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Agrément Certificate

18/5571

Product Sheet 1

LIQUASIL ROOF WATERPROOFING SYSTEMS

LIQUASIL ULTRA PU

This Agrément Certificate Product Sheet⁽¹⁾ relates to Liquasil Ultra PU, moisture-triggered, glassfibre-reinforced aliphatic polyurethane, for use as a roof waterproofing membrane on new and existing flat and pitched roofs with limited and pedestrian access, inverted roofs and green (extensive) roofs.

(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 can enable a roof to be unrestricted under the national Building Regulations (see section 7).

Adhesion — the adhesion of the system is sufficient to resist the effects of any likely wind suction and the effects of thermal or other minor movement likely to occur in practice (see section 8).

Resistance to foot traffic — the system will accept, without damage, the limited foot traffic and loads associated with installation and maintenance of the system (see section 9).

Durability — under normal service conditions, the system will provide a durable waterproof covering with a service life of at least 25 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: 9 October 2018

John Albon – Head of Approvals
Construction Products

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.

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

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Regulations

In the opinion of the BBA, Liquasil Ultra PU, 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 7.4 of this Certificate.
Requirement:	C2(b)	Resistance to moisture
Comment:		The system satisfies this Requirement. See section 6.1 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The system is acceptable. See section 11 and the <i>Installation</i> part of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Durability, workmanship and fitness of materials
Comment:		The use of the system satisfies the requirements of this Regulation. See sections 10.1 and 11 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	2.8	Spread from neighbouring buildings
Comment:		The system, when applied to a non-combustible substrate, can be regarded as having low vulnerability under clause 2.8.1 ⁽¹⁾⁽²⁾ of this Standard. See sections 7.1 to 7.4 of this Certificate.
Standard:	3.10	Precipitation
Comment:		The use of 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)(i)	Fitness of materials and workmanship
Comment:	(iii)(b)(i)	The system is acceptable. See section 11 and the <i>Installation</i> part of this Certificate.
Regulation:	28(b)	Resistance to moisture and weather
Comment:		The use of 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 suitable substructures, the use of the system can enable a roof to be unrestricted under the requirements of this Regulation. 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 2018

In the opinion of the BBA, Liquasil Ultra PU, 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 Liquasil Ultra PU consists of the following components:

- Liquasil Ultra PU Embedment Coat — a polyurethane base coat with a matt finish, available in grey
- Liquasil Ultra PU Top Coat— a polyurethane, UV-resistant top coat with a matt finish, available in a range of colours
- Liquasil Ultra Prime PU — a moisture-curing urethane primer for use on concrete, steel and GRP substrates
- Liquasil Ultra Epoxy Primer — a two-pack, low-viscosity epoxy primer for use where a full seal of the underlying material is required. The product is used on mastic asphalt, bituminous roofing felt, wood, polyurethane foam, liquid roofing membranes and aluminium paint substrates
- Liquasil Ultra Low Viscosity Two Pack Epoxy Primer — a two-pack, low-viscosity, high-build epoxy primer for use where a full seal of the underlying material is required. The product is used on mastic asphalt, bituminous roofing felt, wood, polyurethane foam, liquid roofing membranes and aluminium paint substrates
- Liquasil Ultra Reinforcing Mat — a 225 g·m⁻² glassfibre chopped strand reinforcing mat.

1.2 The liquid-applied components have the nominal characteristics given in Tables 1 and 2.

Table 1 Nominal characteristics of waterproofing components

Characteristic (unit)	Components	
	Liquasil Ultra PU Embedment Coat	Liquasil Ultra PU Top Coat
Colour	grey	dark grey, mid grey, light grey, terracotta, copper green, white
Percentage solids	89	84
Viscosity at 23°C (mPa·s)	thixotropic	thixotropic
Specific gravity (g·cm ⁻³)	1.37	1.38

Table 2 Nominal characteristics of primers

Characteristic (unit)	Components				
	Liquasil Ultra Prime PU	Liquasil Ultra Epoxy Primer		Liquasil Ultra Low Viscosity Two Pack Epoxy Primer	
		Part A	Part B	Part A	Part B
Colour	light brown	various	brown	various	brown
Percentage solids	70	95	100	95	100
Viscosity at 23°C (mPa·s)	140	660	250	thixotropic	250
Specific gravity (g·cm ⁻³)	1.00	1.37	1.01	1.44	1.01

1.3 Bridging tape is an ancillary item for use as additional reinforcement in areas of potential weakness such as upstands, cracks and expansion joints.

2 Manufacture

2.1 The liquid components of the system are manufactured by a batch-blending process.

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 liquid components are delivered to site in packaging bearing the product name, company name, batch number, health and safety information and weight of contents in kilograms. The type of packaging for the liquid components is given in Table 3.

