BASF plc
Construction Chemicals
19 Broad Ground Road
Redditch B98 8YP

Tel: 01527 512255
e-mail: ConstructionChemicalsInfo@basf.com
website: www.master-builder-solutions.basf.co.uk

Agrément Certificate
19/5639
Product Sheet 1

BASF SPRAY-APPLIED ROOF WATERPROOFING SYSTEMS

MASTERSEAL 6689 SPRAY-APPLIED ROOF WATERPROOFING SYSTEM

This Agrément Certificate Product Sheet(1) relates to the MasterSeal 6689 Spray-Applied Roof Waterproofing System, a two-component, liquid-applied polyurea membrane (applied by spray) and a range of primers, for use in protected roof specifications, including green roof and roof garden specifications, on flat and pitched roofs including those with zero fall, and podium decks.

(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 — 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 foot traffic and loads associated with installation and maintenance (see section 9).

Resistance to root penetration – the system will adequately resist plant root penetration in green roof and roof garden specifications (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

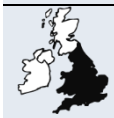
Date of First issue: 5 April 2019

John Albon
Chief Scientific Officer

Claire Curtis-Thomas
Chief Executive

Regulations

In the opinion of the BBA, the MasterSeal 6689 Spray-Applied Roof 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 to 7.4 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.
Regulation:	**7**	**Materials and workmanship (applicable to Wales only)**
Regulation:	**7(1)**	**Materials and workmanship (applicable to England only)**
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 system is acceptable and satisfies the requirements of this Regulation. See sections 11.1 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 used with suitable surface protection, is regarded as having a low vulnerability and will enable a roof to be unrestricted under this Standard, with reference to clause 2.8.1(1)(2). See sections 7.1 to 7.4 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 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)**	**Fitness of materials and workmanship**
Comment:	**(b)(i)**	The system is acceptable. 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 requirement 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. On sloping roofs, boundary restrictions will apply. See sections 7.1 to 7.4 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 section: 3 *Delivery and site handling* (3.1 and 3.3) of this Certificate.

Additional Information

NHBC Standards 2019

In the opinion of the BBA, the MasterSeal 6689 Spray-Applied Roof 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*.

CE marking

The Certificate holder has taken the responsibility of CE marking the system, in accordance with ETA 11/0147 and ETAG 005 : 2005, Parts 1 and 6. An asterisk (*) appearing in this Certificate indicates that data shown are given in the manufacturer's Declaration of Performance.

Technical Specification

1 Description

1.1 The MasterSeal 6689 Spray-Applied Rood Waterproofing System comprises MasterSeal M 689, a two-component (Part A resin, Part B isocyanate) spray-applied polyurea membrane, and a range of primers.

1.2 The membrane is spray-applied in two or three passes to provide a waterproofing membrane with a minimum dry film thickness of 2.4 mm.

1.3 The system is the subject of the ETA 11/0147, issued by DiBt in accordance with ETAG 005 : 2005. The level of Use Categories are:

- working life W3* (25 years)
- climatic zones S* (severe)
- imposed loads P3* (compressible and non-compressible substrates)
- roof slope S1 to S4*
- lowest surface temperature in use TL4* (-30°C)
- highest surface temperature in use TH4* (90°C)
- reaction to fire Class E*.

1.4 Ancillary items which may be necessary for installation of the system, and which are within the scope of this Certificate, include:

- MasterTop P 617 primer — a two component epoxy resin-based primer for use on porous substrates prior to the application of the membrane at temperatures between 8 and 30°C. If required, broadcast fire dried quartz into the wet primer to provide a bond bridge for subsequent layers
- MasterTop P 684 primer — a single-component primer for use on non-ferrous metal substrates prior to the application of the membrane

- MasterTop P 691 primer — a single-component, polyurethane adhesive for use on plastic surfaces and aged membranes when renewing or repairing the UV protective top coat
- kiln dried quartz sand — graded quartz sand (0.8 – 1.2 mm) for broadcasting into MasterTop P 617 Primer.

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

- specialist primers
- concrete repair products
- proprietary joint systems
- drainage membranes
- surface protection.

Details of suitable products and their specifications can be obtained from the Certificate holder.

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 system components are delivered to site in drums bearing a label that includes the component's name, health and safety information and batch number. The pack sizes are detailed in Table 1.

