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BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

Agrément Certificate
11/4836
Product Sheet 1

KRYPTON CHEMICAL ROOF WATERPROOFING SYSTEM

IMPERMAX 25 ROOF WATERPROOFING SYSTEM

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to the Impermax 25 Roof Waterproofing System, a liquid applied polyurethane coating for use on flat or sloping roofs with limited access, and when protected on public access roofs.

AGRÉMENT 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 5).

Properties in relation to fire — the system will enable a roof to be unrestricted under the Building Regulations (see section 6).

Resistance to wind uplift — the system will resist the effects of any likely wind suction acting on the roof (see section 7).

Resistance to foot traffic — the system will accept the limited foot traffic and loads associated with installation and maintenance (see section 8).

Durability — under normal service conditions the system will provide a durable roof waterproofing with a service life in excess of 25 years (see section 10).

The BBA has awarded this Agrément 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: 25 May 2011

Simon Wroe
Head of Approvals — Materials

Greg Cooper
Chief Executive

Certificate amended on 21 November 2011 due to a name change of a system component.

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 Impermax 25 Roof Waterproofing System, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations:

The Building Regulations 2010 (England and Wales)

Requirement:	B4(2)	External fire spread
Comment:		On a suitable substructure, the use of the system will enable a roof to be unrestricted under this Requirement. See sections 6.1 and 6.2 of this Certificate.
Requirement:	C2(b)	Resistance to moisture
Comment:		The system will enable a roof to meet this Requirement. See section 5.1 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The system is acceptable. See section 10 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 9.1 to 9.3, 10 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 low vulnerability and will enable a roof to be unrestricted under this Standard, with reference to clause 2.8.1[1][2] of this Standard. See sections 6.1 and 6.2 of this Certificate.
Standard:	3.10	Precipitation
Comment:		The use of the system will enable a roof to meet the requirements of this Standard, with reference to clauses 3.10.1[1][2] and 3.10.7[1][2]. See section 5.1 of this Certificate.
Regulation:	12	Building standards — conversions
Comment:		All comments given for the membranes under Regulation 9 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) 2000 (as amended)

Regulation:	B2	Fitness of materials and workmanship
Comment:		The system is acceptable. See section 10 and the *Installation* part of this Certificate.
Regulation:	B3(2)	Suitability of certain materials
Comment:		The system is acceptable. See sections 9.1 to 9.3 of this Certificate.
Regulation:	C4(b)	Resistance to ground moisture and weather
Comment:		The system will enable a roof to meet the requirements of this Regulation. See section 5.1 of this Certificate.
Regulation:	E5(b)	External fire spread
Comment:		On a suitable substructure, the use of the system will enable a roof to be unrestricted under the requirements of this Regulation. See sections 6.1 and 6.2 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 section: 2 *Delivery and site handling* (2.1 and 2.4) and 12 *Precautions* (12.1) of this Certificate.

Non-regulatory Information

NHBC Standards 2011

NHBC accepts the use of the Impermax 25 Roof Waterproofing System, when installed and used in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 7.1 *Flat roofs and balconies.*

General

The components of the system are manufactured by the Certificate holder in Spain and marketed in the UK by Krypton Chemicals UK Ltd, Ashtree House, Lichfield Road, Abbots Bromley, Rugeley, Staffordshire WS15 3DN, tel: 01283 841805, e-mail: enquiries@kryptonchemicals.co.uk and website: www.kryptonchemicals.co.uk

1 Description

1.1 The Impermax 25 Roof Waterproofing System is a one-component, liquid-applied polyurethane based membrane.

1.2 The system is built up by applying the following components on site:

- Impermax waterproofing membrane — a one-component, polyurethane, liquid-applied waterproofing membrane
- PUR Cat additive — a catalyst for mixing into the Impermax waterproofing membrane used to reduce the curing time. The catalyst must not be used at temperatures above 20°C
- Reinforcement fabric — a polyester reinforcement fabric with a nominal weight ≥80 $g \cdot m^{-2}$ for embedding into the Impermax waterproofing membrane for use over existing cracks, at upstands and other changes of plane
- Humidity Primer — a primer for use on concrete surfaces where the moisture content of the concrete is greater than 4%
- Thixotropy additive — an additive for mixing into the Impermax waterproofing membrane component when used on upstands

