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BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

Agrément Certificate
12/4951
Product Sheet 1

SCOTT BADER WATERPROOFING SYSTEMS

CRYSTICROOF PREMIER GRP ROOF WATERPROOFING SYSTEM

This Agrément Certificate Product Sheet(1) relates to the CrysticROOF Premier GRP Roof Waterproofing System, cold-applied resin-based base and top coats for use in providing a waterproof covering to flat or pitched roofs with limited access.

(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 the building (see section 6).

Properties in relation to fire — the system will enable a roof to be unrestricted under 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 damage and foot traffic — the system will accept the traffic and loads associated with installation and maintenance (see section 9).

Durability — under normal service conditions, the system will provide a durable waterproof covering with a service life of at least 20 years. A GRP laminate formed under satisfactory conditions can maintain its integrity for 30 years (see section 11).

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: 21 November 2012

Simon Wroe
Head of Approvals — Materials

Greg Cooper
Chief Executive

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, the CrysticROOF Premier GRP Roof Waterproofing System, if installed, used and maintained in accordance with this Certificate, will meet or contribute to meeting 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)

Requirement:	B4(2)	External fire spread
Comment:		On a suitable substructure, the system will enable a roof to be unrestricted under this Requirement. See section 7.1 and 7.2 of this Certificate.
Requirement:	C2(b)	Resistance to moisture
Comment:		The system will enable a roof to meet this requirement. See section 6.1 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The system is acceptable. See sections 11.1 and 11.2 and the *Installation* part 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 10, 11.1 and 11.2 and the *Installation* part of this Certificate.
Regulation:	9	Building standards — construction
Standard:	2.8	Spread from neighbouring buildings
Comment:		The system, when applied to a suitable substructure, 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 section 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 — 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

Regulation:	23(a)(b)(i)	Fitness of materials and workmanship
Comment:		The system is acceptable. See sections 11.1 and 11.2 and the *Installation* part of this Certificate.
Regulation:	28(b)	Resistance to moisture and weather
Comment:		The system will enable a roof to meet the requirements of this Regulation. See section 6.1 of this Certificate.
Regulation:	36(b)	External fire spread
Comment:		On suitable substructures, the use of the system will enable a roof to be unrestricted under the requirements of this Regulation. See section 7.1 and 7.2 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: 3 *Delivery and site handling* (3.1, 3.6 and 3.7) and 13 *Precautions* of this Certificate.

Additional Information

NHBC Standards 2011

NHBC accepts the use of the CrysticROOF Premier GRP Roof Waterproofing System, provided it is installed, used and maintained in accordance with this Certificate, in relation to *NHBC Standards*, Part 7 *Roofs*, Chapters 7.1 *Flat roofs and balconies* and 7.2 *Pitched roofs*.

1 Description

1.1 The CrysticROOF GRP Roof Waterproofing System consists of a glassfibre reinforced polyester resin base coat, cold-applied on site by the hand lay-up process, and a fire-retardant topcoat. A non-slip grade incorporating a gritting agent in the topcoat is available to provide a non-slip surface.

1.2 The system comprises:

- CrysticROOF PREMIER Resin — an unsaturated polyester resin in styrene monomer for use as a basecoat
- CrysticROOF PREMIER Topcoat — an unsaturated, polyester resin monomer, fire retardant topcoat supplied either pre-pigmented in a range of colours or clear for use with polyester pigmented paste
- MEKP catalyst — added to the resin and topcoat to initiate curing
- glass-mat fibre rolls — 450 g·m^{-2} and 600 g·m^{-2} chopped strand glassfibre mat for use as reinforcement to the basecoat
- polyester pigmented paste — mixed with clear topcoat to produce a pigmented finish
- gritting agent — mixed with the topcoat to provide a non-slip surface where necessary
- a range of GRP pre-forms — to provide finishing details.

1.3 Sealant for adhering roof trims – an ancillary item available for use with the system but which is outside the scope of this Certificate.

