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Agrément Certificate
16/5322
Product Sheet 1

STARCOAT LIQUID APPLIED WATERPROOFING SYSTEMS

STARCOAT PMMA

This Agrément Certificate Product Sheet(1) relates to Starcoat PMMA, a polymethyl methacrylate liquid-applied roof waterproofing system for use on flat, pitched roofs and protected zero fall with limited access, including green roof and roof garden specifications.

(1) Hereinafter referred to as '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

Weathertightness — the system will resist the passage of moisture into a building (see section 6).

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

Adhesion — 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 (see section 9).

Resistance to root penetration — the system will resist penetration by plant roots (see section 10).

Durability — under normal service conditions, the system will provide a durable roof waterproofing with a service life in excess of 25 years (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 Second issue: 9 October 2018

John Albon – Head of Approvals Construction Products

Claire Curtis-Thomas
Chief Executive

Originally certificated on 8 June 2016

Certificate amended on 14 October 2020 to update zero fall wording.

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Regulations

In the opinion of the BBA, Starcoat PMMA, 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: On suitable substructures, the use of the system can enable a roof to be unrestricted under this Requirement. See sections 7.1 to 7.3 and 7.5 of this Certificate.

Requirement: **C2(b)** **Resistance to moisture**
Comment: Tests for water resistance on the system, including joints, indicate that it satisfies this Requirement. See section 6.1 of this Certificate.

Regulation: **7** **Materials and workmanship**
Comment: The system is acceptable. See section 12 and the *Installation* part of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation: **8(1)(2)** **Durability, workmanship and fitness of materials**
Comment: The use of the system satisfies the requirements of this Regulation. See sections 11 and 12 and the *Installation* part of this Certificate.

Regulation: **9** **Building standards applicable to construction**
Standard: 2.8 Spread from neighbouring buildings
Comment: The system, when applied to a suitable substructure, is regarded as having low vulnerability under clause 2.8.1[(1)(2)] of this Standard. See sections 7.1 to 7.3 and 7.5 of this Certificate.

Standard: 3.10 Precipitation
Comment: The system, including joints, 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)(b) 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: All comments given for 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 comprises acceptable materials and satisfies the requirements of this Regulation. See section 12 and the *Installation* part of this Certificate.

Regulation: **28(b)** **Resistance to moisture and weather**
Comment: The system will enable a roof to satisfy the requirements of this Regulation. See section 6.1 of this Certificate.

Regulation:	**36(b)**	**External fire spread**
Comment:		On a suitable flat substructure, the system can contribute to a roof being unrestricted under the requirements of this Regulation. On sloping roofs, boundary restrictions will apply. See sections 7.1 to 7.3 and 7.5 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: 3 *Delivery and site handling* (3.1 and 3.3) and 14 *Precautions* of this Certificate.

Additional Information

NHBC Standards 2018

In the opinion of the BBA, Starcoat PMMA, 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 Starcoat PMMA comprises:

- Starcoat PMMA — a two-component polymethyl methacrylate waterproofing resin available in RAL 7032. Other RAL colours are available on request
- Starcoat PMMA Thix — a thixotropic version of the standard resin, for use in detailing at upstands, corners, connections and other details, available in RAL 7032. Other RAL colours are available on request
- Starcoat PMMA TT — a low-temperature installation version of the standard resin, with a modified cure system, to allow application between +25 and –15°C, available in RAL 7032. Other RAL colours are available on request
- Starcoat PMMA Fleece — a 1.10 $kg \cdot m^{-2}$ polyester fleece for use as a reinforcement
- Starcoat PMMA A (Asphalt) Primer — a non-pigmented primer based on a two-component fast-reactive polymethyl methacrylate resin, for the preparation of asphaltic and bituminous substrates
- Starcoat PMMA P (Porous) Primer — a non-pigmented primer based on a two-component fast-reactive and fast-curing polymethyl methacrylate resin, for the preparation of absorbent substrates such as concrete, screeds and timber.

