

**KRYPTON CHEMICAL**

**CONSTRUCTION SYSTEMS  
BASED ON LIQUID  
WATERPROOFING  
MEMBRANES**

**RAYSTON**



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# RAYSTON SYSTEMS AND SOLUTIONS BY KRYPTON CHEMICAL

Krypton Chemical offers architects, builders and owners all the technical assistance and guidance needed throughout the project from beginning to end.

**IMPERMAX RAYSTON** waterproofing systems are known worldwide by their successful records. These systems are supported by long-term guarantee certificates as well as an extensive network of approved applicators providing a high level of reliability.

*See pages 58-59 for a list of completed works.*

## VERSATILE SOLUTIONS IN WATERPROOFING

We have a wide range of products which are always applied as liquids with no need to use any blowlamps or flames, which can also be reinforced if needed and guaranteeing the solution to waterproofing problems in the most complex situations. All these systems are based on the most advanced polymer chemistry and provide excellent technical performance and exceptional waterproofing completeness.

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## RAYSTON SYSTEMS

All the **IMPERMAX RAYSTON** systems are used in roofs and balconies where professional waterproofing is needed.

## WHAT IS LIQUID WATERPROOFING?

Despite being present in the market for about 30 years already, polyurethane based waterproofing systems can still be considered highly advanced products.

Krypton Chemical offers two technological solutions for liquid waterproofing:

### 1. IMPERMAX

Single component cold-applied polyurethane membrane. After application, the material polymerizes giving a seamless and elastic coating, well bonded to the substrate. In this way, an impervious film is formed that is able to ensure a fully sealed support with movement absorption capability.

### 2. IMPERMAX 2K

Rapid curing two-components polyurethane membrane. It is applied using hot mechanical projection equipment. This kind of application provides significant advantages when the application time must be as short as possible.

# RAYSTON LIQUID WATERPROOFING SYSTEMS: CHARACTERISTICS

## IMPERMAX

IMPERMAX is **CE** certified according to the European Technical Approval Document No. 06/0263 issued on December, 5th 2006 (see: *Our Response for the list of product certifications, p.7*).

### SCOPE

- Climatic zone: temperate to alpine (see *CERTIFICATIONS p. 8*)
- New construction and refurbishment
- **Roofs:**
  - Flat roofs with traffic or no traffic
  - Parking lots
  - Light or heavy
  - Roof garden
  - Traditional or inverted
  - Decks
- **Applicable to the following construction elements:** roofs, terraces, balconies, corridors, outdoor stairs, gateways, etc.
- Other non-accessible roofs

### ADVANTAGES

- **Complete watertightness**
- **Seamless membrane:** thanks to the lack of joints, overlaps and abutting, weak points are eliminated bringing about a homogeneous and even surface that can be adapted to any sort of construction. As a result, your building will be protected thoroughly.
- **Crack and movement resistant resulting in an elastic membrane** able to withstand fatigue movement (*according to EOTA TR-8 tests*).
- **Full bonding to the substrate** with no mechanical anchorage and over any slope (S1-S4).
- **Compatible with different substrates:** concrete, metal, wood, fibrous cement, PVC liner, bituminous layers.
- **UV resistant**
- **Good response to mechanical demands**
- **Good resistance to most chemical products**
- **Ductile and docile to simple or complex procedures**
- **Reduced and light thickness**
- **Variety in colours and finishes**
- **Directly accessible:** the waterproofing complex also forms a traffic resistant coating (*Systems IMPERMAX Park, Decor*).
- **Fast application and functionality**
- **Suitable for new construction and refurbishment**
- **Easily applied:** cold applied liquid product
- **Cost and time saving**
- **Excellent solution to deal with critical points:** being a liquid product it easily adapts to the substrate shape with the aid of the geotextile Geomax Rayston. Examples: edges, cracks, expansion joints, etc. (*See section: Constructive details: dealing with critical points, p. 39*).

## IMPERMAX 2K

IMPERMAX 2K is **CE** certified according to the European Technical Approval Document No. 10/0296 issued on December, 2th 2010. (See *CERTIFICATIONS: Our response for the list of product certifications, p. 8*)

### SCOPE

- Climatic zone: temperate to alpine (see *CERTIFICATIONS p. 8*)
- New construction and refurbishment
- **Roofs:** *idem IMPERMAX*
- **Applicable to the following construction elements:** *idem IMPERMAX*
- Other non-accessible roofs

## AN IMPERMAX SYSTEM FOR EVERY NEED

### REFURBISHMENT

Our systems are excellent as they can be applied on almost any kind of substrate. Their properties usually allow them to be used without prior removal of the pre-existing waterproofing materials. The IMPERMAX/IMPERMAX 2K membranes provide a coating that fits in the area to be protected, as a "skin" fully bonded and showing high waterproofing performance.

### NEW CONSTRUCTION

A vast majority of roofs are still being treated with bituminous products or low-technology systems. These products may offer a quick and cheap solution, but they are often risky and prone to premature failure. If roof reliability and integrity must be ensured, IMPERMAX systems offer a cost effective and durable option. They are also well suited for complex layout roofs (with many pieces of equipment on them), or not-easily reachable surfaces (where further repairs may be difficult to carry out). In all cases, IMPERMAX will add value to your property, and they are designed to be adaptable to any scenario.

# LIQUID WATERPROOFING SYSTEMS: CERTIFICATIONS

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## CONCEPT DEFINITIONS RELATED TO ROOF CLASSIFICATIONS

There are many possible certifications either issued by European Union organisms as a **CE**-marking or by independent laboratories. Each certification has its specific scope and details.

### Which are the requirements all the liquid waterproofing systems must fulfil?

The purpose of the **Construction Products Directive** 89/106/EEC of 21 December 1988 is to ensure the free movement of all construction products within the European Union. This Directive defines the essential requirements that structures must comply with in order to be eligible to bear the **CE**-marking.

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### Which are the essential requirements?

These are applicable to the whole construction work, not to the product characteristics by themselves:

**1 MECHANICAL RESISTANCE AND STABILITY**

**2 SAFE USE**

**3 SAFETY IN CASE OF FIRE**

**4 ANTI-NOISE PROTECTION**

**5 HYGIENE, HEALTH AND ENVIRONMENT COMPLIANT**

**6 GOOD ENERGY ECONOMY AND HEAT RETENTION**

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### What is a European Technical Approval document (ETA)?

It is a positive evaluation procedure on the use of a construction related product for a specific use. It is issued for a 25 year term and it is valid in all the European Union countries.

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### What is the **CE** marking?

The **CE**-marking guarantees the product conforms to an ETA specification and its manufacturing procedure has been certified accordingly.

# ETA

## TECHNICAL APPROVAL DOCUMENT FOR LIQUID WATERPROOFING SYSTEMS

ETA is a technical specification.

It certifies the suitability of the liquid waterproofing kits for their use in roofs, decks and balconies.

Beyond determining suitability for waterproofing use, the ETA takes into account the kit performance according to the categories described in the next tables.

### PERFORMANCE LEVELS BY CATEGORY

#### EXTERNAL FIRE RESISTANCE

The roof fire resistance is classified according to the European Standard NBN EN 13.501-5(2005).

Fire classification of construction products and elements- Section 5: Classification by results from tests on roofs exposed to an external fire. This classification is based on four different test methods which relate to different fire types:

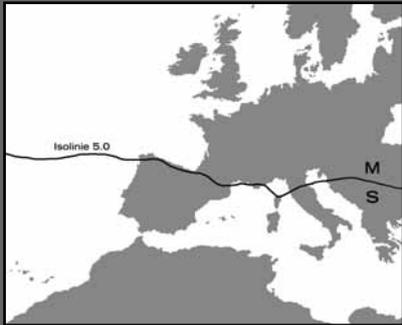
Energy contribution to fire	A-B-C-D-E-F	
Category	Symbol	
A1		Fireproof
A2		Fireproof
B		Resistant to a long-lasting attack of small flames and an individual object, both burning with a limited flame spread rate.
C		Resistant to a brief attack of small flames and an individual object, both burning with a limited flame spread rate.
D		Resistant to a brief attack of small flames with limited flame spread rate and an individual burning object.
E		Resistant to a brief attack of small flames with limited flame spread rate.
F		No performance determined.

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#### Estimated working life

W1 = 5 years    W2 = 10 years    W3 = 25 years

Information provided about the system working life expectancy cannot be construed as an Applicator (or Certification Organism) guarantee. It must be considered only as guiding information for the choice of the best product on a case-by-case basis.

Categories by climatic zone	M Moderate climate	S Severe climate
Annual radiation on horizontal surface	< 5 Gj / m <sup>2</sup>	≥ 5 Gj / m <sup>2</sup>
Average temperature of the warmest month of the year	< 22° C	≥ 22° C
<p><b>Note 1:</b> The annual radiation on horizontal surface is the total amount of solar energy received by an ideal horizontal surface in a defined geographical zone. It is calculated as the mean value in a 5-year period. The average temperature of the warmest month is also calculated along a 5-year period, measuring the highest air temperature of the month considered.</p> <p><b>Note 2:</b> The isoline 5 can be considered to be the dividing line between the climatic zones "moderate" and "severe".</p>		

Classification according to the user load levels	without access	only maintenance access	maintenance and foot traffic allowed	green/inverted roofs
Load level class (flexible support / resilient)	P1 Low	P2 Moderate	P3 Normal	P4
Load level class (rigid support)	P1 Low	P2 Moderate	P3 Normal	P4

Once installation has been completed, including the reinforcement layer (if needed), the system must withstand the damage caused by the user loads during its working life.

## Roof slope

The installed system, including supporting and protective elements, must be able to withstand the effects due to the slope. According to the slope the following categories are defined. Examples of other effects that may affect the classification are also listed.

