



Designated by Government
to issue
European Technical
Approvals

Product

• THIS CERTIFICATE OF CONFIRMATION RELATES TO FLEXOPER, FLEXOPER MF, AND FLEXOBIT ROOF WATERPROOFING SYSTEMS COMPRISING UNREINFORCED HOMOGENEOUS SBS-MODIFIED BITUMEN MEMBRANES ON LIMITED OR PEDESTRIAN ACCESS ROOFS.

• The products are suitable for use as:

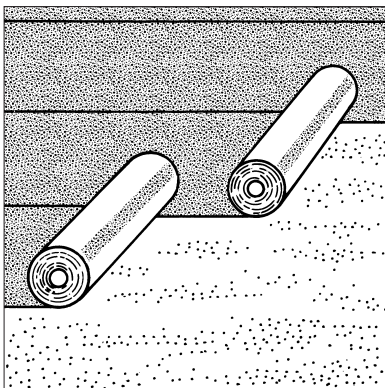
(a) mechanically fixed or partially torch bonded single- or multi-layer waterproofing systems for pitched or flat roofs

(b) single-layer loose laid and ballasted on flat roofs

(c) fully torch bonded two-layer and inverted roof waterproofing systems for pitched or flat roofs.

• The systems should only be installed by operatives of approved contractors trained and certified by Bitufa.

• The products are manufactured in the Netherlands by Bitufa BV, P O Box 811, NL-7301 BB, Apeldoorn, The Netherlands.



Confirmation of a Dutch Agrément issued by BDA Keurings —
En Certificeringsinstituut BV,
P O Box 739, NL-4200 AS,
Gorinchem, The Netherlands.

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**Agrément
Certificate
No 95/3201/C**
Second issue*

FLEXOPER, FLEXOPER MF, AND FLEXOBIT ROOF WATERPROOFING SYSTEMS

Revêtement d'étanchéité
Dachabdichtungen

Building Regulations

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

 The Secretary of State has agreed with the British Board of Agrément the aspects of performance to be used by the BBA in assessing the compliance of roof waterproofing membrane with the Building Regulations. In the opinion of the BBA, Flexoper, Flexoper MF, and Flexobit Roof Waterproofing Systems, if used in accordance with the provisions of this Certificate, will meet the relevant requirements.

Requirement: **B4(2)**

External fire spread

Comment:

On flat roofs and with one of the surface finishes prescribed in Part iii of Table A5 of the Approved Document the roof shall be deemed to be of designation AA. For other situations see sections 10.1 to 10.5.

Requirement: **C4**

Resistance to weather and ground moisture

Comment:

Data examined for water resistance of the membranes indicate that the material meets this Requirement. See section 7.1 of this Certificate.


Requirement: **Regulation 7**

Materials and workmanship

Comment:

The systems comprise acceptable materials. See section 12.1 of this Certificate.

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

 In the opinion of the BBA, Flexoper, Flexoper MF, and Flexobit Roof Waterproofing Systems, 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

Standard: **B2.1**

Selection and use of materials and components

Comment:

The systems comply with the Standard.

Regulation: **12**

Structural fire precautions

Standard: **D2.5**

Separation of roofs and rooflights from boundaries

Standard: **D3.6**

Roofs and rooflights of buildings ancillary to dwellings

Comment:

Test data to BS 476 : Part 3 : 1958 indicate that on suitable substructures the use of the systems will be unrestricted by the requirements of these Standards. See sections 10.1, 10.2, 10.6 and 10.7 of this Certificate.

Regulation: **17**

Preparation of sites and resistance to moisture

Standard: **G3.1**

Resistance to precipitation

Comment:

Test data examined for water resistance on the membranes indicate that the use of the systems can enable a roof to satisfy the requirements of this Standard. See section 7.2 of this Certificate.

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



In the opinion of the BBA, Flexoper, Flexoper MF, and Flexobit Roof Waterproofing Systems, if used in accordance with the provisions of this Certificate, will satisfy the various Building Regulations as listed below.

Regulation:	B2	Fitness of materials and workmanship
Comment:		The systems comprise acceptable materials. See section 1.2.1 of this Certificate.
Regulation:	C5	Resistance to ground moisture and weather
Comment:		Data examined for water resistance of the membranes indicate that the use of the systems can enable a roof to satisfy the requirements of this Regulation. See section 7.2 of this Certificate.
Regulation:	E8	External fire spread
Comment:		Data obtained from tests to BS 476 : Part 3 : 1958 indicate that on suitable substructures the use of the systems will enable a roof to be unrestricted under the requirements of this Regulation. See sections 10.1, 10.2 and 10.8 to 10.10 of this Certificate.