1.2 Other items or components which may be used with the system, but are outside the scope of this Certificate, are:

- Starcoat PMMA M (Metal) Primer — a one-component, solvent-free, acrylate-based fast-reactive primer for metal substrates, available in grey
- Starcoat PMMA Self-Levelling Mortar — a flexible, self-levelling mortar for use in levelling rough substrates of less than 10 mm depths and levelling of gradients, and as additional protection in heavily trafficked areas, such as roof terraces, balconies and multi-storey car parks
- Starcoat PMMA Mortar — for use in levelling rough substrates of greater than 10 mm depths and levelling of gradients
- Starcoat PMMA Coloured Sealer — a flexible, UV-stabilised, pigmented surface sealant, based on polymethyl methacrylate, available in RAL 7030, 7032, 7035 and 1001. Other RAL colours are available on request
- Starcoat PMMA Decorative Chips — an acrylate-based topping available in black, grey and white, for use as a surface sealant coat and decorative medium
- Starcoat PMMA Vehicular Coat — a flexible, filled, slip-resistant surface finish based on polymethyl methacrylate, available in RAL 7030 and 7032
- Starcoat PMMA De-Bonding Tape — for use in providing a bond breaker at expansion/construction joints
- Starcoat PMMA Filler — for use in filling small cracks and joints in the substrate

- Starcoat PMMA Cleaner — for use in cleaning the substrate prior to the installation of the system
- Starcoat PMMA R (Refurb) Primer — a fast-reactive combination primer for interface details and upstands with changing substrate materials
- Starcoat PMMA W (Wet) Primer — a fast-curing, low-viscosity primer with good penetration properties on mineral substrates
- Starcoat PMMA FPO/TPO Primer — a one-component primer used as a bonding agent between FPO and TPO
- Starcoat PMMA Spray (A+B) Primer — a high-grade PMMA-based waterproofing resin for waterproofing main areas, developed specifically for spray application
- Starcoat PMMA Roller-Applied Surfacing — for use as a wearing layer for Starcoat PMMA systems
- Starcoat PMMA Clear Sealer — a colourless, clear and mechanically durable sealer for surfaces with topping
- Starcoat PMMA Reinforced Filler — a highly-flexible, fibre-filled waterproofing product for sealing minor penetrations, eg screws
- Starcoat PMMA Vapour Release Mesh — a prefabricated, compression-resistant mesh for use on cementitious substrates.

2 Manufacture

2.1 The system components are manufactured by batch-blending processes.

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.

3 Delivery and site handling

3.1 The primer and waterproofing resin components of the system are delivered to site in 5, 10 and 25 kg containers bearing the product's name, safety data, batch number and the BBA logo incorporating the number of this Certificate. The catalyst for the resin components is supplied in a 100 g plastic bag.

3.2 Resins must be stored in ventilated, dry locations, away from heat and oxidising agents, out of direct sunlight, and at a temperature between 0 and 25°C. The resins will have a shelf-life of greater than six months if stored correctly and unopened, in accordance with the Certificate holder's instructions.

3.3 The Certificate holder has taken the responsibility of classifying and labelling the system components under the *CLP Regulation (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 Starcoat PMMA.

Design Considerations

4 Use

4.1 Starcoat PMMA is satisfactory for use as a waterproofing system on flat,pitched and protected zero fall roofs with limited access, including green roofs and roof gardens, on substrates of:

- concrete
- bitumen
- timber
- metal

- plastic.

4.2 The system is also satisfactory for use on zero fall roofs with limited access on concrete substrates. The adhesion to, and compatibility with, other substrates must be confirmed by test (see also section 13.4).

4.3 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).

4.4 Flat roofs are defined for the purpose of this Certificate as those 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 a fall greater than 1:6. Zero fall roofs are defined for the purpose of this Certificate as those having a finished fall which can vary between 0 and 0.7°.

4.5 Decks to which the system is to be applied must comply with the relevant requirements of either BS 6229 : 2003 or BS 8217 : 2005 and, where appropriate, *NHBC Standards* 2018, Chapter 7.1.

4.6 Insulation materials to be used in conjunction with the system must be in accordance with the Certificate holder's instructions and be either:

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

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

4.8 The structural decks to which the system is to be applied must be suitable to transmit the dead and imposed loads experienced in service.

4.9 The imposed loads, dead loading and wind load specifications are calculated in accordance with BS EN 1991-1-1 : 2002, BS EN 1991-1-3 : 2003 and BS EN 1991-1-4 : 2005 respectively, and their UK National Annexes.

4.10 The drainage system for both green roof and roof gardens must be correctly designed, and provision made for access for maintenance purposes. Dead loads for green roofs and roof gardens can increase if the drains become partially or completely blocked causing waterlogging of the drainage layer.