CATEGORIES	Slope (%)	Possible related effects (examples)
S1	Up to <5%	<ul style="list-style-type: none"> <li>- Frost (consider ice layer thickness)</li> <li>- UV, stagnant water</li> <li>- Weight, accessibility</li> <li>- Behaviour in case of fire</li> <li>- Plants (garden roofs)</li> </ul>
S2	5 to 10%	<ul style="list-style-type: none"> <li>- Frost (consider ice layer thickness)</li> <li>- UV</li> <li>- Weight, accessibility</li> <li>- Behaviour in case of fire</li> <li>- Plants (garden roofs)</li> </ul>
S3	10 to 30%	<ul style="list-style-type: none"> <li>- Drainage</li> <li>- Frost, snow</li> <li>- UV</li> <li>- Weight, accessibility</li> <li>- Behaviour in case of fire</li> <li>- Plants (garden roofs)</li> </ul>
S4	More than 30%	<ul style="list-style-type: none"> <li>- Drainage</li> <li>- Frost, snow</li> <li>- UV</li> <li>- Weight, accessibility</li> <li>- Behaviour in case of fire</li> </ul>

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## Classification according to surface temperature

The installed system, including supporting and protective elements, must be able to withstand the highest and lowest expected surface temperatures, along all the system working life.

Lowest working temperature	TL1 = +5° C	TL2 -10° C	TL3 -20° C	TL4 -30° C
Highest working temperature	TH1 30° C	TH2 60° C	TH3 80° C	TH4 90° C

# CERTIFICATIONS: Our Response

The Rayston Liquid Waterproofing Systems by Krypton Chemical, in addition to the European Technical Approval (ETA) document, are also specifically certified according to their intended uses. These certificates have been issued by independent laboratories from several countries.

# ETA

## THE EUROPEAN TECHNICAL APPROVAL DOCUMENT

This European Technical Approval Document (ETA) is issued by the Instituto de Ciencias de la Construcción Eduardo Torroja (Madrid, Spain).

The KRYPTON CHEMICAL guide for the ETA document "Liquid Applied Waterproofing Systems for Roofing" is based on the following guidance documents:

- ETAG 005. Ed. 2000. Section 1, "General remarks" and Section 6 "Specific requirements for Polyurethane-based systems"



### IMPERMAX

It is the basic product of the Rayston liquid waterproofing systems. In 2006, IMPERMAX obtained the CE-marking approval for 10 and 25 year. IMPERMAX is rated within the highest classifications determined by the ETA document.

#### IMPERMAX PERFORMANCE LEVELS (ETA N° 06/0263)

	1,6 kg/m <sup>2</sup> (1,4 mm)	1,6 kg/m <sup>2</sup> + COLODUR	2 kg/m <sup>2</sup>	3 kg/m <sup>2</sup> + reinforcement
External fire behaviour	Broof (t1)			
Reaction to fire	Class F			
Working life	W2 (10 years)		W3 (25 years)	
Climatic Zone	S (Severe)			
User Load Category (*)	P3: TH3 P2: TH3 P1: TH4	P3: TH2 P3: TH3 P2: TH4	P3: TH2 P3: TH3 P2: TH4	P4: TH4 P4: TH4 P4: TH4
Roof slope	S1 – S4			
Minimum Surface Temperature	TL3 (- 20° C)			
Maximum Surface Temperature	TH4 (90° C) TH2 (80° C) TH2 (60° C)			

\* The User Load Categories are for concrete and steel supports. For polyurethane foam supports only 2 kg./m<sup>2</sup> systems with 10 year working life and P1 user load level has been tested.

**NOTE:** the user load, measured according to the EOTA Technical report No. 7 "Determination of the resistance to the static indentation", determine the following values:

- P1: Maximum pressure ≈ 7 Kg./cm<sup>2</sup>
- P2: Maximum pressure ≈ 14 Kg./cm<sup>2</sup>
- P3: Maximum pressure ≈ 21 Kg./cm<sup>2</sup>
- P4: Maximum pressure ≈ 25 Kg./cm<sup>2</sup>

### IMPERMAX 2K

Krypton Chemical holds CE markings since 2010 and valid for 25 year.

#### Performance levels IMPERMAX 2K (ETA 10/0296)

External fire behaviour	Broof (t1)
Reaction to fire	Class F
Working life	W3 (25 years)
Climatic Zone	S (Severe)
User Load Category	P4
Roof slope	S1 – S4
Minimum Surface Temperature	TL3 (- 20° C)
Maximum Surface Temperature	TH4



### IMPERMAX

#### DETERMINATION OF THE RESISTANCE TO THERMAL IMPACT // Report 19.221-II

Determination of the adherence to a metallic support. Part 1, Report 19.221 issued on 19 October 2007.

Determination of resistance to thermal shock when IMPERMAX comes into contact with hot asphalt at 160° C. Part 3, same report 19.221-II.

# OTHER CERTIFICATIONS



Applus is a leading company specialized in testing, certification and other technological services.

Krypton Chemical holds several certifications and test reports that are applicable to different uses and products.



## IMPERMAX

- Horizontal roofs exposed to an external fire. No. 06/32301345
- Sloped roofs (20° C) exposed to an external fire. No. 08/32309237
- Sloped roof (45° C) fire resistance. No. 08/32309237
- Resistance to the penetration by plant roots. No. 32305556 (without GEOMAX), No. 07/32305557 (with GEOMAX)
- Taber abrasion. No. 10/101.729-1626

## IMPERMAX AQUA

- Drinking water contact. No. 06/32000011

## IMPERTRANS

- Resistance and aging tests No. 06/32013329
- Drinking water contact No. 07/32000006

## IMPERMAX 2K

- Drinking water contact No. 928/09/8504
- External fire resistance No. 10/101587-1223

## POLIUREA RAYSTON

- Drinking water contact No. 928/09/8505

## COLODUR (clear membrane)

- **2000-h test = 10 year**  
Tensile strength, elongation, artificial weathering, watertightness, water vapour resistance.

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QUALICONSULT

**QUALICONSULT**, founded in France in 1982, is an organization dedicated to testing, diagnostic, assistance and formation in the construction field.

It issues the CCT, a document detailing the use conditions for the waterproofing system, which is based in the existing standards, NF, NF-EN, DTU and European NF ETAG EOTA and the Apsel Professional Rules (Sept. 1999) on Liquid Waterproofing Systems for outdoor floorings an non-enclosed building areas.

**Krypton Chemical holds CCT No. 50 712004096 MS**



**BBA** (British Board of Agrément) is the main certifying authority in the UK for construction products, systems and applicators. The BBA institute has certified IMPERMAX according to the specific requirements for its use in the UK.

**Krypton Chemical holds BBA No. 09/4674 for 10 year Impermax Roof Waterproofing System**



**Krypton Chemical holds BBA No. 11/4836 for 25 year Impermax 25 Roof Waterproofing System**

# SUPPORT PREPARATION

## A key point

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Support preparation is the base for a successful application of any liquid system. Properties and characteristics of supports are essential for a durable and well bonded waterproofing membrane made with RAYSTON systems.

In case of an improper support preparation no guarantee can be given on the work.

Applicators must check support conditions and carry out the remedial treatments in every case, if needed.



## GENERAL REMARKS

To ensure a good penetration and bonding, support must fulfil the following conditions:

1. Should be even (*since it is a self-levelling product*)
2. Should be cohesive and compact
3. Should have a regular and smooth appearance
4. Free from cracks and fissures (*they must be treated beforehand, see section, Detail treatment, p 39*).
5. Should be clean, neat, free from laitance, free particles or strange matter. Free from oil, mosses or greases.

## SUPPORT TYPE

**IMPERMAX** and **IMPEMAX 2K** can be applied on concrete, metal, wood, fibrous cement, asphalt, ceramic, stone, PVC.

## REQUIREMENTS

**SLOPE/FLATNESS:** IMPERMAX is a “thin”, self-levelling coating. It is not designed for correcting flaws in the surface slope or flatness.

Slope should be 1% minimum outwards or to the sewerage for storm water drainage.

## SURFACE CONDITIONS

Before **IMPERMAX/IMPERMAX 2K** application, surfaces must be clean and neat.

- 1) If microorganisms, algae, fungi, mosses or lichens are found, a compatible specific treatment must be done.

- 2) If waste or dirt is found it is convenient to make a mechanical treatment ( sanding, scraping) and cleaning thoroughly afterwards.
- 3) Loose items should be removed. Repair and level with suitable products, having ensured their complete compatibility with the IMPERMAX layer.
- 4) In case of corrosion of the concrete reinforcing bars, a protective treatment should be done.
- 5) If oily stains are found, they should be removed with a specific and suitable cleaning procedure (e.g. *burning*).

---

## CONCRETE OR MORTAR

For new construction works, and as a general rule, the new concrete/mortar slab must be allowed to dry for 28 days at least (this time may change depending on air humidity levels and the season of the year). This gives enough drying time to allow all the humidity to come off.

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## METAL

**New surfaces:** Must be free of oils, silicones or any previous treatment products which might be incompatible with the Rayston products.

**Refurbishment:** Check and clean all rusty areas, which could be peeled. Severely damaged areas, with possible plate destruction, must be replaced with new material before any waterproofing treatment.

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## WOODEN PANELS

Degrease and clean support. As a general rule, it is advisable to apply only on wood supports in good condition, with no degradation signs.

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## FIBROUS CEMENT

Fibrous cement roofs carry a significant risk to health. It is necessary to find suitable solutions for these kinds of roofs.

- **Option 1: Complete roof replacement**

This is a straightforward solution but with a high cost. Usually, this implies completely paralyzing the business activity, removing all the roof (and waste managing) and install the new one. Only a specialized company can undertake this kind of work.

- **Option 2: . Roof encapsulation**

There exist a more economical alternative that does not need removal and replacement. It is to encapsulate the fibrous cement plates. Krypton Chemical holds a patent (ES-00900974) for a completely adapted system for this work.

See Section *Fibrous Cement Rayston*, p. 32.

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**NOTE:** If support is uneven, it must be levelled with suitable products/procedures such as cementitious products or by membrane reinforcement with GEOMAX.

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## CERAMIC TILES

After inspection, damaged tiles must be removed and replaced by new ones or by a cement mortar compatible with the application of IMPERMAX and IMPERMAX 2K. Depending on the nature and condition of the existing tiles, and of any prior maintenance treatment (waxes, silicones, oils), it is necessary to uncover the original support by sanding/scraping and a suitable cleaning treatment in order to avoid bonding failures.

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## OTHER MATERIALS

There is a wide range of possible supports that require preparatory work to be determined in each case. It is strongly recommended to consult the Krypton Chemical Technical Department before starting work.

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## SUPPORTS COATED WITH PREEXISTING WATERPROOFING MATERIALS (LIQUID OR LAYERED)

Application of IMPERMAX/IMPERMAX 2K on pre-existing waterproofing materials must be restricted to those cases on which there is enough inter-material compatibility knowledge.

