



**INSTITUTO DE CIENCIAS
DE LA CONSTRUCCIÓN
EDUARDO TORROJA**

C/ Serrano Galvache n. 4. 28033 Madrid
(Spain) Tel.: (34) 91 302 04 40 / Fax: (34) 91 302
07 00 direccion.ietcc@csic.es www.ietcc.csic.es



European Technical Assessment

ETA 18/ 1082
of 18/ 11/ 2019

English translation prepared by IETcc. Original version in Spanish language

General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) N°305/2011:

Instituto de Ciencias de la Construcción Eduardo Torroja (IETcc)

Trade name of the construction product

QUESTOL®

Product family to which the construction product belongs

Liquid Applied Roof Waterproofing Kit, based on Polyurea

Manufacturer

PLASFI, S.A.
Ctra de Montblanc, s/n
43420 Santa Coloma de Queralt. Tarragona, Spain

Manufacturing plant(s)

Ctra de Montblanc, s/n
43420 Santa Coloma de Queralt. Tarragona, Spain

This European Technical Assessment contains

7 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) n° 005, part 1-6 ed. 2004, used as European Assessment Document (EAD)

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

This European Technical Assessment may be withdrawn by the issuing Technical Assessment Body, in particular pursuant to information by the Commission according to Article 25 Paragraph 3 of Regulation (EU) No 305/2011.

SPECIFIC PARTS OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of the product

QUESTOL® is a liquid applied roof waterproofing membrane (LARWK) based on a resin of Polyurea, manufactured by the company PLASFI, SA. Consists of a Polyurea resins, bi-component, elastomeric without internal protection layer; which once polymerised conforms a jointless elastic lining, in form of a layer completely bonded to the support (concrete, mortar, ceramic, wood, metal. Polyurethane foam (PU) and polystyrene extrude (XPS), and with a final UV protective coat. This LARWK comprises the following components, which are factory produced by the manufacturer or a supplier.

Components	Trade name	Consumption
Primer ¹	IMPLAS 101 (for concrete, ceramic, mineral) (epoxy)	0,2 – 0,8 kg/m ²
	IMPLAS 102 (steel, metal) (epoxy)	0,2 – 0,5 kg/m ²
	IMPLAS 100 (XPS, EPS, PU) (epoxy)	0,2 – 0,5 kg/m ²
Waterproofing membrane	QUESTOL®	≥ 2 kg/m ²
UV protection	ELPA UV (aliphatic polyurethane)	0,25 – 0,35 kg/m ²

This kit show the following working life:

Product	Working life	Minimum thickness (mm)
QUESTOL®	25	1,7

The LARWK “QUESTOL®” is designed and installed in accordance with the manufacturer, design and installation instructions, deposited at the IETcc.

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 ETAG 005 (part 1-6) are included in the annex 1. The provisions made in this European Technical Assessment (ETA) are based on an assumed intended working life of the system of 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.

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 ≥ 1,7 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/m²) and the control visual to check that each coat cover 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,

⁽¹⁾ Depending on support condition other type of primers may be advisable according to the manufacturer.

- It is applied by a hot spray applied machines. Temperatures, component A: 55-65 °C and component B: 65-70 °C. Pressure about 140 bars.

Before, the installation of QUESTOL[®], 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 Essentials

Safety in case of fire (BWR 2)

External fire performance. No Performance Assessment (NPA).

Broof (t1, t2, t3 or t4), with protection layer covered by Commission Decisions 2000/553/CE and 2001/671/CE.

Reaction to fire. No Performance Assessment (NPA).

Hygiene, health and environment (BWR 3)

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 water vapour (EN 1931). $\mu > 2000$

Samples	Thickness	kg/(m ² s)	g/(m ² d)	μ
QUESTOL [®]	1,35 mm	$1,35 \cdot 10^{-7}$	12	2200
QUESTOL [®] with ELPA UV	1,36 mm	$4,75 \cdot 10^{-8}$	4	6200
QUESTOL [®]	2,55 mm	$6,63 \cdot 10^{-8}$	6	2500
QUESTOL [®] with ELPA UV	2,56 mm	$3,96 \cdot 10^{-8}$	3,5	4000

Watertightness (EOTA TR-003). Watertight

Resistance to wind loads (EOTA TR-004). Pass (>50 kPa)

Resistance to mechanical damage

Resistance to dynamic indentation (EOTA TR-006). Resistance Level: I4

Resistance to static indentation (EOTA TR-007).

Static Indentation		
Support	Load (N)	Resistance Level
Steel	250	L4
XPS	150	L2
PU foam	150	L2 thickness: 1,5 mm
	200	L3 thickness: 2,5 mm

Resistance to fatigue movement (1000 cycles) (EOTA TR-008). Pass

Resistance to the effects of low and high surface temperatures

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

Dynamic Indentation		
Support	Indentor (mm)	Resistance Level
Steel	6	I4
XPS	6	I4

Resistance to high temperatures effects. Static indentation

T° C	Steel		XPS		PU foam	
	Load (N)	Resistance level	Load (N)	Resistance level	Load (N)	Resistance level
90 °C	250	I4	70	L1	150 200	L2 thickness: 1,5 mm L3 thickness: 2,5 mm
80 °C	250	I4	150	L2	---	---
60 °C	250	I4	150	L2	---	---
30 °C	250	I4	150	L2	----	----

Resistance to ageing media (heat and water)

Resistance to heat ageing (EOTA TR-011). The samples are exposed to 80 °C during 200 days.

