



IKO Europe nv

D'Herbouvillekaai 80
B-2020 Antwerp
Belgium

Tel: 00 32 3 248 30 00 Fax: 00 32 3 248 37 77
e-mail: spectraroo@eur.iko.com
website: www.spectraroo.com

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**Agrément
Certificate
No 05/4287**

Designated by Government
to issue
European Technical
Approvals

ARMOURPLAN S ROOF WATERPROOFING SYSTEMS

Revêtement d'étanchéité
Dachabdichtungen

Product



• THIS CERTIFICATE OF CONFIRMATION RELATES TO ARMOURPLAN⁽¹⁾ S ROOF WATERPROOFING SYSTEMS, CONSISTING OF SINGLE-PLY POLYMERIC SHEETS.

• The systems are marketed in the United Kingdom by IKO Ltd, Appley Lane North, Appley Bridge, Wigan, Lancashire NN6 9AB

Tel: 0800 028 5573
Fax: 0800 013 5574

• Technical support can be obtained from: Spectraroo Technical Services,
Tel: 01629 582213
e-mail: marketing@spectraroo.co.uk

(1) Armourplan is a registered trademark of the IKO Group.

Regulations — Detail Sheet 1

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, Armourplan S Roof Waterproofing Systems if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements.

Requirement: B4(2)	External fire spread
Comment:	Data obtained from tests to BS 476-3 : 1958 indicate that on suitable non-combustible substructures the use of the systems will enable a roof to be unrestricted under this Requirement. See the tinted areas in the <i>Properties in relation to fire</i> section of the accompanying Detail Sheets.
Requirement: C2(b)	Resistance to moisture
Comment:	Data for water resistance on the membranes, including joints, indicate that the systems meet this Requirement. See the tinted area in the <i>Weather-tightness</i> section of these Front Sheets.
Requirement: Regulation 7	Materials and workmanship
Comment:	The systems are of acceptable materials. See the tinted area in the <i>Durability</i> section of the accompanying Detail Sheets.

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continued

- Installation must be carried out by trained and approved operatives.

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

Confirmation of Dutch Agrément ATG 009/8 issued by BDA-Intron B.V.

2 The Building (Scotland) Regulations 2004



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

Regulation:	8	Fitness and durability of materials and workmanship
Regulation:	8(1)	Fitness and durability of materials and workmanship
Comment:		The systems can contribute to a construction satisfying this Regulation. See the tinted areas of the <i>Durability</i> section and the <i>Installation</i> part of the accompanying Detail Sheet.
Regulation:	9	Building standards — construction
Standard:	2.8	Spread from neighbouring buildings
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 clauses 2.8.1 ⁽¹⁾⁽²⁾ and 2.8.2 ⁽¹⁾⁽²⁾ . See the tinted areas of the <i>Properties in relation to fire</i> section of the accompanying Detail Sheets.
Standard:	3.10	Precipitation
Comment:		Data examined for water resistance on the membranes, including joints, indicate that the use of the membranes can enable a roof to satisfy the requirements of clauses 3.10.1 ⁽¹⁾⁽²⁾ and 3.10.6 ⁽¹⁾⁽²⁾ . See the tinted area in the <i>Weathertightness</i> section of these Front Sheets.
Regulation:	12	Building standards — conversions
Comment:		All comments given for these systems under Regulation 9, also apply to this Regulation with reference to clause 0.12.1 ⁽¹⁾⁽²⁾ and Schedule 6 ⁽¹⁾⁽²⁾ .
		(1) Technical Handbook (Domestic).
		(2) Technical Handbook (Non-Domestic).