Should any doubt arise, in-situ tests must be carried out or completely remove the old material and apply over the original substrate.

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**NOTE:** It is important to check compatibility of IMPERMAX/IMPERMAX 2K with all the additives or curative products used in support treatment.

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## CRITICAL POINTS

It is necessary to address all the surface critical points such as:

- Half-round elements
- Junctions with vertical facings
- Protective coverings
- Clear storeys
- Expansion joints
- Drains,...

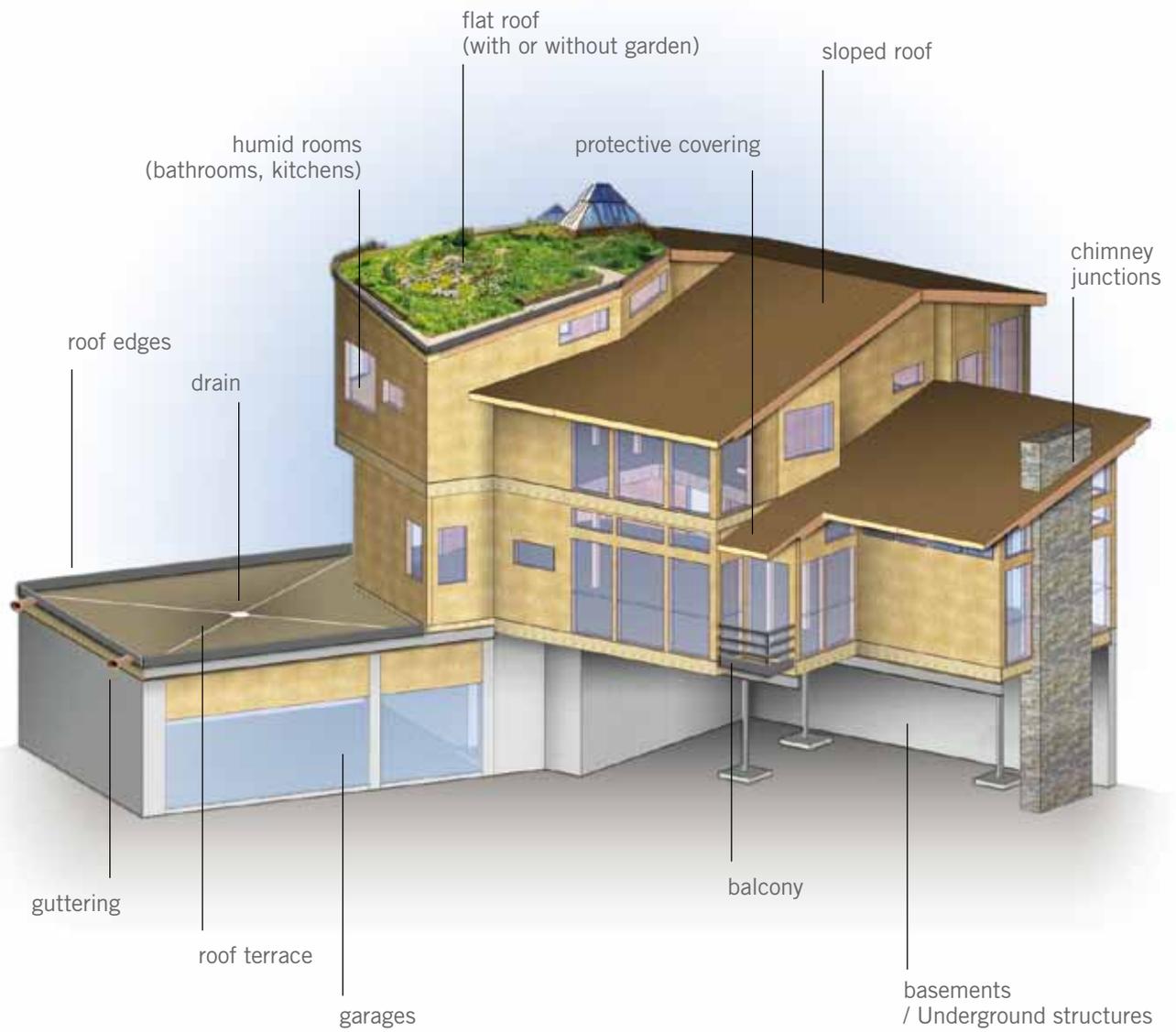
See Section (*detail treatment*, p. 39)

All the information related to support preparation is given as guidance. Applicators must analyze and adapt the previous treatments to each encountered situation.

It is very important to carry out a preliminary in-situ test before validation of any possible treatment not considered in this handbook.

# RAYSTON SYSTEMS: APPLICATIONS

This scheme shows the different areas where Rayston liquid waterproofing systems can be used.



# SYSTEM SELECTOR

We suggest using this selector table to choose the best solution for your project requirements.

A detailed system description is also included, with the constituent elements, installation steps, main advantages and the primary intended uses.

Please keep in mind that all these systems are based on a principal system, according to the ETA document belonging to each membrane (IMPERMAX or IMPERMAX 2K) and referred to a 20 or 25-year working life. This main system is subsequently adapted for each case specific requirement.

# SELECTOR SYSTEMS

USES	IMPERMAX BASIC	IMPERMAX PLUS	IMPERMAX DECOR	IMPERMAX PARK	IMPERMAX STRAT	IMPERMAX FIBROUS CEMENT	IMPERMAX GREEN ROOF
Concrete	x	x	x	x	x		x
Metal	x	x			x		
Wood	x	x			x		
Fibrous Cement	x	x			x	x	
Asphalt	x	x		x			x
PVC	x	x					
RECOMMENDED APPLICATION							
<b>FLAT ROOF NON-TRAFFIC</b>							
Heavy protection / Traditional roof	x						
Light protection / exposed roof		x	x		x		
<b>FLAT ROOF WITH TRAFFIC</b>							
Traditional roof	x	x	x				
Inverted roof	x	x	x				
<b>GARAGES</b>				x			
<b>DECK ROOFING</b>					x		
<b>FIBRE CEMENT ROOFING</b>						x	
<b>GARDEN ROOFS</b>							x

# PRIMERS

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It must be kept in mind that the selected primer will require special care in all the aspects: coverage, application method, number of coats, etc.

It is advised to perform in-situ support tests insuring it is completely compatible.

	PU PRIMER	H PRIMER	EPOXY 100 PRIMER
Concrete Dry and porous mortar		X	X
Ceramic tile and vitrified tile	X		
Concrete Wet mortar		X	
Ceramic tiles with enclosed moisture		X	
Steel/Aluminium/Metal	X		
PVC sheathing	X		
Wood		X	X
Asphalt		X	
Brick	X	X	

## EPOXY100 PRIMER

EPOXY100 PRIMER is a non-solvent, low viscosity product, sold as a 2-pack system (resin+hardener). It can be diluted with solvents (Rayston Solvent) if needed depending on the substrate porosity. This improves penetration and surface bonding.

When applied in sufficient coverage, Epoxy100 primer is very useful as a sealer for porous substrates to be sprayed with hot-applied membrane products (IMPERMAX 2K) with no risk of blistering or membrane surface defects. These defects are due to residues of waterborn primers or air flows during the fast curing process.

*In any case, see relevant Technical Data Sheets by Krypton Chemical for further information.*

**NOTE:** It is very important to apply the correct coverage of primer, in one or several coats.

---

## POLYURETHANE PRIMER

In most occasions, monocomponent polyurethane products offer good adherence due to their chemical curing in contrast to physical-cured products. The polymer presents a high molecular weight that gives a high level of cohesion. This makes a very consistent product, but when applied on certain non-absorbing surfaces, it may be prone to an adhesive failure.

Some surfaces can be specially problematic such as:

- Tile-Brick-Terrazzo
- Marble-Ceramic-Plastics
- Polished concrete, non-porous, worn out concrete
- Surfaces previously treated with epoxy/acrylic

In these cases, if possible, it is recommended to gently "sand" the surfaces, resulting in a certain friction between the materials and favouring adhesion.

POLYURETHANE PRIMER creates strong chemical links between the surface and the following coating to be applied.

POLYURETHANE PRIMER is a non-forming film product; therefore it is not advisable to use this product alone. It is intended to give a strongly bonded coating when combined with monocomponent polyurethane.

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**NOTE:** Never apply these products on wet, soaked, oily, dirty or greasy surfaces.

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## PRIMER H

Wet surfaces are problematic for any resin treatment, both because of the difficulties to obtain a good adhesion and for the problems moisture brings about after a while.

In many cases, working conditions and time constraints make it impossible to ensure the support is in its best condition. It is necessary, therefore, to use a product that could minimize the moisture-driven problems, such as:

- Lack of adhesion (due to support saturation)
- Creation of air bubbles (due to water vapour pressure from which is to relieve. This often happens in elastic coatings)

PRIMER H is an excellent solution for the application of waterproofing or flooring polyurethanes on substrates having more than 4% moisture content.

However, PRIMER H does not work where there is moisture coming from phreatic water or capillarity, with a pressure greater than 1,5 N/mm<sup>2</sup>.

PRIMER H is a two-component water-based resin. After mixing, the product is totally compatible with wet or soaked substrates. When used in sufficient amount, after polymerization, it gives a well bonded, crystalline and very hard product that serves as a barrier against residual moisture and prevents bubble formation on the surface.

PRIMER H is also useful as a sealing product for highly porous supports, in which ascending air makes defects in the final membrane. In this case, it is strongly advisable to do the priming away from high temperature hours, avoiding direct sunlight on the support because this works against the ascending air flow coming up the support.

It is a very useful product for all kinds of waterproofing works using polyurethanes, such as:

- Terrace and roof refurbishments
- Waterproofing treatments and refurbishments in tanks, ponds and all water storage and distribution systems.

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**NOTE:** It is very important to use enough coverage of PRIMER H, either in one or several coats.

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# SYSTEMS DESCRIPTION

## SYSTEM 1 IMPERMAX BASIC

P. 18

IMPERMAX BASIC system is adaptable to many situations and, particularly, waterproofing under heavily loaded or tiled slabs and in traditional or inverted roofs.

