



## Delta Waterproofing

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**Agrément  
 Certificate  
 No 04/4182**

Designated by Government  
 to issue  
 European Technical  
 Approvals

## ECOFIN SINGLE-PLY ROOF WATERPROOFING MEMBRANES

Système d'étanchéité  
 Dachabdichtungen

# Product




• THIS CERTIFICATE RELATES TO ECOFIN SINGLE-PLY ROOF WATERPROOFING MEMBRANES.

- The products are manufactured from flexible polyolefin (FPO) for use in fully adhered, mechanically fixed, loose-laid and ballasted and protected membrane flat roof specifications with limited access.
- Installation must be carried out by trained and approved contractors.
- The membranes are manufactured in Italy and marketed in the UK by Delta Waterproofing.

## Regulations

### 1 The Building Regulations 2000 (as amended) (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 roof waterproofing systems with the Building Regulations. In the opinion of the BBA, Ecofin Single-Ply Roof Waterproofing Membranes, 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 : 1958 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 to 11.4 of this Certificate.
Requirement: C2(b)	Resistance to moisture
Comment:	Data for water resistance on the membranes indicate that the materials meet this Requirement. See section 8.1 of this Certificate.
Requirement: Regulation 7	Materials and workmanship
Comment:	The membranes are acceptable materials. See section 13 of this Certificate.

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



In the opinion of the BBA, Ecofin Single-Ply Roof Waterproofing Membranes, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Regulations and related Technical Standards as listed below.

Regulation:	10	Fitness of materials and workmanship
Standard:	B2.1	Selection and use of materials, fittings, and components, and workmanship
Comment:		The products can contribute to a construction meeting this Standard. See the <i>Installation</i> part of this Certificate.
Standard:	B2.2	Selection and use of materials, fittings, and components, and workmanship
Comment:		The products are acceptable materials. See section 13 of this Certificate.
Regulation:	12	Structural fire precautions
Standard:	D9.1	Fire spread from an adjoining building
Comment:		Test data to BS 476-3 : 1958 indicate that on suitable non-combustible substructures the use of the membranes will be unrestricted by the requirements of this Standard. See sections 11.1 to 11.4 of this Certificate.
Regulation:	17	Resistance to moisture
Standard:	G3.1	Resistance to precipitation — Resistance to precipitation
Comment:		Data examined for water resistance on the membranes, indicates that the use of the membranes can enable a roof to satisfy the requirements of this Standard. See section 8.1 of this Certificate.

## 3 The Building Regulations (Northern Ireland) 2000



In the opinion of the BBA, Ecofin Single-Ply Roof Waterproofing Membranes, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Building Regulations as listed below.

Regulation:	B2	Fitness of materials and workmanship
Comment:		The membranes are acceptable materials. See section 13 of this Certificate.
Regulation:	C4	Resistance to ground moisture and weather
Comment:		Data for water resistance on the membrane, indicate that the use of the membranes can enable a roof to satisfy the requirements of this Regulation. See section 8.1 of this Certificate.
Regulation:	E5	External fire spread
Comment:		Test data to BS 476-3 : 1958 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 to 11.4 of this Certificate.

## 4 Construction (Design and Management) Regulations 1994 (as amended) Construction (Design and Management) Regulations (Northern Ireland) 1995 (as amended)

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

See sections: *5 Description (5.2) and 6 Delivery and site handling (6.3).*

### 5 Description

5.1 Ecofin Single-Ply Roof Waterproofing Membranes are manufactured from flexible polyolefin (FPO) and are available in two grades:

- Ecofin GS — reinforced with 75 gm<sup>-2</sup> glass net. The top layer is grey and the underside is black
- Ecofin FG TNT — reinforced with 50 gm<sup>-2</sup> glass fibre and with additional glass fleece backing.

5.2 The products are manufactured to a width of 1.35 metres and 14.82 metres in length. The product has the nominal thickness and weight characteristics given in Table 1.

Table 1 Nominal characteristics

Characteristics (units)	Ecofin GS							Ecofin FG TNT		
Thickness (mm)	1.5	1.6	1.8	2.0	2.2	2.5	3.0	1.5	1.8	2.0
Weight per unit area (kgm <sup>-2</sup> )	1.5	1.6	1.8	2.0	2.2	2.5	3.0	1.5	1.8	2.0
Roll weight (kg)	30	32	36	40	44	50	60	30	36	40

5.3 Ancillary items for use with the membranes include:

- Ecofin Vapour — a vapour control layer
- Ecofin Membrane Adhesive
- Ecofin Iron — galvanized steel bars for mechanical fixing of the membrane
- Ecofin Contour — galvanized steel bars for mechanical fixing at vertical upstands.

