



APPLICATION GUIDE.

Rayston Proof

**PUA NMDC GEO LAKE System**

by Krypton Chemical

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## 1. General conditions

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### 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, check that the environmental conditions, the 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

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This document is intended to assist you and the applicator during the application of the **RAYSTON PROOF PUA NMDC GEO LAKE** system, a high-performance floating liquid waterproofing system (non-adhered) applied by hot spray machine for lakes.

The system proposed by Krypton Chemical creates a fully continuous floating waterproofing solution that is easy and quick to install. It is an economical way to achieve adequate watertightness and prevent water infiltration in the long term.

The system is an elastic and flexible membrane with characteristics such as resistance to water treated with different liquid chemicals such as chlorine and algaecides, and stability to UV rays and outdoor conditions, among others.

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

## 3. System steps

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The system must follow these steps:

- Geomembrane: Geomax Spray NMDC
- Hot-applied membrane: Rayston Polyurea

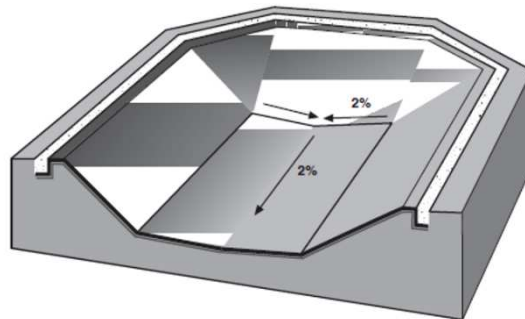
## 4. Preparation of the substrate and details of the system

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### 4.1 Lake geometry

#### Bottom:

To ensure proper drainage, positive gas movement, and to simplify cleaning of the pond after emptying, a slope of 1 to 2% should be constructed.



#### Slopes:

The side slope should not exceed 3:1.

#### Top area:

The crest must have a minimum width of the following:

1.5 m for the installation of the anchor trench.

1.5 - 4.5 m if vehicles are used during the construction and operation of the lagoon. In addition, a slight slope of 1-2% away from the water source is recommended for drainage.

#### Soil preparation:

After excavating the pond, the bottom and slopes should be treated to form a smooth, even surface. The surface of the bottom and slopes of the pond should be solid and hard.

All soils as substrates for geomembranes should be compacted to 85% to 95% of Proctor standard density. Density is achieved by equipment displacement or by mechanical methods. In the latter case, the soil material is deposited in layers of 150 to 300 mm and compacted with a vibratory roller or other methods.

The support surface must not contain loose stones with a diameter greater than 10 mm. The final surface of the bottom and slopes of the pond must be smooth, solid, and hard with no sudden changes in elevation.

### Drainage system:

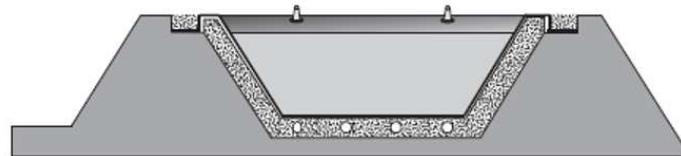
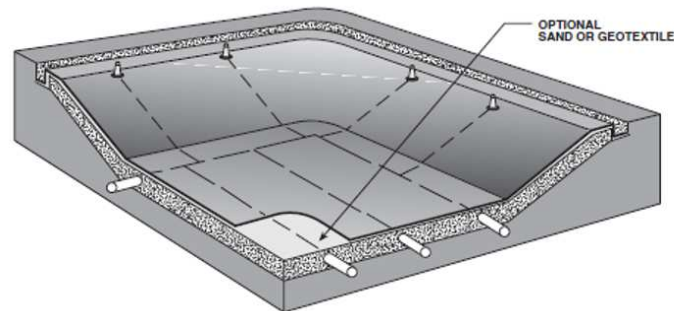
Drainage must ensure the release of liquids and gases under the geomembrane. It is recommended to create a slight slope (1% min.) towards the slope to evacuate the air and gas trapped in the first filling of the basin.