The IMPERMAX system can be left uncovered or be covered depending on the roof type and the permitted user load. If the product is to be covered with a heavy protection (mortar, ceramic tiles) it is advisable to protect it with geotextile of minimum density 200 g/m<sup>2</sup> (GEOMAX PROTEC).

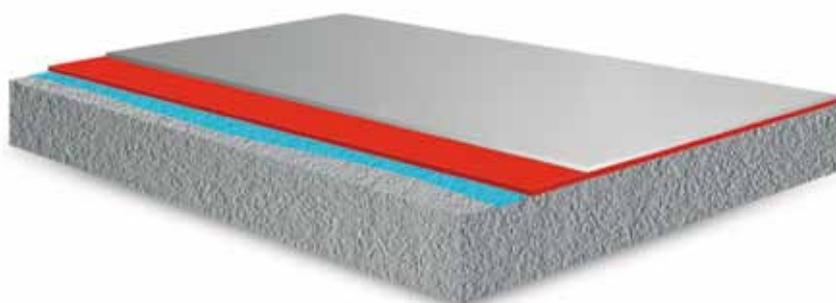
For terraces, balconies and small roofs, flooring can be installed directly on to the membrane, using flexible cement glue (C2 FT-type). For larger surfaces it is recommended to leave the waterproofing membrane unbounded to the flooring layer, spreading a mortar layer on the protective geotextile.



---

### TRADITIONAL ROOF / with or without protection

Waterproofing system for roofs and terraces with no pedestrian traffic or limited traffic for maintenance operations.



1. Resistant support
2. Primer
3. IMPERMAX or IMPERMAX 2K

---

See ETA 02/263 (IMPERMAX) for their diverse variations depending on the required certifications (10 or 25 year).



PAGE

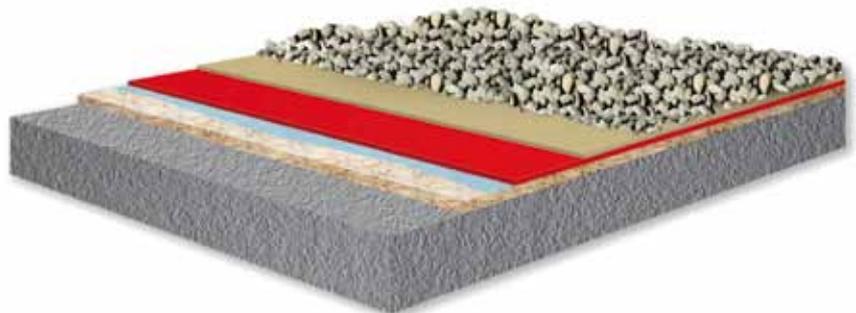


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## PROTECTED ROOF / with gravel

Waterproofing system for roofs and terraces with no pedestrian circulation or limited to maintenance operations.

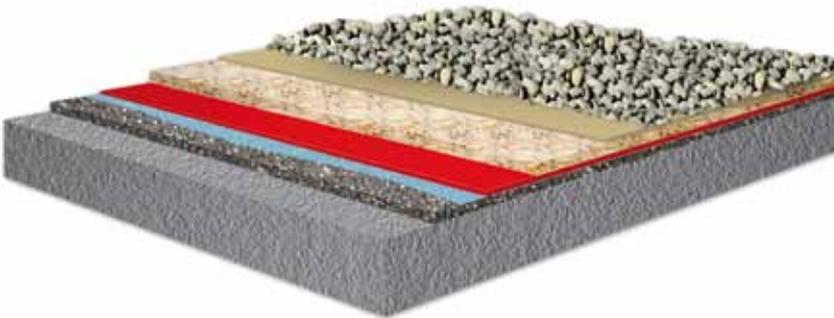
1. Resistant support
2. Insulation/Slope formation
3. Primer
4. IMPERMAX (10 or 25 year)  
or IMPERMAX 2K (25 year)
5. Geomax Protec (recommended)
6. Gravel



---

## INVERTED ROOF / with gravel

Waterproofing system for roofs and terraces with no pedestrian traffic or limited traffic for maintenance operations.



1. Resistant support
2. Insulation /Slope formation
3. Primer
4. IMPERMAX (10 or 25-year) or IMPERMAX 2K (25 year)
5. Insulation (XPS)
6. Geomax Protec (*recommended*)
7. Gravel

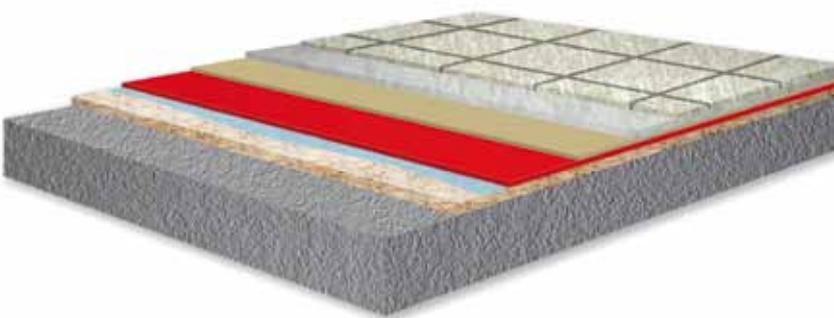
P. 20



---

## TRADITIONAL ROOF / Ceramic tiles

Waterproofing system for roofs and terraces with no pedestrian traffic or limited traffic for maintenance operations.



1. Resistant support
2. Insulation / Slope formations
3. Primer
4. IMPERMAX (10 or 25-year) or IMPERMAX 2K (25 year)
5. Geomax Protec
6. Mortar
7. Tiles



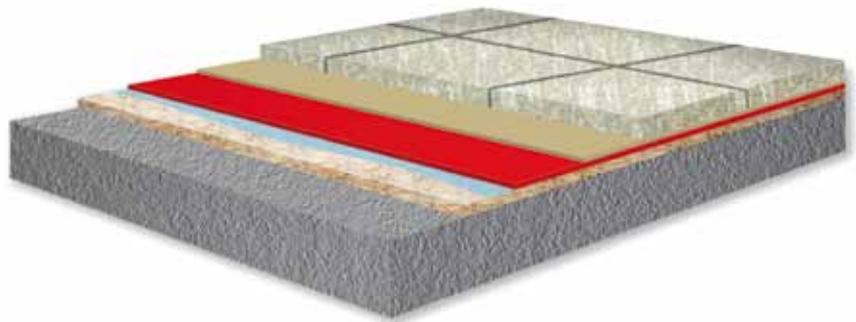


---

## INVERTED FLAT ROOF WITH TRAFFIC / Insulating tile RAYSTON Dale

Traditional or inverted waterproofing system covered with insulating/filtering slabs for terraces with heavy traffic.

1. Resistant support
2. Insulation/Slope formation
3. Primer
4. IMPERMAX (10 or 25-year)  
or IMPERMAX 2K (25 year)
5. Geomax Protec
6. Insulating/filtering slabs  
Rayston DALE



# SYSTEM 2 IMPERMAX PLUS

IMPERMAX PLUS system is specially adapted for exposed and lightly protected roofs, such as metal sheet, fibrous cement and refurbishment works.



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## Waterproofing with light protection (exposed) ROOFS WITH TRAFFIC OR NOT DEPENDING ON THE SUPPORT TYPE



1. Resistant substrate
2. Insulation/Slope formation
3. Primer
4. IMPERMAX (10 or 25-year) or IMPERMAX 2K (25 year)
5. Impertrans 60 with colour pigment



## FINISH

The IMPERMAX PLUS system includes a protection with aliphatic polyurethane resin, adaptable to different needs. **Finishing options:**

1. IMPERTRANS 60 combined with colour pigment (according to RAL chart). It provides a decorative aspect and increased weathering resistance.
2. COLODUR 60, colourless or pigmented (according to RAL chart). It provides a higher abrasion and weathering resistance.

Coverage: 300 gr/m<sup>2</sup>. To be applied at least 24 hours after the previous coat.

## ADVANTAGES

In addition to the general IMPERMAX advantages, the PLUS systems:

1. Allows to obtain an economic treatment with no need to apply a heavy protective layer (*the product may remain exposed, according to the provisions in ETA 06/0263-IMPERMAX and ETA 10/0296-IMPERMAX 2K*).
2. Provides an aesthetic topcoat by covering the waterproofing layer with different colours (RAL chart).
3. Reduces cooling costs by providing a heat and sunlight reflective surface (COOL ROOF).

# SYSTEM 3 IMPERMAX DECOR

IMPERMAX DECOR system allows several finishes depending on the aspect or effect demanded.



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## FINISH

1. Apply a bonding layer with COLODUR 60 resin (300 gr/m<sup>2</sup>) in white or similar to that of the quartz sand to be used.

2. Spread the sand, colour flakes or corundum. **Non-slip effect:**

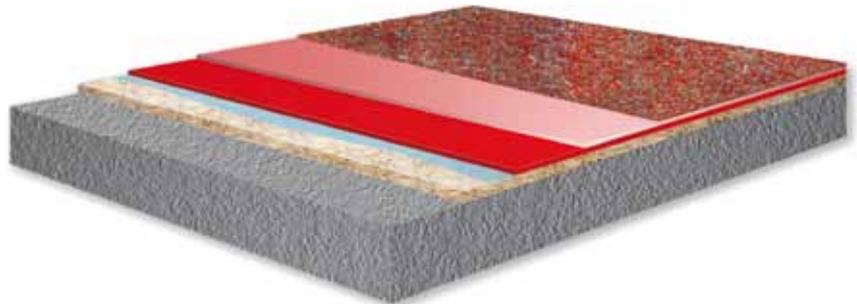
- Suitable coloured sand (applied to saturation, 2 kg/m<sup>2</sup>)
- Vacuum or sweep all the loose sand
- Polish the bonded sand for a smoother finish (optional)

### Decorative:

- Colour chips or corundum: saturated: 300-400 gr/m<sup>2</sup> and semi saturated, depending on the desired effect.

3. Top sealing with clear COLODUR 60 resin (300 g/m<sup>2</sup>)

Waterproofing  
with light pedestrian circulations  
**ROOFS / TERRACES / BALCONIES / RAMPS**



## ADVANTAGES

In addition to the general advantages provided by IMPERMAX DECOR system:

1. Obtain an economic treatment with no need to apply a heavy protective layer (the product may remain exposed, according to the provisions in ETA 06/0263-IMPERMAX and ETA 10/0296-IMPERMAX 2K).

