



# APPLICATION GUIDE.

## **Rayston Proof PU Plus System**

by Krypton Chemical

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## 1. General Terms and Conditions

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### RECOMMENDATIONS

#### MANUFACTURER

The manufacturer of the products used in the works described in this specification shall demonstrate in writing that its Quality Assurance system complies with the requirements of the Spanish Standard UNE-ISO 9001.

#### APPLICATOR

For a correct application of the systems specified in this report, it is recommended that the application company has satisfactorily completed an instruction program on their installation or application and the appropriate methods for the preparation of the substrate, in addition to having the necessary equipment for the correct application of the product.

The application company must have the means and equipment necessary and in suitable conditions for the correct application of the system.

### EXECUTION OF THE APPLICATION:

#### CONDITIONS

Before starting the work described in this specification, it shall be verified that the environmental, site and substrate conditions are suitable for the application.

The final responsibility for any decision regarding the application of the system on site shall rest with the project manager, project execution manager and/or builder, and in no case with the supplier of the product.

#### PREPARATION

The good preparation of the substrate is vital for the correct application of the products. Therefore, the technical instructions recommended by the manufacturer should be followed.

#### APPLICATION

It is recommended that the products described in this report be applied or installed according to the manufacturer's instructions and in compliance with current regulations.

#### PROTECTIVE SYSTEMS

Before starting the application work, the necessary measures will be taken for the protection of workers in terms of Occupational Risk Prevention, and the appropriate measures will be taken so that personnel outside the work site are not affected by the application.

## 2. Proposed Solution

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This document is intended to assist you and the applicator during the application of the **RAYSTON PROOF PU PLUS** system. High performance liquid waterproofing system, cold applied on concrete.

The **RAYSTON PROOF PU PLUS** system is a system based on a 100% solids epoxy primer and a single component cold applied aromatic polyurethane main membrane with high crack bridging capabilities.

A team of people can ensure a successful application by following the steps and using the recommended tools. On-site operations are part of the contractor's area of expertise and are under his responsibility.

## 3. System Steps

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The system should follow the following steps:

- Primer: Rayston Epoxy 100.
- Main membrane: Impermax.
- Top Coat: Colodur.

[Enlate FT](#)

## 4. Substrate requirements

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### 1 Requirements to be met by the substrate

The concrete substrate must meet the following properties:

- Compressive strength (minimum 25 N/mm<sup>2</sup>)
- Minimum cohesion (pull-off strength) of 1.5 N/mm<sup>2</sup>.



- RH <4%.
- Seamless
- Cohesive
- Not contaminated
- Leveling

(If not, the coating will mark the existing irregularities).

### 2 Moisture content, ambient and substrate temperatures.

It is important to monitor ambient temperatures and humidity throughout the application cycle to avoid accelerated reactions.

The substrate should be as dry as possible.

Suggested ambient temperature conditions: Min. + 10°C, Max. +30°C.

Always apply (each coat of the treatment) on a substrate whose temperature is 3°C above the dew point (to avoid condensation of ambient humidity on the substrate).

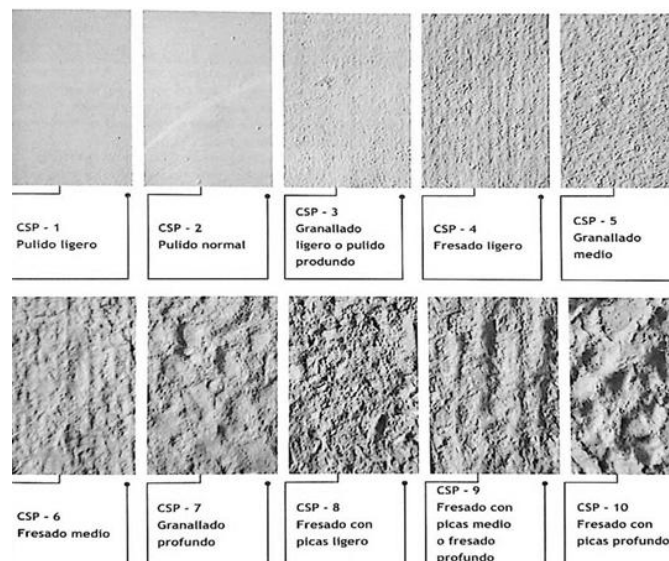
### 3 Preparation of the substrate

To ensure a good compatibility of the system with the existing substrate and to obtain a good adhesion, it is very important that the substrate has minimum conditions and the following properties:

1. Cohesive.
2. Regular and homogeneous.
3. Fully continuous.
4. Free of fissures, cracks and cavities (to be previously treated).
5. Clean and free of dust, grease, fluids and any other type of contaminating chemical agent.
6. Fully cured.
7. Free of particles and other materials not completely adhered to the substrate.
8. As dry as possible (no risk of negative pressure).

The substrate shall be washed with a high pressure water machine to remove dirt (degreasing) and impurities. It will be important that no material remains as they can affect the adherence of the membrane to the substrate.

The degree of roughness in concrete should be CSP1- CSP2 according to ICRI (INTERNATIONAL INSTITUTE for Concrete Repair) Technical Guide No. 03732 "Selection and Specification of Concrete Surface Preparation for Coatings, Sealers and Polymeric Coatings. "



#### 4 Treatment of damages and shocks:

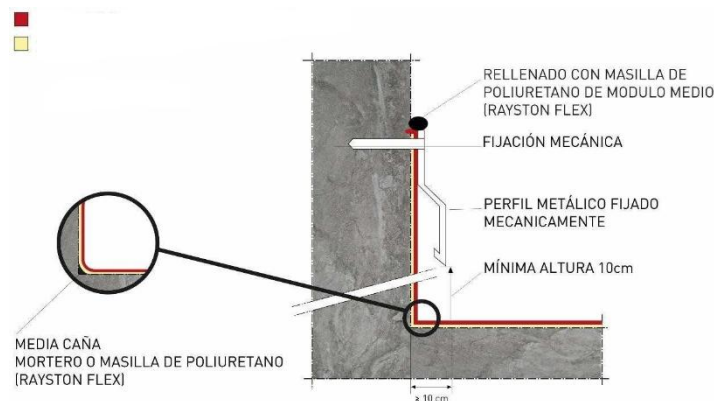
Before priming the surface, local treatments will be made with dry mortar based on Rayston Epoxy 100 resin, with 0.4 to 0.9 mm granulometry aggregate or equivalent, or with cementitious repair mortar type R4, assuring a complete aesthetic homogeneity with the existing treatment. Possible cracks or small cavities will be filled with a polyurethane putty type Rayston Flex or equivalent.

#### 5 Treatment of details and singular points:

Right angles should be avoided in horizontal-vertical joints, corners and other parts of the structure, i.e. it is advisable to round these areas of the surface with a mortar (**half-rounds**).

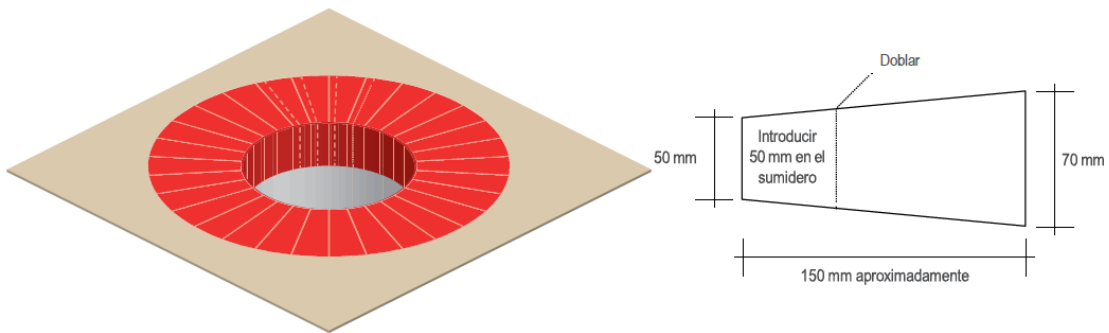


To **avoid delamination** of the polyurethane membrane at the edges of the treatment, the polyurethane membrane should end up to about 15 - 20 cm from the ground on the vertical side. At this point a groove will be cut with the help of a radial saw. The edge of the membrane will end inside this groove. Subsequently, this edge of the membrane should be protected with a Rayston Flex type polyurethane mastic. The installation of a protective aluminum profile will prevent possible detachment of the membrane edge in the medium and long term.

