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BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

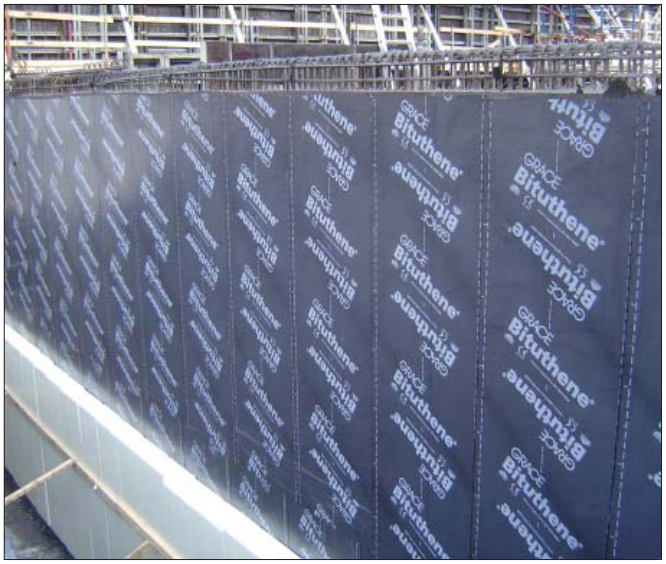
Agrément Certificate
97/3325
Product Sheet 1

GRACE CONSTRUCTION STRUCTURAL WATERPROOFING MEMBRANES

BITUTHENE 3000

This Agrément Certificate Product Sheet[1] relates to Bituthene 3000, a self-adhesive damp-proof and waterproof membrane for use in concrete ground floors, above or below the slab, on underground structures and as externally-applied tanking below ground. It is also for use to protect the building against radon, methane and carbon dioxide gases from the ground.

(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 membrane will resist the passage of liquid water and moisture into the building (see section 6).

Resistance to underground gases — the membrane is capable of restricting the ingress of radon, methane and carbon dioxide gases into the building (see section 7).

Resistance to mechanical damage — the membrane will accept, without damage, the limited foot traffic and loads associated with installation (see section 8).

Adhesion and stability — the adhesion of the membrane to the substrate and to itself is satisfactory (see section 9).

Durability — under normal service conditions the membrane will provide an effective barrier to the transmission of liquid water and water vapour, and will restrict the ingress of radon, methane and carbon dioxide gases during the lifetime of the structure in which it is installed (see section 12).

The BBA has awarded this Certificate to the company named above for the product described herein. This product has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of Second issue: 3 June 2014
Originally certificated on 3 February 1997

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, Bituthene 3000, 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:	C1(2)	Site preparation and resistance to contaminants
Comment:		The membrane can contribute to a structure satisfying the requirements of this Requirement. See sections 7.1 and 7.2 of this Certificate.
Requirement:	C2(a)	Resistance to moisture
Comment:		Tests indicate that the membrane will enable a structure to satisfy this Requirement. See section 6.1 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The membrane is acceptable. See section 12 and the *Installation* part of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)	Fitness and durability of materials and workmanship
Comment:		The membrane can contribute to a construction meeting this Regulation. See section 12 and the *Installation* part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	3.1	Site preparation — harmful and dangerous substances
Standard:	3.2	Site preparation — protection from radon gas
Comment:		When properly installed in a correctly designed structure, the membrane forms an effective barrier to the movement of radon, methane and carbon dioxide gases within the ground slab enabling compliance with these Standards, with reference to clauses 3.1.2[(1)(2)], 3.1.6[(1)(2)], 3.1.7[(1)(2)], 3.1.8[(1)(2)], 3.2.1[(1)(2)] and 3.2.2[(1)(2)]. See sections 7.1 and 7.2 of this Certificate.
Standard:	3.4	Moisture from the ground
Comment:		Tests indicate that the membrane will enable a structure to satisfy the requirements of this Standard, with reference to clauses 3.4.2[(1)(2)], 3.4.4[(1)(2)] and 3.4.6[(1)(2)]. See section 6.1 of this Certificate.
Standard:	7.1(a)	Statement of sustainability
Comment:		The product 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 this product 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)(iv)(b)(i)	Fitness of materials and workmanship
Comment:		The membrane is acceptable. See section 12 and the *Installation* part of this Certificate.
Regulation:	26(a)	Preparation of site and resistance to dangerous and harmful substances
Comment:		The membrane can contribute to a structure satisfying the requirements of this Regulation. See sections 7.1 and 7.2 of this Certificate.
Regulation:	28(a)	Resistance to moisture and weather
Comment:		Tests indicate that the membrane will enable a structure to satisfy the requirements of this Regulation. See section 6.1 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* (3.2 and 3.3) of this Certificate.