Technical Specification

4 Description

4.1 Flexoper, Flexoper MF, and Flexobit Roof Waterproofing Systems comprise the following membranes:

Flexoper — a styrene-butadiene-styrene (SBS) modified bitumen membrane backed with a perforated glass-fibre venting layer with a mineral surface finish, for use as a cap sheet in partially torched roofing applications.

Flexoper MF — an SBS modified bitumen membrane backed with a glass fabric cloth with a mineral surface finish, for use as a cap sheet in mechanically fixed or loose-laid and ballasted applications.

Flexobit — an SBS modified bitumen membrane backed with a thermofusible film with a mineral surface finish, for use as a cap sheet in fully bonded torched roofing applications and in inverted roof specifications.

4.2 The membranes are manufactured to the nominal dimensions given in Table 1.

Table 1 Nominal dimensions

Dimensions	Flexoper	Flexoper MF	Flexobit
thickness (mm)	5.0	5.0	5.0
width (m)	1.0	1.0	1.0
length (m)	5.0	5.0	5.0
roll weight (kg) ⁽¹⁾	28	28	28

(1) Dependent on roll length.

4.3 Ancillary items for use with the systems include:

Uniper — an SBS modified perforated underlay used with Standard Plus underlay or Flexowall for re-roofing and on laminated insulating materials.

Standard Plus underlay — an SBS modified 140 gm⁻² polyester reinforced underlay

Flexowall — an SBS modified polyester reinforced membrane for use at high parapets, details or upstands.

Unibase — an SBS modified polyester reinforced membrane used as a base sheet or a loose slide strip for covering tears.

A range of mechanical fixings to be used with an 80 mm by 40 mm pressure plate — for use with Flexoper MF.

4.4 Quality control checks are carried out on the raw materials, the coating mass and the final product; checks include:

- dimensions
- dimensional stability
- tensile strength and elongation at break
- low temperature flexibility
- heat resistance.

5 Delivery and site handling

5.1 Rolls are delivered to site in paper wrappings or tapes bearing the manufacturer's name, product name, product code, product dimensions and the BBA identification mark incorporating the number of this Certificate.

5.2 Rolls of Flexoper and Flexoper MF should be stored on end on a clean, level surface, away from excessive heat and kept under cover; rolls of Flexobit should be stored horizontally.

6 General

6.1 The systems, when installed in accordance with this Certificate and the relevant clauses of the manufacturer's instructions, are suitable for use on:

- (a) Flexoper — flat or pitched roofs with limited access as a partially bonded single-layer waterproofing or a cap sheet as part of a multi-layer waterproofing system.
- (b) Flexoper MF — flat or pitched roofs with limited access as a mechanically fixed single-layer waterproofing, or on flat roofs with limited or pedestrian access as a loose-laid and ballasted, single-layer waterproofing, mechanically fixed at perimeters and upstands.
- (c) Flexobit — flat or pitched roofs with limited access as a fully bonded cap sheet with butt jointing in a two-layer system and in inverted roof specifications.

6.2 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.

6.3 Pedestrian access roofs are defined for the purpose of this Certificate as those suitable for foot traffic at any time, for example, terraces, balconies, patios. The trafficked layer consists of dense, precast interlocking pavements bedded onto sand, dry mix, or other suitable protection. Special precautions must be taken to protect the membrane adequately.


6.4 When designing flat roofs, 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. Flat roofs are defined for the purpose of this Certificate as those roofs having a minimum finished fall of 1:80. Pitched roofs are defined as those having falls in excess of 1:6.


6.5 Decks to which the product is to be applied must comply with the relevant requirements of BS 6229 : 1982, BS 8217 : 1994 and, where appropriate, NHBC Standards Chapter 7.1 or the Zurich Municipal Technical Manual, Section 5, clause 5.9.3.19.

6.6 Insulation materials used in conjunction with the product must be:

- (a) as described in the relevant clauses of BS 8217 : 1994, or
- (b) the subject of a current BBA Certificate and be used in accordance with and within the limitations of that Certificate.

7 Weathertightness

 7.1 Data examined confirm that 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 Section 5.1 of Approved Document C4 of the Building Regulations 1991 (as amended 1994) (England and Wales).

 7.2 Data examined confirm that the membranes, when completely sealed and consolidated, will adequately resist the passage of moisture to the inside of the building and will satisfy the requirements of Regulation 17 Standard G3.1 for compliance with the Building Standards (Scotland) Regulations 1990 (as amended) and Regulation C5 of the Building Regulations (Northern Ireland) 1994 (as amended 1995).