3 The Building Regulations (Northern Ireland) 2000



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

Regulation:	B2	Fitness of materials and workmanship
Comment:		The systems are of acceptable materials. See the tinted areas in the <i>Durability</i> section of the accompanying Detail Sheets.
Regulation:	C4	Resistance to ground moisture and weather
Comment:		Data for water resistance on the membranes, including joints, indicate that the use of the systems can enable a roof to satisfy the requirements of this Regulation. See the tinted area in the <i>Weathertightness</i> section of these Front Sheets.
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 the tinted areas of the <i>Properties in relation to fire</i> section of the accompanying Detail Sheets.

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: 1 *Description* (1.2) and 2 *Delivery and site handling* (2.3) of the accompanying Detail Sheets.

5 General

5.1 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.

5.2 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.

5.3 Decks to which the systems are to be applied must comply with the relevant requirements of BS 6229 : 2003, BS 8217 : 2005 and, where appropriate, NHBC Standards, Chapter 7.1 or the *Zurich Building Guarantee Technical Manual*, Section 4 *Superstructure*, Sub-section *Flat roofs* (pages 259 and 260).


5.4 Insulation materials used in conjunction with the systems must be either:

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

5.5 Armourplan S membranes can be adversely affected by contact with bituminous or coal tar products, or polystyrene insulation boards, and a suitable separating layer must be used. When doubt arises, the advice of the Certificate holder or Spectrarooft Technical Services should be sought.

5.6 Installation must be carried out only by installers trained and approved by the Certificate holder.

6 Weathertightness

 6.1 Data confirm that the membranes and joints in the membranes, when completely sealed, 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 6

Scotland

Mandatory Standard 3.10

Northern Ireland

Regulation C4.

6.2 The membranes are impervious to water and, when used in one of the systems described, will achieve a weathertight roof capable of accepting minor structural movement without damage.

7 Resistance to foot traffic

7.1 Data indicate that the systems can withstand, without damage, the limited foot traffic and light concentrated loads associated with the installation and maintenance operations. However, reasonable care should be taken to avoid sharp objects or concentrated loads.

7.2 In a situation where regular traffic is envisaged (ie maintenance of lift equipment) a walkway should be provided using concrete slabs supported on bearing pads or an anti-slip walkway with or without a protection sheet. The advice of Spectrarooft Technical Services should be sought on the most appropriate method to be used with the amount of traffic involved.

8 Maintenance

8.1 Roofs covered with the Armourplan S membranes should be the subject of annual inspections, as is good practice with waterproofing systems, to ensure continued security and performance, especially those roofs without ballast.

8.2 In the event of accidental damage, repairs can be carried out by cleaning the area around the damage and applying a patch of the appropriate membrane in accordance with the Certificate holder's instructions.

Bibliography

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

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

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

Conditions of Certification

9 Conditions

9.1 This Certificate:

- (a) relates only to the product that is named, 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.

9.2 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.

9.3 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) remain covered by a valid Dutch Agrément; and

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

9.4 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.

9.5 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, Armourplan S Roof Waterproofing Systems are fit for their intended use provided they are installed, used and maintained as set out in this Certificate. Certificate No 05/4287 is accordingly awarded to IKO Europe nv.

On behalf of the British Board of Agrément

Date of issue: 11th December 2005

A handwritten signature in black ink, appearing to read 'G. H. Cooper', is written over a white background.

Chief Executive

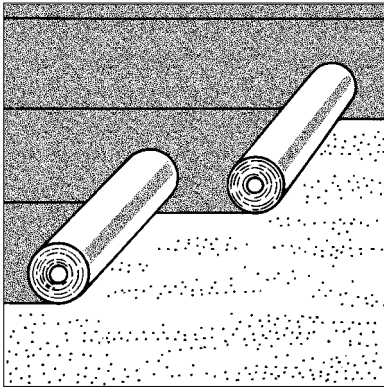


IKO EUROPE nv

Certificate No 05/4287

**ARMOURPLAN SM AND
ARMOURPLAN SM PREMIUM**
DETAIL SHEET 2

Product



• THIS DETAIL SHEET RELATES TO ARMOURPLAN SM AND ARMOURPLAN SM PREMIUM, A POLYESTER REINFORCED FLEXIBLE POLYVINYL CHLORIDE (PVC) MEMBRANE.

