



APPLICATION GUIDE.

Rayston Proof PUA H GREEN ROOF

by Krypton Chemical

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1. General conditions

RECOMMENDATIONS

MANUFACTURER

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

APPLICATOR

For the correct application of the systems specified in this report, it is recommended that the application company has successfully completed a training program on their installation or application and the appropriate methods for preparing the substrate. It must also have the necessary equipment for the correct application of the product. The application company must have the necessary means and equipment in suitable condition for the correct application of the system.

EXECUTION OF THE APPLICATION:

ENVIRONMENTAL CONDITIONS

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

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

PREPARATION

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

APPLICATION

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

PROTECTION SYSTEMS

Before starting the application work, the necessary measures must be taken to protect workers in terms of Occupational Risk Prevention, and the appropriate measures must be taken to ensure that personnel not involved in the work are not affected by the application.

2. Proposed solution

This document is intended to assist you and the applicator during the application of the **RAYSTON PROOF PUA H GREEN ROOF** system. High-performance liquid waterproofing system, applied by hot spray machine on concrete based on aromatic polyurethane resins. Specific system for green roofs.

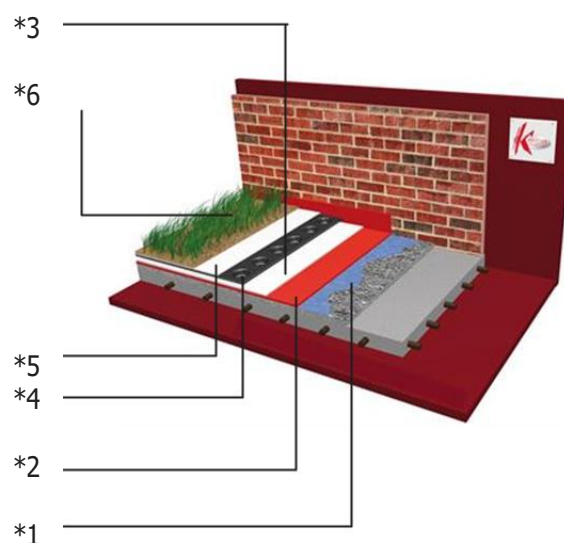
To this end, the preliminary actions to be carried out on the surface must be defined in order to mitigate the risk of future damage. In addition, the minimum properties that the substrate must meet in order to mitigate future risks must be taken into account.

3. System steps

The system must follow these steps:

- Primer: Rayston Epoxy 100. (*1)
- Sprayed membrane: Impermax Polyurea H. (*2)
- Geotextile. (*3)
- Drainage sheet. (*4)
- Geotextile. (5*)
- Gravel + Plants. (6*)

[FT flashing](#)



4. Substrate requirements and treatment of details and specific points

1 Substrate requirements

The cementitious mortar substrate must meet the following properties:

- Compressive strength (minimum 25 N/mm²)
- Minimum cohesion (pull-off resistance) of 1.5 N/mm².



- HR <4%
- No cracks
- Cohesive
- Uncontaminated
- Level

(Otherwise, the coating will highlight any existing irregularities)

2 Moisture content, ambient temperatures, and substrate.

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

The substrate must be as dry as possible.

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

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

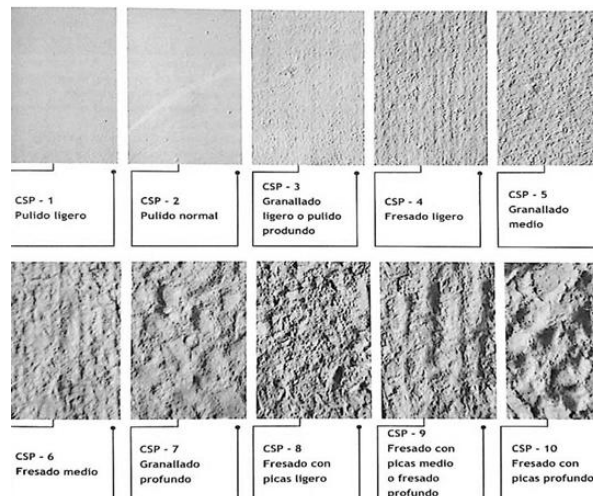
3 Preparation of the substrate:

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

1. Cohesive.
2. Regular and homogeneous.
3. Completely continuous.
4. Free of cracks, fissures, and cavities (which must be treated beforehand).
5. Clean and free of dust, grease, fluids, and any other type of chemical contaminant.
6. Fully cured.
7. Free of particles and other materials not completely adhered to the substrate.
8. As dry as possible (without risk of negative pressure).

The substrate must be washed with a high-pressure water machine to remove dirt (degreasing) and impurities. It is important that no material residues remain, as these can affect the adhesion of the membrane to the substrate.