### Application criteria:

A study must be carried out before starting the drainage project, as any error during construction can lead to significant failures in the waterproofing system.

Water/gas drainage must be taken into account in the following circumstances:

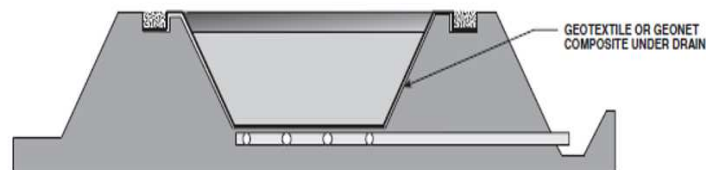
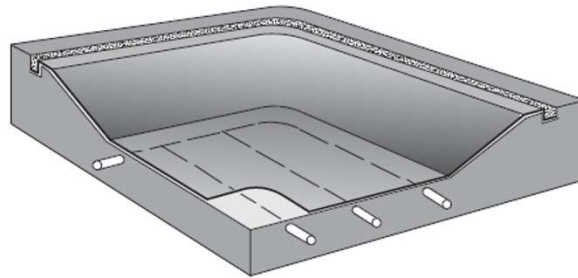
- When the liquids or solids stored are polluting or toxic.
- When the stored liquid contains organic matter
- When the soil under the waterproofing system contains organic matter
- When the soil is karstic or susceptible to internal erosion
- When the lagoon is subject to rapid tides
- When temporary groundwater can develop under the geomembrane
- To prevent the geomembrane from being lifted by wind action.



### Water drainage:

Water drainage can be carried out as follows:

- 10 cm thick granular layer with a minimum of 60% sand,  $0.5 < D < 5$  mm. A synthetic separation layer (filter) must be placed between the soil and the drainage layer.
- A network of drainage ditches must be installed to collect any liquids that may accumulate. The drainage pipes are covered with a permeable geotextile to prevent clogging of the pipes due to fine granules.
- Geosynthetic drainage in combination with drainage pipes.



### Collectors and outlets:

All liquids are guided to the collectors, leading to outlets where they are evacuated by gravity. If gravity evacuation is not possible, it must be done with the aid of a pump. In this case, a well containing an automatic pump must be constructed at the lowest point. This well must be checked frequently. It also serves as a control for the functioning of the waterproofing system. It is recommended that a control well of this type be built if the stored liquids have contaminating effects. For large projects, it is recommended that the drainage system be compartmentalized with separate outlets for each area to help locate leaks.

### Drainage size:

To measure the drainage dimension, the following must be taken into account:

- Amount of liquid rising behind the geomembrane
- Amount of liquid in the event of geomembrane failure
- The maximum negative pressure in the event of rapid emptying of the basin or failure of the waterproofing system.

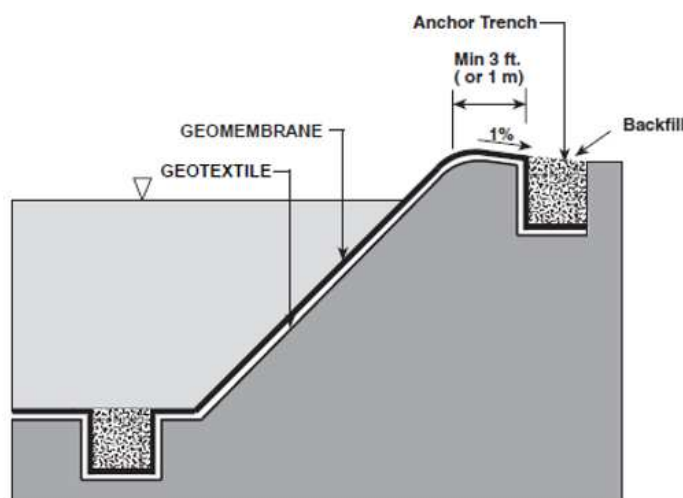
Depending on the hydrogeological context, an additional drainage system outside the site may be essential.