Additional Information

NHBC Standards 2014

NHBC accepts the use of Bituthene 3000 when installed and used in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 4.1 *Land Quality — managing ground conditions* and Chapter 5.1 *Substructure and ground bearing floors*, clause M10 *Tanking materials*.

CE marking

The Certificate holder has taken the responsibility of CE marking the product in association with harmonised European Standard EN 13967 : 2007. An asterisk (*) appearing in this Certificate indicates that data shown are given in the manufacturer's Declaration of Performance.

Technical Specification

1 Description

1.1 Bituthene 3000 is a cold applied, two-ply, self adhesive, damp-proof membrane comprising a top layer of high performance, high-density polyethylene (PE-HD) bonded to a layer of bitumen/polymer adhesive carried on a release paper.

1.2 The nominal characteristics of the product are:

*Thickness (mm)	1.5
*Width (m)	1
*Roll length (m)	20
Roll weight (kg)	35
*Mass per unit area ($kg \cdot m^{-2}$)	1.5
*Watertightness (60 kPa)	Pass
*Tensile strength (N per 6 mm)	18 (longitudinal) and 25 (transverse)
*Elongation (%)	110 (longitudinal) and 40 (transverse)
*Nail tear strength (N)	120 (longitudinal) and 130 (transverse)
*Compatibility with bitumen	Pass
Radon diffusion coefficient ($m^2 \cdot s^{-1}$)	1.9×10^{-11}
Methane resistance ($ml \cdot m^2 \cdot day^{-1} \cdot atm^{-1}$)	114.30
Carbon dioxide resistance ($ml \cdot m^2 \cdot day^{-1}.atm^{-1}$)	3.9

1.3 Ancillary products for use with the product are:

- Bituthene B1 Primer — a bituminous solution for priming substrates before application of membrane on vertical surfaces or suspended slabs
- Bituthene S2 Primer — a synthetic primer for priming 'green' concrete and damp substrates
- Bituthene W2 Primer — a water-based surface conditioner for concrete, masonry and wood surfaces.

1.4 Ancillary items for use with the product, but outside the scope of the Certificate are:

- Bituthene LM — liquid-applied compounds for sealing irregular surfaces
- Bituthene Mastic — a bituminous putty used for sealing irregularities and terminations
- Grace Protection — a range of protective layers
- Hydroduct 200 and 220 – a range of vertical drainage sheets.

2 Manufacture

2.1 Bituthene 3000 is manufactured by a compound mixing and coating process. The adhesive compound is blended and applied onto the release paper using traditional knife and roll techniques and then laminated with HD-PE film.

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 the manufacturer, W R Grace & Co., has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by Intertek (Certificate QMS-0816).

3 Delivery and site handling

3.1 Rolls of the membrane are packed in cardboard containers marked with the roll batch number and bear the Certificate holder's name and the BBA logo incorporating the number of this Certificate.

3.2 Rolls must be stacked on end and stored under cover below 30°C. The Primers and Bituthene Mastic must be stored in a dry, sealed area for inflammable materials at a temperature between 5°C and 30°C. The temperature of separate components of Bituthene LM must not fall below freezing.

3.3 Bituthene B1 and S2 Primers are delivered to site in 5 litre cans and 25 litre drums and Primer W2 is delivered to site in 3.75 litre units. Bituthene LM and Bituthene Mastic are delivered to site in 5.7 litre and 4.5 litre units respectively. The products are classified under *The Chemicals (Hazard Information and Packaging for Supply) Regulations 2009* (CHIP4)/*Classification, Labelling and Packaging of Substances and Mixtures (CLP Regulation) 2009* and bear the appropriate hazard warning label. The flashpoint and hazard classification are given in Table 1.

Table 1 Flashpoint and hazard classification

Component	Flashpoint °C	Classification
Bituthene B1 Primer	25	Flammable(1), Harmful
Bituthene S2	>23	Flammable(1), Harmful
Bituthene Primer W2	43	Flammable(1)
Bituthene LM	>100	Toxic, Harmful
Bituthene Mastic	25	Flammable(1), Harmful, Dangerous to the environment

(1) The product should be stored in accordance with the *The Dangerous Substances and Explosive Atmospheres Regulations 2002*.