Tests	QUESTOL®
Fatigue movement	Apt
Dynamic indentation (-20°C)	I4
Tensile strength (MPa) (EN-ISO 527-3) (initial/ ageing)	8,5 / 6,2
Tensile elongation (%) (EN-ISO 527-3) (initial/ ageing)	473 / 438

Resistance to hot water ageing (EOTA TR-012). The samples are kept in touch with water at 60°C over 60 and 180 days and the following tests were performed: The Delamination strength (kPa) (Concrete): Apt (> 50 kPa) and Static indentation:

T° C	Support	Ageing	Load (N)	Resistance level
90/ 80/ 60/ 30 °C	Steel	60 d	250	L4
		180 d	250	L4
90° / 80 °C	XPS	60 d	70	L1
60° / 30 °C			250	L4
90° / 80 °C		180 d	150	L2
60° / 30 °C			250	L4

Resistance to UV-radiation in the presence of moisture (EOTA TR-010). The samples are exposed 5000 hours to UV-radiation with three different top coats.

Tests	QUESTOL® + ELPA UV
Dynamic indentation (-20 °C)	I4
Tensile strength (MPa) (EN-ISO 527-3) (initial/ ageing)	8,5 / 16
Tensile elongation (%) (EN-ISO 527-3) (initial/ ageing)	473 / 347

Resistance to plant roots (EN 13948). NPA

Related aspects of serviceability

Effect of weather conditions. The system shows a slight change in its tensile properties and none in the dynamic indentation resistance, when the system is assembled and cured under two temperature conditions of 10 °C and 40 °C (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).

Safety in use (BWR 4)

Slipperiness (ENV 13893). The kit with ELPA UV shows a $\mu = 0,55$.

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).

QUESTOL®. Constituted by polyamine and Isocyanates. Containing also a small quantity of pigments and additives. The main characteristics of this waterproof liquid are:

Properties	Component A	Component B
Density (g/cm ³) (ISO 1675)	1,00 – 1,05	1,08 – 1,10
Dry extract (105°C) (% weight) (EN 1768)	> 95	> 95
Ash content (450°C) (% weight) (EN 1879)	< 10	< 10
Viscosity (cps), (S63, 100 rpm, 25°C) (EN ISO 2555)	500 - 900	1700 – 2100

PRIMERS

Characteristics	Standard	IMPLAS 100		IMPLAS 101		IMPLAS 102	
		Component					
		A	B	A	B	A	B
Density (g/cm ³)	ISO 1675	1,04 – 1,06	0,92 – 0,96	1,04 – 1,06	0,92 – 0,96	1,06 – 1,07	0,8 – 0,85
Dry Extract 105°C (% weight)	ISO 1768	> 90	> 90	> 90	> 90	> 90	> 90
Ash content 450°C, (% weight)	EN 1879	< 10	< 10	< 10	< 10	< 10	< 10
Viscosity (cps), (S63, 30 rpm, 25°C)	ISO 2555	50 – 100	1200 – 1600	50 – 100	1200 – 1600	2395 – 2420	155 – 165

ELPA UV. External protection. Single-component aliphatic polyurethane resin. It may be coloured in different RAL colours.

Properties	Values
Density (g/cm ³) (ISO 1675)	0,94 – 0,98
Dry extract (105°C) (% weight) (EN 1768)	> 50
Ash content (450°C) (% weight) (EN 1879)	<10

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
QUESTOL®	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 notified 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 kit, 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.

(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..

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 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 ETAG 005 (part 1-6) “Liquid applied roof waterproofing kits”. 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.

Issued in Madrid on 18 November 2019
by



Instituto de Ciencias de la Construcción Eduardo Torroja
CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS
c/ Serrano Galvache 4. 28033 Madrid (Spain).
director.ietcc@csic.es www.ietcc.csic.es



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

Director IETcc-CSIC

Annex 1.

Characteristics of the System “QUESTOL®”

Minimum thickness	1,7 mm
Water vapour diffusion resistant factor	$\mu = 2000$
Resistance to wind loads	> 50 kPa
Resistance to plant roots	NPA
Statement on dangerous substances	Without dangerous substances
Resistance to slipperiness	$\mu = 0,55$

Performance levels according to the intended use

External fire performance	NPA
Fire reaction	NPA
Expected working life	W3
Climatic zone of use	S
User loads	P4: Concrete/ Steel TH4, TH3, TH2, TH1 P1: XPS TH4 – TH3 P2: XPS TH2 – TH1 P2: PU foam: TH4, TH3, TH2, TH1 (1,5 mm thickness) P3: PU foam: TH4, TH3, TH2, TH1 (2,5 mm thickness)
Roofs slopes	S1 – S4
Minimum surface temperatures	TL3
Maximum surface temperatures	TH4