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BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

Agrément Certificate
95/3114
Product Sheet 1

DRYSEAL GRP ROOFING SYSTEMS

DRYSEAL GRP ROOFING SYSTEM

This Agrément Certificate Product Sheet[1] relates to the Dryseal GRP Roofing System, for use as waterproofing on flat, zero fall 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 the 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 foot traffic — the system will accept the traffic and loads associated with installation and maintenance without damage (see section 9).

Durability — the system will provide a durable roof waterproof covering with a service life in excess of 15 years. A GRP laminate formed under satisfactory weather 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 Second issue: 10 November 2014

Originally certificated on 9th June 2002[2]

(2) Base sheet originally assessed as part of Detail Sheet 2 issued on 24 May 1995.

Simon Wroe
Head of Approvals — Materials

Claire Curtis-Thomas
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 Dryseal GRP Roofing 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:		On a suitable substructure the system will enable a roof to be unrestricted under this Requirement. See section 7 of this Certificate.
Requirement:	C2(b)	Resistance to moisture
Comment:		The system will enable a roof to meet this Requirement. See section 6.2 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The system is acceptable. See section 11 and the *Installation* part of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Durability, workmanship and fitness or materials
Comment:		The use of the system satisfies the requirements of this Regulation. See sections 10 and 11 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 and will enable a roof to be unrestricted under this Standard, with reference to clause 2.8.1[(1)(2)]. See section 7 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 6.2 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

Regulation:	23	Fitness of materials and workmanship
Comment:		The system is acceptable. See section 11 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 6.2 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 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, 3.4 and 3.5) and 13 *Precautions* of this Certificate.

Additional Information

NHBC Standards 2014

NHBC accepts the use of the Dryseal GRP Roofing System, provided it is installed, used and maintained in accordance with this Certificate, in relation to *NHBC Standards*, Part 7 *Roofs*, Chapter 7.1 *Flat Roofs and Balconies* and Chapter 7.2 *Pitched roofs*.

Technical Specification

1 Description

1.1 The Dryseal GRP Roofing System consists of a prefabricated glassfibre reinforced polyester resin flat sheet and preformed trims, mechanically fixed and jointed on site by the hand lay-up process and coated with a UV protective liquid-applied polyester top coat.

1.2 The system comprises:

- H 1250 F Heavy Duty Flat Sheet — manufactured in widths up to 1250 mm, nominal thickness 1.3 mm, nominal weight 14 kg, length 6 m (longer lengths are available to order) and pigmented light grey
- H 1250 R membrane — manufactured in widths up to 1250 mm, nominal thickness 1.3 mm, nominal weight 14 kg, length 6 m (longer lengths are available to order) and pigmented light grey
- polyester resin, MEKP liquid catalyst, 450 $g \cdot m^{-2}$ glassfibre mat strip and 30 $g \cdot m^{-2}$ glass tissue — for use in the on-site jointing of the flat sheet and protection of exposed fixings by the hand lay-up process, with a double layer reinforcement
- polyester coating PET-20D, PET-20L — applied as top coat to the system. The coating improves the resistance to solar ageing and is available in light grey and dark grey. Other colours are available to special order
- mechanical fastenings — for use where flat sheet needs to be mechanically fixed to the deck, eg over insulation boards, as per the Certificate holder's approved list
- continuous flashing H 0300 F — a 300 mm wide flashing for use where a continuous narrow strip of membrane is required. Available in rolls in lengths of 30 m (longer lengths are available to order)
- flat edge/drip trims H 0200 A and H 0250 A — a range of preformed GRP roof edge details for use where drainage is required, and available in a range of fascia depths
- raised edge/check kerb H 0240 B and H 0260 B — a range of preformed GRP roof edge details for use where prevention of water run-off is required, and available in a range of fascia depths
- simulated lead, wall cover flashing trim H UACF — used to replace traditional lead flashings
- wall fillet H 0260 D — for use against abutments, providing for expansion and cross-roof ventilation
- internal and external angles H 0150 G, H 0275 G, H 0150 H and H 0275 H — for use when 90° angle details are required
- internal flexible angles H 0170 J and H 0380 J — for use when a 30° to 50° angle is required, eg at deck to lay board detail, and H 0280 J for use when angles of 50° to 90° are required
- coping trims H 0065 K and H 0130 K — used to cover existing coping on parapets, etc.