• The membranes are for use in mechanically fixed waterproofing systems on flat or pitched roofs or in loose-laid and ballasted waterproofing systems on flat roofs with limited access.

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

Technical Specification

1 Description

1.1 Armourplan SM and Armourplan SM Premium are polyester (110 gm²) reinforced PVC membranes, manufactured by calendaring. Armourplan SM Premium membranes include a lacquer for protection against extreme exposure to micro-organisms and the effects of pollution (ie as a barrier against plasticiser migration).

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

Table 1 Nominal characteristics

Characteristics (units)	Membrane grade	
	SM120	SM150
Thickness (mm)	1.2	1.5
Roll width (mm)	1060, 1500, 2120	1060, 1500, 2120
Roll length (m)	20	15
Weight per units area (gm ²)		
SM	1575	1950
SM Premium	1605	1980
Standard colour ⁽¹⁾	middle grey (MG)	middle grey (MG)
Plasticiser type	phthalate	phthalate

(1) Other colours available on request are green, blue, turquoise, stone red and white.

1.3 Ancillary items for use with the systems include:

- coated metal for PVC — a 0.6 mm galvanized steel sheet, coated with 0.6 mm of Armourplan PVC compound for use in detailing
- polyester fleeces 200, 300, 500 and 800 gm² — for use as a separation layer for mechanical and chemical protection (eg between membrane and EPS insulation boards)

- glass fleece (120 gm²) — for use as a separation layer, for chemical protection
- prefabricated parts — for use in detailing at perimeters
- contact adhesive for PVC — a contact-adhesive based on nitrile rubber for use at details and upstands
- flatbar — used in fastening at edges.

1.4 Quality control checks are carried out during production and on the final product. Checks on the final product include:

- dimensions
- tensile strength and elongation
- tear resistance
- dimensional stability
- joint peel
- interlaminar strength
- low-temperature foldability.

2 Delivery and site handling

2.1 Rolls are wrapped in plastic with labels bearing the product name, manufacturer's name, product dimensions, article number and batch number.

2.2 Rolls should be stored horizontally undercover and on a clean, level surface.

2.3 Contact adhesive for PVC has a flashpoint of <0°C and is classified extremely flammable under the Chemicals (Hazard Information and Packaging for Supply) Regulations 2002 (CHIP3), carries the appropriate hazard warning and is stored in accordance with the Highly Flammable Liquids and Liquefied Petroleum Gases Regulations 1997.

Design Data

3 General

Armourplan SM and Armourplan SM Premium are satisfactory for use as mechanically fixed waterproofing layer on flat and pitched roofs or loose-laid and ballasted systems on flat roofs with limited access.

4 Resistance to wind uplift

4.1 The resistance to wind uplift of the membranes is provided by mechanical fasteners secured to the deck and passing through the membrane. The number of fixings will depend on a number of factors, including:

- wind uplift forces to be resisted
- pull-out strength of fasteners
- elastic limit of the membrane
- appropriate safety factors.

4.2 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 maximum permissible loads of 0.8 kN per fixing.

4.3 When used in a loose-laid and ballasted installation, the precise ballast requirements for loose-laid systems should be calculated in accordance with the relevant parts of BS 6399-2 : 1997, but should be a minimum thickness of 50 mm (20 to 40 grade gravel). The use of concrete slabs on suitable supports should be considered in areas of high wind exposure and the advice of the Spectrarooft Technical Services should be sought.

5 Properties in relation to fire



5.1 When tested in accordance with BS 476-3 : 1958, a system comprising a trapezoidal steel deck, a polyethylene vapour control layer, 150 mm thick mineral wool insulation and a layer of Armourplan SM 120 1.2 mm membrane, mechanically fastened, achieved a rating of EXT.F.AB.

