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Agrément Certificate
No 89/2216

PRODUCT SHEET 1 — FIRESTONE RUBBERGARD EPDM SYSTEMS

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to Firestone RubberGard EPDM Systems, single layer waterproofing membranes for use on limited access roofs.

AGRÉMENT CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation Guidance
- regular surveillance of production
- formal three-yearly review.

KEY FACTORS ASSESSED

Weatherightness — the system and joints in the system, when completely sealed and consolidated, will resist the passage of moisture to the interior of the building (see section 5).

Properties in relation to fire — tests indicate that the system will enable a roof to be unrestricted under Building Regulations (see section 6).

Resistance to wind uplift — the system will resist the effects of any wind suction likely to occur in practice (see section 7).

Resistance to foot traffic — the system will accept the limited foot traffic and loads associated with installation and maintenance of the system without damage (see section 8).

Durability — under normal service conditions the system will provide a durable waterproof covering with a service life of at least 20 years (see section 10).



The BBA has awarded this Agrément Certificate for Firestone RubberGard EPDM Systems to Firestone Building Products as fit for their intended use provided they are installed, used and maintained as set out in this Agrément Certificate.

On behalf of the British Board of Agrément

Head of Approvals
— Materials

Chief Executive

Date of First issue: 31 March 1989

Date of Seventh issue: 19 August 2008

The BBA is a UKAS accredited certification body — Number 113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk

Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

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Regulations

In the opinion of the BBA, Firestone RubberGard EPDM Systems, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations:



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

Requirement:	B4(2)	External fire spread
Comment:		Test data to BS 476-3 : 1958 and 2004 indicate that on suitable non-combustible substructures the use of the system will enable a roof to be unrestricted under this Requirement. See sections 6.1 to 6.4 of this Certificate.
Requirement:	C2(b)	Resistance to moisture
Comment:		Data for water resistance on the system, including joints, indicate that the system meets this Requirement. See section 5.1 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The system is acceptable. See section 10 of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Fitness and durability of materials and workmanship
Comment:		The use of the system satisfies the requirements of this Regulation. See sections 9, 10 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards — construction
Standard:	2.8	Spread from neighbouring buildings
Comment:		Test data to BS 476-3 : 1958 and 2004 indicate that on suitable non-combustible substructures the use of the system will be unrestricted by the requirements of clause 2.8.1 ⁽¹⁾⁽²⁾ of this Standard. See sections 6.1 to 6.4 of this Certificate.
Standard:	3.10	Precipitation
Comment:		Data examined for water resistance on the system, including joints, indicate that the use of the system can enable a roof to satisfy the requirements of clauses 3.10.1 ⁽¹⁾⁽²⁾ and 3.10.7 ⁽¹⁾⁽²⁾ of this Standard. See section 5.1 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).



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

Regulation:	B2	Fitness of materials and workmanship
Comment:		The system is acceptable. See section 10 and the <i>Installation</i> part of this Certificate.
Regulation:	B3(2)	Suitability of certain materials
Comment:		The system is acceptable. See section 9 of this Certificate.
Regulation:	C4(b)	Resistance to ground moisture and weather
Comment:		Data for water resistance on the system, including joints, indicate that the use of the system can enable a roof to satisfy the requirements of this Regulation. See section 5.1 of this Certificate.
Regulation:	E5(b)	External fire spread
Comment:		Test data to BS 476-3 : 1958 and 2004 indicate that on suitable non-combustible substructures the use of the system will be unrestricted by the requirements of this Regulation. See sections 6.1 to 6.4 of this Certificate.

Construction (Design and Management) Regulations 2007

Construction (Design and Management) Regulations (Northern Ireland) 2007

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

See sections: 1 *Description* (1.2) and 2 *Delivery and site handling* (2.3).

Non-regulatory Information

NHBC Standards 2007

NHBC accepts the use of Firestone RubberGard EPDM Systems, when installed and used in accordance with this Certificate, as meeting Technical Requirement R3 in relation to *NHBC Standards*, Chapter 7.1 *Flat roofs and balconies*.

Zurich Building Guarantee Technical Manual 2007

In the opinion of the BBA, Firestone RubberGard EPDM Systems, when installed and used in accordance with this Certificate, satisfy the requirements of the Zurich Building Guarantee Technical Manual, Section 4, *Superstructure*, Sub-section *Flat roofs*.

