

Axter Ltd
West Road
Ransomes Europark
Ipswich
Suffolk IP3 9SX

Tel: 01473 724056 Fax: 01473 723263

e-mail: info@axterltd.co.uk

website: www.axter.co.uk



Agrément Certificate

19/5709

Product Sheet 1

AXTER SECOND GENERATION HOT MELT STRUCTURAL WATERPROOFING SYSTEMS

HYRAFLEX SECOND GENERATION MONOLITHIC HOT MELT STRUCTURAL WATERPROOFING SYSTEM

This Agrément Certificate Product Sheet⁽¹⁾ relates to the Hyraflex⁽²⁾ Second Generation Monolithic Hot Melt Structural Waterproofing System, a hot-applied modified bitumen-based waterproofing system for use on protected flat roofs, zero fall roofs, inverted roofs, green roofs, roof gardens and blue roof specifications in combination with a stormwater attenuation system⁽³⁾, with limited or pedestrian access.

(1) Hereinafter referred to as 'Certificate'.

(2) Hyraflex is a registered Trademark.

(3) The stormwater attenuation system is outside the scope of this Certificate.

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

Weather-tightness — the system will resist the passage of moisture to the interior of a building (see section 6).

Properties in relation to fire — under suitable protection, the use of the system can enable a roof to be unrestricted under the national Building Regulations (see section 7).

Resistance to wind uplift — the system will resist the effects of any likely wind suction acting on the roof (see section 8).

Resistance to mechanical damage — the system will accept, without damage, the limited foot traffic and loads associated with installation and maintenance, and the effects of thermal or other minor movements likely to occur in practice (see section 9).

Resistance to penetration of roots — the system will resist root penetration from green roof and roof garden systems (see section 10).

Durability — under normal service conditions, the system will provide a durable waterproofing for the design life of the structure in which it is incorporated (see section 12).

The BBA has awarded this Certificate to the company named above for the system described herein. This system has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 26 November 2019



Brian Moore
Director

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 MUST check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA directly.

Any photographs are for illustrative purposes only, do not constitute advice and should not be relied upon.

British Board of Agrément

Bucknalls Lane
Watford
Herts WD25 9BA

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tel: 01923 665300
clientservices@bbacerts.co.uk
www.bbacerts.co.uk

Regulations

In the opinion of the BBA, the Hyraflex Second Generation Monolithic Hot Melt Structural Waterproofing System, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):



The Building Regulations 2010 (England and Wales) (as amended)

| | | |
|---------------------|--------------|--|
| Requirement: | B4(2) | External fire spread |
| Comment: | | The system, when used with suitable surface protection, can enable a roof to be unrestricted under this Requirement. See sections 7.1 and 7.2 of this Certificate. |
| Requirement: | C2(b) | Resistance to moisture |
| Comment: | | The system will enable a roof to satisfy this Requirement. See section 6.1 of this Certificate. |
| Requirement: | 7 | Materials and workmanship (applicable to Wales only) |
| Requirement: | 7(1) | Materials and workmanship (applicable to England only) |
| Comment: | | The system is acceptable. See section 12 and the <i>Installation</i> part of this Certificate. |



The Building (Scotland) Regulations 2004 (as amended)

| | | |
|--------------------|----------------|---|
| Regulation: | 8(1)(2) | Durability, workmanship and fitness of materials |
| Comment: | | Use of the system satisfies the requirements of this Regulation. See sections 11.1 and 12 and the <i>Installation</i> part of this Certificate. |
| Regulation: | 9 | Building standards applicable to construction |
| Standard: | 2.8 | Spread from neighbouring buildings |
| Comment: | | The system, when used with suitable surface protection, can be regarded as having low vulnerability and can enable a roof to be unrestricted under clause 2.8.1 ⁽¹⁾⁽²⁾ of this Standard. See sections 7.1 and 7.2 of this Certificate. |
| Standard: | 3.10 | Precipitation |
| Comment: | | The system will enable a roof to satisfy the requirements of this Standard, with reference to clauses 3.10.1 ⁽¹⁾⁽²⁾ and 3.10.7 ⁽¹⁾⁽²⁾ . See section 6.1 of this Certificate. |
| Standard: | 7.1(a) | Statement of sustainability |
| Comment: | | The system can contribute to meeting the relevant requirements of Regulation 9, Standards 1 to 6 and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard. |
| Regulation: | 12 | Building standards applicable to conversions |
| Comment: | | Comments made in relation to the system under Regulation 9, Standards 1 to 6 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) 2012 (as amended)