2 Manufacture

2.1 The components of the system are manufactured via a batch blending process using conventional methods.

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 Scott Bader Company Limited has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by SGS United Kingdom Limited (Certificate GB91/625).

3 Delivery and site handling

3.1 The base and topcoat resins are supplied in 5 kg, 10 kg and 20 kg drums bearing the Certificate holder's name, product name, batch number, health and safety data and the BBA identification mark incorporating the number of this Certificate. The catalyst is supplied in 500 g, 5 kg and 30 kg plastic containers, and the pigment in 1 kg, 2 kg and 5 kg metal containers. The glassfibre reinforcement is supplied polythene-wrapped in roll form in cardboard boxes.

3.2 The base and topcoat resins must be stored in a dark place in suitable closed containers. It is recommended that the storage temperature be less than 20°C, where practical: it must not exceed 30°C. Ideally, containers should be first opened immediately prior to use. Where they have to be stored outside, it is recommended that they are kept in a horizontal position to avoid the possible ingress of water.

3.3 The glass-mat must be kept dry at all times prior to installation.

3.4 The catalyst and pigment paste must be stored in sealed containers in dry conditions at temperatures between 5°C and 25°C, and away from direct sunlight until ready for application.

3.5 The shelf-life of unopened CrysticROOF Premier resins, factory-sealed in steel containers, is up to six months, and in unopened and resealed containers three months, when stored at temperatures between 5°C and 25°C.

3.6 The resins are flammable, and must be stored in accordance with the *Highly Flammable Liquids and Liquefied Petroleum Gases Regulations 1972*.

3.7 The polyester resins and catalyst are classified under *The Chemicals (Hazard Information and Packaging for Supply) Regulations 2009* (CHIP4)/*Classification, Labelling and Packaging of Substances and Mixtures (CLP Regulations) 2009* and all containers bear the appropriate hazard warning label. Flashpoints and hazard classifications are given in Table 1.

Table 1 Flashpoints and hazard classifications

Material	Flashpoint (°C)	Classification
Resin	32	Flammable, Harmful
Topcoat	32	Flammable, Harmful
Catalyst	Not applicable	Irritant, Oxidising

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the CrysticROOF Premier GRP Roof Waterproofing System.

Design Considerations

4 General

4.1 The CrysticROOF Premier GRP Roof Waterproofing System is satisfactory for use as a waterproofing layer on flat or pitched roofs with limited access.

4.2 The system is only for application to timber-based substrates, minimum 18 mm thick, exterior plywood, particle board type P5 or oriented strand board (OSB/3) with tongue-and-groove edges. It should be of the correct durability class for the situation of use, as described in BRE Digest 323 *Selecting wood-based panel products*, the relevant requirements of BS 6229 : 2003 or, where appropriate, comply with *NHBC Standards* 2011, Chapter 7.1. Other substrates are outside the scope of this Certificate.

4.3 '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, either the non-slip grade must be used or special precautions (such as additional protection to the system) must be taken.

4.4 For the purposes of this Certificate, 'pitched roofs' are defined as those roofs having a fall greater than 1:6, 'flat roofs' are defined as those having a minimum finished fall of 1:80 and 'completely flat roofs' are defined as those having a finished fall of less than 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. When upgrading existing flat roofs, care should be taken to minimise ponding water.

4.5 Imposed loads, dead loads and wind loading are calculated in accordance with BS EN 1991-1-1 : 2002, BS EN 1991-1-3 : 2003 and BS EN 1991-1-4 : 2005 + A1 : 2010, and their respective UK National Annexes.

5 Practicability of installation

The system should only be installed by contractors 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 structure to comply with the requirements of the national Building Regulations:

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

Scotland — Mandatory Standard 3.10, clauses 3.10.1 and 3.10.7

Northern Ireland — Regulation 28(b).

6.2 The system is impervious to water and will achieve a weathertight roof capable of accepting minor structural movement without damage.