2. Provides an aesthetic topcoat by covering the waterproofing layer with different colours (RAL chart).

1. Resistant substrate
2. Insulation/Slope formation
3. Primer
4. IMPERMAX (10 or 25-year) or IMPERMAX 2K (25 year)
5. COLODUR 60 (clear)
6. Sand/Coloured quartz granules + COLODUR 60 (clear)

3. Allows to obtain a Class 3 non-slip finish according to UNEENV 12633:2003 Annex A.

Coloured quartz permits a wide range of possible combinations.  
For more information please contact Krypton Chemical Technical Department.



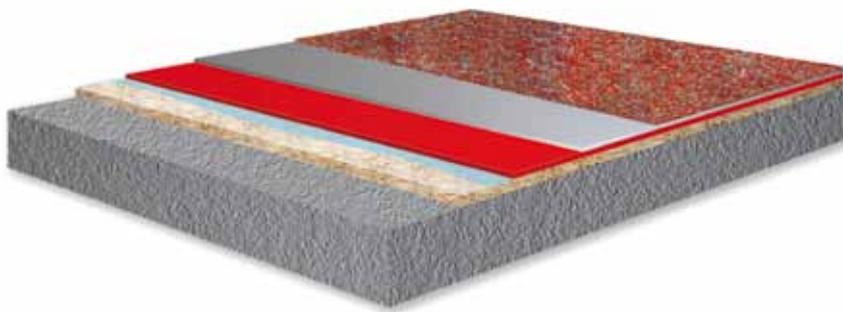
# SYSTEM 4 IMPERMAX PARK

IMPERMAX PARK system is specifically designed for substrates with intense vehicle traffic on them.



P. 24

Apparent waterproofing with  
intense vehicle circulations  
**ROOFS / PARKING DECKS / WORKSHOPS /  
GRANDSTANDS / ALLEYS**



1. Resistant support
2. Insulation / Slope formation
3. Primer
4. IMPERMAX (10 or 25-year)  
or IMPERMAX 2K (25 year)
5. Paviflex
6. Sand (0,4-0,9 mm) +  
COLODUR 60 (RAL colour)

## FINISH

The IMPERMAX PARK waterproofing system consists of the following finishing elements:

- a. Application of a 0,8 to 2,6 kg/m<sup>2</sup> protective layer with PAVIFLEX resin (*solvent free two-component polyurethane*).
- b. Spreading quartz sand 0,4-0,9 mm size.
- c. Vacuum or sweeping of the loose sand.
- d. Final sealing/topcoat with resin COLODUR 60 (clear or pigmented with the desired RAL colour).

## ADVANTAGES

In addition to the general advantages of the IMPERMAX system, the PARK system offers:

1. Provides a high level of resistance to the vehicle traffic and to puncture, giving a considerable performance improvement.
2. Provides a non-slip, aesthetic finish, since it can be done with a desired RAL colour.

# SYSTEM 5 IMPERMAX STRAT

**INTEGRAL SYSTEM FOR EXISTING ROOF REFURBISHMENT**  
WATERPROOFING AND INSULATION

IMPERMAX STRAT system is a great option for new or existing roof treatment where roof insulation performance needs to be upgraded.



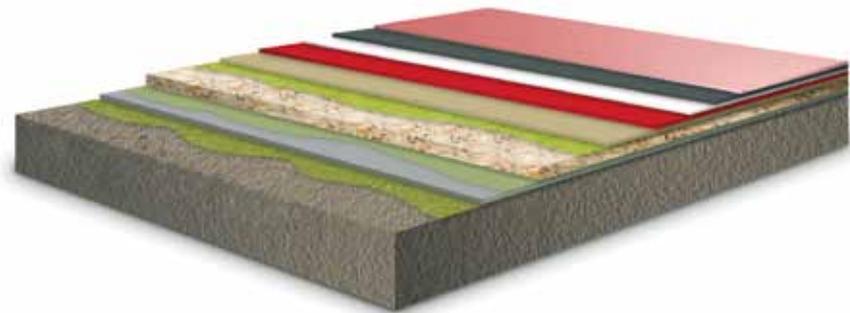
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IMPERMAX STRAT system can be applied over concrete, wood or metal roofs.

For concrete surfaces, the following requirements must be met:

1. Levelled surface, since Adhesive PU Rayston is a self-levelling product
  2. Cohesive material
  3. Free from cracks and fissures, which must be treated beforehand
  4. Clean, neat, free from laitance, free particles or strange materials. Free from oil, mosses or greases.
- COLD-WELDED, WITH NO MECHANICAL SUPPORT**

**SYSTEM ROOF COLD-WELDED**  
**With no mechanical support**



1. Resistant support
2. Adhesive PU Rayston
3. Rayston Vel Aluminium sheathing
4. Adhesive PU Rayston
5. Insulation (Rayston FOAM)
6. Adhesive PU Rayston
7. Rayston Vel sheet
8. IMPERMAX 1
9. Rayston Fiber 200
10. IMPERMAX 2K
11. Impertrans 60 (Colour RAL)

1



2



3



4



## APPLICATION PROCEDURE

### 1. SUPPORT PREPARATION

It is essential to thoroughly clean the support, removing dust and soil, before applying Adhesive PU Rayston and the Rayston Vel Aluminium sheet.

---

### 2. PRIMING

Primer type depends on the kind of support and its condition.  
(See Section "Primers", p. 16)

---

### 3. VAPOUR BARRIER

In order to prevent moisture appearance with time, it is recommended to install Rayston VEL aluminium sheet, specifically designed for preventing water vapour transmission towards the insulation material. This sheet also facilitates the installation of the successive insulating panels.

The Rayston VEL Aluminium sheet should be installed by applying by roller a suitable amount of Adhesive PU Rayston (minimum 0.5 kg/m<sup>2</sup>) on its surface. It is important to overlap each piece 50 mm with the next for a horizontal joint and 100 mm at the roll end.

---

### 4. INSULATION

Insulating Rayston FOAM must have the specified thickness.

Each insulating panel should be glued on the Rayston VEL Aluminium sheet using Adhesive PU Rayston.

Coverage of Adhesive PU Rayston must be 0,5 kg/m<sup>2</sup> at least. Ideally, allow the adhesive to dry for some minutes before gluing the insulating panels. In this way, the product will get enough consistency to prevent panel movement. Sharp edges and junctions must be protected using wooden covers and buffers ensuring the insulating material does not suffer compression forces and keeps its original shape (it is recommended a protective height equivalent to the insulation layer thickness minus 5 mm). These wooden protections must be fixed to the support either mechanically or by means of Adhesive PU Rayston.

Empty spaces between insulating plates, due to height changes, junctions, must be filled with suitable products (e.g. polyurethane mastic or foam) avoiding remaining sharp edges that could impair system performance over time.

**INSULATING FOAM Rayston is an excellent insulation solution that also offers the following advantages:**

1. Fire resistance
  2. High level of thermal insulation (30% increase with respect to other products, XPS-based, using the same applied thickness)
  3. Compatible with Rayston adhesives and resins.
- 

*See the Technical Data Sheet for a complete description of FOAM properties and advantages*

---

## 5. SEPARATION LAYER

In order to provide sufficient separation between the insulation layer (soft) and the liquid waterproofing materials, the asphaltic sheet RAYSTON VEL must be applied cross the area, overlapping 10 cm at least. The asphaltic sheet must be glued with Adhesive PU RAYSTON, with a minimum coverage of 0,5 kg/m<sup>2</sup>.

---

5



## 6. TREATMENT OF CRITICAL SPOTS AND DETAILS

See specific diagrams for IMPERMAX STRAT system.

---

6



## 7. WATERPROOFING

Following Installation Manual guidelines, apply 2 to 3 kg/m<sup>2</sup> of IMPERMAX membrane (in two coats), of different colours, in order to achieve a minimum thickness of 1,6-2,2 mm. A sheet of RAYSTON FIBER 200 should be embedded on the first coat, as reinforcement.

6



Allow a minimum of 12-14 hours drying time between first and second coat. The first coat should not be tacky.

All height and level alterations, passing-through elements, junctions with different materials, joints, etc, must be treated with IMPERMAX+RAYSTON FIBER 200 for a minimum thickness of 1000 microns. Total continuity of the waterproofing layer must be ensured. It is advisable to use a dry metallic roller to ensure a total soaking of RAYSTON FIBER 200 into the first coat of IMPERMAX.

7



It is necessary to overlap with already treated zones at least 5 cm. Make sure the reinforcing sheet RAYSTON FIBER 200 is also overlapped. It is important to ensure a correct treatment of the critical zones, for that it could be necessary to slightly “shred” the glass fibre fabric to make it fit into existing corners and protruding elements.

---

**NOTE:** Avoid detachment, at level changes, of parts of the reinforcing sheet RAYSTON FIBER from the support, forming superficial “tents” that become air-filled spaces.

---

7



In warm conditions (above 30°C) it is recommended to add slow solvent to IMPERMAX (1 kg in 25 kg) to prevent a skin forming too rapidly and a bubbly appearance on the surface. This will also give a longer pot life.

In cold conditions (below 15°C) it is recommended to add Polyurethane Catalyst (1 kg/25 kg) to IMPERMAX in order to speed up the curing process and be able to apply more coats in less time.

When the first IMPERMAX+RAYSTON FIBER coat is dry enough, second coat may be applied, either by roller or airless spraying gun. In this case, make sure edges and details are treated correctly, since this is where the spraying equipment may have difficulties to access. Ensure a minimum coverage of 1 kg/m<sup>2</sup>.

If the IMPERMAX 25-type is chosen, a third coat of the same product must be applied, once the second one has reached a hard enough state. In order to ensure that enough coverage is applied, it is important to use direct systems (25 kg for 5m x 5m areas) by means of wet thickness gauges (micron reading) or dry-film procedures (test pits followed by reparation).

---

**NOTE:** When applied to vertical surfaces, it is recommended to add Thixotropy Additive to IMPERMAX, or apply more coats in order to achieve the desired thickness.

