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Agrément Certificate
 No 99/3603

PRODUCT SHEET 1 — TOUGHSHEET DAMP-PROOF MEMBRANES

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to Toughsheet Damp-proof Membranes, polyethylene membranes for use in solid concrete ground floors that are not subject to hydrostatic pressure, to protect buildings against water from the ground.

THIS CERTIFICATE INCLUDES:

- factors relating to compliance with UK 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

Resistance to water and water vapour — the membranes provide an effective barrier to the passage of liquid water and water vapour from the ground (see section 4).

Resistance to puncturing — the membranes have high resistance to puncture and on a smooth or blinded surface will not be damaged by foot or site traffic (eg wheelbarrows) (see section 5).

Durability — under normal service conditions the membranes will provide an effective barrier to water and water vapour for the life of the concrete slab in which they are installed (see section 7).

The BBA has awarded this Agrément Certificate for Toughsheet Damp-Proof Membranes to Frank Mercer & Sons Ltd as fit for their intended use provided they are installed, used and maintained as set out in this Agrément Certificate.

On behalf of the British Board of Agrément

Date of First issue: 29 April 1999
 Date of Fourth issue: 6 June 2007

Greg Cooper: 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, Toughsheet Damp-proof Membranes, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations:



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

Requirement:	C2(a)	Resistance to moisture
Comment:		The products will meet this Requirement. See sections 4.1 and 4.2 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The products are acceptable materials. See section 7.1 of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8	Fitness and durability of materials and workmanship
Regulation:	8(1)	Fitness and durability of materials and workmanship
Comment:		The products comply with this Standard. See section 7.1 of this Certificate.
Regulation:	9	Building standards – construction
Standard:	3.4	Moisture from the ground
Comment:		The products can enable a floor to satisfy the requirements of this Standard, with reference to clauses 3.4.1 ⁽¹⁾⁽²⁾ , 3.4.2 ⁽¹⁾⁽²⁾ , 3.4.4 ⁽¹⁾⁽²⁾ and 3.4.6 ⁽¹⁾⁽²⁾ . See sections 4.1 and 4.2 of this Certificate.
Regulation:	12	Building standards – conversions
Comment:		All comments given for these products 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).



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

Regulation:	B2	Fitness of materials and workmanship
Comment:		The products are acceptable materials. See section 7.1 of this Certificate.
Regulation:	C4	Resistance to ground moisture and weather
Comment:		The products will contribute to a roof satisfying this Regulation. See sections 4.1 and 4.2 of this Certificate.

Construction (Design and Management) Regulations 2007

Construction (Design and Management) Regulations (Northern Ireland) 1995 (as amended)

Information in this Certificate may assist the client, CDM co-ordinator or planning supervisor, designer and contractors to address their obligations under these Regulations.

See section: 1 *Description* (1.1).

Non-regulatory Information

NHBC Standards 2007

NHBC accepts the use of Toughsheet Damp-proof Membranes meets NHBC Standards Performance Standard M8 Damp-proof membrane of Chapter 5.1 *Substructure and ground bearing floors*.

Zurich Building Guarantee Technical Manual 2007

In the opinion of the BBA, Toughsheet Damp-proof Membranes, when installed and used in accordance with this Certificate, satisfy the requirements of the *Zurich Building Guarantee Technical Manual*, Section 3 *Substructure*, Sub-section *dpc and dpm*.

General

This Certificate relates to Toughsheet Damp-proof Membranes, for use in solid concrete ground floors that are not subject to hydrostatic pressure, to protect buildings against water from the ground and laid in accordance with Clause 1.1 of CP 102 : 1973 or with this Certificate.

Technical Specification

1 Description

1.1 Toughsheet Damp-proof Membranes are a blown film of extruded polyethylene. The nominal characteristics are shown in Table 1.

Table 1 Nominal characteristics

Characteristics (units)	Grade			Tolerance (%)
	250	300	500	
Thickness (µm)	250	300	500	±10 ⁽¹⁾
Roll width (kg)	23	27.62	23	-0, +10
Standard roll length (m)	25	25	12.5	-0, +5
Standard sheet width (m)	4	4	4	-0, +5
Colours	blue	blue	blue	
	black	black	black	
	clear	yellow ⁽²⁾	yellow ⁽²⁾	

(1) A tolerance of ±12% is allowed in Draft MOAT 61 : January 1998 *Guideline for the assessment of polyethylene damp-proof membranes with a single value ≥80% of the nominal.*

(2) The yellow membrane is for use as a radon gas control membrane.