General

This Certificate relates to Firestone RubberGard EPDM Systems, single layer waterproofing membranes for use on limited access roofs.

The membrane is manufactured in the USA and marketed in the UK by Firestone Building Products.

The system is installed by trained and approved contractors only.

Technical Specification

1 Description

1.1 RubberGard is manufactured by blending ethylene-propylene-diene terpolymer (known as EPDM), process oils, fillers and other additives. The sheets are produced by milling and calendaring before finally vulcanising. Three grades of RubberGard are available, standard grade, LSFR (Low Slope Fire Retardant) and FR (Fire Retardant) grade. The LSFR grade contains less combustible ingredients and FR grade contains additional fire retardant ingredients.

1.2 The nominal characteristics of the membranes are given in Table 1.

Table 1 Nominal characteristics

Characteristic (units)	Grade					
	1.14	1.14LSFR	1.14FR	1.52	1.52LSFR	1.52FR
Thickness (mm)	1.14	1.14	1.14	1.52	1.52	1.52
Mass per unit area (kgm ⁻²)	1.41	1.51	1.51	1.95	2.10	2.10
Width (m) ⁽¹⁾	2.28, 3.05, 5.08, 6.10, 7.62, 9.15, 12.20 and 15.25					
Length (m) ⁽¹⁾	15.25, 30.50, 45.75 and 61.0					

(1) Other widths and lengths are available to special order.

1.3 Other materials for use with the system include:

- QuickSeam Splice Tape (76 mm or 152 mm) — a double-sided butyl self-adhesive tape for use on lap joints
- QuickSeam FormFlash — a self-adhesive uncured EPDM for use as a flashing material, especially where irregular shapes are involved
- QuickSeam Flashing — self-adhesive fast curing EPDM strip for use to flash metal edge trim details
- QuickSeam Batten Cover Strip — a self-adhesive semi-cured EPDM strip for use as a sealing tape over fixings
- QuickSeam SA Flashing — self-adhesive cured EPDM strip for use as a flashing material
- Firestone Splice Adhesive SA-1065 — a contact adhesive for bonding the membrane or flashing to compatible substrates
- QuickSeam Penetration Pocket — a prefabricated pocket for use with the Firestone S-10 Pourable Sealer at irregular shaped roof penetrations
- QuickPrime Plus — for preparing membrane or other compatible substrates to receive QuickSeam products
- Firestone Bonding Adhesive BA 2004 (T) — a contact adhesive for bonding the membranes to compatible substrates
- Firestone Modular Water-Based Bonding Adhesive — a water-based adhesive for bonding the membrane to compatible substrates
- Firestone Pourable Sealer S-10 — for sealing penetration pocket details
- Firestone Splice Wash SW-100 — for cleaning heavily contaminated EPDM membrane
- Firestone Water Block Seal S-20 — butyl-based sealant for watertight seal when used under compression
- Firestone Lap Sealant HS — an EPDM edge sealant for use with cut QuickSeam products
- Firestone Termination Bar — aluminium bars for terminating the membrane at upstands of concrete or masonry
- Firestone Batten Bars — metal or polymer strips to mechanically attach the membrane, RMA strip or RPF strip
- Firestone fixings — a range of all purpose and heavy duty fasteners, type dependent on specification and substrate used
- QuickSeam Walkway Pads — for use in areas of high accessibility
- QuickSeam RMA (Reinforced Mechanically Anchored) Strip — a reinforced EPDM membrane strip for non-penetrating mechanical attachment

- QuickSeam RPF (Reinforced Perimeter Fastening) Strip — a reinforced EPDM membrane strip for the attachment of the membrane at base tie-in details
- QuickSeam Universal Pipe Flashing — a pre-fabricated pipe boot for flashing circular roof penetrations.

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

- thickness
- tensile strength
- elongation
- tear resistance
- water absorption
- ozone resistance
- factory seam strength.

2 Delivery and site handling

2.1 The membrane is delivered to site in rolls on cardboard cores, wrapped in a polyethylene sleeve bearing the product name, thickness, manufacturer's name and the BBA identification mark incorporating the number of this Certificate.