Assessment and Technical Investigations

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

Design Considerations

4 Use

4.1 Bituthene 3000 is satisfactory for use as a damp-proof and waterproof membrane for above or below ground floor slabs, underground structures (such as podium slabs and roofs to underground car parks) and for externally applied tanking below ground, in accordance with CP 102 : 1973 and BS 8102 : 2009.

4.2 The membrane can be installed in flooring constructions as described in BRE Report 211 (BR 211 : 2007) which include the following:

- reinforced cast in situ (ground-supported) concrete floors
- suspended beam and block concrete floors
- precast concrete slabs.

4.3 The membrane is satisfactory for use to restrict the ingress of radon, methane and carbon dioxide gases into buildings from landfill and naturally occurring sources.

4.4 Buildings in areas of risk from landfill gas should be constructed in accordance with the recommendations of BS 8485 : 2007, the *Ground Gas Handbook*, 2009 and the following BRE Reports:

- BRE Report 211 (BR 211 : 2007) *Radon : guidance on protective measures for new dwellings*
- BRE Report 212 (BR 212 : 1991) *Construction of new buildings on gas-contaminated land*
- BRE Report 376 (BR 376 : 1999) *Radon : guidance of protective measures for new dwellings in Scotland*
- BRE Report 413 (BR 413 : 2001) *Radon : guidance of protective measures for new dwellings in Northern Ireland*
- BRE Report 414 (BR 414 : 2001) *Protective measures for housing on gas-contaminated land*
- BRE Good Building Guide 73 : 2008 *Radon protection for new domestic extensions and conservatories with solid concrete ground floors*
- BRE Good Building Guide 74 : 2008 *Radon protection for new dwellings. Avoiding problems and getting it right!*
- BRE Good Building Guide 75 : 2009 *Radon protection for new large buildings.*

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

5 Practicability of installation

The product is designed to be installed by a competent general builder, or a contractor, experienced with this type of product.

6 Weathertightness

6.1 Results of tests confirm that the membrane and joints in the membrane, when completely sealed and consolidated, will adequately resist the passage of liquid water and moisture from the ground and so meet the relevant requirements of the national Building Regulations:

England and Wales — Approved Document C, Requirement C2(a), Section 4.7, and Requirement C2(b), Section 6, when referring to reservoir roofs

Scotland — Mandatory Standard 3.4, clauses 3.4.2, 3.4.4 and 3.4.6

Northern Ireland — Regulation 28(a).

6.2 The membrane is impervious to water and will give a waterproof layer capable of accepting minor structural movements without damage.

7 Resistance to underground gases

7.1 The membrane is capable of restricting the ingress of radon, methane and carbon dioxide gases into buildings through the ground floor slab from naturally occurring sources and/or landfill.

7.2 BRE Reports 211 and 212 recommend 300 μm thick polyethylene sheet as the minimum required thickness for a gas-resistant membrane. It is generally accepted that other materials with comparable or higher gas resistance are suitable, provided they can withstand the construction processes. In the opinion of the BBA, the membrane meets the criteria.

7.3 When installed in accordance with BRE Report 414 the membrane will be compliant with the recommendations made in CIRIA C665 : 2007 *Assessing risks posed by hazardous ground gases to building*, BS 8485 : 2007, BRE Report 211 and *NHBC Standards*. Guidance is given in the *Ground Gas Handbook*, 2009 and the Certificate holder's technical literature.

8 Resistance to mechanical damage

8.1 The membrane can be punctured by sharp objects and care must be taken in handling building materials over the exposed surface.

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

9 Adhesion and stability

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

10 Effects of temperature

10.1 The membrane will remain flexible and capable of being formed at the minimum recommended temperatures (see section 13.5).

10.2 When installed correctly and protected immediately after installation, the membrane should not achieve temperatures at which slippage due to softening of the adhesive layer can occur.

10.3 Under certain temperature conditions batten termination at the top of a vertical drop may be required.

11 Maintenance

As the membrane is either protected by a wall, backfill or screed and has suitable durability (see section 12), maintenance is not required. However, damage occurring prior to installation of the protection must be repaired (see section 15).

12 Durability

The membrane, when fully protected and subjected to normal service conditions, will provide an effective barrier to the transmission of liquid water and water vapour and will restrict the ingress of radon, methane and carbon dioxide gases during the lifetime of the building.