| | | |
|--------------------|--------------------|---|
| Regulation: | 23(a)(b)(i) | Fitness of materials and workmanship |
| Comment: | | The system is acceptable. See section 12 and the <i>Installation</i> part of this Certificate. |
| Regulation: | C4(b) | Resistance to moisture and weather |
| Comment: | | The system can enable a roof to satisfy the requirements of this Regulation. See section 6.1 of this Certificate. |

| | | |
|--------------------|--------------|---|
| Regulation: | 36(b) | External fire spread |
| Comment: | | The system, when used with suitable surface protection, can enable a roof to be unrestricted under the requirements of this Regulation. See sections 7.1 and 7.2 of this Certificate. |

Construction (Design and Management) Regulations 2015 Construction (Design and Management) Regulations (Northern Ireland) 2016

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

See sections: 1 *Description* (1.2), 3 *Delivery and site handling* (3.1 and 3.3) and 14 *Procedure* (14.2) of this Certificate.

Additional Information

NHBC Standards 2019

In the opinion of the BBA, the Hyraflex Second Generation Monolithic Hot Melt Structural Waterproofing System, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards*, Chapter 7.1 *Flat roofs and balconies*.

Technical Specification

1 Description

1.1 The Hyraflex Second Generation Monolithic Hot Melt Structural Waterproofing is a hot liquid applied, elastomeric bitumen system, forming a seamless membrane with a nominal system thickness of 6 mm. The system consists of:

- Hyraflex Hot Melt monolithic elastomeric compound — a hot-applied polymer-modified bitumen compound
- Hyraflex Reinforcement — a polymeric mesh (100g.m⁻²) for use as the reinforcement layer for the system
- Hyraflex Primer — a surface preparation primer, for use prior to the application of the hot-applied membrane
- Hyraflex 25 — a polyester reinforced (120 g.m⁻²) elastomeric SBS modified bitumen, root resistant, waterproofing membrane. The upper and lower surfaces are finished with sand
- Hyraflex 25 S — a stabilised polyester reinforced (180 g.m⁻²) elastomeric SBS modified bitumen waterproofing membrane. The upper surface is finished with sand and lower surface with a thermofusible film
- Hyraflex 25 Trafic — a stabilised polyester reinforced (180 g.m⁻²) elastomeric SBS modified bitumen, root resistant, waterproofing membrane. The upper surface is finished with mineral slate chippings and the lower surface with a thermofusible film
- Hyraflex 35 — a polyester reinforced (180 g.m⁻²) elastomeric SBS modified bitumen, root resistant, waterproofing membrane. The upper and lower surfaces are finished with fine sand
- Hyraflex 35 S — a stabilised polyester reinforced (180 g.m⁻²) elastomeric SBS modified bitumen waterproofing membrane. The upper surface is finished with sand and lower surface with a thermofusible film
- Hyraflex 35 Trafic — a stabilised polyester reinforced (180 g.m⁻²) elastomeric SBS modified bitumen, root resistant, waterproofing membrane. The upper surface is finished with mineral slate chippings and the lower surface with a thermofusible film.

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

Table 1 Nominal characteristics of membranes

| Characteristic (unit) | Hyraflex 25 | Hyraflex 25 S | Hyraflex 25 Trafic | Hyraflex 35 | Hyraflex 35 S | Hyraflex 35 Trafic |
|--|----------------|------------------|-----------------------|----------------|------------------|-----------------------|
| Thickness (mm) | 2.3 | 3.2 | 3.2 | 3.9 | 4.0 | 4.0 |
| Roll width (m) | 1 | 1 | 1 | 1 | 1 | 1 |
| Roll length (m) | 10 | 10 | 8 | 7.5 | 10 | 8 |
| Roll weight (kg) | 33.9 | 38 | 36.1 | 36.6 | 51.3 | 41 |
| Mass per unit area (kg·m ⁻²) | 3.39 | 3.8 | 4.51 | 4.9 | 5.1 | 5.1 |
| Tensile strength* (N per 50 mm) | | | | | | |
| longitudinal | 400 | 600 | 600 | 600 | 600 | 600 |
| transverse | 275 | 600 | 600 | 600 | 600 | 600 |
| Elongation at break* (%) | | | | | | |
| longitudinal | 10 | 35 | 35 | 35 | 35 | 35 |
| transverse | 10 | 35 | 35 | 35 | 35 | 35 |
| Low temperature flexibility* (°C) | -16 | -16 | -16 | -16 | -16 | -16 |
| Flow resistance* (°C) | 100 | 100 | 100 | 100 | 100 | 100 |
| Impact – soft substrate* (mm) | 700 | 1000 | 1250 | 1000 | 1500 | 1750 |
| Static loading – soft substrate* (kg) | 10 | 20 | 20 | 20 | 20 | 20 |