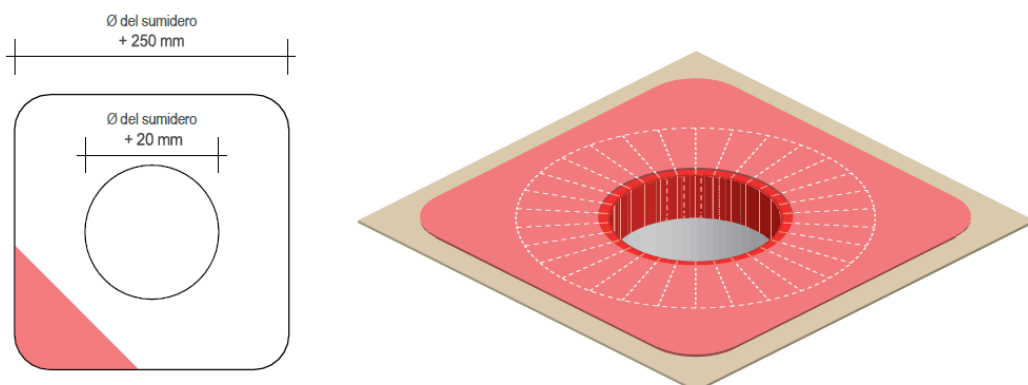


The following steps should be followed in the **sumps**:

1. Cut enough wedge-shaped reinforcing strips to cover the sump in overlapping layers.
2. Dip individual strips in waterproofing resin, ensuring saturation of each strip.
3. Apply waterproofing resin on the top and also on the inside of the sump, making sure that no resin drips down the drain.



4. Remove any excess resin from the strips and place them in an overlapping pattern until the entire outlet is covered.
5. Remove air bubbles or wrinkles and apply additional resin to the reinforcement (if necessary), taking care to peel off overlapping edges.
6. Cut a square reinforcement piece with rounded ends, cut a circular hole in the middle of the piece with a diameter = Diameter of the sump + 20mm, and saturate it with waterproofing resin, then squeeze out the excess resin and place it over the sump making sure that the hole in the piece is right over the sump.
7. Use a brush or roller to remove air bubbles or wrinkles and to ensure that the square piece of reinforcement is fully saturated and pressed firmly down.



Regarding the **expansion joints** of the structure, if they have a movement greater than 50% of the joint size, mechanical joints should be placed (for example, a joint with a minimum width of 10 cm should be opened a maximum of 15 cm). To ensure the watertightness of the system, these mechanical joints should be placed according to the manufacturer's specific recommendations.

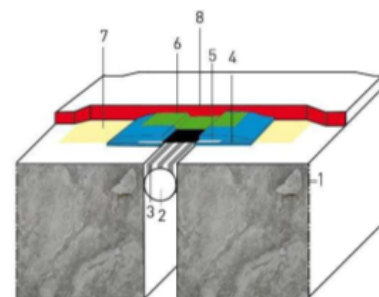
If the movement is smaller, they can be treated with Rayston Joint Geo high elasticity band, after filling them appropriately (polyethylene foam cylinder and polyurethane putty type Rayston Flex). Rayston Joint Geo adheres to the primed substrate thanks to an adhesive (PU 2K adhesive) or an epoxy resin such as Rayston Epoxy 100 applied on the geotextile adhered to the membrane. Polyurea membranes do not have a good adhesion on the Rayston Flex Joint Geo strip, so that, in case of movement of the joint, this movement will not be transferred to the polyurea membrane, or in any case the movement will be attenuated to this polyurea membrane, reducing the risk of cracking of the same.

Rayston Joint Geo can be supplied in different widths, it is advisable to always use a band with the appropriate width.