1.3 Other materials available for use with the system, but outside the scope of the Certificate, are:

- Rayston PU solvent — a diluent (maximum addition 10%) added to the Impermax waterproofing membrane component for use as a porosity sealer primer on porous substrates, eg masonry and as a general-purpose cleaning solvent
- PU Primer — a one-component primer for use on a range of substrates including glass and steel
- Impertrans — a single-component, UV resistant, decorative and protective coating for application over Impermax waterproofing membrane
- Super-accelerant PU — a curing agent for mixing into the Impermax waterproofing membrane for use when a fast 'cure-through' is required.

Quality control

1.4 A series of quality control checks are performed on incoming raw materials, during production and on the finished components.

2 Delivery and site handling

2.1 The liquid components of the system are delivered to site in sealed containers with labels bearing the manufacturer's name, product description and the appropriate hazard and risk labels, see section 2.4. They are available in the pack sizes given in Table 1.

Table 1 Pack weight and storage life

Component	Pack sizes (kg)	Storage life (months)
Impermax waterproofing membrane	5, 10 and 25	12
PUR Cat additive	1	12
Thixotropy additive	1	12
Humidity Primer (Parts A + B)	5, 10 and 20	12
Rayston PU solvent	4, 9 and 20	12

2.2 All containers should be stored under cover in a cool, dry and ventilated place away from other chemicals and protected from frost. Components kept in sealed, unopened containers and stored in accordance with the manufacturer's instructions will have a shelf-life as detailed in Table 1.

2.3 The Reinforcement fabric is available in a variety of roll sizes and weights.

2.4 The materials are classified under *The Chemicals (Hazard Information and Packaging for Supply) Regulations 2009* (CHIP4) and bear the appropriate hazard warning label. The flashpoints and classification of components are given in Table 2.

Table 2 Flashpoint and hazard classification of components

Products/components	Flashpoint (°C)	Classification
Impermax waterproofing membrane	>54	Harmful, Flammable[1]
PUR Cat additive	25	Highly Flammable[1], Harmful
Thixotropy additive	31	Flammable[1], Harmful
Humidity Primer		Harmful, Dangerous for the Environment, Irritant
Part A	121	
Part B	>100	
Rayston PU solvent	27	Flammable[1], Harmful

(1) These components must be stored in accordance with *The Dangerous Substances and Explosive Atmospheres Regulations 2002*.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Impermax 25 Roof Waterproofing System.

Design Considerations

3 Use

3.1 The Impermax 25 Roof Waterproofing System is satisfactory for use as a fully adhered exposed waterproofing layer on flat and pitched roofs with limited access and, when fully protected, on pedestrian access roofs.

3.2 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, additional protection to the membrane must be provided (see sections 3.4 and 8).

3.3 Flat roofs are defined for the purpose of this Certificate as those roofs having a minimum finished fall of 1:80. For design purposes, twice the minimum finished fall should be assumed, unless a detailed analysis of the roof is available, including overall and local deflection, direction of falls, etc. Pitched roofs are defined for the purpose of this Certificate as those having a fall greater than 1:6.

3.4 Pedestrian access roofs are defined for the purpose of this Certificate as those suitable for foot trafficking only, eg, terraces, balconies, podium decks. Special precautions must be taken to protect the membrane when used in these areas (see section 8).

3.5 Decks to which the system are to be applied must comply with the relevant requirements of either BS 6229 : 2003 and, where appropriate, *NHBC Standards*, Chapter 7.1 *Flat roofs* and *balconies*.

3.6 The adhesion of the system has been assessed as suitable on concrete, including damp concrete[1] substrates. Acceptable adhesion of the system to other substrates should be confirmed by test.

(1) Concrete with a humidity level ≥ 4% must be primed with Humidity Primer.