1.2 Ancillary materials used with Toughsheet Damp-proof Membranes are:

- mastic tape — at least 0.2 mm thick, 25 mm wide, used for jointing
- girth tape — adhesive polyethylene tape, 100 mm wide, used for sealing joints.

1.3 Quality control checks carried out on the final product include:

- width
- spot thickness
- roll weight
- impact resistance (body and fold)
- tensile strength
- elongation at break
- tear strength.

2 Delivery and storage

2.1 Rolls of the membranes are packed in wrappers bearing labels with the product's name and the BBA identification mark incorporating the number of this Certificate. Rolls are supplied shrink-wrapped and on pallets.

2.2 Rolls should be stored under cover on the original pallet or individually, on end.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Toughsheet Damp-proof Membranes.

Design Considerations

3 Use

3.1 Toughsheet Damp-proof Membranes are satisfactory for use in concrete floors not subject to hydrostatic pressure, in accordance with the relevant clauses of CP 102 : 1973.

3.2 The membranes can be installed either as an oversite membrane, between a blinded hardcore bed and the base concrete, or as a sandwich membrane in base concrete or between the base concrete and the screed.

3.3 The 300 µm and 500 µm membranes meet the requirements for use as a gas control membrane against radon or on gas-contaminated land in accordance with the recommendations published by the Building Research Establishment (BRE) and the national Building Regulations.

4 Resistance to water and water vapour

 4.1 The membranes and the methods of jointing provide an effective barrier to the passage of liquid water and water vapour from the ground (see section 12, Table on Physical properties — general).

4.2 The membranes have minimum nominal sheet thicknesses greater than the requirements of the national Building Regulations. Therefore the product complies with the requirements of the national Building Regulations, if installed in the manner described in the relevant documents, or in accordance with section 8 (Scotland only):

England and Wales — Approved Document C, Requirement C2(a), Section 3. Clauses 4.8 and 4.9

Scotland — Mandatory Standard 3.4, clauses 3.4.1⁽¹⁾⁽²⁾, 3.4.2⁽¹⁾⁽²⁾, 3.4.4⁽¹⁾⁽²⁾ and 3.4.6⁽¹⁾⁽²⁾

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

Northern Ireland — Regulation C4, Technical Booklet C, Sections 1 and 2.

5 Resistance to puncturing

The membranes have a high resistance to puncture. On smooth or blinded surfaces they will not be damaged by normal foot or site traffic (eg wheelbarrows) but care should be taken to avoid damage during installation, particularly when handling building materials and equipment over the surface and when placing concrete or screeds, since they can be punctured by sharp objects (see section 12, Table on *Physical properties — general*).

6 Underfloor heating

When used in accordance with underfloor heating under normal operating conditions there will be no adverse effect on the membranes; however, the Certificate holder's advice should be sought.

7 Durability

 7.1 When subject to the normal conditions of use, the membranes will provide an effective barrier to the transmission of liquid water and water vapour for the life of the concrete slab in which they are installed.

7.2 Long periods of exposure to ultraviolet light will reduce the effectiveness of the membranes. The membranes should be protected from such exposure during storage and when in use.

Installation

8 General

8.1 Installation of Toughsheet Damp-proof Membranes should be in accordance with the Certificate holder's instructions and Clause 11 of CP 102 : 1973, the relevant clauses of BS 8000-4 : 1989, or section 11 of this Certificate.

8.2 Unless the base is smooth, a surface blinding of soft sand (or similar material) should be used to prevent puncturing during installation or when the concrete or screed is being placed.

8.3 The membranes must be clean and free from dirt and grease.

9 Site conditions

9.1 The membranes may be installed in all conditions normal to ground-floor slab construction. Where there is a risk of ground becoming waterlogged, sub-soil drainage must be provided in accordance with CP 102 : 1973.

9.2 The membranes remain flexible in the extremes of temperature likely to occur in practice.

10 Floor Finishes

The type of floor finish to be used may limit the suitability of polyethylene dpm's; the guidance given in CP 102 : 1973 should be followed.