4.11 On zero fall roofs it is particularly important to identify the correct drainage points to ensure that the drainage provided is effective.

5 Practicability of installation

The system should only be installed by installers who have been trained and approved by the Certificate holder.

6 Weathertightness

6.1 The system will adequately resist the passage of moisture into the building and enable a roof to comply with the requirements of the national Building Regulations.

6.2 The system is impervious to water and will achieve a weathertight roof capable of accepting minor structural movement.

7 Properties in relation to fire

7.1 In the opinion of the BBA, a system comprising a 12 mm thick gypsum glassrock roof board, primed with Starcoat PMMA P Primer and coated with Starcoat PMMA (grey) reinforced with Starcoat PMMA Fleece, can be classified as $B_{ROOF}(t4)$ in accordance with BS EN 13501-5 : 2005.

7.2 In the opinion of the BBA, a roof garden incorporating the system, covered with a drainage layer of gravel 100 mm thick and a soil layer a minimum of 300 mm thick, will be designated as $B_{ROOF}(t4)$.

7.3 In the opinion of the BBA, when the system is used in irrigated roof gardens its use will be unrestricted under the requirements of the national Building Regulations.

7.4 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 suitable plants.

7.5 The designation of other specifications should be confirmed by:

England and Wales — test or assessment in accordance with Approved Document B, Appendix A, clause A1
Scotland — test to conform to Mandatory Standard 2.8, clause 2.8.1[(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.

8 Adhesion

The adhesion of the system to concrete, bitumen, timber, plastic and metal is sufficient to resist the effects of any wind suction, elevated temperatures, thermal shock or minor movement likely to occur in service.

9 Resistance to mechanical damage

9.1 The system will accept, without damage, the limited foot traffic and light concentrated loads associated with installation and maintenance. However, reasonable care should be taken to avoid puncture by sharp objects or concentrated loads.

9.2 Results of testing for dynamic and static indentation are given in Table 1.

Table 1 Dynamic and static indentation

Test	Result	Method
Dynamic indentation		EOTA TR 006
concrete		
unaged	I_3	
UV aged(1)	I_4	
heat aged(2)	I_4	
insulation		
unaged	I_4	
Static indentation		EOTA TR 007
concrete		
unaged	L_3	
water exposure(3)	L_3	
insulation		
unaged	L_3	

(1) UV aged using UVA lamps at an exposure of 1000 $MJ \cdot m^{-2}$ at 50°C to EOTA TR 010.
(2) Heat aged for 200 days at 80°C to EOTA TR 011.
(3) Water exposure for 60 days at 60° to EOTA TR 012.

9.3 Where traffic in excess of this is envisaged, such as for maintenance of lift equipment, additional protection to the membrane in accordance with the Certificate holder's instructions must be provided.

9.4 In areas of heavy pedestrian traffic, an additional coat of Starcoat PMMA Self-Levelling Mortar is applied with a finish coat of Starcoat PMMA Coloured Sealer, in accordance with the Certificate holder's instructions.

9.5 Once a green roof or roof garden is installed, it can be regarded as a suitable protection for the membrane in use.

10 Resistance to root penetration

Results of root penetration resistance tests on the system components indicate that they are resistant to root penetration and can be used in a roof waterproofing system for roof gardens and green roofs.

11 Maintenance

11.1 The system must be the subject of annual inspections and maintenance to ensure continued performance.

11.2 Roofs must be the subject of regular inspections, particularly in autumn after leaf fall and in spring, to ensure that unwanted vegetation and other debris are cleared from the roof and drainage outlets (see section 4.10). Guidance is available within the latest edition of *Guidelines to Green Roofing*, published by The Green Roof Organisation (GRO).

11.3 Any damage should be repaired in accordance with section 16 and the Certificate holder's instructions.

12 Durability

Starcoat PMMA will achieve a service life in excess of 25 years.

Installation

13 General

13.1 Substrates to which the system is to be applied must be sound, dry, clean and free from sharp projections, such as nail heads and concrete nibs. Rough substrates must be made good using the appropriate levelling compound in accordance with the Certificate holder's instructions.

13.2 Soil 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.

13.3 Where necessary, substrate priming must be carried out using a sheepskin roller in accordance with the Certificate holder's instructions.

