating to the product, and the Conditions of Certification.

Technical Specification

1 Description

1.1 Preprufe 160R and 300R Waterproofing Membranes consist of a white PE-HD film with a white pressure sensitive adhesive protected by a weather resistant coating. The Preprufe range is as follows:

- (1) Preprufe 160R — for use in vertical applications against permanent formwork
- (2) Preprufe 300R — a heavy duty version for use in horizontal or vertical applications. The surface is treated to allow foot traffic and the placing of steel reinforcement using appropriate spacers and chairs.
- (3) Preprufe Tape — for use in overbanding end laps and cut edges and for detailing. LT grade is available for use in low temperature applications and HC grade for use in hot climates.

1.2 The nominal dimensions of the Preprufe Membranes are given in Table 1.

Table 1 Nominal characteristics

	160R	300R	Tape
thickness (mm)	1.0	1.2	1.0
width (m)	1.2	1.2	0.10
roll length (m)	35	30	15
roll weight (kg)	42	50	2
weight per unit area (kgm ⁻²)	1.00	1.39	1.20

1.3 Ancillary products are:

Bituthene Liquid Membrane — a liquid-applied compound for sealing around penetrations.

Bitutape — for use in bonding exposed flaps when applied against removable formwork or for increased lap security.

2 Delivery and site handling

2.1 Rolls of Preprufe are packed with application instructions in polythene wrappers and cardboard containers marked with the roll batch number, and bear the manufacturer's name and the BBA identification mark incorporating the number of this Certificate.

2.2 Rolls must be suitably stored to prevent damage, under cover and in a cool, dry area.

Design Data

3 General

3.1 Preprufe 160R and 300R Waterproofing Membranes are satisfactory for use as waterproofing and damp-proofing in grade 2, 3 and 4 basement constructions as defined in Table 1 of BS 8102 : 1990.

3.2 Preprufe 160R and 300R Waterproofing Membranes, when fully protected and subjected to normal service conditions, will provide effective barriers to the transmission of liquid water and water vapour for the life of the structures in which they are incorporated (see section 10 of Detail Sheet 1).

3.3 The products are white in colour to reduce solar gain after installation prior to pouring of the concrete.

4 General

4.1 Preprufe 160R and 300R Waterproofing Membranes must be installed in accordance with the relevant requirements of BS 8102 : 1990 and the manufacturer's instructions.

4.2 All surfaces to which the membranes are applied should be sound and solid to eliminate movement during the pouring of concrete. The substrate must have a smooth finish with no gaps or voids greater than 12 mm. Substrates do not require priming prior to installation of the system.

4.3 Horizontal substrates should either be of monolithic concrete construction or well compacted sand blinding on a granular fill. The substrate must be free from sharp protrusions and loose aggregate. The substrate does not need to be dry, but must be free from standing water to avoid contamination of the overlap areas.

4.4 Vertical substrates should either be of concrete or 19 mm plywood and provide support for the membrane. The plywood sheets should be closely butted and not more than 12 mm out of alignment.

4.5 The system can be installed at temperatures above -4°C. At low temperatures or in damp conditions, the selvedge of membranes and Preprufe Tape may require gentle warming with a gas torch or similar to remove moisture or condensation and improve adhesion.

4.6 Provided sharp objects are not present prior to and during installation of the poured concrete, Preprufe 160R and 300R will not be damaged by normal foot traffic.

5 Procedure

5.1 Edge and end laps for Preprufe 160R and 300R should be a minimum of 75 mm. The end laps for Preprufe Tape should be a minimum of 75 mm. Laps should be dry, clean and free from dust.

5.2 End laps and cut edges should be overbanded using Preprufe Tape. The overlap area should be wiped with a damp cloth to ensure the area is clean and free from dust and allowed to dry prior to jointing. The tape is centred over lap and rolled firmly to ensure a watertight seal. The plastic release liner must be removed.

Horizontal application

5.3 Preprufe 300R is unrolled over the substrate with the white HDPE film towards the substrate.

5.4 Subsequent sheets are accurately positioned to ensure the correct overlaps (see section 5.1 of this Detail Sheet).

5.5 The plastic release liner should be peeled back from the overlap as the two membranes are bonded, ensuring a continuous bond without creases, and firmly rolled.

5.6 The plastic release liner is removed to expose the white protective coating prior to placing reinforcement and pouring concrete.

Vertical application

5.7 Preprufe 160R and 300R are installed with the white HDPE film towards the substrate and secured using the appropriate mechanical fastenings to suit the substrate.

5.8 The top of the membrane is secured using a batten or fastener 50 mm below the top edge.

5.9 The membrane can then be mechanically fixed through the self adhesive selvedge so that the membrane lies flat.

5.10 The plastic release liner is then removed prior to the installation of the next sheet.

5.11 The underside of the succeeding sheet must be dry, clean and free from dust before the overlap is made (see section 5.1 of this Detail Sheet). The overlap is firmly rolled to ensure it is sealed.