7 Properties in relation to fire

7.1 Test results indicate that a system comprising unsaturated polyester topcoat with resin and glassfibre reinforcement applied to an 18 mm thick oriented strand board (OSB/3) substrate is classified under BS EN 13501-5 : 2005 + A1 : 2009 as $B_{ROOF}(t4)$.

7.2 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.

8 Resistance to wind uplift

The system has adequate resistance to the effects of wind suction likely to occur in practice, provided the substrate is adequately fixed to the roof structure.

9 Resistance to damage and foot traffic

9.1 The system can accept, without damage, the limited foot traffic and light concentrated loads associated with installation and maintenance. However, reasonable care is required to avoid damage by sharp objects or concentrated loads. Results of testing for dynamic and static indentation are given in Table 2.

Table 2 Dynamic and static indentation

Test	Result	Method[1]
Dynamic indentation		EOTA TR 006
unaged[3]	I_3	
heat aged[2]	I_3	
UV aged[3]	I_4	
Static indentation		EOTA TR 007
unaged	L_4	
water exposure[4]	L_4	

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

(2) 80 days at 80°C.

(3) UV aged using UVA lamps at an exposure of 800 $MJ \cdot m^{-2}$ at 50°C.

(4) Surface water at 60°C for 60 days.

9.2 The non-slip system is suitable for use on walkways on flat roofs. Care should be taken when walking across the roof on the standard system.

10 Maintenance

Roofs must be inspected regularly and roof drains kept clear, as is good practice with all roofing membranes.

11 Durability

11.1 A GRP laminate constructed in accordance with the installation guide and formed in satisfactory weather conditions can maintain its integrity for 30 years.

11.2 The results of accelerated ageing tests confirm that satisfactory retention of physical properties is achieved. When installed and used in accordance with this Certificate, the system will provide an effective barrier to the transmission of liquid water and water vapour for at least 20 years.

Installation

12 General

12.1 Application of the CrysticROOF Premier GRP Roof Waterproofing System must be carried out only by the Certificate holder's approved installers in accordance with the Certificate holder's instructions.

12.2 The timber-based substrates to which the system is to be applied must be properly prepared in accordance with the Certificate holder's instructions, and must be completely dry before application of the system begins. Adhesion to the substrate will depend upon its condition and cleanliness.

12.3 The system must only be applied at temperatures of 5°C and rising to substrates that are dry and free from ice and frost. Installation must not be carried out during inclement weather (eg rain, fog or snow).

12.4 Bulk materials must not be stored on one area of the roof prior to installation, to ensure that localised overloading does not occur.

13 Precautions

13.1 Vapours from the individual components of the system, some of which contain styrene monomer, may cause irritation to the respiratory system, eyes and skin. The system should only be used in areas with sufficient ventilation to prevent the build-up of vapour. Contact with the skin, eyes and clothes should be avoided. The Certificate holder's instructions and the relevant safety regulations for working procedures must be adhered to at all times.

13.2 The individual components must not be allowed to enter the drainage system. Care must also be taken to prevent vapours entering the inside of the building, eg by closing doors, windows.

14 Procedure

14.1 Full cure of CrysticROOF Premier resins is dependent upon ambient air temperature and is achieved by the correct addition of liquid catalyst. The system must not be applied where the air or substrate temperature is outside the range of 5°C to 30°C, or where the relative humidity would cause wetting of the uncured resins, ie precipitation or surface condensation.

14.2 The basecoat is prepared on site by adding catalyst to the basecoat resin at a rate determined by the ambient temperature (see Table 3) immediately prior to application, and then mixing thoroughly either by hand or using a low shear mechanical stirrer where possible until catalyst is uniformly distributed throughout the resin without aeration. The mixture is then allowed to stand to regain thixotropy. On adequate mixing, the resin will have a slight brown hue that deepens progressively as curing takes place. The catalysed resin has a working time of approximately 12 to

45 minutes depending on temperature (see Table 4) and is applied to the substrate at a rate of 1 kg·m^{-2} to 1.5 kg·m^{-2} of roof area, using a synthetic pile roller.