2.2 EPDM membranes have no particular storage conditions but the Firestone QuickSeam products should be stored in a clean, dry position and in temperatures between 15°C and 25°C. QuickSeam FormFlash and QuickSeam Flashing cures gradually and should not be stored for more than nine months. As curing occurs the product will become less flexible, this does not affect its waterproofing characteristics but it does become more difficult to form details.

2.3 Materials that are classified as 'highly flammable' under *The Chemicals (Hazard Information and Packaging for Supply) Regulations 2002* (CHIP3), are given in Table 2. These products bear the appropriate hazard warning.

Table 2 Flashpoint and hazard classification

Materials	Flashpoint (°C)	Classification
Splice Adhesive SA-1065 ⁽¹⁾	-18	harmful, highly flammable, dangerous for the environment
QuickPrime Plus ⁽¹⁾	-4	harmful, highly flammable, dangerous for the environment
Bonding Adhesive BA 2004 (T) ⁽¹⁾	-18	harmful, highly flammable
Pourable Sealer S-10 (Part A)	185	not applicable
Pourable Sealer S-10 (Part B)	218	harmful
Water Block Seal (S-20) ⁽¹⁾	10	highly flammable, dangerous for the environment
Firestone Lap Sealant HS	11	harmful, highly flammable
Splice Wash SW-100 ⁽¹⁾	13	harmful, highly flammable

(1) These components should be stored in accordance with the Highly Flammable Liquids and Petroleum Gases Regulations 1997.

2.4 Bonding Adhesive BA 2004 (T), Splice Adhesive SA-1065, Firestone Lap Sealant HS, Water Block Seal S-20 and Modular Water-Based Bonding Adhesive should be stored between 15°C and 25°C. Modular Water-Based Bonding Adhesive should not be allowed to freeze.

2.5 The shelf-life of ancillary items is given in Table 3.

Table 3 Product shelf-life

Product	Shelf-life (months)
QuickSeam Splice Tape	12
QuickSeam FormFlash	9
QuickSeam Flashing	12
QuickSeam Batten Cover Strip	12
QuickSeam Universal Pipe Flashing	12
QuickSeam Walkway Pads	12
QuickSeam Penetration Pocket	12
Splice Adhesive SA-1065	9
QuickPrime Plus	12
QuickSeam RMA Strip	12
Bonding Adhesive BA 2004 (T)	12
Modular Water-Based Bonding Adhesive	6
Lap Sealant HS	12
Pourable Sealer S-10	12
Water Block Seal S-20	12
Splice Wash SW-100	12

(1) These components should be stored in accordance with the Highly Flammable Liquids and Petroleum Gases Regulations 1997.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Firestone RubberGard EPDM Systems.

Design Considerations

3 General

3.1 Firestone RubberGard EPDM Systems are satisfactory for use as:

- loose-laid and ballasted waterproofing layer, mechanically fixed at perimeters and upstands, on flat roofs with limited access
- fully-adhered waterproofing layer, mechanically fixed at perimeters and upstands, on flat and pitched roofs with limited access
- mechanically-fixed (using one of two fixing systems) waterproof layer, on flat roofs with limited access
- loose-laid system to the inverted roof concept, mechanically fixed at perimeters and upstands, on flat roofs with limited access.

3.2 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.

3.3 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 as those having falls greater than 1:6.

3.4 Decks to which the products 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 Flat roofs and balconies* or the *Zurich Building Guarantee Technical Manual, Section 4, Superstructure, Sub-section Flat roofs* pages 268 to 270.


3.5 Insulation systems or materials used in conjunction with the product must be approved by the manufacturer and by Firestone Building Products and must be either:

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

4 Practicability of installation

Installation of Firestone RubberGard EPDM Systems must be carried out by trained and approved installers.

5 Weathertightness

 5.1 Data confirm that the membrane and joints in the system, 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 (see section 15, Tables for *Physical properties – general* and *Physical properties – joints*):

England and Wales — Approved Document C, Requirement C2(b), Section 6

Scotland — Mandatory Standard 3.10, clauses 3.10.1⁽¹⁾⁽²⁾ and 3.10.7⁽¹⁾⁽²⁾


(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

Northern Ireland — Regulation C4(b).

5.2 The system is impervious to water and when used as described will achieve a weathertight roof capable of accepting minor structural movement without damage.