In small projects, half-perforated pipes with a diameter of 125 mm are generally used in combination with geospacer strips 0.2 to 0.5 m wide.

For large projects, the drainage system must be measured according to the actual situation.

## 4.2 Anchor trench

An anchor trench must be dug at the top and bottom of the slope around the entire perimeter of the lagoon. Anchor trenches should be approximately 0.6 m wide by 0.6 m deep (0.6 x 0.6') and a minimum of 1 m back from the top and bottom of the slope. The edge of the trench should be rounded and free of protrusions to reduce stress on the geomembrane. After installation of the geomembrane, the anchor trench should be filled with concrete.



## 5. Steps and application of the system

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### 5.1 Installation of the waterproofing system

The system is based on the use of Rayston Polyurea sprayed waterproof membrane on Geomax Spray NMDC non-woven geotextile.

Geomembrane:

**Geomax Spray NMDC:** Non-woven geotextile for reinforcing polyurea coating. (200g/m<sup>2</sup>).

Hot-applied membrane:

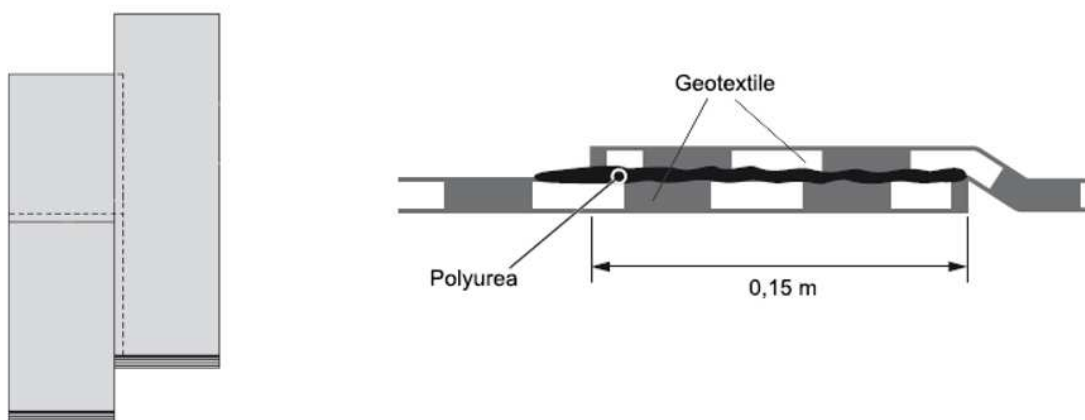
**Rayston Polyurea:** Pure elastomeric polyurea waterproofing membrane, sprayed and hot-applied. UV resistant (although it will yellow over time without losing its mechanical properties) and resistant to salt water and chlorinated water. Application rate: 2 kg/m<sup>2</sup>.

### 5.2 Geotextile anchoring

The geotextile panels will be unrolled onto the surface. Care must be taken to ensure that the geotextile is positioned to adapt to surface irregularities as much as possible. Uniform wrinkling of the geotextile is considered normal and acceptable, however, excessive wrinkling should be avoided.

The geotextile panels must be anchored in place every 1.5-2 m. The anchoring nails can be U-shaped or straight pins and must be long enough to secure the covering.

Adjacent panels should overlap by at least 0.15 m and be bonded with polyurea.



NOTE: Geotextile panels are 4.5 or 5.4 m wide and 100 m long. Geotextile rolls must remain covered and protected from the elements until they are ready for installation. Geotextile panels should only be rolled out for daily fumigation. Do not place or roll on damp substrates at any time.

### 5.3 Polyurea Application

There are two methods for applying polyurea to the geomembrane:



- On-site spraying: Spraying polyurea coatings onto pre- r installed geotextile panels.

Polyurea application After placing, anchoring, and joining an area of geotextile, a polyurea coating can be applied. Specify extended gel times (8 to 20 seconds) in all cases to allow the coating material to penetrate the geotextile.