1.3 The following materials may be used with the system, but are out of the scope of this Certificate, the Certificate holder will give advice on recommended materials:

- Starcoat QC — a cold liquid applied single component polyurethane resin waterproofing system (the subject of BBA Certificate 13/5031, Product Sheet 1)
- Starcoat PMMA — a cold liquid applied polymethyl methacrylate resin waterproofing system (the subject of BBA Certificate 16/5322, Product Sheet 1)
- cold liquid applied bitumen waterproofing — single component bitumen waterproofing with anti-root additive for waterproofing complex details
- inverted roof insulation — vacuum insulation panels, extruded polystyrene (XPS) insulation boards and expanded polystyrene (EPS) boards
- upstand insulation boards — EPS or XPS insulation board with a weather-resistant facing board, used for upstand detailing
- water flow reducing layers (WFRL) — geotextiles, such as spun bonded polyethylene, installed above inverted roof insulation to minimise heat loss caused by rainwater cooling of the roof deck
- self-adhesive or heat activated, reinforced, elastomeric SBS modified bitumen underlay and capsheet membranes
- drainage, protection, moisture retention layers and related ancillaries — for use in living roof and podium deck hard landscaping applications
- extensive, intensive, biodiverse and modular living roof systems and related ancillaries
- blue roof attenuation systems and related ancillaries
- paviour supports and related ancillaries
- ceramic roof tiles and related ancillaries
- prefabricated roof accessories and ancillaries, such as pipe collars
- rainwater outlets and related ancillaries.

2 Manufacture

2.1 The Hyraflex Hot Melt monolithic elastomeric compound is manufactured by heating and blending together the raw materials.

2.2 As part of the assessment and ongoing surveillance of product quality, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

2.3 The management system of Axter SAS has been assessed and registered as meeting the requirements of EN ISO 9001 : 2015 and EN ISO 14001 : 2015 by AFAQ (Certificate QUAL/1996/5190.11 and No 2011/40655.3 respectively).

3 Delivery and site handling

3.1 The Hyraflex Hot Melt monolithic elastomeric compound is delivered to site in 10 or 24 kg boxes. The boxes bear the product name, the manufacturer's name and the BBA logo incorporating the number of this Certificate.

3.2 Reinforcing and protection layers are packaged with labels bearing the Axter trade name and should be stored under cover and kept dry.

3.3 The Certificate holder has taken the responsibility of classifying and labelling the system components under the *CLP Regulations (EC) No 1272/2008 on the classification, labelling and packaging of substances and mixtures*. Users must refer to the relevant Safety Data Sheet(s).

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Hyraflex Second Generation Monolithic Hot Melt Structural Waterproofing System.

Design Considerations

4 General

4.1 The Hyraflex Second Generation Monolithic Hot Melt Structural Waterproofing System is satisfactory for use as a waterproofing layer on roofs with limited or pedestrian access in:

- inverted roof specifications using aggregate ballast and paving on flat roofs, including zero fall roofs with limited access
- protected roof specifications, eg covered by pavers or other suitable protection on flat roofs, including zero fall roofs
- green roof (extensive), biodiverse roof and brown roof specifications on flat roofs, including zero fall roofs with limited access or pitched roofs with limited access, and roof garden (intensive) specifications
- blue roof specifications in combination with a stormwater attenuation system⁽¹⁾, on flat roofs, including zero fall roofs.

(1) The stormwater attenuation system is outside the scope of this Certificate.