6 Properties in relation to fire

 6.1 When tested in accordance with BS 476-3 : 1958 a system comprising:

- a 0.7 mm steel profile deck, polyethylene vapour retarder, one 30 mm (nominal) thick layer of polyurethane insulation board with glassfibre tissue facing and a layer of RubberGard 1.14FR fixed using a mechanically attached system, achieved an EXT.F.AA rating
- a 0.7 mm steel profile deck, polyethylene vapour retarder, one 51 mm (nominal) thick layer of composite insulation board (6 mm WBP plywood/45 mm polyisocyanurate) and a layer of fully adhered RubberGard 1.52FR, achieved an EXT.F.AA rating.

6.2 When tested in accordance with BS 476-3 : 2004 a system comprising:

- a 12 mm OSB (Oriented Strand Board) and a layer of RubberGard 1.14FR bonded with Firestone Modular Water-Based Bonding Adhesive, achieved an EXT.F.AA rating
- a 12 mm plywood and a layer of RubberGard 1.14FR bonded with Firestone Modular Water-Based Bonding Adhesive, achieved an EXT.F.AA rating.

6.3 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 : 2004 designation EXT.F.AA.

6.4 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 to conform Mandatory Standard 2.8, clauses 2.8.1⁽¹⁾2⁽²⁾

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

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

7 Resistance to wind uplift

7.1 The adhesion of a fully adhered system to a substrate will normally be limited by the cohesive strength of the substrate. Tests indicate that on substrates with high cohesive strength the adhesion of the membranes is sufficient to resist the effect of wind suction, thermal cycling or minor structural movements occurring in practice (see section 1.5, Table for *Physical properties — general*).

7.2 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.

7.3 The resistance to wind uplift of the membrane is provided by mechanical fasteners secured to the deck. 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.

8 Resistance to foot traffic

Data indicate that the system can withstand, without damage, the limited foot traffic and light concentrated loads associated with the installation and maintenance operations. Where traffic in excess of this is envisaged, the use of QuickSeam Walkway Pads should be considered, and the advice of the Certificate holder should be sought. Reasonable care should be taken to avoid puncture by sharp objects or concentrated loads (see section 1.5, Table for *Physical properties — general*).

9 Maintenance



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

10 Durability



Accelerated weathering tests and performance in use confirm that satisfactory retention of physical properties is achieved. All available evidence indicates that the system should have a life in excess of 20 years (see section 1.5, Tables for *Physical properties — longitudinal directional*, *Physical properties — transverse, directional*, *Physical properties — general* and *Physical properties — joints*).

Installation

11 General

11.1 Installation of Firestone RubberGard EPDM Systems must be carried out by trained and approved installers working in accordance with the relevant clauses of the Certificate holder's instructions, BS 8000-4 : 1989 and this Certificate.

11.2 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.

11.3 When the systems are to be laid on a rough deck, a loose-laid, non-woven geotextile fleece (minimum 200 gm⁻²) should be laid first.

11.4 Installation should not be carried out during wet weather (eg rain, fog, snow), nor when the temperature is below 0°C. Special precautions in accordance with the Certificate holder's instructions should be taken if the fully-adhered system is to be installed at temperatures below 5°C due to the risk of condensation contaminating the bonding adhesive.

11.5 The Modular Water-Based Bonding Adhesive should not be used if there is a possibility of freezing temperatures within 48 hours after application.

11.6 Contact with bituminous, coal tar and oil-based products must be avoided as the membrane is not compatible with lower grades of bitumen. If contact with such products is likely, an isolating layer should be interposed before installing the waterproofing sheet. Where doubt arises, the advice of the Certificate holder should be sought.

11.7 The membrane must be mechanically fixed around perimeters of the roof at 305 mm maximum centres.

11.8 The membrane should be unrolled into position and allowed to relax for 30 minutes prior to fixing and/or lap jointing. Care must be taken to avoid ripples or folds in the sheets.

11.9 Sheets may be prefabricated prior to application to reduce the amount of on-site lap jointing. Prefabrication is only suitable for loose-laid and ballasted applications.

12 Procedure

Loose-laid and ballasted applications

12.1 The membrane is unrolled onto the substrate and mechanically fixed as described in section 11.7 or fully adhered at perimeters. Lap jointing and flashing must be carried out in the manner described in sections 13.1 and 13.2 to 13.6 respectively.