13.4 Adhesion checks may be carried out to ensure that the system is compatible with the existing surfaces. The Certificate holder must be consulted for details of suitable test methods and requirements before use.

13.5 Installation should not be carried out during inclement weather (eg rain, fog or snow). When the temperature is below 5°C, suitable precautions against surface condensation on the substrate must be taken. The substrate and ambient air temperature for the application of Starcoat PMMA standard formulation and Starcoat PMMA Thix is between –5 and +35°C, and for Starcoat PMMA TT between –15 and +25°C.

13.6 Detailing (eg at upstands) should be carried out in accordance with the Certificate holder's instructions.

13.7 Expansion or construction joints must be additionally reinforced prior to the application of the main waterproofing layer, in accordance with the Certificate holder's instructions.

13.8 It is recommended that membranes installed for green roof installations are visually inspected and tested electronically for waterproofing integrity prior to the green roof system being installed, in accordance with *NHBC Standards* 2018, Chapter 7.1, Clause 7.1.9.

13.9 All equipment should be cleaned after use with Starcoat PMMA Cleaner.

14 Precautions

14.1 Vapours from the system may cause sensitisation and irritation to the respiratory system, eyes and skin. The system should be used only in areas with sufficient ventilation to prevent the build-up of vapours. Contact with the skin, eyes and clothing must be avoided. The Certificate holder's instructions and the relevant safety regulations for working procedures must be adhered to at all times.

14.2 The system must not be allowed to enter the waste drainage system. Precautions must also be taken (eg closing of doors and windows) to prevent vapours entering the building.

15 Application

5.1 Once the substrate has been primed and joint treatments have cured, Starcoat PMMA resin is applied at a minimum application rate of 1.5 $kg \cdot m^{-2}$.

5.2 Starcoat PMMA Fleece is applied into the wet Starcoat PMMA resin and embedded using sheepskin rollers, ensuring that any trapped air pockets are removed.

15.3 A further layer of Starcoat PMMA resin is applied to the substrate at a minimum application rate of 1 $kg \cdot m^{-2}$, ensuring that the fleece is saturated. Recommended application rates for various situations are:

- smooth substrates 2.5 $kg \cdot m^{-2}$
- fine-grained substrates 3.0 $kg \cdot m^{-2}$
- rough substrates 3.5 $kg \cdot m^{-2}$
- below Starcoat PMMA Coloured Sealer/Self-Levelling Mortar 2.5 $kg \cdot m^{-2}$.

15.4 The specification above the waterproofing system should be of suitable design, including a filter layer and drainage where required. In cases of doubt, the Certificate holder's advice should be sought.

16 Repair

Minor damage can be repaired by cleaning back to the unweathered material and recoating the damaged area with the membrane at the appropriate application rate stated in section 15.

Technical Investigations

17 Tests

Tests were carried out and the results assessed by the BBA to determine:

- tensile strength and elongation
- water vapour diffusion resistance coefficient (μ)
- watertightness
- tensile bond strength on concrete, steel, bitumen, timber and plastic
- dynamic indentation
- static indentation
- resistance to fatigue cycling
- resistance to low temperatures
- resistance to high temperatures
- heat ageing at 80°C for 200 days
- resistance to UV ageing at 1000 $MJ \cdot m^{-2}$
- resistance to water exposure at 60°C for 60 days
- the effect of application temperatures
- the effect of day joints
- external fire performance to ENV 1187 : 2002, Test 1
- reaction to fire
- water exposure (180 days at 60°C).

18 Investigations

18.1 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.

18.2 Data on fire performance were assessed.

18.3 Data on root penetration were assessed.

Bibliography

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

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 + A1 : is 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*

BS EN 13501-5 : 2005 + A1 : 2009 *Fire classification of construction products and building elements — Classification using data from external fire exposure to roofs tests*

ENV 1187 : 2002 *Test methods for external fire exposure to roofs*

EOTA TR 006 *Determination of the resistance to dynamic indentation*

EOTA TR 007 *Determination of the resistance to static indentation*

EOTA TR 010 *Exposure procedure for artificial weathering*

EOTA TR 011 *Exposure procedure for accelerated ageing by heat*

EOTA TR 012 *Exposure procedure for accelerated ageing by hot water*

19 Conditions

19.1 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.

19.2 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.

19.3 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.

19.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

19.5 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.

19.6 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.

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