Technical Investigations

The following is a summary of the technical investigations carried out on the Preprufe 160R and 300R Waterproofing Membranes.

6 Tests

6.1 Samples of the membranes were obtained from the manufacturer for testing. The results of the tests carried out by the BBA on the 1 mm thick grade are typical values for the material and are summarised in Tables 2, 3 and 4.

Table 2 Physical properties — general

Test (units)	Method*	Mean results
Weight per unit area (kgm ⁻²)	Direct measurement	1.02
Water vapour permeability (gm ⁻² per day)	BS 3177 : 1959(1995) (75% RH/25°C)	0 ⁽¹⁾
Low temperature flexibility (°C)	MOAT 27 : 5.1.6D	
unaged		< -20 ⁽²⁾
heat aged ⁽³⁾		< -20 ⁽²⁾
water soak ⁽⁴⁾		< -20 ⁽²⁾

(1) No water vapour could be detected passing through the sample by measuring equipment. The product has a very high water vapour resistance.

(2) Lowest temperature tested.

(3) Heat aged 56 days at 60°C.

(4) Water soak 28 days at 23°C.

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

Table 3 Physical properties — directional

Test (units)	Method*	Mean results	
		long ⁽¹⁾	trans ⁽²⁾
Tensile strength at break (Nmm ⁻²)	BS 2782 : 320A (test speed)		
unaged	100 mm min ⁻¹	13.7	12.1
heat aged ⁽³⁾		14.9	13.6
water soak ⁽⁴⁾		13.1	13.8
Elongation at break first yield (%)	BS 2782 : 320A (test speed)		
unaged	100 mm min ⁻¹	7.7	6.6
heat aged ⁽³⁾		10.3	8.7
water soak ⁽⁴⁾		6.8	6.5
Elongation at break	BS 2782 : 320A (test speed)		
unaged	100 mm min ⁻¹	753	825
heat aged ⁽³⁾		795	882
water soak ⁽⁴⁾		733	883
Nail tear (N)	MOAT 27 : 5.4.1 (test speed)	312	291
	100 mm min ⁻¹		
Dimensional stability (%)	MOAT 27 : 5.1.6.1	+0.41	+0.17

(1) Longitudinal direction.

(2) Transverse direction.

(3) Heat aged for 56 days at 60°C.

(4) Water soak for 28 days at 23°C.

— not tested

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

Table 4 Service performance

Test (units)	Method*	Mean results
Unrolling at low temperature	MOAT 27 : 5.4.3	pass
Resistance to water pressure (6 metre head) ⁽¹⁾	MOAT 27 : 5.1.4	pass
Chisel impact	BBA T1/13 ⁽²⁾	
0°C		3 ⁽³⁾
23°C		3 ⁽³⁾
Static indentation concrete	MOAT 27 : 5.1.9	L ₃
Dynamic indentation perlite	MOAT 27 : 5.1.10	I ₂
Resistance to sliding at 90° (mm)	MOAT 27 : 5.1.7	0
Air leakage	MOAT 27 : 5.2.1	pass
Shear strength of joints [N (50 mm ⁻¹)]	MOAT 27 : 5.2.2/3/4 (test speed)	
unaged	200 mm min ⁻¹	476
heat aged ⁽⁴⁾		472
water soak ⁽⁵⁾		356
Resistance to peel from concrete [N (50 mm ⁻¹)]	MOAT 27 : 5.1.3 (test speed)	
unaged	100 mm min ⁻¹	144
heat aged ⁽⁶⁾		142
water soak ⁽⁷⁾		129

(1) Tested on joints.

(2) Based on BE 27, Appendix B C(v). BE 27 *Department of Transport Checks and Tests for the Approval of Waterproofing Systems for Concrete Decks to High Bridges*

(3) Severe indentation.

(4) Heat aged for 28 days at 60°C.

(5) Water soak for 7 days at 60°C.

(6) Heat aged for 28 days at 70°C.

(7) Water soak for 28 days at 30°C.

— not tested

*The test document is detailed in the *Bibliography*. Numbers in the table refer to sections of the various document.

6.2 Test data for Preprufe 300R from an independent laboratory were examined for the following properties:

dimensions

weight per unit area

water vapour permeability

low temperature flexibility

tensile strength

elongation

nail tear

tensile strength of joints

resistance to peel

puncture resistance

chisel impact.

7 Other investigations

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

Electronic Copy

Bibliography

BS 2782 *Methods of testing plastics*
Part 3 *Mechanical properties*
Methods 320A to 320F : 1976(1996) *Tensile strength, elongation and elastic modulus*

BS 3177 : 1959(1995) *Method for determining the permeability to water vapour of flexible sheet materials used for packaging*

BS 8102 : 1990 *Code of practice for protection of structures against water from the ground*

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On behalf of the British Board of Agrément

Date of Second issue: 3rd May 2000

Chief Executive

**Original Detail Sheet issued on 11th September 1997. This amended version includes change of product's nominal characteristics and change of product colour.*