11 Procedure

11.1 Adjacent sheets should be overlapped by at least 150 mm, and should be bound with mastic strips and sealed with 100 mm wide girth jointing tape (see Figure 1).

11.2 Alternatively, when it is not possible to keep the sheet dry, a double welted fold should be formed using at least 300 mm of the membrane. It is essential that the fold is held in position prior to placing the concrete, eg by weighting with bricks (see Figure 2).

Figure 1 Mastic tape joint

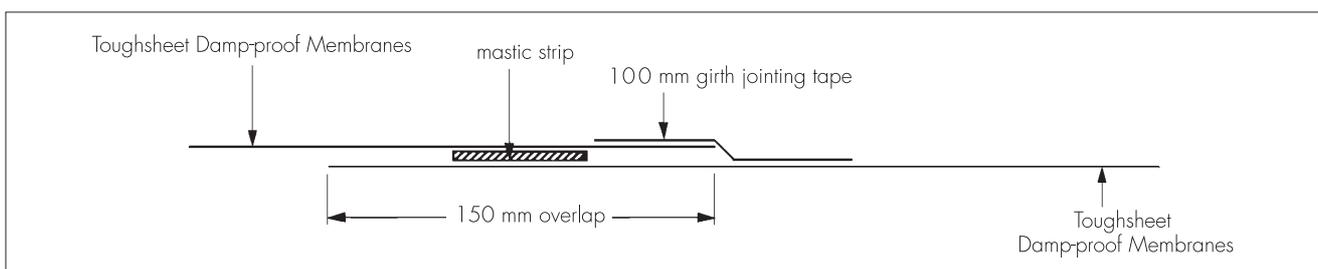
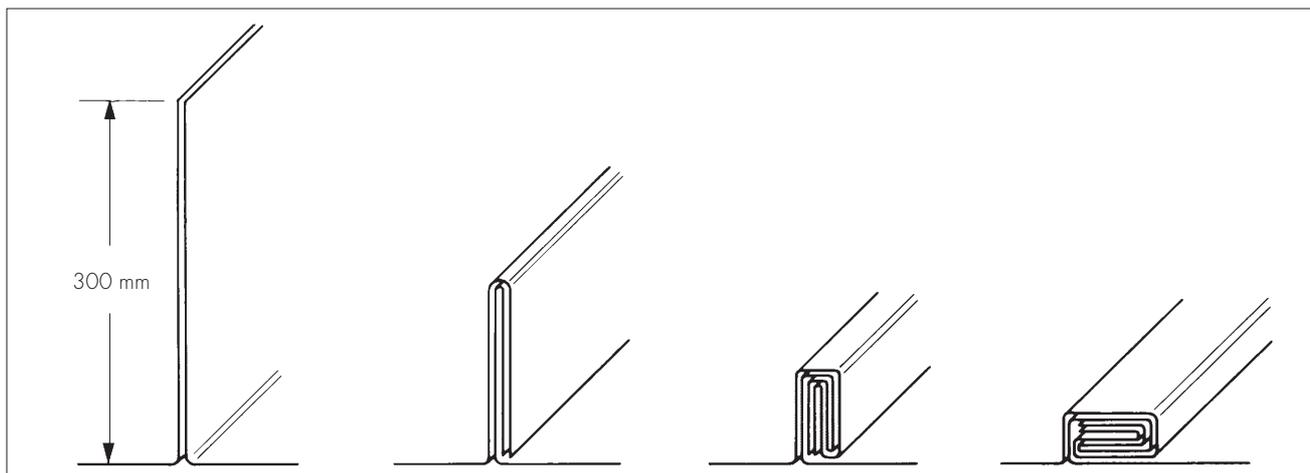


Figure 2 Double welted fold joint



11.3 Perforations or punctures in the membranes should be patched with sheets of identical thickness, lapped at least 150 mm beyond the limits of the puncture and the laps so formed sealed with double-sided pressure sensitive tape.

11.4 The damp-proof membranes must be continuous with the damp-proof course in the surrounding walls. Where necessary the membrane should be used as a vertical damp-proof course to link the two.