Installation

13 General

13.1 The Bituthene 3000 membrane must be installed in accordance with the relevant requirements of CP 102 : 1973, Section 2, or BS 8102 : 2009 and the Certificate holder's instructions. Additional guidance on the use of dpm materials is given in BS 8000-4 : 1989.

13.2 All surfaces to which the membrane is applied must have a smooth finish (ie free from cavities, projections and mortar deposits) and need to be dry and free from dust and frost. Concrete surfaces must be sound. Vertical surfaces of brickwork and blockwork must 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.

13.3 In basement constructions, vertical surfaces are primed prior to the application of the membrane with:

- Primer B1 at a rate of 10 m^2 per litre to 12 m^2 per litre or
- Primer S2 at a rate of 9 m^2 per litre to 11 m^2 per litre or
- Primer W2 at a rate of 7 m^2 per litre to 8 m^2 per litre.

13.4 Primer S2 enables application of the membrane to 'green' concrete, damp blockwork or brickwork and in damp or marginal weather conditions. Primers B1 and W2 can be applied to dry substrates only. All primers must be allowed to dry for a minimum period of one hour and touch dry before application of the membrane.

13.5 The membrane can be installed in all normal site conditions provided the air temperature is not below 5°C to prevent the risk of surface condensation. At temperatures below 5°C, measures must be taken to prevent the risk of moisture contamination and under no circumstances is the membrane installed in temperatures below –5°C. The membrane must not be applied externally during snow or rain.

13.6 The membrane must be covered by a 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.

14 Procedure

14.1 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 must be pressed firmly from the middle to prevent trapping air. Joints are made by overlapping adjacent sheets with a minimum overlap of 50 mm at edges and ends.

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

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

14.4 When the membrane is applied to the external structure, it must be protected against puncture during backfilling, or subsequently by the backfill, by Grace Protection immediately after installation. Alternatively, Hydroduct vertical drainage sheets may be used where perimeter drainage is required.

14.5 Where the membrane is applied internally, the horizontally laid membrane is loaded with screed or concrete to resist uplift pressure.

14.6 The membrane installation may be subject to third-party independent validation in accordance with the *Ground Gas Handbook,* 2009.

15 Repair

Damage to the membrane can be adequately repaired by patching prior to the application of protection or backfilling. If required by the local authority repair work should be confirmed by an independent validation report, as all gas membrane installations should be subject to third-party validation in accordance with the *Ground Gas Handbook,* 2009.

Technical Investigations

16 Tests

16.1 An assessment was made of data to EN 13967 : 2007 in relation to:

- visible defects*
- dimensions and tolerances*
- resistance to impact*
- reaction to fire*
- water vapour transmission*
- tensile strength and elongation* on controls and following 24 weeks at 90°C
- tear resistance*
- watertightness on controls following:
  - — 12 weeks ageing at 70°C
  - — 4 weeks ageing at 70°C subsequent to a compatibility with bitumen test*
  - — 1 and 16 weeks immersion in lime water
- resistance to static loading*
- joint strength*.

16.2 Tests were carried out to determine:

- mass per unit area
- ring and ball softening point
- low temperature unrolling
- tensile strength and elongation at break and low-temperature flexibility on controls and following 2 weeks and 8 weeks heat ageing at 60°C, water soak for 4 weeks at 23°C and UV ageing for 500 hours QUV lamp exposure
- tensile strength of joints on controls and samples following 4 weeks heat ageing at 60°C and water soak for 1 week at 60°C
- vertical pull-off strength on controls and following 4 weeks at 60°C

- peel strength on controls and following 4 weeks at 60°C
- slippage
- substrate movement.

16.3 Tests were carried out to assess:

- characteristics of the product and the coating medium
- durability of the product, the coating medium and joints
- properties when installed.

17 Investigations

17.1 An evaluation was made of the results of test data on the permeability of radon, methane and carbon dioxide gases in relation to the product.

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

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

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

17.5 Data from assessments, leading to the issue of previous Certificate 90/2553, were re-examined.

Bibliography

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

BS 8102 : 2009 *Code of practice for protection of below ground structures against water from the ground*

BS 8485 : 2007 *Code of practice for the characterization and remediation from ground gas in affected areas*

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

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

EN 13967 : 2007 *Flexible sheets for waterproofing — Plastic and rubber damp proof sheets including plastic and rubber basement tanking sheet — Definitions and characteristics*

18 Conditions

18.1 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.

18.2 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.

18.3 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.

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

18.5 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
- individual 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.

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

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