---

## APPLICATIONS ON WOOD

In case of applications of IMPERMAX STRAT on wooden surfaces, make sure the following requirements are met:

1. Wood must be suitable for outdoor use.
2. Installation and fastening must be done according to manufacturer instructions.
3. Wood panels must be rigid enough to hold the joint extensions.
4. Materials must conform to current legislation.
5. In new or treated woods, make sure adhesion of Adhesive PU Rayston is correct (carrying out a pull-off test). If necessary, sanding of the surface can improve adhesion.
6. If the materials are to remain uncovered during assembling works, protect them from rain and moisture.

## 8. FINISH

Using the IMPERMAX STRAT system implies finishing the waterproofing job by applying an IMPERTRANS 60 aliphatic polyurethane resin, with a chosen RAL colour.

This finish gives the system a better resistance to UV radiation and colouring according to RAL chart. This topcoat is a decorative and weather resistant coating. As a finish, an IMPERTRANS 60 coat of 300 gr/m<sup>2</sup> will be applied on the IMPERMAX membrane, 24 hour later from the previous coat.

The product can be applied by roller or airless sprayer machine, taking into account that it is a self-levelling resin, which can sag when applied on sloped surfaces if an excessive amount is used. Therefore, it may be necessary to apply 2 or 3 coats instead.

---

## ADVANTAGES

Use of IMPERMAX STRAT system offers the following advantages:

1. Totally seamless membrane, without joints or overlaps.
2. Totally bonded material; no water can flow between layers.
3. Elastic membrane. It bridges over cracks and offers movement resistance (according to EOTA TR-8 tests).
4. Insulation + waterproofing totally bonded to the surface, without excessive space requirements or creation of "dead" zones.
5. Allows for a high degree of freedom when designing roofs and other spaces.
6. Cost-effective finish, with no need of heavy protection (the product may remain exposed, according to ETA 06/0263).
7. It provides an aesthetic and decorative finish, because the waterproofing membrane can be covered with different colours (according to RAL chart).



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# IMPERMAX STRAT, SUSTAINABLE SYSTEM

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## ENERGY CONSUMPTION AND EXPENSES GROW WITH ECONOMIC DEVELOPMENT

One of the aspects that characterize the development in a society is its energy consumption in all forms, especially electric power. In this line, it can be observed that electricity use in developed countries has considerably increased lately.

Reduction of energy consumption in an environment with rising energy prices (gas, fuel oil, electricity) is essential for maintaining the potential for economic development. It is therefore important to control, rationalize and reduce the energy-related heating and acclimatisation expenses.

Energy expenses accounts for an average of 10% to 20% of the total expenses of a given business or administrative office, and more than 30% of the budget in an industrial plant.

The goal of the energy balance is to optimize the efficiency in all the sources that supply a given activity.

## ENERGY CONSUMPTION SHOULD NOT BE HIGHER THAN THE AVAILABLE ENERGY

For this reason, the reality of the limitation of the energetic resources will force a transition to a SUSTAINABLE energy future.

The only point that remains unsolved is how this transition will take place.



## INNOVATION AND ENERGETIC EFFICIENCY

Construction business is key in the overall energy consumption. Technical regulations are being modified worldwide in order to obtain higher energetic efficiency both in buildings and in the construction products.

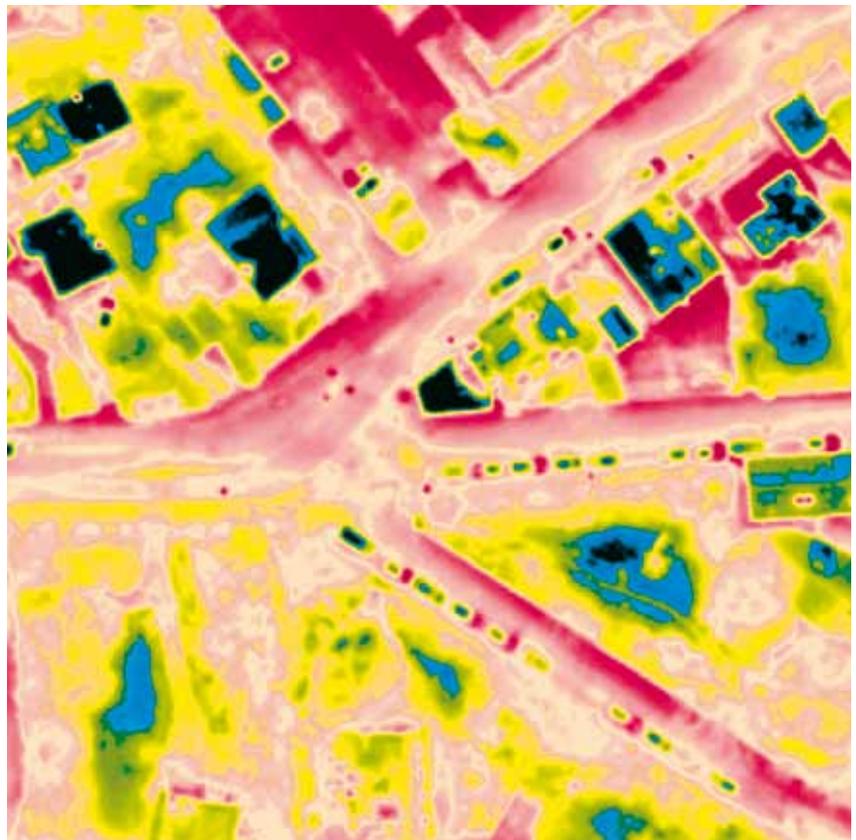
Rayston IMPERMAX STRAT roof system is completely adapted for both building refurbishment and new construction. This system integrates insulation and waterproofing, which allows obtaining sustainable buildings with high energy savings.

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---

### HEAT LOSS LEVELS

	Non-detectable
	Weak
	Medium
	High
	Very high
	Excessive



---

# INTEGRAL SYSTEM FOR PRE-EXISTING ROOF REFURBISHMENT

## WATERPROOFING AND INSULATION

---

Krypton Chemical, **sole manufacturer in Spain** of liquid polyurethane based membranes for more than 10 year, has successfully introduced the Rayston IMPERMAX STRAT system thanks to these notorious advantages:

- They are liquid products, with no joints, overlaps nor welding. This allows for continuous protection against weak points.
- It is a totally bonded system. It prevents water from flowing between layers.
- It can be installed on concrete, wood or metal supports.

### COMPLIANT WITH THE CTE (SPANISH TECHNICAL BUILDING CODE) REQUIREMENTS

Under the European Directive on Energy Performance of Buildings (2002/91/EC) and its transposition into the Spanish legislation, new requirements are appearing in the construction business in the areas related to energy consumption and insulation.

The Spanish Building Act (LOE), 38/1999 of 5 November, establishes, by means of the overall CTE code, three sets of basic requirements on functionality, safety and habitability of buildings.

In the habitability section, the Spanish Technical Building Code includes the basic document where the energetic efficiency requirements for new and refurbished buildings are laid down (U-value).

Rayston IMPERMAX STRAT system allows for the creation of an external surrounding layer, able to comply with the requirements for a suitable thermal comfort inside the building. This is achieved taking into account different weather, seasonal, or user conditions, and complying with the U-values set for the different climatic zones defined.

Krypton Chemical helps the designer by calculating the U-value (*see example in next page*) as a function in the different constructive systems and finding the insulation thickness (Rayston Foam) needed to comply with the threshold values as defined by the CTE code.

This system allows for:

---

### A SYSTEM FOR SUSTAINABLE BUILDINGS

Construction business is key in the overall energy consumption. Technical regulations are being modified worldwide in order to obtain higher energetic efficiency both in buildings and in the construction products.

Rayston IMPERMAX STRAT roof system is completely adapted for both building refurbishment and new construction. This system integrates insulation and waterproofing.



IMPROVEMENT  
OF THE CLIMATIC COMFORT



REDUCTION  
OF ENERGY CONSUMPTION



REDUCTION  
OF CO<sub>2</sub> EMISSION



ENERGETIC  
EXPENSES CUTS

---

## MAXIMUM THERMAL TRANSMITTANCE OF WALLS AND INTERNAL DIVISIONS OF THE THERMAL ENVELOPE "U" (W/m<sup>2</sup> K)

Walls and internal divisions	Zone A	Zone B	Zone C	Zone D	Zone E
Facade walls, internal partitions in contact with non-habitable spaces. First perimeter metre of floors flat on the ground (1) and first metre of walls in contact with the ground.	1,22	1,07	0,95	0,86	0,74
Floors (2)	0,69	0,68	0,65	0,64	0,62
Roofs (3)	0,65	0,59	0,53	0,49	0,46
Windows and window frames	5,70	5,70	4,40	3,50	3,10
Median walls	1,22	1,07	1,00	1,00	1,00

(1) Including underground slabs up to 0,5 m deep

(2) Internal partitions in contact with non-habitable spaces, such as vented crawl spaces, are considered floors

(3) Internal partitions in contact with upper non-habitable spaces, are considered roofs

## U VALUE IN FLOORS REFURBISHED WITH IMPERMAX STRAT

External layers	Thickness (m)	Lambda (W/mK)	R. Thermal	m <sup>2</sup> K/W
Colodur (aliphatic finish)	0,01	0,7	0,14	
Liquid waterproofing	0,03	0,7	0,43	
Rayston FOAM	0,05	0,029	1,72	
Stone/Siliceous stoneware	0,015	2,6	0,01	
Sand, gravel	0,08	2	0,04	
Waterproofing/asphalt	0,005	0,7	0,01	
Hollow brick	0,07	0,49	0,14	
Concrete/ceramic slab 20+4 cm	0,24	0,8	0,30	2,79

**Air chamber:** 25 mm // Non ventilated // Thermal R. 0,16

Internal layers	Thickness (m)	Lambda (W/mK)	R. Thermal	m <sup>2</sup> K/W
Plaster	0,015	0,35	0,04	0,04

**RESULT:** thermal transmission coefficient "U" 0,32



The U value varies with the climatic zone



Installing Rayston FOAM (insulation layer)

P. 31



Installing Rayston Vel sheets



Installing IMPERMAX + Rayston Fiber



IMPERMAX + topcoat (Colodur)

# SISTEMA 6 IMPERMAX FOR FIBROUS CEMENT / ASBESTOS

Specific system for treatment of fibrous cement roofing. This system holds a proprietary patent ES 10070795 U.

## PROBLEMS WITH FIBROUS CEMENT ROOFS

Fibrous cement plates have been used in many facilities such as industrial buildings, and in general roofing in order to protect them from sunlight and rain.