7.3 The product is impervious to water and, when used in the systems described, will give a weathertight roofing capable of accepting minor structural movements without damage.

8 Resistance to wind uplift

8.1 Data examined indicate that the adhesion of the bonded systems to the decking, or to bituminous felt, is sufficient to resist the effects of wind suction, elevated temperature and thermal shock conditions likely to occur in practice.

8.2 When Flexoper MF is mechanically fixed, the number of fixings and their position will depend on: wind uplift forces to be resisted
the pull-out strength of the fixing screws
elastic limit of the membrane
appropriate safety factors.

8.3 The number of fixings used should be established by reference to the wind uplift force calculated in accordance with either CP 3 : Chapter V : Part 2 : 1972 or BS 6399 : Part 2 : 1995 on the basis of a maximum permissible load per individual fixing of 0.4 kN.

8.4 The precise ballast requirement for loose-laid systems should be calculated in accordance with the relevant parts of either CP 3 : Chapter V : Part 2 : 1972 or BS 6399 : Part 2 : 1995 but should not be below a minimum thickness of 50 mm. The use of concrete slabs, etc on suitable protective supports should be considered in areas of high design wind loads.

9 Resistance to foot traffic

The system can accept, without damage, the limited foot traffic and light concentrated loads associated with installation and maintenance operations. Where traffic in excess of this is envisaged, additional protection to the membrane in accordance with the manufacturer's instructions must be provided. However, reasonable care should be taken to avoid puncture by sharp objects or concentrated loads.

10 Properties in relation to fire



10.1 When tested in accordance with BS 476 : Part 3 : 1958, a system comprising 19 mm thick exterior grade plywood, covered with a bitumen primer and a single layer of Flexoper partially bonded cap sheet, achieved an EXT.F.AA rating.

10.2 Indicative tests on Flexoper MF in accordance with BS 476 : Part 3 : 1958 suggest that the product, when used in a mechanically fixed system, would have an EXT.F.AA rating.



10.3 Flexoper MF, when used in a loose-laid and ballasted specification, and Flexobit in an inverted roof specification, including a minimum surface finish of 50 mm of aggregate, may be considered to be of designation AA. The roof therefore meets the requirements of Regulation B4(2) of the Building Regulations 1991 (as amended 1994) (England and Wales).

10.4 When used for flat roofs with one of the surface finishes defined in Part iii of Table A5 of Appendix A of Approved Document B of the Building Regulations 1991 (as amended 1994) (England and Wales) (and listed below), the roof is deemed to be of designation AA.

Surface finishes:

- bitumen bedded stone chippings covering the whole surface to a depth of not less than 12.5 mm
- bitumen bedded tiles of a non-combustible material
- sand and cement screed, or
- macadam.

10.5 The designation of other specifications should be confirmed by test or assessment in accordance with Clause A1 of Appendix A of Approved Document B of the Building Regulations 1991 (as amended 1994) (England and Wales).



10.6 A roof waterproofed with Flexoper MF, ballasted by a minimum depth of 50 mm of aggregate, may be considered to be of designation AA and therefore satisfies the requirements of Regulation 12 Standards D2.5 and D3.6 of the Building Standards (Scotland) Regulations 1990 (as amended).

10.7 The designation of specifications other than that contained in section 10.1 and 10.2 must be confirmed by testing to ensure conformity with Standards D2.5 and D3.6 for compliance with the Building Standards (Scotland) Regulations 1990 (as amended).



10.8 A roof waterproofed with Flexoper MF, ballasted by a minimum depth of 50 mm of aggregate, may be considered to be of designation AA and therefore satisfies the requirements of Regulation E8 of the Building Regulations (Northern Ireland) 1994 (as amended 1995).

10.9 When used for flat roofs with one of the surface finishes given in Technical Booklet E, Table 4.6, Part IV of the Building Regulations (Northern Ireland) 1994, the roof should be considered to be of designation AA.

10.10 The designation for other specifications, for example when the system is used on combustible substrates, should be confirmed either by testing or by assessment by a NAMAS accredited laboratory, BRE or an independent consultant with appropriate experience.

11 Maintenance

11.1 Roofs covered with Flexoper, Flexoper MF and Flexobit should be the subject of annual inspections, as is good practice with waterproofing systems, to ensure continued security and product performance.

11.2 In the event of damage, the sheets can be effectively repaired after cleaning the surrounding area, with pieces of the membranes torch welded to the damaged area.

