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European Technical Assessment

ETA 06/0263
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General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) Nº305/2011:	Instituto de Ciencias de la Construcción Eduardo Torroja (IETcc)
Trade name of the construction product	**IMPERMAX**
Product family to which the construction product belongs	Liquid Applied Roof Waterproofing Kit, based on pure Polyurethane
Manufacturer	**KRYPTON CHEMICAL, S.L.** C/ Martí Franques nº 12. Pol. Ind. Les Tápies 43890 L´Hospitalet de l´infant. Tarragona, Spain
Manufacturing plant(s)	C/ Martí Franques nº 12. Pol. Ind. Les Tápies 43890 L´Hospitalet de l´infant. Tarragona, Spain
This European Technical Assessment contains	9 pages including 1 Annex which form an integral part of this assessment. Annex 2. Contain confidential information and is not included in the ETA when that assessment is publicly available
This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of	Guideline for European Technical Approval (ETAG) nº 005, part 1-6 ed. 2004, used as European Assessment Document (EAD)
This version replaces	ETA 06/0263 issued on 09/ 03/ 2015

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SPECIFIC PARTS OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of the product

The Liquid Applied Roof Waterproofing Kit (LARWK) "IMPERMAX" is designed and installed in accordance with the manufacturer, design and installation instructions, deposited at the IETcc(1). This LARWK comprises the following components, which are factory produced by the manufacturer or a supplier.

Components	Trade name	Consumption
Primer	RAYSTON EPOXY 100 (epoxy)	0.3 – 0,5 kg/m^2
	HUMIDITY PRIMER (epoxy primer in water dispersion)	0,3 – 0,5 kg/m^2
	POROSITY SEALER / PRIMAIRE R4	0,15 – 0,25 kg/m^2
	POROSITY SEALER FLEX	0,15 – 0,25 kg/m^2
	POROSITY SEALER FLEX 100	0,15 – 0,25 kg/m^2
	POLYUREA PRIMER	0,15 – 0,25 kg/m^2
	POLYUREA PRIMER FLEX	0,15 – 0,25 kg/m^2
Internal reinforcement	GEOMAX (Geotextil non-woven) RAYSTON FIBER 150 (Glass fibre mat)	------
Waterproofing membrane	IMPERMAX	≥ 1,6 kg/m^2
	IMPERMAX QC**.** Alternative version to IMPERMAX, it has same formulation with <1000 ppm of a moisture-triggering cure catalyst and thixotropic adjustment added after manufacturing and prior to delivery. This helps to improve curing under difficult (cold, dry) conditions	
	IMPERMAX ST (<2%). Alternative version to IMPERMAX, it has the same formulation however with a thixotropic adjustment added after manufacturing and prior to delivery that lets the resin to be applied over sloped surfaces.	
	IMPERMAX TIXO. Alternative version to IMPERMAX, it has the same formulation however, with a thixotropy adjustment (< 3%) added after manufacturing and prior to delivery that lets the resin to be applied over sloped surfaces.	
	IMPERMAX/IMPERMAX QC/ IMPERMAX ST/ IMPERMAX TIXO + IMPERMAX A.	≥ 2,2 kg/m^2

This kit can be used for different working life depending mainly of this thickness:

Working life	Minimum quantity consumed	Minimum thickness (mm)
10	1,6 kg/m^2	1,4
25	2 kg/m^2	1,6
	2 kg/m^2 + RAYSTON FIBER 150 1,5 kg/m^2 IMPERMAX (+ RAYSTON FIBER 150) + IMPERMAX A (0,7 kg/m^2)	1,8
25	3 kg/m^2 + GEOMAX	2,2

IMPERMAX/ST/QC/TIXO and IMPERMAX A are liquid applied roof waterproofing membranes based on pure polyurethane, manufactured by the company KRYPTON CHEMICAL, S.L. All consists of a polyurethane resin, liquid-applied, mono-component, elastomeric with or without internal protection layer. IMPERMAX/ST/QC/TIXO are moisture cured. IMPERMAX A is moisture triggered cured. Once polymerised they conform an elastic lining, in form of a layer completely bonded to different supports (steel and other types of metals, concrete, mortar, ceramic, timber, polyurethane foam and other waterproofing membranes like PVC, EPDM and bituminous). Depending on support condition, other type of primer may be advisable.

2 Specification of the intended use in accordance with the applicable EAD

The intended use of this System is the waterproofing of roof against the water, as in liquid as vapour form. This LARWK fulfils the Essential Requirements nº 2 (Safety in case of fire), nº 3 (Hygiene, health and the environment) and nº 4 (Safety in use) of the European Regulation 305/11.