12.2 The membrane should be covered by at least 50 mm thickness of 20 mm to 40 mm grade well-rounded gravel. If crushed stone ballast is used, a protective mat of non-woven polyester fleece should be laid between the membrane and the aggregate. In areas of high wind exposure, paving slabs may be considered for use at a distance of one metre from the perimeter to avoid damage to the membranes due to wind uplift.

12.3 An alternative method of ballasting is by the use of concrete paving, maximum size 600 mm by 600 mm by 50 mm thick. A non-woven polyester fleece (minimum 200 gm⁻²) must be laid between EPDM and the supports.

12.4 When using a loose-laid application, normal account should be taken in the design of the deck of the extra dead load due to the weight of the aggregate.

12.5 When the membrane is to be laid directly onto a concrete deck, a separating layer of 12 mm thick wood fibreboard or a non-woven polyester fleece (minimum 200 gm⁻²) must first be laid on the deck. This is not required if insulation, a minimum of 19 mm thick, is to be laid immediately under the membrane. When used as the waterproofing layer in a roof designed to the inverted roof concept, a separating layer of non-woven polyester fleece must be laid between the concrete deck and the membrane.

Fully adhered applications

12.6 All insulation boards must be attached to the structural deck by bitumen bonding, adhesive or mechanical fastening (a minimum of four fixings per board) as appropriate to the type and thickness. The method of attachment must be adequate to provide resistance to wind uplift forces as defined in BS 6399-2 : 1997. When installed over glassfibre, mineral wool-based or polystyrene insulations, a suitable separation layer is either mechanically fastened or bitumen bonded over the insulation prior to the application of the waterproofing.

12.7 When used as a fully-bonded system, the resistance to wind uplift will be limited by the cohesive strength of the insulation and method of attachment. These factors should be taken into account when selecting the insulation material.

12.8 The fully-bonded application may not be used directly onto insulation materials that will be adversely affected by the solvent in the adhesive (eg polystyrene). The width of the membrane should not exceed 6.1 m for this type of application.

12.9 When used over expansion joints, bridging strips unbounded for a minimum of 150 mm should be installed over all joints.

12.10 A layer of Bonding Adhesive BA-2004 (T) or Modular Water-Based Bonding Adhesive should be applied to both the substrate and the membrane by means of a roller at an approximate application rate of 0.8 litres per metre square and 0.5 litres per metre square respectively (the exact rate dependent on the porosity of the substrate). When the adhesive has become touch dry, the membrane should be applied to the substrate and rolled to ensure a full bond and that air has not been trapped beneath the membrane.

12.11 Alternatively, a layer of Modular Water-Based Bonding Adhesive should be applied to the approved substrate at an application rate of between 1.47 to 2.45 metres square per litre. The membrane should be applied to the adhesive while wet and rolled to ensure a full bond and no air has been trapped beneath the membrane.

Mechanically fixed applications – fixing battens

12.12 The fixings may be waterproofed either within the lap joint of adjacent sheets (Batten-In-Seam System) or by covering with QuickSeam Batten Cover Strip (150 mm wide) centrally lapped over the batten (Mechanically Anchored System). Alternatively, QuickSeam RMA Strips are pre-attached to the deck using battens and the membrane spliced to the strips using QuickPrime Plus.

12.13 Where the Batten-In-Seam System is used, the lap should be a minimum width of 200 mm of which 70 mm should be between the centre of the Firestone Fixing Batten the exposed edge of the lap.

12.14 Where the Mechanically Anchored System is used, the lap should be a minimum of 100 mm. The width of the membrane should not exceed 9.15 m for this type of application.

12.15 The Firestone Fixing Battens are attached to the substrate by screws passing through the membrane or the QuickSeam RMA strip and the batten.

12.16 The membrane is normally fully adhered at perimeters and penetrations, although mechanical fixing may be used as described in section 11.7. Lap jointing and flashing must be carried out in the manner described in sections 13.1 and 13.2 to 13.6 respectively.

13 Details

Seaming procedure – QuickSeam

13.1 The lap joint area should be cleaned with QuickPrime Plus (alternatives should not be used). The QuickSeam Splice Tape should be positioned over the lower sheet's lap area and unrolled, leaving the release paper in place and rolling with a silicone roller. The upper sheet will be placed into position and mated to the tape by hand whilst the release paper is removed. Consolidate the seam using a silicone roller. Care must be taken to avoid ripples or folds.