4.2 The system is suitable for use on the following substrates:

- in-situ concrete, precast concrete or concrete blocks
- lightweight structural concrete, subject to the Certificate holder's recommendations
- timber (exterior grade plywood, OSB3, composite timber or sawn timber)
- metal (upstands and flat substrates).

4.3 The system must not be installed directly to profiled metal sheet. Timber board or sheet metal should be mechanically fixed to the profiled metal to carry the system. The Certificate holder's advice should be sought in this instance.

4.4 The following terms are defined for the purpose of this Certificate as:

- roof garden (intensive) — a roof with a substantial layer of growing medium with planting that can include shrubs and trees, generally accessible to pedestrians
- green roof (extensive) — a roof with a shallow layer of growing medium planted with low-maintenance plants such as mosses, sedums, grasses and some wild flower species

- biodiverse roof — a roof planted with the aim either to recreate the habitat that was lost when the building was erected or to enhance it
- brown roof — a roof with a growing medium selected to allow indigenous plant species to inhabit the roof over time; no deliberate planting is undertaken
- blue roof — a flat roof designed to allow controlled attenuation of rain fall during heavy and storm events, as part of sustainable urban drainage systems (SUDS). Guidance for the design and construction of blue roofs is available in the NFRC *Technical Guidance Note for the construction and design of Blue Roofs*.

4.5 Limited access roofs are defined for the purpose of this Certificate as those subjected only to pedestrian traffic for maintenance of the roof covering and cleaning of gutters, etc. Where traffic in excess of this is envisaged, additional protection to the membrane must be provided (see section 9). Pedestrian access roofs are defined for the purpose of this Certificate as those not subjected to vehicular traffic.

4.6 Flat roofs are defined for the purpose of this Certificate as those having a minimum finished fall of 1:80⁽¹⁾. 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 and direction of falls, etc.

4.7 Pitched roofs are defined for the purpose of this Certificate as those having a fall greater than 1:6.

4.8 Zero fall roofs (also known as completely flat) are defined for the purpose of this Certificate as those having a finished fall which can vary between 0 and 1:80. Reference should also be made to the appropriate clauses in the Liquid Roofing and Waterproofing Association (LRWA) Note 7 – *Specifier Guidance for Flat Roofs*.

(1) *NHBC Standards 2019* require a minimum fall of 1:60 for green roofs and roof gardens.

4.9 Decks to which the system is to be applied must comply with the relevant requirements of BS 6229 : 2018, BS 8217 : 2005 and, where appropriate, *NHBC Standards 2019*, Chapters 7.1.

4.10 Structural decks to which the system is to be applied must be suitable to transmit the dead and imposed loads experienced in service. Imposed loads, dead loading and wind loads are calculated by a suitably experienced and competent individual in accordance with BS EN 1991-1-1 : 2002, BS EN 1991-1-3 : 2003 and BS EN 1991-1-4 : 2005, and their UK National Annexes.

4.11 Recommendations for the design of green roofs and roof garden specifications are available within the latest edition of *The GRO Green Roof Guide – Green Roof Code of Best Practice for the UK*.

4.12 The drainage systems for inverted roofs, zero fall roofs, blue roofs, green roofs or roof gardens must be correctly designed, and the following points should be addressed:

- provision made for access for maintenance purposes
- for zero fall roofs, it is particularly important to identify the correct drainage points, to ensure that drainage is sufficient and effective
- dead loads for green roofs and roof gardens can increase if the drains become partially or completely blocked causing waterlogging of the drainage layer
- additional guidance for inverted roof specifications is given in BBA Information Bulletin No 4 *Inverted roofs – Drainage and U value corrections*.

4.13 Insulation materials used in conjunction with the system must be suitable for use within inverted roofs, the subject of a current BBA Certificate and used in accordance with, and within the scope of, that Certificate, and used in accordance with the manufacturer's instructions.

5 Practicability of installation

The system should only be installed by trained contractors using specialist equipment. Details of these are available from the Certificate holder.

6 Weathertightness



6.1 The system will adequately resist the passage of moisture to the interior of a building and so satisfy the relevant requirements of the national Building Regulations.