Table 1 Pack sizes

Component	Pack size (kg)
MasterSeal M 689 (Part A)	200
MasterSeal M 689 (Part B)	225
MasterTop P 617 (Part A)	12.6
MasterTop P 617 (Part B)	5.5
MasterTop P 691	19.5
MasterTop P 684	4.7
Kiln dried quartz sand	25

3.2 The MasterSeal M 689 membrane components and MasterTop P 617, P691 and P 684 primers must be stored off the ground in dry locations, out of direct sunlight and at a temperature range of between 20 and 25°C (15 - 25°C for primers). When stored in accordance with the Certificate holder's instructions they will have a shelf-life of 6 months.

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 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 MasterSeal 6689 Spray-Applied Roof Waterproofing System.

Design Considerations

4 General

4.1 The MasterSeal 6689 Spray-Applied Roof Waterproofing System is satisfactory for use as a fully adhered waterproofing layer on new and existing flat (including those with zero fall) and sloping protected roof specifications including:

- podium decks and covered walkways for pedestrian access
- inverted roofs below XPS and other suitable insulation boards
- terraces
- ballasted roofs using stone, paved finishes etc
- roof gardens
- green roofs.

4.2 The system has been assessed for use on the following substrates:

- concrete substrates primer with MasterTop P 617
- metal substrates primed with MasterTop 684
- bitumen, PVC and EPDM primed with MasterTop P 691.

4.3 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.

4.4 Limited access roofs are defined for the purpose of this Certificate as those subjected only to pedestrian traffic for maintenance of the roof covering, cleaning of gutters, etc. Where traffic in excess of this is envisaged, additional protection to the membrane must be provided as specified by the Certificate holder.

4.5 Flat roofs are defined for the purpose of this Certificate as those with a minimum finished fall of 1:80(1). For design purposes, twice the minimum 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 for the purpose of this Certificate as those having a fall in excess of 1:6. Zero fall roofs are those with a finished fall of between 0 to 0.7 degrees, reference should also be made to the appropriate clauses in Liquid Roofing and Waterproofing Association (LRWA) Note 7 – *Specifier Guidance for Flat Roofs.*

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

4.6 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, Chapter 7.1.

4.7 Structural decks to which the system is to be applied must be suitable to transmit the dead and imposed loads experienced in service.

4.8 Imposed loads, dead loading and wind loads are calculated 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.

4.9 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.*

4.10 The drainage systems for inverted roofs, zero fall 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*.

4.11 Insulation materials to be used in conjunction with the system must be in accordance with the Certificate holder's instructions and must 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 limitations of, that Certificate.

4.12 The Certificate holder must be consulted for advice on suitable protection (eg pavers), depending on the use of the roof.

5 Practicability of installation

The system must only be installed by installers who have been trained by the Certificate holder.

6 Weathertightness

6.1 The system will adequately resist the passage of moisture into a building and will 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 When tested to ENV 1187 : 2002, Test 4, and classified in accordance with BS EN 13501-5 : 2005, a system comprising a 60 mm concrete tile, two coats of MasterTop P 617 primer incorporating broadcasted fire dried quartz into the second layer and one coat of MasterSeal M 689 (applied at 2.4 - 3.0 kg·m^2, final thickness 2.4 mm), achieved a B_{ROOF}(t4) classification.

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

- a roof garden covered with a drainage layer of gravel 100 mm thick and a soil layer 300 mm thick
- when protected by an inorganic covering (eg gravel or paving slabs) listed in the Annex of Commission Decision 2000/553/EC.

7.3 In the opinion of the BBA, the use of the system in irrigated green roofs or roof gardens will also be unrestricted under the national Building Regulations.

7.4 The designation of other specifications should be confirmed by:

England and Wales — test or assessment in accordance with Approved Document B, Appendix A, clause 1
Scotland — test to conform to Mandatory Standard 2.8, clause 2.8.1
Northern Ireland — test or assessment by a UKAS-accredited laboratory or an independent consultant with appropriate experience.

7.5 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 adhesion of the system to the substrates listed in section 4.2 is sufficient to resist the effects of any wind suction, elevated temperatures, thermal shock or minor movement likely to occur in practice.

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 intensive plantings must not be of the type that will be removed, or become delocalised, owing to wind scour experienced on site.

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

The system can accept the 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. Extra care should be taken when walking across the roof if surface water is present.

10 Resistance to root penetration

The system, including joints, indicate that it is 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 biannual inspections and maintenance in accordance with BS 6229 : 2018, Chapter 7, to ensure continued performance.

11.2 Guidance is available within the latest edition of *The GRO Green Roof Code – Green Roof Code of Best Practice for the UK.*

12 Durability

Under normal conditions, the system will function effectively as a roof waterproofing for a period in excess of 25 years. Where the system is used in a fully protected specification and subject to normal service conditions, it 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 Installation of the MasterSeal 6689 Spray-Applied Roof Waterproofing System must be in accordance with the Certificate holder's instructions and this Certificate.

