



Bailey Roofing Systems

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**Agrément
Certificate
No 06/4375**

Designated by Government
to issue
European Technical
Approvals

SYSTEM 17000 ROOF WATERPROOFING SYSTEM

Système d'étanchéité pour toiture
Dachabdichtungen

Product



• THIS CERTIFICATE RELATES TO THE SYSTEM 17000 ROOF WATERPROOFING SYSTEM, BASED ON POLYESTER REINFORCED ATACTIC POLYPROPYLENE MODIFIED BITUMEN MEMBRANES.

• The product is for use as a partially or fully bonded roof waterproofing system on flat or pitched roofs with limited access.

• The product is a two-layer roof waterproofing system available with two finishes, sand or mineral surfaced and should be installed by approved contractors only.

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 with the Building Regulations. In the opinion of the BBA, the System 17000 Roof Waterproofing System, 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:

On flat roofs and with one of the surface finishes prescribed in Part IV(A) of Table A4 of the Approved Document the roof shall be deemed to be of designation AA. For other situations see sections 11.1 and 11.2 of this Certificate.

Requirement: **C2(b)**

Resistance to moisture

Comment:

Data for water resistance on the membranes, including joints, indicate that the material meets the requirement. See section 8.1 of this Certificate.

Requirement: **Regulation 7**

Materials and workmanship

Comment:

The system comprises an acceptable material. See section 13 of this Certificate.

2 The Building (Scotland) Regulations 2004



In the opinion of the BBA, the System 17000 Roof Waterproofing System, 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 system can contribute to a construction satisfying this Regulation. See section 13 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards — construction
Standard:	2.8	Spread from neighbouring buildings
Comment:		The designation of all specifications must be confirmed by test to satisfy the requirements of clauses 2.8.1 ⁽¹⁾⁽²⁾ and 2.8.2 ⁽¹⁾⁽²⁾ . See section 11.1 of this Certificate.
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 section 8.1 of this Certificate.
Regulation:	12	Building standards — conversions
Comment:		All comments given for this system 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, the System 17000 Roof Waterproofing System, 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 system comprise acceptable materials. See section 13 of this Certificate.
Regulation:	C4	Resistance to ground moisture and weather
Comment:		Tests for water resistance of the membranes, including joints, indicate that the use of the system can enable a roof to satisfy the requirements of this Regulation. See section 8.1 of this Certificate.
Regulation:	E5	External fire spread
Comment:		When used on flat roofs and protected by one of the surface finishes specified in Part IV(A) of schedule 5, the roof may be considered to be of designation AA. See sections 11.1 and 11.2 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 section: 5 Description (5.2).

Technical Specification

5 Description

5.1 The System 17000 Roof Waterproofing System comprises:

- 17400 (cap sheet) — a torch-applied atactic polypropylene modified bitumen sheet reinforced with a 170 gm⁻² polyester base, a sand finish, and a polythene film undersurface
- 17450 (cap sheet) — as above but with a green/grey slate chipping finish
- 17300 (base sheet) — as above but with a 150 gm⁻² polyester base.

5.2 The nominal dimensions for the membranes are given in Table 1.

Table 1 Nominal characteristics

Characteristic (units)	sheet		
	17400	17450	17300
Thickness (mm)	4	4	3
Roll length (m)	10	10	10
Roll width (m)	1	1 ⁽¹⁾	1
Weight (kgm ⁻²)	4.4	4.5	3.3
Roll weight (kg)	44	45	33

(1) Includes 70 mm selvage edge.

5.3 Other materials used with this system include:

- Bailey AMC Primer — for use on steel substrates
- Bailey AMC, Aluminium SHR — an aluminium solvent-based solar reflective paint for protecting the membrane.

5.4 The membranes are manufactured by saturating, coating and surfacing 170 gm⁻² and 150 gm⁻² spunbond polyester-based mats respectively with a mixture of bitumen, polymer resin and small amounts of inert fillers.

5.5 Quality control checks include penetration and viscosity checks on the bituminous compound and quality checks on the final product include appearance, thickness, width, cold bend and ash.

6 Delivery and site handling

6.1 Rolls are delivered to site with three printed bands bearing the product name, weight, length, country of origin and a batch number ticket.

6.2 The rolls should be stored on end, on a smooth, clean surface and not subjected to excessive heat.

Design Data

7 General

7.1 The System 17000 is satisfactory as a partially or fully bonded weatherproof covering for flat and pitched roofs with limited access.

7.2 17400 and 17450 mineral can also be used as a cap sheet in a multi-layer system based on traditional bitumen felts or as a repair medium for existing roofs (ie as a complete single layer overlay where appropriate).

7.3 The mineral surfaced 17450 mineral is for use where appropriate, as an exposed cap sheet, or in detail work in conjunction with 17400, 17300 or roofing felts to BS 747 : 2000.