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

### 6 Delivery and site handling

6.1 Membranes are delivered to site as rolls on timber pallets, packaged in polyethylene film bearing self-adhesive tapes with the manufacturer's name, product identification, size and batch number/manufacturing date.

6.2 Rolls should be stored in a cool, dry area on a clean, level surface, and kept under cover. Rolls should only be unwrapped from packaging at time of installation.

6.3 Ecofin Membrane Adhesive is classified as Harmful and Highly Flammable under the Chemicals (Hazard Information and Packaging for Supply) Regulations 2002 (CHIP3). It should be stored in a well-ventilated area in accordance with the Highly Flammable Liquids and Petroleum Cases Regulations 1997.

### 7 General

7.1 Ecofin Single-Ply Roof Waterproofing Membranes are satisfactory for use as waterproofing on flat roofs with limited access in the following:

- Ecofin GS in mechanically-fastened systems
- Ecofin FG TNT in fully-adhered, loose-laid and ballasted and protected membrane systems.

7.2 Limited access roofs are defined for the purpose of this Certificate as those roofs subjected only to pedestrian traffic for maintenance of the roof covering and cleaning of gutters, etc. 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. 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. Pitched roofs are defined for the purpose of this Certificate as those having a fall in excess of 1:6.

7.4 Decks to which the membranes are to be applied must comply with the relevant requirements of BS 6229 : 2003, BS 8217 : 1994 and, where appropriate, NHBC Standards, Chapter 7.1 or the Zurich Building Guarantees Technical Standards , Page 234.

7.5 Insulation systems or materials used in conjunction with the product must either be:

- as described in BS 8217 : 1994, or
- the subject of a current BBA Certificate and be used in accordance with, and within the limitations of, that Certificate (see BBA website: [www.bbacerts.co.uk](http://www.bbacerts.co.uk)).

### 8 Weathertightness



8.1 Data confirm that the membranes, and joints in the membranes, when completely sealed and consolidated, will adequately resist the passage of moisture to the inside of the building and so meet the requirements of the national Building Regulations:

#### England and Wales

Approved Document C, Requirement C2, Section 5.1

#### Scotland

Regulation 17, Standard G3.1

#### Northern Ireland

Regulation C4.

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8.2 The membranes are impervious to water and, when used in one of the systems 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 Data show that the adhesion of a fully-adhered system to a prepared substrate is sufficient to resist the effects of wind forces, elevated temperature and thermal shock conditions likely to occur in practice.

9.4 Where the membrane is fully adhered to insulation boards, the resistance to wind uplift will be dependent on the cohesive strength of the insulation and the method by which it is secured to the roof deck. This should be taken into account when the insulation material is selected.

9.5 In loose-laid and ballasted systems, the precise ballast requirements should be calculated in accordance with the relevant parts of BS 6399-2 : 1997. The use of concrete slabs on suitable supports should be considered in areas of high wind exposure and the advice of the Certificate holder should be sought. The membrane should always be ballasted with a minimum depth of 50 mm of aggregate.

## 10 Resistance to foot traffic

Data indicate that the membranes 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, eg maintenance of lift equipment, a walkway should be provided, eg using concrete slabs supported on bearing pads.

## 11 Properties in relation to fire



11.1 When tested in accordance with BS 476-3 : 1958, a system comprising 0.7 mm profiled steel deck, Ecofin Vapour, 85 mm thick glass fibre-faced polyurethane insulation and mechanically fixed 1.5 mm Ecofin GS achieved an EXT.F.AB rating.

11.2 When tested to BS 476-3 : 1958, a system comprising 0.7 mm profiled steel deck, Ecofin

Vapour, 85 mm thick foil-faced polyurethane insulation and 1.5 mm Ecofin FG TNT, fully adhered using Ecofin Membrane Adhesive, achieved an EXT.F.AB rating.

11.3 When used in a loose-laid and ballasted specification including a minimum surface finish of 50 mm of aggregate, the membranes shall be deemed to satisfy BS 476-3 : 1958, designation EXT.F.AA.

11.4 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 confirm to Standard D9.1.

### *Northern Ireland*

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

## 12 Maintenance

12.1 Roofs covered with the membranes 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



Accelerated weathering tests confirm that satisfactory retention of physical properties is achieved. Available evidence indicates that the membranes should have a life of at least 20 years.

## Installation

## 14 General

14.1 Installation of Ecofin Single-Ply Roof Waterproofing Membranes 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, in loose-laid, protected roof or mechanically-fastened systems, a suitable protection layer should be placed over the substrate.