The degree of roughness of the concrete must be CSP1-CSP2 according to Technical Guide No. 03732 of the ICRI (International Concrete Repair Institute) "Selection and Specification of Concrete Surface Preparation for Polymeric Coatings, Sealants, and Sealers."



4 Treatment of damage and impact marks:

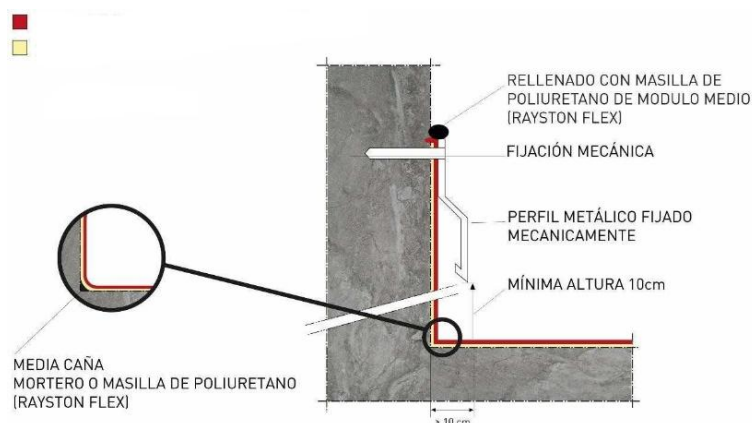
Before proceeding with the primer on the surface, local treatments shall be carried out with dry mortar based on Rayston Epoxy 100 resin, with aggregate of 0.4 to 0.9 mm grain size or equivalent, or R4-type cementitious repair mortar, ensuring complete aesthetic homogeneity with the existing treatment. Any cracks or small cavities shall be filled with Rayston Flex polyurethane filler or equivalent.

5 Treatment of details and specific points:

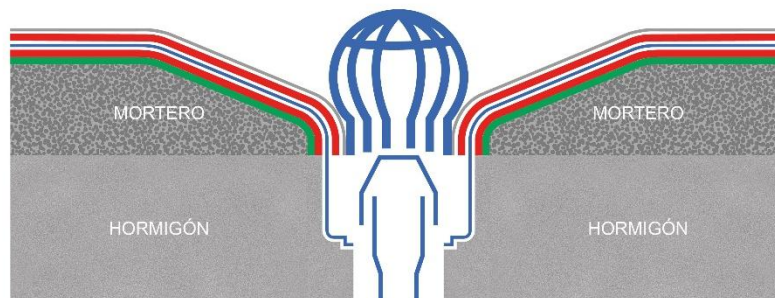
Right angles should be avoided at horizontal-vertical joints, corners, and other parts of the structure; in other words, it is advisable to round off these areas of the surface with mortar (**half-rounds**).



To **prevent delamination** of the polyurea membrane at the edges of the treatment, it should end about 15-20 cm from the floor on the vertical part. 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. This edge of the membrane must then be protected with a Rayston Flex-type polyurethane mastic. The installation of an aluminum protective profile will prevent possible detachment of the edge of the membrane in the medium and long term.



In **drains**: Remove the cover or gravel, clean with pressurized water, and once dry, apply the primer as a bonding bridge. Allow to cure, and spray the membrane, completely covering the edge of the drain and facilitating its entry into the water collection basin.



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

If the movement is smaller, it can be treated with Rayston Joint Geo high elasticity tape, after filling it appropriately (polyethylene foam cylinder and Rayston Flex type polyurethane putty). Rayston Joint Geo adheres to the primed substrate thanks to an adhesive (2K PU Adhesive) or an epoxy resin such as Rayston Epoxy 100 applied to the geotextile attached to the tape. Polyurea membranes do not adhere well to Rayston Flex Joint Geo tape, so if the joint moves, this movement will not be transferred to the polyurea membrane, or in any case the movement will be attenuated when it reaches the polyurea membrane, reducing the risk of cracking.

Rayston Joint Geo can be supplied in different widths; it is advisable to always use a strip of the appropriate width.

For small jobs, Rayston Flex 3040 single-component polyurethane mastic should be applied manually. For greater productivity, the highly elastic polyurea-based mastic (two-component, cures in a few seconds) Rayston Flex 70 can be applied as an alternative using the portable Rayston Spray Gun machine. If a large number of linear meters of joint need to be filled, application will be more efficient with the Rayston G-1 machine.

A similar treatment should be carried out on cracks larger than 2 mm or even smaller if there is a suspicion that they are moving and/or continuing to open over time (unstabilized cracks or fissures).