For small jobs, Rayston Flex 3040 one-component polyurethane putty should be applied manually. For higher productivity, it is possible to apply, alternatively, the very high elasticity polyurea based filler (bi-component, curing in a few seconds) reference Rayston Flex 70 with the Rayston Spray Gun portable machine. If it is necessary to fill a large number of linear meters of joint, the application will be more efficient with the Rayston G-1 machine.

Similar treatment will be done on cracks larger than 2 mm or even smaller in width if they are suspected of moving and/or continuing to open over time (unstabilized cracks or fissures).

1. REGULAR, DRY AND FULLY CURED CONCRETE SURFACE.
2. JOINT BOTTOM: POLYURETHANE FOAM CYLINDER (PE).
3. RAYSTON FLEX 3040 / RAYSTON FLEX 70
4. PU 2K ADHESIVE OR RAYSTON EPOXY 100
5. RAYSTON FLEX JOINT GEO
6. SEPARATION STRIP (PE) - RAYSTON FLEX JOINT (OPTIONAL)
7. PRIMER
8. WATERPROOFING MEMBRANE APPLIED IN LIQUID FORM



**Important:** Treatment done in winter (lowest possible temperatures) will always be more effective than treatment done in summer. In winter, with low temperatures, the materials will be contracted and the joint edges will be farther apart. In summer, with high temperatures, the materials will be expanded and the joint edges will be closer together. If the treatment is done in summer, without leaving any slack in the membrane, as winter sets in and the environment cools, the joint edges will separate and the membrane will be stressed with the risk of cracking.

## 5. Steps and application of the system

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### 5.1 Primer

**RAYSTON EPOXY 100** is a high-viscosity, high-solids epoxy system consisting of two pre-measured components. Depending on the porosity of the substrate, it can be diluted with Rayston solvent to improve liquid penetration and adhesion performance. Ideally applied in two stages to achieve maximum adhesion.

Apply 0.5 kg/m<sup>2</sup> of Rayston Epoxy 100 in two coats. The first coat of primer can be diluted with 10%-15% Rayston Solvent to help it penetrate (anchor) into the surface and aid consolidation. A total of 0.2 kg/m<sup>2</sup> should be applied in this first coat.

Once the first coat has cured, apply the second coat with a light wet sprinkling of 0.3-0.8 mm aggregate. Apply a total of 0.3 kg/m<sup>2</sup>.

To apply, spread the material evenly, avoiding accumulations, and work within the product's pot life (see FT).

Important: The primer is applied to seal the porosity of a surface and should never be applied when there is rising air, i.e., when there is direct sunlight on a porous exterior surface that is gradually heating up. The recommended product in this system, RAYSTON EPOXY 100, can only be used if the substrate moisture content is less than 4%. (If it is higher, ask the technical office for a list of primers).

Application tools Rayston Epoxy 100:



### 5.1 Main membrane

**IMPERMAX** is a single-component, solvent-based liquid waterproofing system. It can be applied with a trowel, roller, brush, or airless spray gun.

The product should be applied at a total rate of 2 kg/m<sup>2</sup> in two coats of 1 kg/m<sup>2</sup> each. Once the first coat has dried, apply the second coat of Impermax (approximately one coat every 24 hours, or sooner depending on weather conditions). Use a spiked roller immediately after application to prevent bubbles.

Impermax is an aromatic resin, which will turn yellow (depending on the color) quite quickly if exposed to sunlight.

It is advisable to reinforce the membrane with Rayston Fiber 150 when there is pedestrian traffic. Place the reinforcement in the first coat while it is still wet, ensuring that it is completely soaked. Once cured, apply the second coat of Impermax.

## 5.2 Top Coat

**COLODUR** is a single-component, solvent-based polyurethane resin that is highly resistant to outdoor conditions, UV radiation, chemicals, abrasion, and scratching. For this system, we recommend applying 0.5 kg/m<sup>2</sup> using a roller or airless spray in two coats of 0.25 kg/m<sup>2</sup> each.