14.3 Installation should not be carried out during wet weather (eg rain, fog, snow) nor when the temperature is below 5°C unless suitable precautions are taken in accordance with the Certificate holder's instructions.

## 15 Procedure

### Fully-adhered system

15.1 The Ecofin FG TNT is unrolled onto the substrate, without ripples, with a 60 mm overlap.

15.2 The membrane is folded back and adhesive applied to the membrane and substrate at a rate of between 0.15 kgm<sup>-2</sup> and 0.40 kgm<sup>-2</sup>.

15.3 The adhesive should be allowed to dry until tacky, between 5 and 10 minutes dependent on weather conditions, prior to membrane application.

### Mechanically-fastened system

15.4 The Ecofin GS is unrolled onto the substrate, without ripples, with a minimum overlap of 60 mm plus the width of the washer.

15.5 The membrane is secured within the lap area using fasteners and seam plates. The maximum distance between each fastening assembly should be 300 mm and the minimum distance between the plates and sheet edge should be 15 mm.

### Loose-laid and ballasted and protected roof systems

15.6 The Ecofin FG TNT is unrolled onto the substrate, without ripples, with a 60 mm overlap, and mechanically fastened at perimeters.

15.7 When used in a loose-laid and ballasted system a suitable protection layer should be laid over the membrane prior to the application of the ballast. When used in protected roof systems a suitable filter layer should be laid over the insulation.

15.8 Loose-laid applications should be covered by at least a 50 mm depth of well-rounded gravel. In areas of high-wind exposure, paving slabs set on a suitable support may be considered (eg pads).

15.9 When using a loose-laid application, normal account should be taken in the design of the deck of the extra dead loading due to the weight of the aggregate and/or paving.

## 16 Jointing and flashing procedure

### Hot-air welding

16.1 All joints should be sealed, wherever possible by automatic rather than by hand-held hot-air gun. The temperature should be set in accordance with the Certificate holder's instructions.

16.2 The welding area should be dry and clean. If the membrane in the welding area is oxidised due to prolonged outdoor exposure it should be cleaned in the prescribed manner.

16.3 The welded width of the joint must be a minimum of 60 mm. Care should be taken that over heating of the membrane does not occur, as this will result in scorching and carbonisation of the membrane.

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.

## Technical Investigations

The following is a summary of the technical investigations carried out on Ecofin Single-Ply Roof Waterproofing Membranes.

## 17 Tests

17.1 Data from tests carried out or assessed by the BBA are summarised in Tables 2 and 3.

17.2 Testing was also carried out on the following properties:

- thickness
- width
- weight per unit area
- flatness and trueness
- ash content.

Table 2 Physical properties directional

Test (units)	Method <sup>(1)</sup>	Mean results <sup>(2)</sup>				
		Ecofin GS		Ecofin FG TNT		
		Long <sup>(3)</sup>	Trans <sup>(4)</sup>	Long <sup>(3)</sup>	Trans <sup>(4)</sup>	
Tensile strength (N per 50 mm)	EN 12311-2	1145	813	572	498	
Tensile strength on heat ageing <sup>(5)</sup> (N per 50 mm)	EN 12311-2	1129	753	—	—	
Elongation at maximum force (%)	EN 12311-2	4.5 <sup>(6)</sup>	4.5 <sup>(6)</sup>	542	633	
Elongation on heat ageing <sup>(5)</sup> (%)	EN 12311-2	5.0 <sup>(6)</sup>	3.8 <sup>(6)</sup>	—	—	
Nail tear (N)	MOAT 67	4.3.11	606.8	745.8	835.5	731.5
			544.0	529.5	560.3	496.1
			820.6	1034.5	1103.5	1110.3
Dimensional stability (%)	EN 1107-2	-0.1	+0.1	0.0	0.0	

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

(2) All tests carried out on 1.5 mm membranes.

(3) Longitudinal direction.

(4) Transverse direction.

(5) Heat aged 84 days at 80°C.

(6) To failure of reinforcement.

— not tested.