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

5.3 The designation of other specifications (eg when used 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 or assessment carried out by a UKAS accredited laboratory or an independent consultant with appropriate experience to conform to Mandatory Standard 2.8

Northern Ireland

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

6 Durability



6.1 Accelerated weathering tests and evidence from long-term existing sites confirm that satisfactory retention of physical properties is achieved. Available evidence indicates that the mechanically fixed system should have a life in excess of 30 years and ballasted systems in excess of 20 years.

6.2 In environments where the membranes are in contact with organic solvents, the life expectancy of the membranes may be reduced. In cases of doubt the advice of the Certificate holder should be sought.

Installation

7 General

7.1 Installation of Armourplan SM and Armourplan SM Premium must be carried out by trained and approved installers working in accordance with the relevant clauses of the *Spectrarooft Technical Installation Manual*, BS 8000-4 : 1989 and this Certificate.

7.2 Conditions on site should be those for normal roof waterproofing work. Deck surfaces must be dry, clean and free from sharp projections such as nail heads, concrete nibs. When used over a rough substrate, a suitable protection layer should be placed over the substrate.

7.3 Installation should not be carried out during wet weather (eg rain, fog, snow) nor when the temperature is below 0°C unless suitable precautions against surface condensation are taken in accordance with the *Spectrarooft Technical Installation Manual*.

7.4 When used over bitumen, bitumen-bound insulation products, coal tar, pitch or oil-based products a separation layer must be interposed between the substrate and the membrane. In cases of doubt the advice of the Certificate holder should be sought.

7.5 When using a loose-laid specification, account should be taken in the design of the deck of the extra dead loading due to the weight of the aggregate.

8 Procedure

Mechanically fastened

8.1 The membrane should be unrolled onto the substrate without undulations, with 110 mm minimum side laps and 60 mm minimum end laps.

8.2 The membrane is fixed to the deck (through insulation boards, where appropriate) in the joint overlaps prior to welding of the seams in accordance with the *Spectrarooft Technical Installation Manual*.

8.3 The membrane should then be fixed at the edges by either mechanically fastening using flatbar, coated metal for PVC or by welding.

Loose-laid and ballasted

8.4 The membrane should be unrolled onto the substrate on top of any protective or isolating layer, taking care not to stretch the material. Edge and end laps should be 60 mm minimum.

8.5 The membrane should then be fixed at the edges by either mechanically fastening using flatbar, coated metal for PVC or by welding.

8.6 The membrane should be covered with a protective sheet prior to the application of a 50 mm minimum thick layer of washed, well-rounded gravel. In areas of high wind exposure, additional ballast such as concrete slabs on suitable protective supports may be necessary.

Hot-air welding

8.7 Joints are made using either automatic or hand-operated machines with the temperature set in accordance with the *Spectrarooft Technical Installation Manual*.

8.8 The lap area must be dry and clean. If the membrane in the weld area has become contaminated, it must be cleaned in accordance with the Certificate holder's instructions.

8.9 The welded width of the joint must be a minimum of 30 mm for field welds and 15 mm at detailing. Care should be taken that overheating of the membrane does not occur, possible impairment of the membrane may result.

8.10 Flashings should be formed in accordance with the *Spectrarooft Technical Installation Manual*.

8.11 The seam is tested with a metal probe to highlight poorly-welded areas. Any such areas should be made good using hot-air welding.

Technical Investigations

The following is a summary of technical investigations carried out on Armourplan SM and Armourplan SM Premium.

9 Tests

9.1 Data from tests conducted by BDA and the BBA are summarised in Tables 1 to 3.

Table 1 Physical properties — directional

Test (units)	Method ⁽¹⁾	Mean results	
		long ⁽²⁾	trans ⁽³⁾
Tensile strength (N per 50 mm) Armourplan SM120	EN 12311-2	2050	1680
Elongation at break (%) Armourplan SM120	EN 12311-2	23.0	21.0
Dimensional stability (%) Armourplan SM120	EN 1107-2	0.15	+0.10
Tear strength (N) (trapezoidal) Armourplan SM120	EN 12310-2	470	505
Nail tear (N) Armourplan SM120	EN 12310-1	375	560

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

(2) Longitudinal direction.