12 Durability



12.1 Flexoper, Flexoper MF, and Flexobit Roof Waterproofing Systems, when subjected to normal conditions of exposure and use, will retain their integrity for a period of at least 20 years.

12.2 With slate surfaced products, after some years some localised loss of the slate surfacing may occur in areas where complex detailing of the roof design is incorporated.

Installation

13 General

13.1 Deck surfaces must be dry, clean and free from sharp projections such as nail heads, concrete nibs, etc.

13.2 Installation of these products is carried out in accordance with the manufacturer's instructions and the relevant clauses of BS 6229 : 1982, BS 8000 : Part 4 : 1989, BS 8217 : 1994 and, where appropriate, NHBC Standards Chapter 7.1 or the Zurich Municipal Technical Manual, Section 5, clause 5.9.3.19.

13.3 The membranes may be laid in conditions normal to roofing work and must not be laid in rain, snow or heavy fog, nor if the temperature falls below 5°C, unless precautions against condensation have been taken.

13.4 If the roof is likely to be subjected to uncontrolled pedestrian access, the substructure must meet the requirements of clause 8.3 of BS 8217 : 1994, and to prevent damage to the roof covering one of the appropriate surface finishes referred to in clauses 8.11 and 8.13 of the code must be used.

13.5 At falls in excess of 5° (1:11), the normal precautions against slippage and the provision for

mechanical fixings as required by BS 8217 : 1994 should be observed.

13.6 In renovation of existing roofs, blisters should be opened and flattened or removed, and cracks should be covered with loose strips of unibase before installation of the top layer.

13.7 Flexoper, Flexoper MF and Flexobit having a mineral surface finish, when used on roofs with limited access, require no further surface protection.

13.8 The roofing layers must always be installed with staggered overlaps and in such a manner that no counter-seams in the direction of outlets are made.

13.9 Flexobit is used in all detailing work, for example, upstands and protrusions.

14 Procedure

14.1 For all applications, the courses must be laid out and pre-treated, then fixed or bonded as described in the manufacturer's installation instructions.

14.2 Side and end laps should be a minimum of 100 mm for Flexoper and 110 mm for Flexoper MF. An uninterrupted bitumen bead of approximately 5 mm should exude from all laps to indicate a satisfactory seal.

14.3 The type of mechanical fixings used for Flexoper MF will vary according to the type of deck and insulation used. Further advice should be sought from Bitufa.

Butt jointing (Flexobit only)

14.4 The first roll of the base layer is installed by torching and the next roll is unrolled onto the substrate and adjusted until the two rolls are butted against each other. The second roll is then installed ensuring a minimum 5 mm bead of molten bitumen is visible at the joint between the two sheets. The process is repeated across the roof.

14.5 The second layer is installed similarly, ensuring that the joints in the two layers are staggered.

Technical Investigations

The following is a summary of the technical investigations carried out on Flexoper, Flexoper MF, and Flexobit Roof Waterproofing Systems.

15 Tests

Technical data from tests carried out by the BDA, which led to the issue of Dutch Certificate CTG-007/5, is summarised in Tables 2 to 6. The results relate to tests carried out on the Flexoper membrane unless otherwise stated in the table headings. This product is identical to the Flexoper MF and Flexobit except for the different backing layers as described in section 4.1.

Table 2 Coating mass

Test (units)	Method*	Mean result
Fines content (%)	MOAT 31 : 6F	0.7
Ring and ball (%)	MOAT 31 : 6G	
unaged		129
heat aged ⁽¹⁾		125
Low temperature flexibility (°C)	MOAT 31 : 6D	
unaged		-20
heat aged ⁽¹⁾		-20

(1) Heat aged 180 days at 70°C.

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

Table 3 Physical properties — directional

Test (units)	Method*	Mean results	
		Long ⁽¹⁾	Trans ⁽²⁾
Tensile strength at break (Nmm ⁻²)	MOAT 31 : 6C	0.55	0.40
Elongation at break (%)	MOAT 31 : 6C	>1000	>1000
Tearing strength (N)	MOAT 27 : 5.4.1		
Flexoper		35	35
Flexoper MF		>90 ⁽³⁾	—
Dimensional stability (%)	MOAT 27 : 5.1.6	-0.02	—

(1) Longitudinal direction.

(2) Transverse direction.

(3) No break within span of tensile machine.

— = not tested

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

Table 4 Physical properties — general

Test (units)	Method*	Mean result
Low temperature Flexibility (°C)	MOAT 31 : 6D	
unaged		<-20
heat aged ⁽¹⁾		<-10
Heat resistance (°C)	MOAT 31 : 6E	
unaged		105
heat aged ⁽¹⁾		100

(1) Heat aged 180 days at 70°C.