4 Practicability of installation

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

5 Weathertightness

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

England and Wales — Approved document C, Requirement C2(b) Section 6
Scotland — Regulation 9, Mandatory Standard 3.10, clauses 3.10.1 and 3.10.7
Northern Ireland — Regulation C4(b).

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

6 Properties in relation to fire

6.1 When tested in accordance with BS 476-3 : 2004 the system comprising two coats of Impermax waterproofing membrane each applied at a coverage rate of 1 kg·m^{-2} on a 18 mm thick WBP plywood substrate achieved an EXT.F.AC rating.

6.2 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.

7 Resistance to wind uplift

The adhesion of the system to concrete is sufficient to resist the effects of wind suction, thermal cycling or other minor structural movement likely to occur in service.

8 Resistance to foot traffic

8.1 The system can accept the limited foot traffic and light concentrated loads associated with installation and maintenance. Reasonable care should be taken to avoid puncture by sharp objects or concentrated loads. Where traffic in excess of this is envisaged, such as maintenance of lift equipment, a walkway should be provided, for example, using concrete slabs supported on bearing pads.

8.2 When used on pedestrian access roofs, the system must be fully protected (see section 13.8).

9 Maintenance

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

9.2 Maintenance should include checks and operations to ensure the following where applicable:

- the membrane and drainage outlets are free from the build-up of silt and other debris
- integrity of detailing
- protection layers, eg walkways are in good condition.

9.3 In the event that the system is contaminated by oil, grease or other chemicals then the advice of the Certificate holder must be sought.

10 Durability

Accelerated weathering tests and evidence from existing installations confirm that satisfactory retention of physical properties is achieved. Under normal conditions, the system will have a service life in excess of 25 years.

Installation

11 General

11.1 Installation of the Impermax 25 Roof Waterproofing System must be in accordance with the relevant Clauses of BS 8000-4 : 1989, BS 6229 : 2003, the Certificate holder's instructions and this Certificate.

11.2 Installation should not be carried out during inclement weather, eg rain, fog, snow, and the ambient temperature at the time of laying must be between 5°C and 35°C and surfaces to be coated at least 3°C above the dew-point.

11.3 Substrates to which the system is to be applied must be sound, dry, clean and free from sharp projections such as nail heads and concrete nibs. The Certificate holder's advice should be sought for suitable cleaning procedures and the use of a proprietary surface cleaner/fungicidal wash.

11.4 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.

11.5 Defects in the substrate (eg cracks) must be repaired, prior to application, in accordance with the Certificate holder's instructions. Cracks must be treated with a reinforced Impermax coating layer consisting of a 300 mm strip of Reinforcement fabric embedded in the Impermax waterproofing membrane prior to the application of the main waterproofing layer.

11.6 Active joints must also be treated with a reinforced Impermax coating layer, prior to the application of the main waterproofing layer, to ensure that the designed movement accommodation is maintained. The Certificate holder's advice should be sought for suitable specifications.

11.7 Substrates must be prepared and primed in accordance with the manufacturer's instructions. Adhesion checks should be carried out to ensure that the system is fully compatible with the existing surfaces and to determine the necessity for a primer, (see section 3.6).

11.8 The Certificate holder should be consulted on specifications for detailing around drains and other penetrations.

11.9 After use, all equipment should be cleaned with Rayston PU solvent. The Certificate holder's advice should be sought on the use of other cleaning products.

12 Precautions

12.1 Vapours from components of the system may cause sensitisation and irritation to the respiratory system, eyes and skin. The system must be used only in areas with sufficient ventilation to prevent the build-up of vapours. Contact with the skin, eyes and clothes must be avoided. The manufacturer's material safety data sheets must be consulted for detailed information on the safe handling and use of the products.

12.2 The system's components must not be allowed to get into the waste drainage system.

12.3 The waterproofing is slippery when wet. If additional slip resistance is required the advice of the Certificate holder must be sought.

13 Procedure

13.1 The Impermax waterproofing membrane component is mixed using a slow-speed drill fitted with a suitable paddle stirrer for at least two minutes, taking care to avoid excessive air entrainment and ensuring that any settlement occurring during storage is re-dispersed and the product is homogeneous.