(3) Transverse direction.

Table 2 Service performance⁽¹⁾

Test (units)	Method ⁽²⁾	Mean results
Wind loading ⁽³⁾ (N per fastener) corrected result ⁽⁴⁾	ETAG 006	816
Static indentation concrete EPS	MOAT 27 : 5.1.9	L ₄ L ₄
Dynamic indentation Perlite EPS	MOAT 27 : 5.1.10	I ₃ I ₃
Low temperature flexibility (°C)	MOAT 27 : 5.4.2	<40
Resistance to plant roots	DIN 4062	pass
Shear strength of joints (N per 50 mm)	MOAT 27 : 5.2.2	1450
Peel strength (Nmm ⁻¹)	MOAT 29 : 4.17.2	11.0
Water vapour permeability (gm ² day ⁻¹)	BS 3177 (25°C/75% RH)	1.81
Vapour resistance (MNsg ⁻¹)	BS 3177 (25°C/75% RH)	113

(1) All tests carried out on Armourplan SM120.

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

(3) Mechanically fastened system on a metal deck.

(4) Sample tested was a 0.75 mm thick profiled steel deck, 100 mm of rockwool insulation fastened with two fasteners per board with 1.2 mm Armourplan SM mechanically fastened at 250 mm centres.

Table 3 Tests on Armourplan SM120 site samples by the BBA

Test (units)	Method ⁽¹⁾	Mean results
Nail tear (N) ⁽²⁾ long ⁽³⁾ trans ⁽⁴⁾	EN 12310-1	515 637
Thickness (mm) ⁽²⁾	EN 1849-2	0.99
Weight per unit area (kgm ⁻²) ⁽²⁾	EN 1849-2	1.288
Low temperature unaged aged ⁽⁵⁾	EN 495-5	20 <10 ⁽⁶⁾

(1) The test documents are detailed in the *Bibliography*.

(2) Sample taken from a 23-year-old site.

(3) Longitudinal direction.

(4) Transverse direction.

(5) Sample taken from a 35-year-old site.

(6) 10°C lowest temperature tested.

9.2 Test data on the following properties were also examined:

- dimensions
- weight per unit area
- flatness/straightness
- heat ageing 180 days at 80°C
- UV ageing 2500 light hours Xenotest
- water soak six months at 23°C
- exposure to micro-organisms for 12 months
- dehydrochlorination.

10 Investigations

10.1 Existing data on fire performance to BS 476-3 : 1958 were examined.

10.2 Visits to existing sites installed during 1969 and 1981 were carried out to assess the durability of the product under normal service conditions. Samples were taken for comparison testing.

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 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*

DIN 4062 : 1978 *Cold processable plastic jointing materials for sewer drains; jointing materials for prefabricated parts of concrete, requirements, testing and processing*

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 1849-2 2001 *Flexible sheets for waterproofing — Determination of thickness and mass per unit area — Plastic and rubber sheets for roof waterproofing*

EN 12310-1 : 1999 *Flexible sheets for waterproofing — Bitumen sheets for roof waterproofing — Determination of resistance to tearing (nail shank)*

EN 12310-2 : 2000 *Flexible sheets for waterproofing — Determination of resistance to tearing — Plastic and rubber sheets for roof waterproofing*

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

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

MOAT No 29 : 1984 *Directives for the Assessment of Roofing Systems using PVC sheets without reinforcement, loose laid under heavy protection and not compatible with bitumen*

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

ETAG 006 : 2000 *Systems of Mechanically Fastened Flexible Roof Waterproofing Membranes*



On behalf of the British Board of Agrément

Date of issue: 16th December 2005

Chief Executive