Base Tie-In

13.2 At perimeters and upstands, the QuickSeam RPF (Reinforced Perimeter Fastening) Strip is mechanically fastened with a batten bar to the substrate. The field membrane is bonded to the strip using QuickPrime Plus and then continued up the vertical substrate of the wall using Bonding Adhesive BA-2004 (T).

Alternative Base Tie-In

13.3 Concurrently, with the installation of the EPDM membrane, the EPDM flashing should be applied. It should first be lapped and bonded to the horizontal membrane in accordance with section 13.1, with a minimum lap of 100 mm.

Flashing

13.4 The flashing should then be bonded with the bonding adhesive to the vertical surface in accordance with section 12.10.

13.5 The flashing should then be mechanically fixed at its upper edge and be protected by dressing back to the wall and covering with coping stones or by use of counter-flashing.

13.6 For specific flashing requirements, the advice of the Certificate holder should be sought.

14 Repair

In the event of accidental damage, repairs can be carried out by cleaning the area around the damage and applying a patch of RubberGard or QuickSeam SA Flashing in accordance with section 13.1.

15 Tests

15.1 Samples of the Firestone RubberGard EPDM Systems were obtained from the Certificate holder. The results of the tests carried out by the BBA are summarised in Tables 4 to 7.

Table 4 Physical properties — longitudinal directional

Test (units)	Mean result			Method ⁽¹⁾
	1.14	1.14FR	1.52FR	
Tensile strength (Nmm ⁻²)				BS 903 (A2)
unaged	7.81	10.12	9.45	
heat aged ⁽²⁾	9.59	—	—	
UV aged ⁽³⁾	8.82	—	—	
bitumen compatibility ⁽⁴⁾	8.94	—	—	
Modulus at 100% strain (Nmm ⁻²)				BS 903 (A2)
unaged	2.85	4.10	4.61	
heat aged ⁽²⁾	4.15	—	—	
UV aged ⁽³⁾	2.70	—	—	
bitumen compatibility ⁽⁴⁾	3.32	—	—	
Elongation (%)				BS 903 (A2)
unaged	383	433	350	
heat aged ⁽²⁾	311	—	—	
UV aged ⁽³⁾	367	—	—	
bitumen compatibility ⁽⁴⁾	392	—	—	
Resistance to tear (kNm ⁻²)				BS 903 (A3)
unaged	11.7	—	9.3	
heat aged ⁽²⁾	8.9	—	—	
Dimensional stability — free (%)	-0.20	-0.20	0.00	MOAT 27 : 5.1.6.1

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

(2) Heat aged for 84 days at 80°C.

(3) 1000 light hours UV using a cycle of 4 hours UV at 45°C/4 hours condensation at 40°C.

(4) Bitumen compatibility in accordance with MOAT 46 : 6T

— not tested.

Table 5 Physical properties — transverse directional

Test (units)	Mean result			Method ⁽¹⁾
	1.14	1.14FR	1.52FR	
Tensile strength (Nmm ⁻²)				BS 903 (A2)
unaged	8.12	9.33	7.98	
heat aged ⁽²⁾	10.02	—	—	
UV aged ⁽³⁾	9.11	—	—	
bitumen compatibility ⁽⁴⁾	8.87	—	—	
Modulus at 100% strain (Nmm ⁻²)				BS 903 (A2)
unaged	2.81	3.49	3.75	
heat aged ⁽²⁾	4.15	—	—	
UV aged ⁽³⁾	2.70	—	—	
bitumen compatibility ⁽⁴⁾	3.32	—	—	
Elongation (%)				BS 903 (A2)
unaged	397	438	333	
heat aged ⁽²⁾	296	—	—	
UV aged ⁽³⁾	365	—	—	
bitumen compatibility ⁽⁴⁾	404	—	—	
Resistance to tear (kNm ⁻²)				BS 903 (A3)
unaged	13.1	—	10.5	
heat aged ⁽²⁾	8.3	—	—	
Dimensional stability — free (%)	-0.10	-0.10	0.05	MOAT 27 : 5.1.6.1

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

(2) Heat aged for 84 days at 80°C.