1.3 Ancillary items for use with the system include:

- bonding compound — for use in spot bonding to timber and bonding trim overlaps
- expansion joints — preformed GRP units for use over building joints.

2 Manufacture

2.1 The laminate is manufactured in a continuous process by laying down a liquid polyester resin onto a continually moving carrier surface. Strands of glass fibre reinforcement are added and the resin is formed into sheeting, which is cut and trimmed to length.

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 Hambleside Danelaw Limited has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by BSI (Certificate FM 23063).

3 Delivery and site handling

3.1 The system is delivered to site with the flat sheet in roll form, trims in lengths, and topcoat and resin in 20 kg drums. Each component carries a label bearing the component reference code, batch number and the BBA logo incorporating the number of this Certificate.

3.2 All preformed components should be stored in a dry, well ventilated area, clear of the ground and well supported.

3.3 The liquid components normally have a six-month shelf life if stored in sealed containers, under dry conditions, in temperatures between 5°C and 25°C and away from direct sunlight.

3.4 The polyester resin for jointing is flammable, with a flashpoint below 32°C, and must be stored in accordance with the *Highly Flammable Liquids Regulations* 1972.

3.5 All hazardous components of the system, as classified under *The Chemicals (Hazard Information and Packaging for Supply) Regulations 2009* (CHIP 4)/*The Classification, Labelling and Packaging of Substances and Mixtures 2009 (CLP Regulation)*, bear the appropriate hazard warning label.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Dryseal GRP Roofing System.

Design Considerations

4 Use

4.1 The Dryseal GRP Roofing System is satisfactory for use as a waterproofing layer on flat, zero fall or pitched roofs with limited access, provided it is installed in accordance with this Certificate and the relevant clauses of the Certificate holder's instructions.

4.2 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, special precautions, such as additional protection to the membrane, must be taken.

4.3 Flat roofs are defined for the purpose of this Certificate as those having a minimum finished fall of 1:80. Zero fall roofs are defined for the purpose of this Certificate as those having a finished fall of less than 1:80. Pitched roofs are defined as those having falls in excess of 1:6.

4.4 When designing flat roofs, 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 eliminate ponding of water.

4.5 Decks to which the system is to be applied must comply with the relevant requirements of BS 6229 : 2003, BS 8217 : 2005, the Certificate holder's specifications and, where appropriate, *NHBC Standards*, Part *7 Roofs*, Chapter *7.1 Flat roofs and balconies* and *7.2 pitched roofs*.

4.6 Insulation materials used in conjunction with the system must comprise a rigid insulation board of sufficient compressive strength to resist indentation when fixing, and be:

- 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.

4.7 Dead loads, wind loading and imposed 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 respective UK National Annexes.

5 Practicability of installation

The system must only be installed by trained approved installers.

6 Weathertightness

6.1 To achieve weathertightness it is essential that the joints and coating are correctly applied as described in the Certificate holder's literature.

6.2 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 C4(b).

6.3 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 Results of tests indicate that a system comprising a blockboard composite panel substrate and the Dryseal GRP Roofing System will be unrestricted.

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 and Annex 2.C
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.

9 Resistance to foot traffic

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.

10 Maintenance

The system should be subjected to regular annual inspections, and roof drains kept clear, as is good practice with all roofing membranes.

11 Durability

A GRP laminate constructed in accordance with the installation guide and formed in satisfactory weather conditions can maintain its integrity for 30 years. The results of accelerated ageing tests and performance in use confirm that satisfactory retention of physical properties is achieved. All available evidence indicates that the system, when constructed in accordance with this Certificate, will have a life expectancy in excess of 15 years provided there is no abnormal movement of the structure and the roof is subject to the normal regular inspections and maintenance.

Installation

12 General

12.1 Application of the Dryseal GRP Roofing System is carried out by installers trained and approved by the Certificate holder. Application must be carried out in strict accordance with the relevant clauses of the Certificate holder's instructions.