Table 3 Liquid component packaging and size

Component	Packaging	Packaging size (litre)
Liquasil Ultra PU Embedment Coat	clamp top tin	12.5 and 15
Liquasil Ultra PU Top Coat	clamp top tin	12.5 and 15
Liquasil Ultra Prime PU	metal can	5 and 25
Liquasil Ultra Epoxy Primer		
Part A	plastic pail	10
Part B	metal can	2

3.2 The liquid components must be stored in a dry, well-ventilated area, under cover, within the temperature range recommended by the Certificate holder and away from heat sources.

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 Liquasil Ultra PU.

Design Considerations

4 Use

4.1 Liquasil Ultra PU is satisfactory for use as a waterproofing layer on new and existing flat and pitched roofs with limited and pedestrian access, inverted roofs and green (extensive) roofs.

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

- concrete
- mastic asphalt
- bituminous roofing membranes
- steel
- wood
- liquid-applied roof waterproofing
- GRP
- aluminium paint.

4.3 Limited access roofs are defined for the purposes 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.

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

4.5 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.

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

4.7 Green roofs are defined for the purpose of this Certificate as those consisting of the structural deck and all layers on it (including the waterproofing system) with a thin layer of growing medium planted with an extensive vegetation, such as mosses, sedums and herbaceous plants with non-intrusive roots.

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

4.9 For green and inverted roofs, structural decks to which the system is to be applied must be capable of transmitting the dead and imposed loads experienced in service.

4.10 Dead loads and imposed loads for green and inverted roofs are calculated in accordance with BS EN 1991-1-1 : 2002 and BS EN 1991-1-3 : 2003, and their UK National Annexes.

4.11 The drainage system for green roofs must be correctly designed, and provision made for access for maintenance. Dead loads for green roofs can also dramatically increase if the drains become partially or completely blocked, causing waterlogging of the drainage soil layers.

4.12 In inverted roof specifications, the ballast requirements should be calculated in accordance with the relevant parts of BS EN 1991-1-4 : 2005 and its UK National Annex. Additional guidance for inverted roof specifications is given in BBA Information Bulletin No 4 *Inverted roofs – Drainage and U value corrections*.

5 Practicability of installation

Installation of the system must only be carried out by contractors trained and approved by the Certificate holder.

6 Weathertightness



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

6.2 The system is impervious to water and, when used as described, will give a weathertight roofing capable of accepting minor movement without damage.

6.3 To achieve a weathertight coating it is essential that the application rate is as quoted in the Certificate holder's literature for the system.

7 Properties in relation to fire



7.1 When tested to DD CEN/TS 1187 : 2012, Test 4, a system comprising 12 mm calcium silicate board, a base coat of Liquasil Ultra PU Embedment Coat at a coating rate of $1 \text{ l}\cdot\text{m}^{-2}$, a layer of Leeson Reinforcing Mat, and a top coat of Liquasil Ultra PU Top Coat at a coating rate of $1.75 \text{ l}\cdot\text{m}^{-2}$, when classified to BS EN 13501-5 : 2016, achieved $B_{\text{ROOF}}(t4)$.

7.2 Protected or inverted roof specifications, including an inorganic covering listed in the Annex of Commission Decision 2000/553/EC, can be considered to be unrestricted under the national Requirements.

7.3 The designation of other specifications, eg when used on combustible substrates or combinations of other roof components, 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⁽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.

7.4 In the opinion of the BBA, irrigated green roofs will be unrestricted under the national Requirements.

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

8 Adhesion

The adhesion of the system to concrete, fibre-cement, asphalt, bitumen felts, polyurethane foam and metal is sufficient to resist the effects of any wind suction, elevated temperatures, thermal shock or minor movement likely to occur in practice.

9 Resistance to foot traffic

9.1 The system can accept, without damage, the limited foot traffic and light concentrated loads associated with installation and maintenance operations. However, reasonable care should be taken to avoid puncture by sharp objects or concentrated loads. Results of dynamic and static indentation tests are given in Table 4.

Table 4 Dynamic and static indentation

Test	Result	Method
Dynamic indentation		
control:		
steel substrate		
– tested at 23°C	I ₄	
– tested at –20°C	I ₄	
PU insulation substrate		EOTA TR-006
– tested at 23°C	I ₃	
heat aged ⁽¹⁾ :		
– tested at –20°C on steel	I ₄	
UV aged ⁽²⁾ :		
– tested at –10°C on steel	I ₄	
Static indentation		
control tested at 23°C:		
steel substrate	L ₃	
PU insulation substrate	L ₃	EOTA TR-007
water exposure ⁽³⁾ :		
– tested at 23°C on steel	L ₄	
– tested at 90°C on steel	L ₂	

(1) Heat aged 200 days at 80°C.