Table 3 Physical properties

Test (units)	Method <sup>(1)</sup>	Mean result	
		Ecofin GS <sup>(2)</sup>	Ecofin FG TNT <sup>(3)</sup>
Water vapour permeability (gm <sup>-2</sup> day <sup>-1</sup> )	BS 3177 (25°C/75% RH)	0.21	—
Water vapour resistance (MNsg <sup>-1</sup> )	BS 3177 (25°C/75% RH)	977.0	—
Low temperature folding (-35°C)	EN 495-5		
unaged		pass	—
UV aged <sup>(4)</sup>		pass	—
heat aged <sup>(5)</sup>		pass	—
Static indentation (kg)	EN 12730		
concrete		L <sub>15</sub>	—
EPS		L <sub>25</sub>	—
Dynamic indentation (kg)	EN 12691		
EPS		I <sub>15</sub>	—
Perlite		I <sub>15</sub>	—
Water absorption (%)	MOAT 67 : 4.3.13	2.10	—
Tensile strength of joints (N per 50 mm)	EN 12317-2		
control		445.6	—
after heat ageing <sup>(5)</sup>		451.8	—
Resistance to peel (N per 50 mm)	MOAT 67 : 4.3.3		
control		—	152
after heat ageing <sup>(5)</sup>		—	156
Resistance to wind uplift fully adhered (kPa)	MOAT 67 : 4.3.2	—	6
mechanically fastened (N) <sup>(6)</sup>			
load per fixing		1400	—
corrected load per fixing		596	—

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

(2) All tests carried out on 1.5 mm membranes.

(3) All tests carried out on 1.6 mm membranes.

(4) UV aged using 4500 MJm<sup>-2</sup> UVA.

(5) 28 days at 80°C.

(6) Using Ecofin Vapour over a profiled 0.7 mm thick, galvanized steel decking with aluminium-faced polyurethane boards, mechanically fastened to the deck.

— Not tested.

## 18 Investigations

18.1 Existing data on fire performance of the membranes to BS 476-3 : 1958 were 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.

## Bibliography

BS 476-3 : 1958 *Fire tests on building materials and structures — External fire exposure roof test*

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

BS 8217 : 1994 *Code of practice for built-up felt roofing*

EN 495-5 : 2000 *Flexible sheets for waterproofing — Determination of foldability at low temperature — Plastic and rubber sheet for roof waterproofing*

EN 1107-2 : 2001 *Flexible sheets for waterproofing — Determination of dimensional stability — Plastic and rubber sheet for roof waterproofing*

EN 12311-2 : 2000 *Flexible sheets for waterproofing — Determination of tensile properties — Plastic and rubber sheets for roof waterproofing*

EN 12317-2 : 2000 *Flexible sheets for waterproofing — Determination of shear resistance of joints — Plastic and rubber sheets for roof waterproofing*

EN 12691 : 2001 *Flexible sheets for waterproofing — Bitumen, plastic and rubber sheets for roof waterproofing — Determination of resistance to impact*

EN 12730 : 2001 *Flexible sheets for waterproofing — Bitumen, plastic and rubber sheets for roof waterproofing — Determination of resistance to static loading*

MOAT No 67 : 2001 *UEAtc Technical Guide for the assessment of non-reinforced, reinforced and/or backed roof waterproofing systems made of FPO*

## Conditions of Certification

### 19 Conditions

19.1 This Certificate:

- (a) relates only to the product that is described, installed, used and maintained as set out in this Certificate;
- (b) is granted only to the company, firm or person identified on the front cover — no other company, firm or person may hold or claim any entitlement to this Certificate;
- (c) is valid only within the UK;
- (d) has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective;
- (e) is copyright of the BBA;
- (f) is subject to English law.

19.2 References in this Certificate to any Act of Parliament, Regulation made thereunder, Directive or Regulation of the European Union, Statutory Instrument, Code of Practice, British Standard, 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 and the manufacture and/or fabrication including all related and relevant processes thereof:

- (a) are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA;

(b) continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine; and

(c) are reviewed by the BBA as and when it considers appropriate.

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

- (a) the presence or absence of any patent, intellectual property or similar rights subsisting in the product or any other product;
- (b) the right of the Certificate holder to market, supply, install or maintain the product; and
- (c) the actual works in which the product is installed, used and maintained, including the nature, design, methods and workmanship of such works.

19.5 Any recommendations relating to the use or installation 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, common law or other duty which may 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, 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 installation and use of this product.



In the opinion of the British Board of Agrément, Ecofin Single-Ply Roof Waterproofing Membranes are fit for their intended use provided they are installed, used and maintained as set out in this Certificate. Certificate No 04/4182 is accordingly awarded to Delta Waterproofing.

On behalf of the British Board of Agrément

Date of issue: 2nd December 2004

A handwritten signature in black ink, appearing to read 'P. Q. Newson', is written over a light grey background.

Chief Executive

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**British Board of Agrément**

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Certificate, including validity and  
scope, tel: Hotline 01923 665400,  
or check the BBA website.