P. 32

They were extensively used in the past due to the plates' special contraction characteristics. They are easy to cut and perforate and are inexpensive when compared with other materials.

Manufacturing and sale of these products are totally forbidden from 2002 onwards. Nevertheless, the health concerns remain since there are many buildings with old fibrous cement roofs.

According to the GUE/NGL report, asbestos is still a major lung cancer cause for European workers. Asbestos is the second most carcinogenic substance outside the workplace.

According to the Spanish Decree RD 396/2006, only authorized companies are allowed to deal with these materials, and they must be registered in the Asbestos Risk Companies List (REA).

## HOW TO DEAL WITH THESE ROOFS?

Krypton Chemical has developed an integral procedure for the cleaning, encapsulation and waterproofing of the fibrous cement.

The sealing and encapsulation system offers the advantage of being cheaper than removal and replacement of the roof, in addition to complying with all the current environmental and safety regulations.



## ADVANTAGES

**Encapsulation without total roof removal.**

### 1. IMPERMAX

IMPERMAX system for liquid waterproofing is certified for a 10 or 25 year working life (ETA 06-0263).

### 2. IMPERMAX 2K

IMPERMAX 2K system allows for a fast-curing encapsulation by mechanical hot spray application. This procedure offers a significant advantage when return to service must be as quick as possible.

This system is certified for a 25 year working life, according to ETA 10/0296.

1. These two systems provide excellent surface protection, extending the roof working life in such a way that, with the asbestos fibres encapsulated, current roofs increase their durability.

2. **They offer an ecological option while keeping the current roof in place.** No resources are consumed in the removal works or in the transport to the dumping site, where there is a space needed for other kind of non-recoverable waste.

3. Since the roofs do not need to be removed, **normal activities** (industrial, storage) **inside the facilities are not disturbed.**

4. **They comply with all the health & safety regulations** both for your employees or partners and for the rest of the community.

## FINISH

The liquid membranes IMPERMAX and IMPERMAX 2K may change colour (yellowing), without any property impairment.

**It is recommended to apply an aliphatic finish.**

### 1. COLODUR 60

Aliphatic membrane ensures the waterproofing and sealing of light entrances, keeping indoor luminosity.

### 2. IMPERTRANS 60

Aliphatic membrane, elastic. It can be tinted (e.g. in white, in order to improve light reflection) in any RAL colour.



## PROCEDURE

### 1. SUPPORT PREPARATION

A



B



C



D



### 2. FILTERING OF WASHING WATERS

A



B



C



D



### 3. ENCAPSULATION AND WATERPROOFING TREATMENT

4. After cleaning allow drying before primer application.  
(See Section "Primers", p.16 for suitable primer options).

5. Apply waterproofing system IMPERMAX or IMPERMAX 2K.  
These liquid products are resins that, after polymerization, become elastic, polymechanic and high-performance membranes.

A



B



C



D



# SISTEMA 7 IMPERMAX GREEN ROOF

IMPERMAX GREEN ROOF system is specially designed for garden roofs.

## WHAT IS A GARDEN ROOF?

A garden roof (also called green roof) not only combines all the advantages in thermal and acoustic insulation, but also makes a contribution to the rain cycle, biodiversity and the natural treatment of the atmospheric pollution, especially in urban areas.

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Garden roofs are known and used since ancient times. They have been traditionally used to keep houses away from the cold and rain (a perfect waterproofing) and from 1970 in Northern Europe (Germany, Netherlands, Switzerland, Nordic countries). It is a usual architectural feature in sustainable buildings with high environmental quality.

These kinds of roofs are built in flat or slightly sloped surfaces with a vegetal substrate: grass, bushes, turf (especially wind-resistant). They are easily applied and only local and traditional materials are needed. They require a solid supporting structure, able to hold the entire roof weight. Nowadays, modern experiments with garden roofs combine the natural protective layer with modern materials.

The Spanish Technical Building Code entered into force on March 29, 2007 (one year after its approval date) with the aim of improving building quality and to promote innovation and sustainability in the construction process.

Garden roof development is really changing architecture and urban design.

The polyurethane membrane IMPERMAX Rayston by Krypton Chemical has been certified as root puncture resistant, with or without Geomax as a reinforcing membrane element.

*(See certificate p. 09)*

## RAYSTON BIO ROOF DRAIN

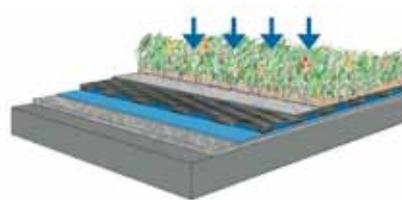


Draining layer RAYSTON BIO ROOF DRAIN is composed of inner cavities where part of the water gets trapped.

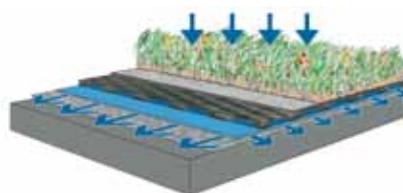
## HOW DOES A GARDEN ROOF WORK?

Green roofs are spaces built on top of any type of building that provide a leading sustainability and multiple economic and environmental benefits.

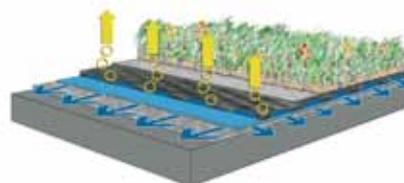
- Easy, light, and trouble-free maintenance system
- By means of a “green roof” system, concepts of nature, energy efficiency, waterproofing, water saving and solar energy are combined.



1. Rain water soaks into the substrate and seeps through the geotextile (GEOMAX PROTEC) down to the draining layer Rayston Bio Roof Drain.



2. The rest of the water flows through the holes in the upper side of the Bio Roof Drain sheet and, when this filtered portion arrives to the geotextile layer, it gets trapped in it. The geotextile acts as a retaining membrane.



3. According to the natural water cycle, water evaporates, humidifying and oxygenating the substrate through the Bio Roof Drain holes.

## TYPES OF GARDEN ROOFS



### INTENSIVE ROOF

This kind of roof allows for the installation of adaptable green areas depending on the building appearance (turf, bushes, trees).

**Multifunctional use:** permits combination with other uses, such as terraces, pedestrian or recreational zones, and even vehicle access areas.



### EXTENSIVE ROOF

For a slow-growing and wide-covering garden with substrates of 15 cm minimum thickness on horizontal roofs.

Best adapted and widely used plants for these roofs are Sedum-type and aromatics. Sedum advantages are e.g. limited load and reduced maintenance costs.



### SOLAR ROOF

Solar roofs are built more often these days. It is therefore interesting to give them a better and landscape integrated aspect.

The IMPERMAX Rayston membrane is root puncture-resistant as certified by the independent laboratory Applus.

*(See certification p. 09).*



### ROOF WITH TRAFFIC

Roofs with traffic can be installed over underground garages, common areas and even tunnels. They provide multifunctional use areas: services access, air-conditioning equipment installation, vehicle traffic and even recreational areas.

Besides the load provoked by every kind of use, occasional overloads must be taken into account, vibrations due to working machinery or driving force behind running vehicles.



## WHY ARE THESE ROOFS NECESSARY

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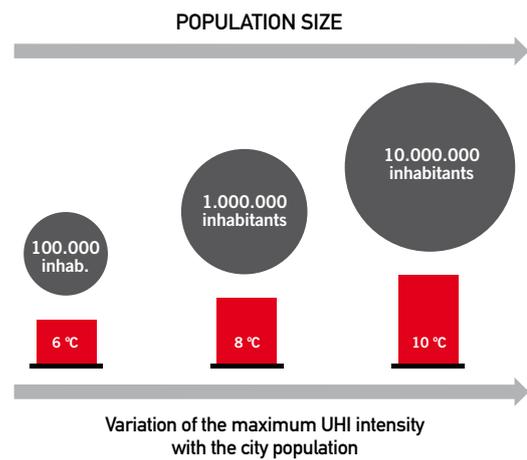
In many cities, air temperature is higher than in non-urban areas. This is called “urban heat island effect” (UHI).

Temperatures in the city are circle-shaped, with lower values in the outskirts. UHI is not constant, and is more often found in certain zones, e.g. city centre, industrial areas, power stations...

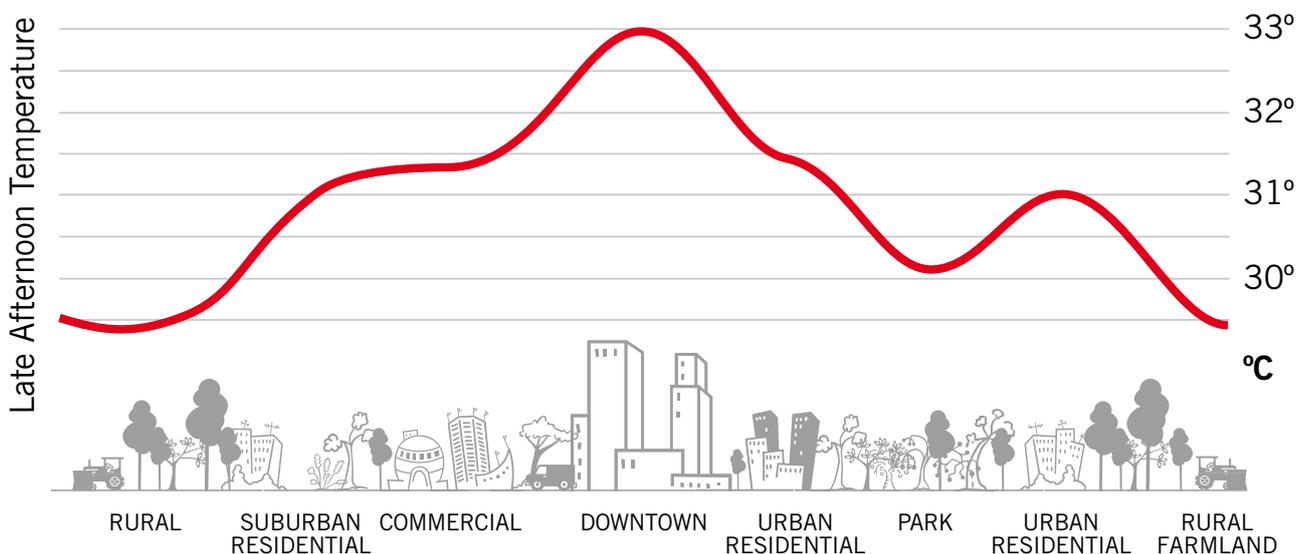
This “urban heat island effect” is also due to the great number of inhabitants and the anthropogenic heat emissions.