This LARWK is made of non load-bearing construction elements. It does not contribute directly to the stability of the roof on which is installed, but it can contribute its durability by providing enhanced protection from the effect of weathering.

This LARWK can be used on new or existing (retrofit) roofs. It can also be used on horizontal surfaces (singular details).

The performance levels of this System according to the Guide ETAG 005 Part. 1 and 6 are included in the annex 1. The provisions made in this European Technical Approval (ETA) are based on an assumed intended working life of the system of 10 (W1) and 25 years (W3). The indication given on the working life cannot be interpreted as a guarantee given by the manufacturer, but are only to be regarded as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

"Assumed intended working life" means that, when an assessment following the ETAG provisions is made, and when this working life has elapsed, the real working life may be, in normal use conditions, considerably longer without major degradation affecting the Essential Requirements.

(1) The technical documentation of this ETA is deposited at IETcc and, as far as relevant for the tasks of the approved bodies involved in the attestation of conformity procedure, is handed over to the approved bodies.

Installation. The Kit is installed on site. It is the responsibility of the manufacturer to guarantee that the information about design and installation of this LARWK is effectively communicated to the concerned people. This information can be given using reproductions of the respective parts of this European Technical Assessment. Besides, all the data concerning the execution shall be clearly indicated on the packaging and/or the enclosed instruction sheets using one or several illustrations.

Design. The fitness of the respective use for the levels of performance of this System stated in Annex 1 complies with the Spanish national requirements. In the MTD the manufacture gives information on the quantities consumed and the processing, which shall lead to a thickness of the roof waterproofing ≥1.4 mm.

Execution.. Particularly, it is recommended to consider:

- The kit installation has to be carried out by qualified installers,
- it can only be used the components of the kit indicated in this ETA,
- the supervision of the amount of material used (kg/m^2) and the control visual to check that each coat covers totally the one below, can ensure the minimum thickness of the kits,
- inspection of the roof surface (cleanliness and correct preparation) before applying the roof waterproofing,
- the recommended temperature of the product to be assembled will be between 0 ºC and 40 ºC and it will be not admitted support temperatures upper to 45 ºC. In other conditions, it will need to follow the manufacturer's instructions.

Before, the installation of IMPERMAX, it is recommended to read its security card.

Use, maintenance and repair of the works. In those roofs with deteriorated areas of the waterproof layers, they will be repaired removing all the deteriorated layers. Afterwards, the new product will be assembled following the installation instruction and the new coats must overlap, at least 3 cm, to the coat no deteriorated. Further installation details are laid down in the MTD place at IETcc.

3 Performance of the product and references to the methods used for its assessment

The identification tests and the assessment for the intended use of this LARWK according to the Essential Requirements were carried out in compliance with the ETA Guidance n.005: Guideline for European Technical Approval of Liquid applied roof waterproofing kits, ETAG 005, edition 2004, Part 1" General" and Part 6 "Specific stipulations for kits based on polyurethane" (called ETAG 005, in this ETA).

3.1 LARWK Characteristics

Safety in case of fire ((BWR 2)

External fire performance. Classification: B_{roof}(t1) according EN 13501-5 for supports with fire classification A1-A2, and any slope. For support with no A1-A2 fire classification the classification is NPA.

Reaction to fire. NPA

Hygiene, health and environment (BWR 3)

Resistance to water vapour (EN 1931). μ = 1485

Watertightness (EOTA TR-003). Watertight

Statement of dangerous substances. According to the manufacturer's declaration taking account of EOTA TR 034, the product installed does not contain and release any dangerous substance.

Resistance to wind loads (EOTA TR-4). Pass (>50 kPa)

Resistance to dynamic indentation (EOTA TR- 6).

Support	IMPERMAX		IMPERMAX + IMPERMAX A
	Consumption 2 kg/m^2	Consumption 1,6 kg/m^2	Consumption 2,2 kg/m^2
	Level of resistance		
Steel	I4	I4	I4
Foam polyurethane	I4	------	I3

Resistance to static indentation (EOTA TR-7).