Table 3 Levels of catalyst to be added to base and topcoat resins based on ambient temperature

Temperature	7.5–13 °C	14–20°C	21–28°C	29–35°C
Catalyst level	4%	3%	2%	1%

Table 4 Catalysed basecoat resin — working times

Temperature (°C)	Amount of catalyst (%)	Working time (pot life) (minutes)
10	3	45
15	2	33
20	1	22
25	1	17
35	1	12

14.3 The glass mat reinforcement is embedded into the initial layer of basecoat by application of a second layer of basecoat resin, using a synthetic pile roller to ensure it is thoroughly wetted out with the resin. All joints in the glass mat should have a 50 mm overlap, consolidated with a ribbed roller.

14.4 The laminate should only be overcoated when the resin has sufficiently cured (between 30 to 90 minutes depending on conditions) therefore allowing personnel to gain access without damaging the laminate. When cured, the laminate has a tack-free surface providing protection against contamination.

14.5 The laminate should be inspected carefully prior to the application of the topcoat to ensure uniformity of resin distribution. All irregularities should be removed with coarse sandpaper and re-coated.

14.6 Where applicable, polyester pigment paste is added to clear topcoat at a maximum rate of 10% by weight, immediately prior to application. Catalyst is added at a rate determined by the ambient temperature (see Table 3) and mixed thoroughly, either by hand or with a low shear mechanical stirrer where possible, ensuring that the catalyst is uniformly distributed throughout the resin without aeration. The mixture is then allowed to stand to regain thixotropy. The catalysed topcoat resin has a working time of 5 to 13 minutes depending on temperature (see Table 5). When thoroughly mixed, the topcoat is applied at a coverage rate of 0.65 to 0.8 kg·m^{-2} using a fresh synthetic pile roller. The topcoat is fully cured within 24 to 48 hours.

Table 5 Catalysed topcoat resin — working times

Temperature (°C)	Amount of catalyst (%)	Working time (pot life) (minutes)
10	4	13
15	2	12
20	2	10
25	2	8
35	1	5

14.7 The topcoat is checked for uniformity of colour and any signs of pin-holing. Sub-standard areas are thoroughly abraded before the application of a further thin layer of topcoat, care being taken to apply the new top coat to the prepared area only.

15 Repair

In the event of damage, repairs must only be carried out by contractors approved by the Certificate holder.

Technical Investigations

16 Tests

Tests were conducted on samples of CrysticROOF Premier GRP Roof Waterproofing System and results assessed to determine:

- tensile strength
- density
- Barcol hardness
- infra-red analysis of top coat and basecoat resins
- loss on ignition
- cross-break strength
- water vapour transmission
- static loading

- dynamic loading
- tensile bond strength
- water exposure
- heat ageing
- UV ageing
- slip 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 : 2003 *Flat roofs with continuously supported coverings — Code of practice*

BS EN 1991-1-1 : 2002 *Eurocode 1— Actions on structures — General actions — Densities, self-weight, imposed loads for buildings*
UK National Annex to BS EN 1991-1-1 : 2002 *Eurocode 1— Actions on structures — General actions — Densities, self-weight, imposed loads for buildings*
BS EN 1991-1-3 : 2003 *Eurocode 1— Actions on structures — General actions — Snow loads*
UK National Annex to BS EN 1991-1-3 : 2003 *Eurocode 1— Actions on structures — General actions — Snow loads*
BS EN 1991-1-4 : 2005 + Amendment 1 : 2010 *Eurocode 1— Actions on structures — General actions — Wind actions*
UK National Annex to BS EN 1991-1-4 : 2005 + Amendment 1 : 2010 *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 roof tests*

BS EN ISO 9001 : 2008 *Quality management systems — Requirements*

EOTA Technical Report TR 006 (May 1999), *Determination of the resistance to dynamic indentation* [*Liquid Applied Roof Waterproofing Kits (LARWK)]*

EOTA Technical Report TR 007 (May 1999), *Determination of the resistance to static indentation* [*Liquid Applied Roof Waterproofing Kits (LARWK)]*

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.

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