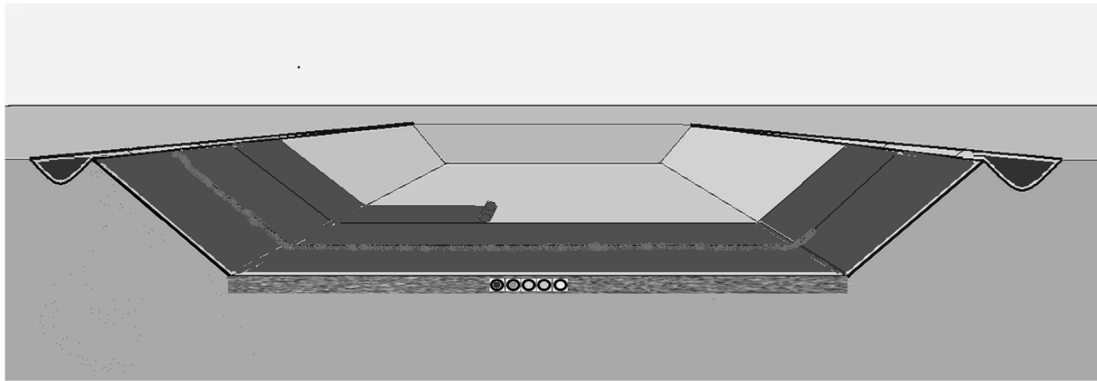
The product dries immediately and can be recoated within 12 hours. When the 12-hour recoating window is exceeded, the surface to be recoated must be thoroughly cleaned with MEK immediately prior to recoating.

The application of polyurea requires the use of special equipment systems; the requirements for these systems are clearly indicated in the Product Data Sheet.

- Workshop manufacturing: The geotextile panels are pre-sprayed with polyurea in the workshop and then the prefabricated panels are installed on site.

For greater productivity and speed of execution on site, the system allows Geomax Spray 200 to be coated in the workshop and then the overlaps to be executed on site (with the help of PU Activator Primer, as described in this section). This always results in a completely continuous waterproofing membrane with no risk of these joints opening up over time.

The geotextile panels can be pre-sprayed with polyurea and, if necessary, with a topcoat using special robotic equipment, leaving 0.15 m of geotextile unsprayed for anchoring and bonding in the field. This will significantly reduce installation time.



## 6. On the application of a top coat

In this type of project, we cannot recommend an aliphatic top coat for the system. This is to reduce risks such as delamination.

Therefore, we recommend applying a RAL to the polyurea with low yellowing.

## 7. Certificates

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### Rayston Polyurea Certificates

ETA, European Technical Assessment, certificate (No. 16/148) & BBA, British Board of Agreement, (No. 18/5582) for roof waterproofing, which demonstrates its ability to bridge cracks from the substrate and maintain the watertightness of the membrane between (-20° and 90°C), due to its thermosetting behavior. The user loads P4 to TH4 (90°C), which means that the membrane is a substrate for pedestrian traffic on it.

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

Drinking water certificate according to Directive 98/83/EC (tested at 40°C) and WRAS (United Kingdom) certificate, tested at 60°C, APPROVAL NUMBER: 1709541, which demonstrates the chemical resistance of Rayston Polyurea in continuous contact with water at these temperatures. Furthermore, the chemical composition of the water is not altered by contact with the polyurea membrane at these temperatures.

CE marked under European standard EN-1504-2 for the protection of concrete surfaces.

## 8. Maintenance

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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 pond should always be inspected after other professionals have carried out work such as construction, installation of new equipment, or repair of existing equipment.

## 9. Conclusions

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The **RAYSTON PROOF PUA NMDC GEO LAKE** system proposed by Krypton Chemical has been used in a large number of lakes 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 can be found in a facility of this type.

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

The information contained in this document, as well as the advice given by Krypton Chemical, SL professionals, 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, this information does not serve as a guarantee for the applicator, who should consider it as merely indicative and strictly 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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