Support	IMPERMAX		IMPERMAX + IMPERMAX A
	Consumption 2 kg/m^2	Consumption 1,6 kg/m^2	Consumption 2,2 kg/m^2
	Level of resistance		
Steel	L4	L3	L4
Foam polyurethane	L3	------	L4

Resistance to fatigue movement (1000 cycles) (EOTA TR-8). Pass

Resistance to low temperatures effects (-20ºC). Dynamic indentation

Support	IMPERMAX		IMPERMAX + IMPERMAX A
	Consumption 2 kg/m²	Consumption 1,6 kg/m²	Consumption 2,2 kg/m²
	Level of resistance		
Steel	I4	I4	I4
Foam polyurethane	I4	------	I3

Resistance to high temperatures effects. Static indentation

IMPERMAX Without Internal reinforcement 1,6 kg/m²			
Maximum surface temperature	**Substrate**	**Load (N)**	**Level resistance**
90ºC	Steel	70	L1
80ºC / 60ºC	Steel	200	L3

IMPERMAX Without Internal reinforcement (2 kg/m²)			
Maximum surface temperature	**Substrate**	**Load (N)**	**Level of resistance**
90ºC	Steel	150	L2
	Polyurethane foam	70	L1
80ºC	Steel	200	L3
	Polyurethane foam	70	L1
60ºC	Steel	250	L4
	Polyurethane foam	70	L1

IMPERMAX With Internal reinforcement (2 kg/m² + RAYSTON FIBER)			
Maximum surface temperature	**Substrate**	**Load (N)**	**Level resistance**
90ºC	Steel	200	L3
80º/ 60ºC	Steel	250	L4

IMPERMAX With Internal reinforcement (3 kg/m² + GEOMAX)			
Maximum surface temperature	**Substrate**	**Load (N)**	**Level resistance**
90ºC / 80ºC	Steel	200	L3
60ºC	Steel	250	L4

IMPERMAX + IMPERMAX A with Internal reinforcement (2,2 kg/m²+ RAYSTON FIBER 150)			
Maximum surface temperature	**Substrate**	**Load (N)**	**Level of resistance**
90ºC/80º/60ºC	Steel	250	L4
	Polyurethane foam	200	L3

Resistance to heat ageing (EOTA TR-11). The samples are exposed to 80ºC during 100-200 days.

Tests	***2 kg/m²***	**2 kg/m² + *RAYSTON FIBER***	***3 kg/m²* + GEOMAX**	**1,6 kg/m²**	**2,2 kg/m² IMPERMAX A**
Working life	W3	W3	W3	W2	W3
Fatigue movement	Pass				
Dynamic indentation (-20ºC) Steel /PU	I4				I4/I3
Tensile strength (MPa) (EN-ISO 527-3) (Initial/ ageing)	2,4 / 3,3	6 / ----	5,8 /5,6	3,5 / --	4 / 6
Tensile elongation (%) (EN-ISO 527-3) *(Initial/ ageing)*	459 / 192	6 /---	40 / 48	694 / --	685 /110

Resistance to UV-radiation in the presence of moisture (EOTA TR- 10). The samples are exposed 5.000 hours to UV-radiation.

Tests	**2 kg/m²**	***3 kg/m²* + GEOMAX**	***2,2 IMPERMAX A***
Working life	W3	W3	W3
Dynamic indentation (-20ºC) *(Steel /PU)*	I4	I4	I4/I2
Tensile strength (MPa) (EN-ISO 527-3) (initial/ ageing)	2,4 / 3,1	5,8 / 6,6	4 / 7
Tensile elongation (%) (EN-ISO 527-3) (initial/ ageing)	459 / 193	40 / 46	685 /162

Resistance to hot water ageing (EOTA TR-12). The samples are kept in touch with water at 60ºC over 30 (W2) and 60 (W3) days. For the system with 2 kg/m² with RAYSTON FIBER 150, and IMPERMAX A, was performed to 180d. The Delamination strength (kPa) (Concrete): Apt (> 50 kPa) and Static indentation.

IMPERMAX Without Internal reinforcement 1,6 kg/m² (30d)			
Maximum surface temperature	**Substrate**	**Load (N)**	**Level of resistance**
90ºC	Steel	70	L1
80ºC	Steel	150	L2
60ºC	Steel	200	L3

IMPERMAX Without Internal reinforcement (2 kg/m²)(W3)(60d)			
Maximum surface temperature	**Substrate**	**Load (N)**	**Level of resistance**
90ºC	Steel	150	L2
80ºC	Steel	200	L3
60ºC	Steel	250	L4

IMPERMAX With Internal reinforcement (2 kg/m² + RAYSTON FIBER 150) (60d)			
Maximum surface temperature	**Substrate**	**Load (N)**	**Level resistance**
90ºC	Steel	200	L3
80º/ 60ºC	Steel	200	L3

IMPERMAX With Internal reinforcement (3 kg/m² + GEOMAX) (W3) (60d)			
Maximum surface temperature	**Substrate**	**Load (N)**	**Level of resistance**
90ºC / 80ºC	Steel	200	L3
60ºC	Steel	250	L4

IMPERMAX + IMPERMAX A with Internal reinforcement (2,2 kg/m²+ RAYSTON FIBER 150)				
Ageing age	**Maximum surface temperature**	**Substrate**	**Load (N)**	**Level of resistance**
60d	90ºC	Steel	250	L4
		Polyurethane foam	200	L3
180d	90ºC/80ºc/60ºc	Steel	250	L4
		Polyurethane foam	70	L1

Resistance to plant roots (EN 13948). NPA.