11.5 The membranes must be covered by a screed or other protective layer as soon as possible after installation. Care should be taken to ensure that the membrane is not stretched or displaced when placing the concrete or screed over the membrane. Sufficient allowance should be made to avoid bridging (ie creating areas of unsupported membrane) during screeding operations at details such as internal angles.

Technical Investigations

12 Tests

12.1 Samples of Toughsheet Damp-proof Membranes were obtained from the manufacturer for testing. A summary of tests showing typical values for the material is detailed in Tables 2 and 3.

Table 2 Physical properties — general

Test (units)	Mean results		Method ⁽¹⁾
	250	300	
Thickness (mm)	0.26	0.29	Direct measurement
Sheet width (mm)	4052	—	Direct measurement
Density (kgm ⁻³)	937	—	BS 2782.6-620A
Water vapour transmission rate (gm ⁻² day ⁻¹)	0.50	0.48	BS 3177 (25°C/75% RH)
Water vapour resistance (MNsg ⁻¹)	410	428	BS 3177 (25°C/75% RH)
Dart impact (g)	418	—	BS 2782.3-352D ⁽³⁾
Leakage at joints	pass	pass	MOAT 27 : 5.2.1
Tensile strength of joints (N)			MOAT 27 : 5.2.2
unaged	175.3	—	
heat aged ⁽²⁾	184.8	—	

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

(2) Heat aged at 60°C for 28 days.

(3) Tested to a withdrawn Standard.

— Not tested.

12.2 Dimensional measurements were carried out on a sample roll of 500 µm membrane.

Table 3 Physical properties — directional

Test (units)	Mean results		Method ⁽¹⁾
	Longitudinal	Transverse	
Tensile strength (at break) (Nmm ⁻²)			BS 2782.3-320A (500 mm/min)
250 µm			
unaged	19.1	19.7	
heat aged ⁽²⁾	20.3	19.2	
UV aged ⁽³⁾	16.5	15.9	
300 µm			
unaged	18.3	18.7	
Elongation at break (%)			BS 2782.3-320A (500 mm/min)
250 µm			
unaged	612	651	
heat aged ⁽²⁾	637	646	
UV aged ⁽³⁾	580	578	
300 µm			
unaged	578	633	
Nail tear (N)			MOAT 27 : 5.4.1
250 µm			
unaged	101	90	
heat aged ⁽²⁾	107	107	
300 µm			
unaged	119	116	
Trouser tear (Nmm ⁻¹)			T1/23 ⁽⁴⁾
250 µm			
unaged	182	198	
heat aged ⁽²⁾	200	207	
300 µm			
unaged	196	217	
Dimensional stability (%)			MOAT 27 : 5.1.6.1
250 µm	-0.27	+0.12	
300 µm	-0.17	+0.07	
Low temperature flexibility (°C)			MOAT 27 : 5.4.2
250 µm	≤-25	≤-25	
300 µm	≤-25	≤-25	

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

(2) Heat aged at 80°C for 56 days.

(3) UV aged for 100 light hours using a QUV-B/4 hours UV at 50°C/4 hours condensation at 50°C.

(4) BBA test method in general accordance with BS 2782.3-360B : 1980.

13 Investigations

13.1 A factory inspection was carried out to assess and examine the manufacturing process and quality control methods.

13.2 An assessment of the test data was made in accordance with Draft MOAT No 61 : January 1998 *Guideline for the assessment of polyethylene damp-proof membranes*.

Bibliography

- BS 2782-3.320A to 320F : 1976 *Methods of testing plastics — Mechanical properties — Tensile strength, elongation and elastic modulus*
- BS 2782-3.352D : 1979 *Methods of testing plastics — Mechanical properties — Determination of falling weight impact resistance of thin flexible sheet (film)*
- BS 2782-3.360B : 1980 *Methods of testing plastics — Mechanical properties — Determination of tear strength of sheet and sheeting (trouser tear method)*
- BS 2782-6.620A to 620D : 1991 *Methods of testing plastics — Dimensional properties — Determination of density and relative density of non-cellular plastics*
- BS 3177 : 1959 *Method for determining the permeability to water vapour of flexible sheet materials used for packaging*
- BS 8000-4 : 1989 *Workmanship on building sites — Code of practice for waterproofing*
- 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*

14 Conditions

14.1 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.

14.2 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.

14.3 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.

14.4 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.

14.5 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.