13.2 Cracks and upstands must be treated with a reinforced Impermax coating layer in accordance with the Certificate holder's instructions.

13.3 Where application to upstands or other steep slopes is required, Thixotropy additive should be mixed into the Impermax waterproofing coating to minimise slump, at a rate of 1 kg additive to 25 kg of coating.

13.4 Impermax waterproofing membrane is applied by roller, squeegee or suitable airless spray machine in two coats each at a rate of 1 $kg \cdot m^{-2}$ to achieve a minimum total application rate of 2 $kg \cdot m^{-2}$ and to ensure a minimum total coating thickness of 1.6 mm is achieved. At least 24 hours should be allowed between coats.

13.5 When applied by roller, it is recommended that the membrane application is carried out in two or three coats to achieve the required application rate.

13.6 Following application, a spiked roller must be used to break air bubbles that form in the wet membrane.

13.7 A check should be made on the cured membrane for the presence of pinholes and missed areas. These should be rectified by applying additional coat(s) of membrane as necessary.

13.8 Where protection is required, eg when used on public access roofs, the fully cured system must be protected with Reinforcement fabric prior to bedding suitable paving or tiles on a sand or mortar bed. The Certificate holder must be consulted for details.

14 Repair

14.1 Damage to the system must be repaired as soon as possible to ensure that the waterproofing integrity is maintained.

14.2 The system can be repaired by cutting back the damaged or de-bonded coating to sound, well-bonded material and reinstating it to the original specification ensuring an overlap of at least 30 mm onto the existing coating.

14.3 Areas of existing coating to be overlapped must be cleaned, dried and primed with PU Primer and allowed to fully dry for at least one hour prior to overcoating in accordance with the Certificate holder's instructions.

14.4 If repairs to the substrate are required, the Certificate holder's advice should be sought for suitable repair materials.

14.5 On completion, and when the coating has fully cured, the repair should be inspected to ensure it is sound and well bonded to the existing coating.

Technical Investigations

15 Tests

15.1 Tests on the system were carried out by IETcc – Instituto de Ciencias de La Construcción Eduardo Torroja (Spain) and were assessed by the BBA. The tests are summarised in Table 3.

Table 3 Physical properties — general

Test (units)	Mean result	Method
Water vapour transmission ($g \cdot m^{-2} \cdot day^{-1}$)(1)	20	EN 1931
Water vapour diffusion resistance coefficient (μ)(1)	1.485	EN 1931
Tensile strength/Elongation (MPa)/(%)		EN ISO 527-3
unaged	2.4/459	
heat aged(2)	3.3/192	
UV aged(3)	3.1/193	
prepared at 0°C	4.0/384	
prepared at 40°C	2.7/240	
Watertightness	Pass	EOTA TR 003
Tensile bond strength (MPa)		EOTA TR 003
unaged		
concrete	2.62	
ceramic	2.00	
polyurethane foam	1.49	
day joint	1.80	
water exposure(4)		
concrete	1.96	
Dynamic indentation		EOTA TR 006
unaged		
polyurethane foam	I_4	
steel	I_4	
tested at –20°C		
steel	I_4	
polyurethane foam	I_4	
heat aged(2)		
steel (tested at –20°C)	I_4	
UV aged(3)		
steel (tested at –10°C)	I_4	
polyurethane foam (tested at –10°C)	I_4	
Static indentation		EOTA TR 007
unaged		
polyurethane foam	L_3	
steel	L_4	
tested at 60°C		
polyurethane foam	L_1	
steel	L_4	
tested at 80°C		
polyurethane foam	L_1	
steel	L_3	
water exposure(4)		
tested at 60°C		
steel	L_4	
tested at 80°C		
steel	L_3	
Fatigue cycling		EOTA TR 008
unaged(5)	Pass	
heat aged(6)	Pass	

(1) Tested at 22°C and (0/90–95)% RH.
(2) Heat aged 200 days at 80°C.
(3) UV aged to EOTA TR 010 for 1000 $MJ \cdot m^{-2}$ severe conditions.
(4) 60 days at 60°C to EOTA TR 012.
(5) 1000 cycles at –10°C.
(6) 50 cycles at –10°C.