If a non-slip and low-abrasion finish is required, the resin can be mixed with the Anti-Slip Additive (fine or coarse). A more non-slip but also more abrasive finish can be obtained by sprinkling 0.3-0.8 mm quartz sand at a rate of 1-2 kg/m<sup>2</sup> onto the first fresh coat of resin finish.

Once this has cured, apply the second sealing coat.

Colodur will take around 7 days to reach its final chemical and mechanical resistance, depending on environmental conditions.

Note: Use white pigmentation to achieve the "Cool Roof" effect and obtain an SRI of 105.

## 6. Certificates

### IMPERMAX ST/QC Certificate

ETE certificate for roof waterproofing number 06/0263 dated 09/14/2018, issued by Instituto Torroja, the reference laboratory for construction products in Spain. Several systems with different performances appear in the certificate, the performances of the system proposed in this document are W3, S, and P4 to TH3 (above the required minimum of P4 to TH2).

British BBA (UK) Certificate for roof waterproofing number 11/4836.

Broof(t1) and Broof(t4), being Broof(t4) much more demanding than Broof(t1) and Broof(t1) the minimum required by the CTE in Spain for roof coverings.

Root penetration resistance certificate according to Spanish standard UNE-53420.

## Colodur Certificates

The Colodur product has been exhaustively tested by the Applus Laboratory in the following tests:

- Adhesion resistance, UNE-EN 13892-8:2003
- Impact resistance, UNE-EN ISO 6272-1:2012
- Wear resistance BCA, UNE-EN 13892-4:2003
- Determination of the resistance value to slip/slip of unpolished pavements (USRV). UNE-ENV 12633:2003, Annex A.
  
- Abrasion Resistance TABER s/n UNE 48250
- Scratch resistance y/n UNE EN ISO 1518
- Resistance to liquids (motor oil and diesel fuel) y/n UNE EN ISO 2812-3 and UNE EN ISO 2812-4
- Resistance to staining due to contact with Vulcanized Rubber
- Determination of gloss y/n UNE EN ISO 2813
- Permeability to water vapor, UNE EN ISO 778-1 and UNE EN ISO 7783-2

## 7. Maintenance

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It is advisable to maintain the installations and carry out periodic cleaning by removing surface residues and dirt prior to cleaning.

A minimum frequency of two visual inspections per year is recommended, one at the beginning of spring and the other at the beginning of fall.

In addition, the roof will always be inspected after other professionals have performed work such as construction, installation of new equipment or repair of existing equipment.

## 8. Conclusions

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The **RAYSTON PROOF PU PLUS** system proposed by Krypton Chemical, has been used in a large number of works and rehabilitation of roofs in Spain and other countries. It has a great track record of success.

This system is totally continuous (without joints), remains adhered to the treated surface and offers great resistance over time. In addition, it is a system that easily and efficiently solves all the singular points that can be found in an installation of these characteristics. It has an aliphatic finish.

This system, applied on site by a company approved by Krypton Chemical, is CE marked, based on tests carried out by the APPLUS laboratory.

The information contained in this document, as well as the advice given by the professionals of Krypton Chemical, SL both written and oral or through tests, are given in good faith based on our experience and the results obtained through tests carried out by independent laboratories and do not serve as a guarantee for the applicator, who should take them as purely indicative references and with strictly informative value. We recommend studying this information in depth before proceeding to the choice, use and application of any of these products. It is advisable to carry out "in situ" tests to determine the suitability of a treatment on site. Our recommendations do not exempt the obligation of the applicator to know in depth, the correct method of application of these systems before proceeding to their use, as well as to perform as many tests as appropriate in case of doubt about the suitability of these for any work, installation or repair, taking into account the specific circumstances in which the product will be used. Krypton's obligations are those established in Article 15 of Law 38/1999 on Building Management in its capacity as a supplier of products. In no case it is assumed that the responsibilities and obligations corresponding to the director of the work and management of the execution of the work and constructor are being assumed as established therein. Krypton's obligations shall only be those that can be claimed from a supplier of products. In no event, by this or any other document, does Krypton assume the responsibilities and obligations of the construction manager, construction management or builder.

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