Safety in use (BWR 4). Slipperiness (EN 13893). NPA

Related aspects of serviceability

Effect of weather conditions. The system does show changes in its tensile properties, when the system is assembled and cured under two temperature conditions of 0 ºC and 40 ºC, but these values obtained complied with the manufacturer's specifications (pass).

Effect of day joints. The delamination strength test performed on a layer assembled over other one, it shows a good delamination strength, being upper to required value of 50 kPa (pass).

3.2 Characteristics of the components

The characteristics of the components of this System show the following values, which compliance with their respective tolerances stated in the Manufacture Technical Dossier (MTD).

IMPERMAX, IMPERMAX QC, IMPERMAX ST, IMPERMAX TIXO, IMPERMAX A. Constituted by polyol and isocyanates, with mineral fillers, inorganic pigments and additives (anti-air entering, biocides, thixotropy, etc.). The main characteristics of this waterproof liquid are:

Properties	**IMPERMAX**	**IMPERMAX QC**	**IMPERMAX ST**	**IMPERMAX TIXO**	**IMPERMAX A**
Density (g/cm³), (ISO 1675)	1,3 –1.4				1,4 – 1,5
Dry extract (05ºC),(% weight) (EN 1768)	> 81				> 81
Ash content (450°C),(% weight) (EN1879)	29-35				29 -35
Viscosity Brookfield (20ºC, S64, mPa.s),(EN ISO 2555). 30 days after manufacturing	5000-10000 (100 rpm)	10000-25000 (20 rpm)	10000-25000 (20 rpm)	20000-50000 (10 rpm)	10000-25000 (20 rpm)

PRIMER

Characteristics	**Component**	**Density (g/cm³)**	**105ºC (% weight)**	**Ash 450°C, (% weight)**	**Viscosity (cps), (S63, 30 rpm, 25ºC)**
		ISO 1675	ISO 1768	EN 1879	ISO 2555
HUMIDITY PRIMER	A	1,11 -1,16	> 90	----	80 - 230
	B	1,01 – 1,09	> 30	----	220 - 340
RAYSTON EPOXY 100	A	1,11 -1,16	> 90	< 10	500 - 700
	B	1,01 – 1,09	> 90	< 10	220 - 340
POROSITY SEALER/PRIMAIRE R4	A	0,90 – 1,00	>55	<10	50 - 250
POROSITY SEALER FLEX	A	0,95 – 1,05	>70	<10	200 - 400
POROSITY SEALER FLEX 100	A	1,00 – 1,10	>95	<10	1000 - 3500
POLYUREA PRIMER	A	0,90 -1,00	>55	<10	50 - 250
	B	0,80 – 1,00	>90	<10	<40
POLYUREA PRIMER FLEX	A	0,95 – 1,05	>70	<10	50 - 250
	B	0,8 – 1,00	>90	<10	<40

GEOMAX. Geotextile non-woven with the following characteristics.

Properties	Values
Weight per surface unit (gr/ m^2) EN 29073-1	≥ 80
Thickness (mm) EN 29073-2	0,65
Tensile strength Longitudinal (kN) EN ISO 10319	≥ 1,5
Tensile strength Transversal (kN) EN ISO 10319	≥ 4
Elongation Longitudinal (%) EN ISO 10320	≥ 90
Elongation Transversal (%) EN ISO 10321	≥ 90
Indentation Resistance (kN) EN ISO 12236	≥ 0,50

RAYSTON FIBER 150. Glass fiber mat with the following characteristics.

Properties	Values
Weight per surface unit (g/ m^2). EN 29073-1	150
Thickness (mm). EN 29073-2	0,65
Flexural strength (MPa)	> 80

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

System of Attestation of Conformity. The European Commission according to her decision (98/599/EC of October 1998, Official Journal of the European Communities N° L 287, 24.10.1998) on the procedure of attestation of conformity for the procedure of attestation of conformity (Annex III, clause 2(ii) second possibility of EU Regulation 305/2011) for liquid applied roof waterproofing kits has laid down for this type of material.