13.2 Installations must not be carried out during inclement weather, eg rain, fog or snow.

13.3 Substrates to which the system is to be applied must be sound, clean, frost free, dry, free from laitance, fatty/oily residues, contaminants and from sharp projections such as nail heads and concrete nibs. Concrete surfaces must be prepared by scabbing or blast tracking methods and have a moisture content of <5%. The Certificate holder's advice must be sought for the suitability of the substrate to receive the system and for suitable cleaning procedures, including the use of a proprietary surface cleaner/fungicidal wash, where required.

13.4 Previously coated areas must be checked for integrity and adequate adhesion to the substrate. Defects such as cracks and blisters must be repaired prior to application of the system in accordance with the Certificate holder's instructions.

13.5 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.

13.6 MasterTop P 617 and MasterTop P 684 primers must be applied to the prepared substrate at an ambient and substrate temperature between 8 and 30°C. MasterTop P 691 primer must be applied to the prepared substrate at an ambient and substrate temperature between 5 and 25°C. The primers are applied by brush or roller at a typical coverage rate (dependent on condition and porosity of the substrate) of 300 - 500 $g \cdot m^{-2}$ for MasterTop P 617, 40 - 60 $g \cdot m^{-2}$ for MasterTop P 684 and for 50 - 100 $g \cdot m^{-2}$ MasterTop P 691.

13.7 The MasterSeal M 689 components must be applied to the primed substrate at an ambient temperature between 5 and 35°C and the substrate must be at least 3°C above the dew point.

13.8 Detailing, such as at upstands, penetrations and joints, must be carried out in accordance with the Certificate holder's instructions.

13.9 Equipment should be cleaned with a suitable solvent such as a glycol ether based spray gun cleaner.

14 Procedure

14.1 MasterSeal M 689 membrane is processed using a two-component high pressure spray machine, typically set at 75°C and pressure of 160 bar.

14.2 The resin component of MasterSeal M 689membrane must be thoroughly stirred or agitated prior to use.

14.3 A first pass is applied at a rate of 0.7 $kg \cdot m^2$ to achieve a thickness of 0.7 mm.

14.4 Further layers are applied in a 'crisscross' application, 90° difference in direction of spray at a rate of 1 $kg \cdot m^2$ to achieve an overall target thickness of 2.4 mm.

14.5 If work is interrupted for more than 4 hours, it is recommended to use MasterTop P 691. For extended periods of interruption, it is recommended to clean and degrease the old layer prior to the application of MasterTop P 691.

14.6 The applied layers must not be walked on within the first 10 minutes after application. Full cure is achieved after 48 hours.

14.7 The cured system must be overlaid with suitable finishes. The Certificate holder must be consulted for details of suitable specifications.

15 Repair

15.1 Any loose debris needs to be removed. Damaged membrane must be cut back to sound, well-adhered material, abraded with a slow moving rotary disc at least 100 mm larger than the area which needs to be repaired.

15.2 The abraded surface is solvent wiped with xylene or acetone, which is allowed to fully evaporate.

15.3 The MasterSeal 6689 Spray-Applied Roof Waterproofing System is applied as described in sections 14.1 to 14.6, ensuring that there is at least a 100 mm overlap over the existing sound material.

15.4 A check for adequate adhesion must be carried out once the system has cured, taking care not to damage the repair.

Technical Investigations

16 Tests

Tests were conducted on the MasterSeal 6689 Spray-Applied Roof Waterproofing System and the results assessed to determine:

- water vapour permeability/water vapour diffusion resistance coefficient (μ)
- tensile strength and elongation
- watertightness
- tensile bond strength
- resistance to fatigue
- crack bridging capability
- resistance to dynamic indentation
- resistance to static indentation
- resistance to low temperatures
- resistance to high temperatures
- effect of heat aging
- effect of exposure to surface water at 60°C
- effect of short term exposure to UV-A radiation
- root resistance.

17 Investigations

17.1 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.

17.2 Independent external test reports relating to reaction to fire and classifications in accordance with BS EN 13500-1 : 2007 were reviewed.

Bibliography

BS 6229 : 2018 *Flat roofs with continuously supported flexible waterproof 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 : 2015 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

ETAG 005 : 2005 Guideline for European Technical Approval of Liquid Applied Roof Waterproofing Kits

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.

British Board of Agrément
Bucknalls Lane
Watford
Herts WD25 9BA

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