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

7 Properties in relation to fire



7.1 In the opinion of the BBA, a roof incorporating the system will be unrestricted under the national Building Regulations in the following circumstances:

- protected or inverted roof specifications, including an inorganic covering listed in the Annex of Commission Decision 2000/553/EC, can be considered to be unrestricted under the national Requirements
- a roof garden covered with a drainage layer of gravel 100 mm thick and a soil layer 300 mm thick
- irrigated roof gardens and green roofs.

7.2 The designation of other specifications should be confirmed by reference to the documents supporting the national Building Regulations

7.3 If allowed to dry, plants used in a roof garden may allow flame spread across the roof. This should be taken into consideration when selecting the plants. Appropriate planting irrigation and/or protection must be applied to ensure the overall fire rating of the roof is not compromised.

8 Resistance to wind uplift

8.1 The system will resist the effects of wind suction likely to occur in service.

8.2 The ballast requirements for inverted specifications should be calculated by a suitably competent and experienced individual in accordance with the relevant parts of BS EN 1991-1-4 : 2005 and its UK National Annex. The system should always be ballasted with a minimum depth of 50 mm of aggregate. In areas of high wind exposure, the Certificate holder's advice should be sought. Alternatively, concrete slabs on suitable supports can be used.

8.3 The growing medium used in roof gardens and ballast on inverted/protected roofs must not be of a type that will be removed or become delocalised owing to wind scour experienced on the roof.

8.4 It should be recognised that the type of plants used in roof gardens could significantly affect the expected wind loads experienced in service.

9 Resistance to mechanical damage

9.1 The system can accept, without damage, the limited foot traffic and light concentrated loads associated with installation and maintenance. Reasonable care should be taken to avoid puncture by sharp objects or concentrated loads. Where traffic in excess of this is envisaged, for example, for lift equipment maintenance, a walkway must be provided.

9.2 When used over construction or bridging joints, the system can accommodate, without damage, the minor structural movement likely to occur under normal service conditions. When used over expansion joints, the system should be correctly detailed in accordance with the Certificate holder's instructions.

10 Resistance to penetration by roots

10.1 Hyraflex 35 or Hyraflex 35 Traffic are suitable for use as root-resistant membranes and, when used with the Hyraflex Second Generation Monolithic Hot Melt Structural Waterproofing System in roof garden, green roof biodiverse roof and brown roof applications, will provide adequate protection from penetration by roots.

10.2 Advice on suitable planting specifications can be obtained from the Certificate holder.

11 Maintenance



11.1 The system should be the subject of six monthly inspections and maintenance in accordance with BS 6229 : 2018, Chapter 7, to ensure continued performance.

11.2 For green roofs, biodiverse, brown roofs and roof gardens, guidance is available within the latest edition of *The GRO Green Roof Code – Green Roof Code of Best Practice for the UK*.

11.3 Where damage has occurred it should be repaired in accordance with Section 15 and the Certificate holder's instructions.

12 Durability



The Hyraflex Second Generation Monolithic Hot Melt Structural Waterproofing System will provide an effective barrier to the transmission of liquid water and water vapour for the design life of the roof in which it is incorporated.

Installation

13 General

13.1 Concrete structures should be designed and built in accordance with BS EN 1992-1-1: 2004 and its UK National Annex.

13.2 New concrete⁽¹⁾ must be well compacted and finished, preferably by power floating, and without excessive laitance, to a dense, smooth finish, free from defects.

(1) Concrete toppings/screeds must be well compacted and bonded to the substrate and have a skip float finish with minimum laitance.

13.3 A curing period of 28 days is normally allowed before installing the product on new concrete substrates.

13.4 The Hyraflex Second Generation Monolithic Hot Melt Structural Waterproofing System must be installed in accordance with the relevant clauses of BS 8000-0 : 2014, the Certificate holder's instructions and this Certificate, on a dry and frost-free substrate. After rain or snow, the substrate must be allowed to dry before installation can commence. The installing contractor can aid drying by suitable means approved by the Certificate holder. Once applied, the membrane is not affected by rain, snow or frost.

13.5 To assess the suitability of a substrate to receive the membrane, bond tests must be carried out. If bonding problems occur, advice should be sought from the Certificate holder.

13.6 Metal substrates should be free from oil, rust, paint or other coatings liable to affect the bond.

13.7 Prior to the application of the system, defects in the substrate such as cracks, irregularities and other areas of potential weakness must be repaired using a repair product approved by the Certificate holder, and the substrate cleaned in accordance with the Certificate holder's instructions. Any gaps, irregularities and areas of potential weakness may be filled with a suitable repair mortar. The certificate holder can advise on suitable materials for this purpose. The Hyraflex Compound may be used to fill minor depressions in the substrate.