15.2 Additional characterisation tests on the Reinforcement fabric and bond strength to damp concrete were carried out by the BBA. The results of these tests are given in Tables 4 and 5.

Table 4 Characterisation tests on the Reinforcement fabric

Test (units)	Mean result	Method
Mass per unit area ($g \cdot m^{-2}$)	82.9	BS EN 29073-1
Tensile strength/elongation (N)/(%)		BS EN 29073-3
longitudinal	121.5/73	
transverse	208.2/73	

Table 5 Bond test to damp[1] concrete

Test (units)	Mean result	Method
Tensile bond strength (MPa)	1.36	EOTA TR 004

(1) Concrete damp (no standing water) primed with Humidity Primer.

16 Investigations

16.1 An assessment was made of the test data relating to the issue of European Technical Approval ETA-06/0263 issued by IETcc.

16.2 An assessment was made of independent fire test data relating to the system's performance in respect of roof fire exposure to BS 476-3 : 2004.

16.3 Visits were made to existing sites in Spain to assess the in-service performance of the system.

16.4 The manufacture and production control procedures at the manufacturing location were assessed and details were obtained on the quality and composition of the materials used.

Bibliography

BS 476-3 : 2004 *Fire tests on building materials and structures — Classification and method of test for external fire exposure to roofs*

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

BS 8000-4 : 1989 *Workmanship on building sites — Code of practice for waterproofing*

BS EN 29073-1 : 1992 *Methods of test for nonwovens — Determination of mass per unit area*

EN 1931 : 2000 *Flexible sheets for waterproofing — Bitumen, plastic and rubber sheets for roof waterproofing — Determination of water vapour transmission properties*

EN ISO 527-3 : 1996 *Plastics — Determination of tensile properties — Test conditions for films and sheets*

EOTA Technical Report TR 003 (May 2004), *Determination of the watertightness [Liquid Applied Roof Waterproofing Kits (LARWK)]*
EOTA Technical Report TR 004 (May 2004), *Determination of the resistance to delamination [Liquid Applied Roof Waterproofing Kits (LARWK)]*
EOTA Technical Report TR 006 (May 2004), *Determination of the resistance to dynamic indentation [Liquid Applied Roof Waterproofing Kits (LARWK)]*
EOTA Technical Report TR 007 (May 2004), *Determination of the resistance to static indentation [Liquid Applied Roof Waterproofing Kits (LARWK)]*
EOTA Technical Report TR 008 (May 2004), *Determination of the resistance to fatigue movement [Liquid Applied Roof Waterproofing Kits (LARWK)]*
EOTA Technical Report TR 010 (May 2004), *Exposure procedure for artificial weathering [Liquid Applied Roof Waterproofing Kits (LARWK)]*
EOTA Technical Report TR 012 (May 2004), *Exposure procedure for accelerated ageing by hot water [Liquid Applied Roof Waterproofing Kits (LARWK)]*

17 Conditions

17.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is granted only to the company, firm or person named on the front page — no other company, firm or person may hold or claim any entitlement to this Certificate
- 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.

17.2 Publications and documents referred to in this Certificate are those that the BBA deems to be relevant at the date of issue or re-issue of this Certificate and include any: Act of Parliament; Statutory Instrument; Directive; Regulation; British, European or International Standard; Code of Practice; manufacturers' instructions; or any other publication or document similar or related to the aforementioned.

17.3 This Certificate will remain valid for an unlimited period provided that the product/system and the manufacture and/or fabrication including all related and relevant 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.

17.4 In granting this Certificate, the BBA is not responsible for:

- 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
- individual installations of the product/system, including the nature, design, methods and workmanship of or related to the installation
- the actual works in which the product/system is installed, used and maintained, including the nature, design, methods and workmanship of such works.

17.5 Any information relating to the manufacture, supply, installation, use and maintenance 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 and maintained. It does not purport in any way to restate the requirements of the Health & Safety at Work etc Act 1974, or of any other statutory, common law or other duty which may exist at the date 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. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the manufacture, supply, installation, use and maintenance of this product/system.

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