12.2 The system must not be laid in rain, snow, heavy fog or high winds, nor if rain is imminent or at temperatures below 5°C. However, once the GRP flat sheet has been installed and jointed, the system is weathertight and can be temporarily left before installation of the top coat. The flat sheet surface must be clean and dry prior to the installation of the top coat.

12.3 Deck surfaces must be dry, clean and free from sharp projections (nail heads, concrete nibs, etc), and in a sound condition.

12.4 For timber decks used in cold roof construction, 16 mm diameter holes should be drilled in the deck in every joist space at 450 mm centres, in order to allow air to permeate.

12.5 Any treated timber wall/fascia battens or insulation stops required should be fixed in accordance with the Certificate holder's instructions.

13 Precautions

13.1 Vapours from the liquid components of the system, some of which contain styrene monomer, 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 vapour. Contact with the skin, eyes and clothes must 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 liquid components must not be allowed to enter the drainage system.

14 Procedure

Flat sheet

14.1 The flat sheet is rolled out over the substrate, marked and cut to length allowing for 50 mm laps to the perimeter. The flat sheet is marked with a line 50 mm in from the edge to assist with the positioning of laps.

14.2 The flat sheet is mechanically fastened through laps at maximum 350 mm centres, using approved anti-corrosive fixings and stress plates.

14.3 Other preformed trims required are mechanically fixed as described in the Certificate holder's instructions.

14.4 All lap joints, seams, fixing heads and penetrations of the flat sheet must be sealed using the hand lay-up process of applying GRP, in accordance with the Certificate holder's instructions.

14.5 Once the GRP joints have cured (speed of curing is dependent on ambient temperature) the polyester top coat can be applied. If application of the top coat is not immediate, the roof can be left incomplete for a short period of time as the GRP layer is weathertight.

Top coat application

14.6 The roof area must be clean, dry, grease-free and clear of all loose debris prior to the installation of the top coat.

14.7 Resin is measured out into clean, calibrated buckets as required. Catalyst is added as detailed in the installation instructions, the amount dependent upon ambient temperature and volume of resin.

14.8 The minimum amount of catalyst used is 1% by volume (approximately 10 ml per litre of resin) and maximum 3% (approximately 30 ml per litre of resin).

14.9 Catalyst is sprinkled onto the top coat whilst stirring continuously until the catalyst is completely dispersed.

14.10 The top coat is applied using a roller or brush, at the rate of 1 kg per two square metres, ensuring even and total coverage. Application to roof details, eg around penetrations and edges, must be carried out prior to the coating of the main roof area.

14.11 If unused top coat starts to gel (ie form skin or leave granular lumps on the surface), application must cease immediately, and a fresh batch of resin must be prepared prior to continuing.

15 Repair

Repairs must be carried out in accordance with the Certificate holder's instructions. Larger holes or areas of more widespread damage are repaired by overlaying with Dryseal flat sheet, adequately secured to the existing membrane or through to the substrate. The perimeter edges are laminated to the existing GRP surface after the appropriate preparation, prior to the application of the top coat.

Technical Investigations

16 Tests

Tests were carried out on the system and the results assessed to determine:

- density
- weight per unit area
- hardness
- glass/resin ratio
- tensile strength and elongation
- moisture absorption
- water vapour permeability
- resistance to water pressure
- fatigue cycling
- resistance to static and dynamic indentation
- delamination strength
- tensile bond strength
- nail pull-through
- unrolling at low temperatures
- coefficient of expansion
- effect of elevated temperatures
- effect of water soak
- effect of UV exposure
- hard body impact
- thermal shock.

17 Investigations

17.1 A visit was made to a site in progress to assess the methods of installation.

17.2 Installation instructions were assessed to establish the practicability of the materials used.

17.3 An assessment was made of indicative fire data to BS 476-3 : 1958.

Bibliography

BS 6229 : 2003 *Code of practice for flat roofs with continuously supported coverings*

BS 8217 : 2005 *Code of practice for built-up felt roofing*

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 *Eurocode 1 : Actions on structures — General actions — snow loads*

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

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

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

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

Conditions of Certification

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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