7.4 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.

7.5 Flat roofs are defined for the purpose of this Certificate as those roofs having a minimum finished fall of 1:80. For design purposes on 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. Pitched roofs are defined as those having falls in excess of 1:6.

7.6 Decks to which the product is 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 266 to 268).

7.7 Insulation systems or materials used in conjunction with the product must be one of the following:

- 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.

8 Weathertightness



8.1 Test 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 or satisfy the requirements of the national Building Regulations thus:

England and Wales

Approved Document C, Requirement C2, Section 6.

Scotland

Mandatory Standard 3.10, clauses 3.10.1⁽¹⁾⁽²⁾ and 3.10.6⁽¹⁾⁽²⁾.

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-domestic).

Northern Ireland

Regulation C4.

8.2 The systems are impervious to water and, when used as described, will give a weathertight roofing capable of accepting minor structural movement without damage.

9 Adhesion

The adhesion of the system to the decking, or to bituminous felts, is sufficient to resist the effects of wind suction, elevated temperature and thermal shock conditions likely to occur in practice.

10 Resistance to foot traffic

The system can accept, without damage, the limited foot traffic and light concentrated loads associated with installation and maintenance operations. Reasonable care is required, however, to avoid puncture by sharp objects or concentrated loads.

11 Properties in relation to fire



11.1 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 (England and Wales) or Technical Booklet E, Table 4.6 Part iv of the Building Regulations (Northern Ireland) (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.

11.2 The designation of other specifications, for example, when used on combustible substrates, should be confirmed by:

England and Wales

Test or assessment in accordance with Approved Document B, Appendix A, Clause 1

Scotland

Test to conform to Mandatory Standard 2.8, clauses 2.8.1⁽¹⁾⁽²⁾ and 2.8.2⁽¹⁾⁽²⁾

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

Northern Ireland

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

12 Maintenance

In the event of damage, the sheet can be effectively repaired, after cleaning, with pieces of the membrane torch-welded to the damaged area.

13 Durability



Accelerated weathering tests confirm that satisfactory retention of physical properties is achieved. All available evidence suggests that the System 17000 Roof Waterproofing should have a life of at least 20 years.

Installation

14 General

14.1 Installation of the System 17000 Roof Waterproofing System must be in accordance with the manufacturer's instructions and by an approved installer. Additional guidance on the use of roof waterproofing membranes is available in BS 8000-4 : 1989 and BS 8217 : 2005.

14.2 Substrates to which the roof covering is applied must be firm, dry and clean and free from sharp projections such as nail heads and concrete nibs. Metal, concrete and wood wool substrates should first be primed with Bailey AMC Primer.

14.3 The product should not be laid in rain, snow or heavy fog, nor if the temperature falls below 5°C.

15 Procedure

15.1 The system is applied by melting the polythene lower surface and the bitumen lower surface by torching and pressing the membrane down. Care must be taken not to overheat the coating. When used as a cap sheet in a multi-layer system, 17400 or 17450 mineral is fully bonded to the 17300 or to base layers complying with BS 747 : 2000. To achieve a partially bonded system, a base layer of BS 747 : 2000, type 3B, felt is bitumen bonded to a loose-laid layer of BS 747 : 2000, type 3G, felt. The membrane is then torch bonded to this base.

15.2 At falls in excess of 5° (1.11) precautions against slippage, and requirements for mechanical fixing as required by BS 8217 : 2000, should be observed.

15.3 Edge laps should be at least 50 mm wide and end laps of at least 100 mm should be used.

15.4 The surface of 17450 does not require any further protection; however, 17400 should always be protected by a solar protective coating of Bailey AMC Aluminium SHR, or a surface finish applied in accordance with BS 8217 : 2005, Clauses 6.12 and 8.19. Surface finishes in the code of practice include:

- stone aggregate in dressing compound
- precast concrete paving flags
- proprietary tiles on bonding compound.

15.5 Metal pipes, in contact with the membrane should be coated with Bailey AMC Aluminium SHR, a solar protective paint.

Technical Investigations

The following is a summary of the technical investigations carried out on the System 17000 Roof Waterproofing System.

16 Tests

Samples of the membranes were obtained from the manufacturer for testing. The results of the tests carried out by the BBA, which show typical results for the material, are summarised in Tables 2 to 6.

Table 2 Physical properties of the coating mass — general

Test (units)	Method ⁽¹⁾	Mean result
Fines content (%)	MOAT 30 : 6.F	24.9
Ring and ball softening point (°C)	BS 4692	
unaged		154
heat aged ⁽²⁾		153
Penetration at 25°C	BS 4691	
unaged		26.4
heat aged ⁽²⁾		20.4
Low temperature flexibility (°C)	MOAT 27 : 5.1.6	
unaged		-15
heat aged ⁽²⁾		-10

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

(2) Heat aged at 70°C for 168 days.