Important: Treatment carried out in winter (at the lowest possible temperatures) will always be more effective than treatment carried out in summer. In winter, at low temperatures, the materials will be contracted and the edges of the joint will be further apart. In summer, with high temperatures, the materials will be expanded and the edges of the joints will be closer together. If the treatment is carried out in summer, without leaving any slack in the membrane, when winter arrives and the temperature drops, the edges of the joints will separate and the membrane will become tense, with the risk of cracking.

5. Steps and application of the system

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/m² 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/m² will 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/m².

To apply, spread the material evenly, avoiding accumulations, and work within the product's pot life (see FT) using a rubber trowel or roller.

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:



5.2 Main membrane

Impermax Polyurea H is a fast-curing, two-component, aromatic hybrid polyurea resin-based system for the application of elastic membranes with crack bridging. For this project, a layer of polyurea resin should be applied at a rate of 2 kg/m².

Polyurea H is applied using a hot spray machine. The parameters of the dosing machine (temperatures, pressures, etc.) are specified in the resin's technical data sheet.

To ensure optimal adhesion in daily overlaps and total continuity of the membrane, clean the surface with Rayston Solvent or MEK, which will clean/degrease and activate the surface. Allow the solvent to evaporate, then apply 0.1 kg/m² of PU Activator Primer (transparent, non-film-forming adhesion promoter for non-porous surfaces) with a roller or rub with a soaked cloth. Once the primer has dried, begin applying the polyurea.

A non-woven **geotextile** (200-500 g/m²) must be placed once the main membrane has cured to protect it.

5.3 Final Layer

Next, we will install a **drainage sheet**. In dry climates, Krypton Chemical, S.L. recommends Bio Roof Drain, which allows water (from rain or dew) to remain in small bowls. The non-perforated version is even better for very dry climates.

Once the drainage sheet has been laid, we will protect it with a non-woven **geotextile** (200-500 g/m²).

The soil, free of sharp stones or edges, is poured onto this geotextile.

It is recommended to place the drainage sheet and geotextile as soon as possible after applying Impermax Polyurea H.

6. Certificates

POLYUREA H Certificates

ETE (European Technical Evaluation) number 11/00629 issued by the Torroja Institute, reference laboratory for construction materials in Spain with a useful life of 10 years.

EPD (ISO 14025:2006 / EN 15804:2012+A2:2019/AC:2021).

External fire performance	Broof (t1) roof slope < 20° and support A1-A2// NPD for support no A1-A2
Fire reaction	F
Expected working life	W2
Climatic zone of use	S
User loads	P4
Roofs slopes	S1 – S4
Minimum surface temperatures	TL3
Maximum surface temperatures	TH4

- (Reaction to fire classification report in accordance with standard en 13501-1: 2007)
- IEC 60243-1:2013, "Electric strength of insulating materials- Test methods- Part 1: Tests at power frequencies"

7. Maintenance

It is advisable to maintain the installations and carry out periodic cleaning, removing surface residues and dirt before 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 should always be inspected after other professionals have carried out work such as construction, installation of new equipment, or repair of existing equipment.

8. Conclusions

The **RAYSTON PROOF PUA H GREEN ROOF** system proposed by Krypton Chemical has been used in a large number of construction and roof renovation projects in Spain and other countries. It has a long track record of success.

This system is completely continuous (without joints), remains adhered to the treated surface, and offers great resistance over time. In addition, it is a system that easily and effectively resolves all the unique issues that may be encountered in an installation of this type.

In the event of a leak, it is very easy to find where it is, as it is a fully adhered system. Whereas, in the case of a prefabricated membrane, if there is a leak, it is almost impossible to find it because the water flows horizontally.

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

The proposed system will improve performance, appearance, and aesthetics in the long term.

The information contained in this document, as well as the advice given by the professionals at Krypton Chemical, SL, whether in writing, orally, or through testing, is provided in good faith based on our experience and the results obtained through tests carried out by independent laboratories. However, it does not serve as a guarantee for the applicator, who should take it as a reference only and for informational purposes. We recommend that you study this information in depth before proceeding with the selection, use, and application of any of these products. It is advisable to carry out tests "in situ" to determine the suitability of a treatment on site. Our recommendations do not exempt the applicator from the obligation to have in-depth knowledge of the correct method of application of these systems before proceeding with their use, as well as to carry out as many tests as necessary in case of doubt about their suitability 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 by Law 38/1999 on Building Regulations in Article 15 in its capacity as a product supplier. Under no circumstances is it assumed that Krypton is assuming the responsibilities and obligations corresponding to the site manager, construction manager, and builder as established by said law.

The obligations enforceable against Krypton shall only be those that can be claimed from a product supplier. Under no circumstances, through this or any other document, does Krypton assume the responsibilities and obligations corresponding to the project manager, the construction manager, or the builder.

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