13.8 The substrate should be primed with Hyraflex Primer and allowed to dry before the application of the membrane. Coverage will vary depending on the porosity of the substrate but the minimum coverage rate is 0.15 litres per m².

13.9 The membrane should be covered with an access or protective layer immediately after installation, in accordance with the Certificate holder's instructions.

13.10 Detailing must be formed in accordance with the Certificate holder's instructions.

13.11 The growing medium or other bulk material should not be stored on one area of the roof prior to installation, to ensure that localised overloading does not occur.

14 Procedure

14.1 The Hyraflex reinforcement is rolled out loose over the substrate with 100 mm overlaps.

14.2 The blocks of Hyraflex Hot Melt monolithic elastomeric compound are heated in an electronic or propane gas, thermostatically controlled, insulated melter.

14.3 The operating temperature range for the molten compound is 150 and 180°C. The temperature of the compound must not exceed 200°C.

14.4 The molten compound is poured onto the reinforcement at a coverage rate of approximately 2.5 kg·m⁻² and the appropriate Hyraflex SBS polymer modified waterproofing membrane is simultaneously unrolled into the compound and fully bonded.

14.5 The finished system must have a minimum depth of 6 mm.

14.6 Axter recommended inverted roof finishes, (insulation, ballast, paving slabs, green living roof, blue roof finishes should be applied in accordance with the Certificate holder's instructions.

15 Repair

15.1 Any damage to the system must be repaired as soon as possible to ensure that the integrity of the waterproofing is maintained. The advice of the Certificate holder should be sought.

15.2 Where maintenance or repair of any of the roof components above the waterproofing system is necessary, care must be taken to avoid damage to the membrane. If damage occurs, it should be repaired in accordance with the Certificate holder's instructions.

15.3 In the event that the system is contaminated by chemicals, oils and greases, the advice of the Certificate holder should be sought.

Technical Investigations

16 Tests

16.1 Tests were carried out and the results assessed to determine:

- mass per unit area
- tensile strength and elongation
- fines content
- penetration
- flow
- low temperature flexibility
- water vapour permeability
- six metre head of water
- resistance to dynamic indentation
- resistance to static indentation

- fatigue cycling
- effects of long-term heat ageing
- effects of long-term water exposure
- resistance to chisel impact
- resistance to aggregate indentation.

16.2 Tests were carried out in accordance to the FLL Standard and EN 13948 : 2007 for root resistance.

17 Investigations

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

Bibliography

BS 6229 : 2018 *Flat roofs with continuously supported flexible waterproof coverings — Code of practice*

BS 8000-0 : 2014 *Workmanship on construction sites — Introduction and general principles*

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

BS EN 1991-1-1 : 2002 *Eurocode 1 : Actions on structures — General actions— Densities, self-weight, imposed loads for buildings*

NA to BS EN 1991-1-1 : 2002 *UK National Annex to Eurocode 1 : Actions on structures — General actions— Densities, self-weight, imposed loads for buildings*

BS EN 1991-1-3 : 2003 + A1 : 2015 *Eurocode 1 : Actions on structures — General actions — Snow loads*

NA to BS EN 1991-1-3 : 2003 + A1 : 2015 *UK National Annex to Eurocode 1 : Actions on structures — General actions — Snow loads*

BS EN 1991-1-4 : 2005 + A1 : 2010 *Eurocode 1 : Actions on structures — General actions — Wind actions*

NA to BS EN 1991-1-4 : 2005 + A1 : 2010 *UK National Annex to Eurocode 1 : Actions on structures — General actions — Wind actions*

EN 13948 : 2007 *Flexible sheets for waterproofing — Bitumen, plastic and rubber sheets for roof waterproofing — Determination of resistance to root penetration*

EN ISO 9001 : 2015 *Quality management systems — Requirements*

EN ISO 14001 : 2015 *Environmental management systems — Requirements with guidance for use*

18 Conditions

18.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page – no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- 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 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

18.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and 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 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

18.5 In issuing this Certificate the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- 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
- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

18.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal 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, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue 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.