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

Table 5 Service performance

Test (units)	Method*	Mean result
Unrolling at low temperature	MOAT 27 : 5.4.3	satisfactory
Static indication	MOAT 27 : 5.1.9	
concrete		L ₂
polyurethane foam		L ₂
Dynamic indentation	MOAT 27 : 5.1.10	
perlite		I ₄
polyurethane foam		I ₄
Resistance to sliding	MOAT 27 : 5.1.7	satisfactory
Resistance to cyclic movement	MOAT 31 : 6K	
unaged		satisfactory
heat aged ⁽¹⁾		satisfactory
Watertightness	MOAT 27 : 5.1.4	no leakage
Resistance to thermal shock	MOAT 27 : 5.1.5	no change
Integrity of joints	MOAT 27 : 5.2.1	
unaged		no leakage
heat aged ⁽¹⁾		no leakage
water soak ⁽²⁾		no leakage
Tensile strength of joints (N per 20 mm)	MOAT 27 : 5.2.2	
unaged		290 ⁽³⁾
heat aged ⁽¹⁾		290 ⁽³⁾
water soak ⁽²⁾		290 ⁽³⁾
Resistance to brushing of mineral protection (%)	MOAT 31 : 6J	
dry		65
wet ⁽⁴⁾		75

(1) Heat aged 28 days at 80°C.

(2) Water soak 7 days at 60°C.

(3) No break within span of tensile machine.

(4) Water soak 24 hours at 20°C.

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

Table 6 Joint performance — Flexoper MF

Test	Method*	Mean result
Peel strength (180°)	BRL 1511/01 8.13	
unaged (N per 50 mm)		200
heat aged ⁽¹⁾ (N per 50 mm)		245
water soak ⁽²⁾ (N per 50 mm)		115
Tensile strength (N per 50 mm)	BRL 1511/01 8.14	
unaged		705
heat aged ⁽¹⁾		1080
water soak ⁽²⁾		615
Watertightness at 10 kPa	BRL 1511/01 8.12	
unaged		watertight
heat aged ⁽¹⁾		watertight
water soak ⁽²⁾		watertight

(1) Heat aged 28 days at 80°C.

(2) Water soak 7 days at 60°C.

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

16 Other investigations

16.1 A factory visit was made to examine the manufacturing process and quality control procedures employed in the manufacture of Flexoper, Flexoper MF, and Flexobit Roof Waterproofing Systems.

16.2 An examination was made of reports of fire tests carried out to BS 476 : Part 3 : 1958.

16.3 A visit to a site in progress was carried out to investigate installation procedures.

16.4 Data in the Dutch Agrément CTG-007/5 and BDA test data were evaluated in the context of United Kingdom roofing practice and Building Regulations, including data on the butt jointing of Flexobit.

Bibliography

BS 476 *Fire tests on building materials and structures*

Part 3 : 1958 *External fire exposure roof test*

BS 6229 : 1982 *Code of practice for flat roofs with continuously supported coverings*

BS 6399 *Loading for buildings*

Part 2 : 1995 *Code of practice for wind loads*

BS 8000 *Workmanship on building sites*

Part 4 : 1989 *Code of practice for waterproofing*

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

CP 3 *Code of basic data for the design of buildings*

Chapter V *Loading*

Part 2 : 1972 *Wind loads*

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

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

BRL 1511/01: *Baanvormige*

Dakbedekkingssystemen — Specificke bepalingen 1993

Conditions of Certification

17 Conditions

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

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

- (a) the specification of the product is unchanged; and
- (b) the product remains the subject of a BDA Agrément.

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

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

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

17.5 It should be noted that any recommendations relating to the safe use of this product which are contained or referred to in this Certificate are the minimum standards required to be met when the product is used. They do not purport in any way to restate the requirements of the Health & Safety at Work etc Act 1974, or of any other statutory or Common Law duties of care, or of any duty of care which exist at the date of this Certificate or in the future; nor is conformity with such recommendations to be taken as satisfying the requirements of the 1974 Act or of any present or future statutory or Common Law duties of care. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the use of this product.



In the opinion of the British Board of Agrément, Flexoper, Flexoper MF, and Flexobit Roof Waterproofing Systems are fit for their intended use provided they are installed, used and maintained as set out in this Certificate. Certificate No 95/3201/C is accordingly awarded to Bitufa BV.

On behalf of the British Board of Agrément

Date of Second issue: 19th August 1996

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

Director

**Original Certificate issued 28th November 1995. This amended version to include reference to Flexobit installed using butt jointing.*