Table 3 Physical properties of polyester reinforcement⁽¹⁾ — general

Test (units)	Method ⁽²⁾	Mean result
Weight per unit surface area (kgm ⁻²)	Direct	0.173
Tensile strength (Nmm ⁻²)	MOAT 30 : 6.C	
longitudinal		9.7
transverse		11.6
Elongation (%)	MOAT 30 : 6.C	
longitudinal		37
transverse		34

(1) All tests performed on 0.173 kgm⁻² (nominal) reinforcement size.

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

Table 4 Physical properties membranes — general

Test (units)	Method ⁽¹⁾	Mean results		
		17300	17400	17450
Roll width (m)	Direct	1.0	1.0	1.0
Roll thickness (mm)	Direct	3.3	4.0	4.2
Weight per unit surface area (kgm ⁻²)	Direct	3.4	4.3	4.7
Water vapour permeability (gm ⁻² day ⁻¹)	BS 3177 (25°C/75% RH)	0.63	0.68	0.54
Water vapour resistance (MNsg ⁻¹)	BS 3177 (25°C/75% RH)	325	301	380

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

Table 5 Physical properties membranes — directional

Test (units)	Method ⁽¹⁾	Mean results	
		Long ⁽²⁾	Trans ⁽³⁾
Tensile strength (N per 50 mm)	MOAT 30 : 6.C		
17300		940	542
17400		778	577
17450		703	613
Elongation (%)	MOAT 30 : 6.C		
17300		62	79
17400		58	57
17450		44	72
Nail tear (N)	MOAT 27 : 5.4.1		
17300		124	182
17400		174	200
17450		160	157
Dimensional stability (free) (%)	MOAT 27 : 5.1.6		
17300		0.71	0.74
17400		0.23	-0.55
17450		0.25	-0.35

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

(2) Longitudinal direction

(3) Transverse direction

Table 6 Service performance

Test (units)	Method ⁽¹⁾	Mean results		
		17300	17400	17450
Resistance to water pressure	MOAT 27 : 5.1.4	pass	pass	pass
hard substrate		L ₄	L ₄	L ₄
soft substrate		L ₄	L ₄	L ₄
Dynamic indentation	MOAT 27 : 5.1.6			
hard substrate		I ₄	I ₄	I ₄
soft substrate		I ₃	I ₃	I ₃
Fatigue resistance	MOAT 30 : 6K	pass	pass	pass
Wind uplift	MOAT 27 : 5.1.1	pass	pass	pass
Thermal cycle	MOAT 27 : 5.1.5	pass	pass	pass
Low temperature flexibility (°C)	MOAT 27 : 5.4.2			
unaged		-15	-15	0
heat aged ⁽²⁾		-10	-5	+5
UV aged ⁽³⁾		-10	-5	+5
Unrolling at low temperature	MOAT 27 : 5.4.3	pass	pass	pass
Thermal behaviour (°C)	MOAT 30 : 6.E			
highest pass				
unaged		120	120	120
heat aged ⁽²⁾		110	120	120
Resistance to slipping (mm)	MOAT 27 : 5.1.7	0	0	0
Peel strength (N per 50 mm) chipboard substrate	MOAT 27 : 5.1.3	6.3	51	40

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

(2) Heat aged at 70°C for 168 days.

(3) UV aged for 2000 hours QUV. Cycle 4 hours UV at 45°C/4 hours condensation at 40°C.

17 Investigations

17.1 A user survey was performed to examine the product's performance in use.

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

Bibliography

BS 747 : 2000 *Reinforced bitumen sheets for roofing — Specification*

BS 3177 : 1959 *Method for determining the permeability to water vapour of flexible sheet materials used for packaging*

BS 4691 : 1974 *Method for determination of penetration of bituminous materials*

BS 4692 : 1971 *Method for determination of softening point of bitumen (ring and ball)*

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

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

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

MOAT 27 : 1983 *Directive for the Assessment of Roof Waterproofing Systems*

MOAT 30 : 1984 *Special Directives for the Assessment of Reinforced Waterproof Coatings in Atactic Polypropylene (APP) Polymer Bitumen*

Conditions of Certification

18 Conditions

18.1 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.

18.2 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.

18.3 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.

18.4 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 or 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.

18.5 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 or in the future; nor is conformity with such information 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 manufacture, supply, installation, use and maintenance of this product/system.



In the opinion of the British Board of Agrément, the System 17000 Roof Waterproofing System is fit for its intended use if used as set out in this Certificate. Certificate No 06/4375 is accordingly awarded to Bailey Roofing Systems.

On behalf of the British Board of Agrément

Date of issue: 3rd October 2006

A handwritten signature in black ink, appearing to read 'G. A. Cooper'.

Chief Executive

British Board of Agrément

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