(2) UV aged 1000 MJ·m⁻² at 50°C.

(3) Water exposure at 60°C for 60 days.

9.2 In pedestrian access areas suitable protection, such as pavers, is used.

10 Maintenance



10.1 Maintenance should include checks and operations to ensure that, where applicable:

- where used, protection layers are in good condition
- the exposed membrane is free from the build-up of silt and other debris and unwanted vegetation is cleared
- when used in inverted roofs, adequate ballast is in place and is evenly distributed over the insulation.

10.2 Green 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 *The GRO Green Roof Code* ☐ *Green Roof Code of Best Practice for the UK*.

10.3 Should a leak occur in the waterproofing layer in green or inverted roof specifications, access to it is achieved by removing the layers above the waterproofing and replacing them following repair.

11 Durability



Liquasil Ultra PU will achieve an initial life expectancy of at least 25 years.

Installation

12 General

12.1 Installation of the Liquasil Ultra PU is carried out in accordance with the Certificate holder's instructions.

12.2 The system must be applied when the air and substrate temperatures are greater than 5°C. Special precautions may be necessary when temperatures exceed 30°C, as shown in the Certificate holder's Technical Data sheets.

13 Site and surface preparation

13.1 Substrates on which the system is to be applied must be properly prepared in accordance with the Certificate holder's instructions.

13.2 Adhesion to substrates will depend on the condition and cleanness of the substrate. Substrates must be visibly dry, sound and free from loose materials or contamination (eg moss or algae).

13.3 Substrates are high-pressure washed and rinsed to remove loose or flaking materials, but the substrate must be visibly dry before application of the system. Areas contaminated with moss and lichen are treated with a proprietary fungicidal wash and allowed to dry.

13.4 Damaged areas of the substrate (eg blistered bitumen roofing felt or degraded mastic asphalt) must be removed, replaced or repaired. The adhesion of existing liquid-applied coatings is checked and any defective area removed back to a firm edge. Substrate defects (eg shallow-bottomed cracks and indentations) are filled using a cementitious mortar.

13.5 Deck surfaces must be free from sharp projections, such as protruding fixing bolts and concrete nibs.

13.6 Gutters and outlets must be checked to ensure that they are, and remain, clear of all debris.

13.7 All points of potential weakness such as splits, cracks, joints and crazed surfaces must be reinforced in accordance with the Certificate holder's instructions prior to application of the system.

13.8 Substrates are primed with the appropriate primer at the recommended coverage rate in accordance with the Certificate holder's instructions.

14 Application

14.1 Liquasil Ultra PU Embedment Coat is applied to the substrate using a medium pile roller at a coverage rate of $1.0 \ell \cdot m^{-2}$. The application rate may need to be increased on uneven or porous substrates and the advice of the Certificate holder should be sought.

14.2 The reinforcement is laid out and rolled into the wet base coat. Adjacent widths of reinforcement are overlapped by a minimum of 20 mm.

14.3 The base coat is cured for a minimum of 16 hours at 20°C prior to application of the top coat. At lower temperatures this time should be increased in line with the recommendations of the Certificate holder. Providing the base coat surface is clean, there is no maximum over-coating time.

14.4 Prior to the application of the Liquasil Ultra PU Top Coat, the base coat surface must be dry and free of contamination.

14.5 The top coat is applied at a coverage rate of $1.75 \ell \cdot m^{-2}$ on smooth surfaces, ensuring the embedment coat is totally covered. The top coat is cured for a minimum of 6 hours at 20°C (longer at lower temperatures), prior to trafficking.

15 Repair

The repair of minor damage to the system can be achieved effectively by cleaning back to the unweathered material and recoating the damaged area with the membrane at the application rates stated in section 14.

Technical Investigations

16 Tests

Tests were carried out and the results assessed to determine:

- watertightness
- water vapour transmission
- tensile properties
- delamination strength from concrete, primed concrete, primed steel, bitumen roofing membrane, primed wood, liquid-applied acrylic roof waterproofing, primed GRP and primed aluminium paint
- dynamic indentation
- static indentation
- fatigue cycling
- extremes of installation temperature (tensile strength and dynamic indentation repeated)
- UV ageing for $1000 \text{ MJ} \cdot m^{-2}$ at 50°C (tensile strength and dynamic indentation)
- heat ageing at 80°C for 200 days (tensile strength, dynamic indentation and fatigue cycling repeated)
- water exposure at 60°C for 60 days (delamination strength and static indentation repeated).

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

17.3 A visit was made to an existing site to assess the system in use.

17.4 Data on fire performance were evaluated.

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 : 15 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 : 2016 *Fire classification of construction products and building elements — Classification using data from external fire exposure to roofs tests*

DD CEN/TS 1187 : 2012 *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*

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.