(3) 1000 light hours UV using a cycle of 4 hours UV at 45°C/4 hours condensation at 40°C.

(4) Bitumen compatibility in accordance with MOAT 46 : 6T

— not tested.

Table 6 Physical properties — general

Test (units)	Mean result		Method ⁽¹⁾
	1.14	1.52FR	
Water vapour transmission at 25°C/75% RH (gm ⁻² day ⁻¹)	0.29	–	BS 3177
Water vapour resistance at 25°C/75% RH (MN _{sg} ⁻¹)	707	–	BS 3177
Water absorption (%)	0.21	–	MOAT 46 : 6j
Static indentation concrete substrate	L ₄	L ₄	MOAT 27 : 5.1.9
EPS substrate	L ₃	L ₃	
Dynamic indentation chipboard substrate	I ₃	I ₃	MOAT 27 : 5.1.10
perlite substrate	I ₄	I ₄	
EPS substrate	I ₄	I ₄	
Resistance to water pressure – 6 m	pass	–	MOAT 27 : 5.1.4
Peel resistance (N) chipboard substrate unaged	22.0	–	MOAT 27 : 5.1.3
heat aged ⁽²⁾	18.8	–	
fibreboard substrate	10.2	–	
concrete substrate	27.8	–	
Resistance to sliding	pass	–	MOAT 27 : 5.1.7
Fatigue cycling unaged	pass	–	MOAT 46 : 6l
heat aged ⁽²⁾	pass	–	
Wind uplift ⁽³⁾ (kPa) control	9	–	MOAT 27 : 5.1.2
after thermal shock	7	–	

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

(2) Heat aged for 28 days at 80°C.

(3) Wind uplift carried out on a chipboard substrate.

– not tested.

Table 7 Physical properties — joints⁽¹⁾

Test (units)	Mean result		Method ⁽²⁾
	Splice Adhesive	QuickSeam Splice Tape	
Air pressure – 10kPa	pass	pass	MOAT 27 : 5.2.1
Tensile strength (N) unaged			MOAT 46 : 6O
tested at: 23°C	147	109	
80°C	63	54	
–20°C	340	287	
heat aged ⁽³⁾ tested at 23°C	150	209	
T peel (Nmm ⁻²)	0.97	–	MOAT 46 : 6P

(1) Tests performed using 1.14 grade.

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

(3) Heat aged for 28 days at 80°C.

– not tested.

15.2 An examination was also made of test data on the following properties:

- thickness
- width
- mass per unit area.

15.3 Test data on wind uplift testing carried out by BBRI (WTCB/CSTC) on the RMA strip method of mechanically fastening to the ETAG 006 : 2000 method were examined.

16 Investigations

16.1 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.

16.2 A site in progress was examined to evaluate the manufacturer's installation instructions, and the practicability of the materials used.

16.3 An existing site was examined to evaluate the material's performance in use.

16.4 Existing data on the fire performance of the products to BS 476-3 : 1958 and BS 476-3 : 2004 were examined.

Bibliography

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

BS 476-3 : 2004 *Fire tests on building materials and structures — Classification and method of test for external fire exposure to roofs*

BS 903-A2 : 1971 *Physical testing of rubber — Determination of tensile stress-strain properties*

BS 903-A3 : 1982 *Physical testing of rubber — Determination of tear strength (trouser, angle and crescent test pieces)*

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

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

MOAT No 46 : 1988 *Special Directives for the Assessment of Roof Waterproofing Systems with Non-reinforced Vulcanized EPDM*

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

17 Conditions

17.1 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.

17.2 References in this Certificate to any Act of Parliament, Statutory Instrument, Directive or Regulation of the European Union, British, European or International Standard, Code of Practice, manufacturers' instructions or similar publication, are references to such publication in the form in which it was current at the date of this Certificate.

17.3 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.

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

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- individual installations of the product/system, including the nature, design, methods and workmanship of or related to the installation
- the actual works in which the product/system is installed, used and maintained, including the nature, design, methods and workmanship of such works.

17.5 Any information relating to the manufacture, supply, installation, use and maintenance of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used and maintained. It does not purport in any way to restate the requirements of the Health & Safety at Work etc Act 1974, or of any other statutory, common law or other duty which may exist at the date of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the manufacture, supply, installation, use and maintenance of this product/system.