Product	Intended uses	Level or Classes	System
IMPERMAX	Liquid Applied Roof Waterproofing Kit	Any	3

According to this decision, system 3 of Attestation of Conformity also applies with regard to external fire performance. The system 3 provides: Tasks for the manufacturer: Factory production control and Tasks for the approved body: Initial type-testing of the product.

5 Technical details necessary for the implementation of the AVCP system, as provided for the applicable EAD

The ETA is issued for this kit on the basis of agreed data/information, deposited at IETcc, which identifies the product that has been assessed and judged. It is the manufacturer's responsibility to make sure that all those who use the kit are appropriately informed of specific conditions according to sections 1, 2, 4 and 5 including the annexes of this ETA. Changes to the LARWK or the components or their production process, which could result in this deposited data/information being incorrect should be notified to the IETcc before the changes are introduced. IETcc will decide whether or not such changes affect the ETA and if so whether further assessment or alterations to the ETA shall be necessary.

5.1 Tasks of the manufacturer

Factory production control. The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall ensure that the product is in conformity with this ETA.

The manufacturer may only use components stated in the technical documentation of this ETA including Control Plan. The incoming raw material is subjected to verifications by the manufacturer before acceptance.

The factory production control shall be in accordance with the Control Plan(2) which is part of the Technical Documentation of this ETA. The Control Plan has been agreed between the manufacturer and the IETcc and is laid down in the context of the factory production control system operated by the manufacturer and deposited at the IETcc. The results of factory production control shall be recorded and evaluated in accordance with the provisions of the Control Plan.

Other tasks of the manufacturer. The manufacturer shall, on the basis of a contract, involve a body which is notified for the tasks referred to in section 4 in the field of LARWK in order to undertake the actions laid down

(2) The control plan is a confidential part of this European Technical Assessment and only handed over to the notified body involved in the procedure of attestation of conformity. See section 3.2.2.

in this clause. For this purpose, the control plan shall be handed over by the manufacturer to the notified bodies involved.

For initial type – testing, the results of the tests performed, as part of the assessment for the ETA shall be used unless there are changes in the production line or plant. In such cases the necessary initial type- testing has to be agreed with the IETcc.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of this ETA.

5.2 Tasks of notified bodies. The notified body shall perform

Initial type-testing of the product. The initial type-testing have been conducted by the IETcc to issued this ETA in accordance with chapter 5 of the guideline “Liquid applied roof waterproofing kits” (ETAG 005) part 1and 6. The verifications underlying this ETA have been furnished on samples from the current production; these will replace the initial type-testing carried out by the manufacturer. The IETcc has assessed the results of these tests in accordance with chapter 6 of this ETA –Guideline, as part of the ETA issuing procedure.

Issued in Madrid on 14 september 2018
by

Instituto de Ciencias de la Construcción Eduardo Torroja

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On behalf of the Instituto de Ciencias de la Construcción Eduardo Torroja

Director

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Annex 1.

Characteristics of the System "IMPERMAX"

Minimum thickness	1,4 mm (W2) 1,6 mm (W3) 2,2 mm (W3): 3 kg/m^2 + GEOMAX 1,6 mm (W3): 2 kg/m^2 + RAYSTON FIBER 150 1,8 mm (W3): 2,2 kg/m^2 + RAYSTON FIBER 150 (IMPERMAX A system)
Water vapour diffusion resistant factor	μ = 1485
Resistance to wind loads	> 50 kPa
Resistance to plant roots	NPA
Statement on dangerous substances	Without dangerous substances
Resistance to slipperiness	NPA

Performance levels according to the intended use

Levels	**1,6 kg/m^2**	**2 kg/m^2**	**3 kg/m^2 + GEOMAX**	**2 kg/m^2 + RAYSTON FIBER**	**IMPERMAX (+ RAYSTON FIBER) + IMPERMAX A**
External fire performance	Broof (t1) for any roof slope and support A1-A2// NPA for support no A1-A2				
Reaction to fire	NPA				
Working life	W2 (10 years)	W3 (25 years)			
Climatic zone	S (Severe)				
User load	P3: TH2 P2: TH3 P1:TH4	P3: TH2, P3: TH3 P2:TH4	P4: TH2 P3: TH3 P3:TH4	P4: TH2, TH3 P3: TH4	P4: TH4 on concrete P2: TH4 on PU foam
Roof slope	S1-S4				
Minimum surface temperature	TL3 (- 20 ^{0}C)				
Maximum surface temperature	TH4 (90ºC) // TH3 (80ºC) // TH2 (60ºC)				

NOTE: For a polyurethane foam support, the system has been only test for a working life of 10 years (W2) and 2 kg/m^2 of IMPERMAX with a User load of P1