This kind of roof reduces heating and humidifies the air. It also reduces dust and aerosol-related pollution.

Variation of the maximum UHI intensity with the city population



Sketch of an Urban Heat Island profile



## BENEFITS

### Benefits for buildings

In addition to a very attractive appearance, garden roofs offer many ecological and economical advantages.

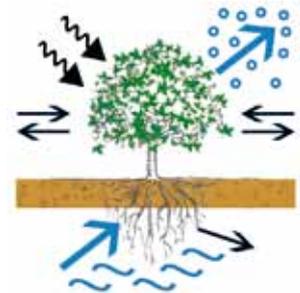
- Setting of a garden roof has a direct impact in the durability and comfort of the buildings.
- These roofs guarantee perfect and durable watertightness, provided that the materials are protected from UV radiation and weathering effects.
- The building is also protected against thermal shocks due to the contact of cold rain with a hot roof.
- Temperatures are more constant. This is a means to reduce mechanical tensions and improve life conditions of the dwellers.
- Another significant benefit of a garden roof comes from its natural insulating properties.
- Thermal insulation obtained may give significant energy savings, especially in summer cooling costs and, to a lesser extent, in winter heating costs.
- As for soundproofing, performance is very good, provided that either the soil as the vegetation is among the best sound insulators known.
- Garden roofs are cost effective. Either for small garages as for big industrial roofs.

### Benefits for the people

- Green is a powerful anti-stress colour.
- In addition to this, the eco-roof allows for a better global experience, in terms of health (lesser environmental pollution, less pollen, fresher air) and in terms of daily life economy (building durability, higher selling price, energy savings)

Green or Garden roofs are spaces built in the roof of any building, standing out for their sustainability and for their many economic and environmental advantages.

1. Easy, light, and trouble-free maintenance system.
2. By means of a "green roof" system, concepts of nature, energy efficiency, waterproofing, water saving and solar energy are combined.
3. Garden roofs create a pleasant environment by **reducing air heat and humidifying the urban environment.**



4. These kinds of roofs are capable of **retaining up to 90% of rainfall.**

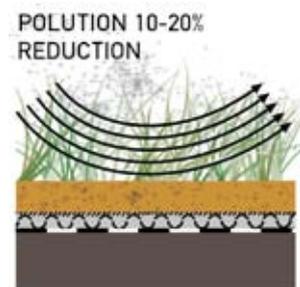
Most of water returns to the atmosphere, leaving a small fraction which is slowly collected by the drains.

This means a cost improvement, by the corresponding reduction in rainwater drainage system size.



5. **Pollution** by dust and aerosols is **significantly reduced** by the air-filter effect.

Plants have a filtering effect, improving air and water quality (CO<sub>2</sub> and other toxic element reduction).



6. Another significant benefit is a **reduction ambient noise** (up to 8 dB). Behaves as a soundproofing layer.



## CONCEPT

To obtain a sustainable garden roof it is necessary to build the system correctly. Consequently, Krypton Chemical has developed a complete green roof system, adaptable to any need.

IMPERMAX GREEN ROOF system by Rayston is composed of the waterproofing layer, the polyurethane membranes IMPERMAX and IMPERMAX 2K and the necessary drainage for each case.

### IMPERMAX GREEN ROOF example 1

1. Resistant support
2. Slope formation
3. Primer
4. IMPERMAX or IMPERMAX 2K
5. Insulating tiles RAYSTON DALE
6. Draining layer RAYSTON BIO ROOF DRAIN
7. GEOMAX PROTEC
8. Ecological substrate
9. Plants



### example 2

1. Resistant support
2. Slope formation
3. Primer
4. IMPERMAX or IMPERMAX 2K
5. Ajustable support
6. Butyl Tex 30
7. Insulating tiles RAYSTON DALE
8. Draining layer RAYSTON BIO ROOF DRAIN
9. GEOMAX PROTEC
10. Ecological substrate
11. Plants



### example 3

1. Resistant support
2. Slope formation
3. Primer
4. IMPERMAX or IMPERMAX 2K
5. GEOMAX PROTEC
6. Draining layer RAYSTON BIO ROOF DRAIN
7. GEOMAX PROTEC
8. Ecological substrate
9. Plants



**NOTE:** Krypton Chemical offers its Technical Department that can help you evaluate the different needs for every job.

# SYSTEM 8 IMPERMAX D

IMPERMAX D system describes the different critical point treatments that may be found in job sites. It is distinguished by the type of liquid membrane (IMPERMAX/IMPERMAX 2K) used.



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## IMPERMAX DETAIL AND CRITICAL POINT TREATMENT WITH COLD-APPLIED SYSTEMS

All size buildings in contact with water frequently present leaks at specific point. These critical points are more or less numerous depending on the type of work. If overall watertightness needs to be guaranteed, it is very important to deal with these points in the right way.

Critical points mean those roof elements that, due to their function or position, require a different treatment or a more careful implementation than the rest of the roof to avoid subsequent problems.

With the cold-applied liquid waterproofing systems (IMPERMAX), critical points must be reinforced with a reinforcing net made of a highly resistant fibre geotextile such as glass or polyester. The function of this geotextile is to improve the fatigue and perforation resistance of the waterproofing membrane.

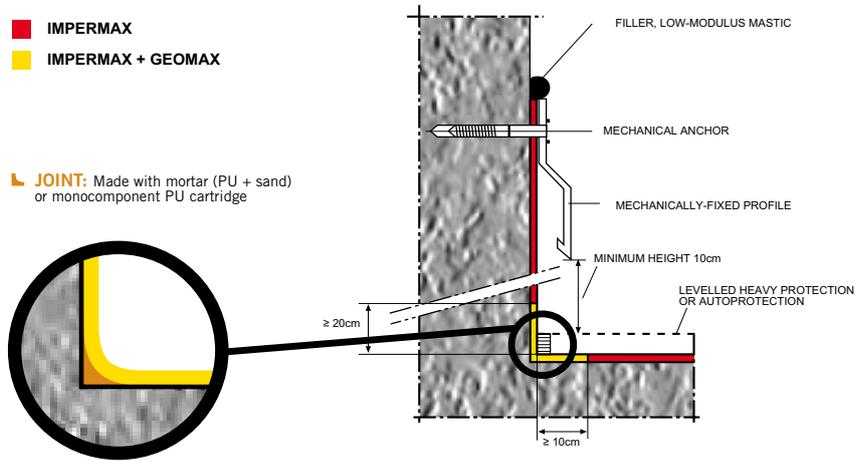
With the hot-applied membranes (IMPERMAX 2K) a highly resistant adhesive tape is used, as a separation layer. Thus, the “floating” membrane has more capacity of movement at these points.

# JUNCTION TREATMENT BETWEEN HORIZONTAL AND VERTICAL SURFACES

## HALF-ROUND ELEMENTS

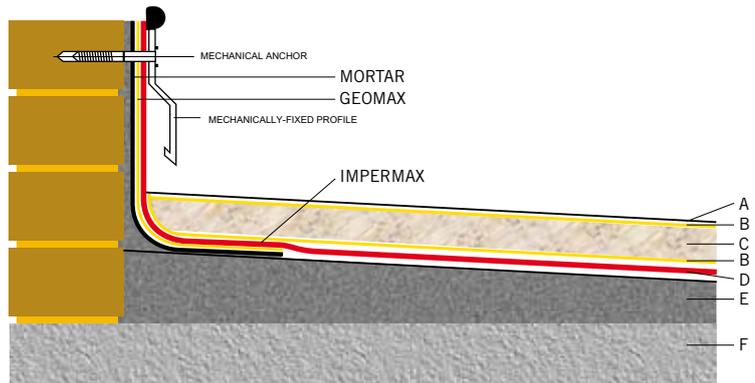
It is very important that the half-round points are clean, dry, stable and linked to the rest of the roof. The height of geotextile to be applied on the vertical part depends on the amount of water expected to fall on the roof. As a general rule, it is recommended to apply 20 cm at the vertical part and 10 cm at the horizontal part, if 30 cm Geomax rolls are used.

### CASE 1 WATERPROOFING INSTALLATION



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### CASE 2 INSULATING INSTALLATION OVER WATERPROOFING LAYER



- A. Tiles/topcoat resin (optional)
- B. GEOMAX (recommended)
- C. Insulation
- D. IMPERMAX
- E. Cellular concrete
- F. Concrete

## WATER COLLECTORS

These are very important parts. They must be treated correctly because they are places where subsequent problems may arise. Collectors are: gutters, water inlets, sinks, drains.

## GUTTER TREATMENT

Gutters collect rainwater from the whole roof and divert it away. They are therefore attention demanding zones.

BEFORE

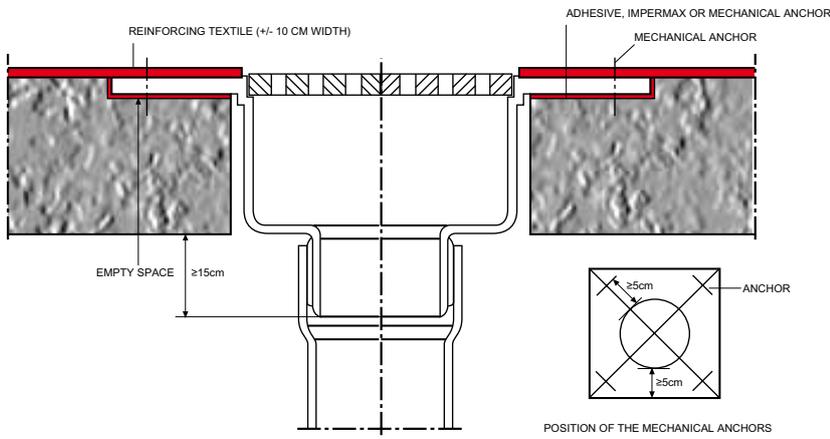


AFTER



# DRAINS INSTALLATION

## CASE 1 ROOFS WITH IMPERMAX, WITH DIRECT TRAFFIC ON

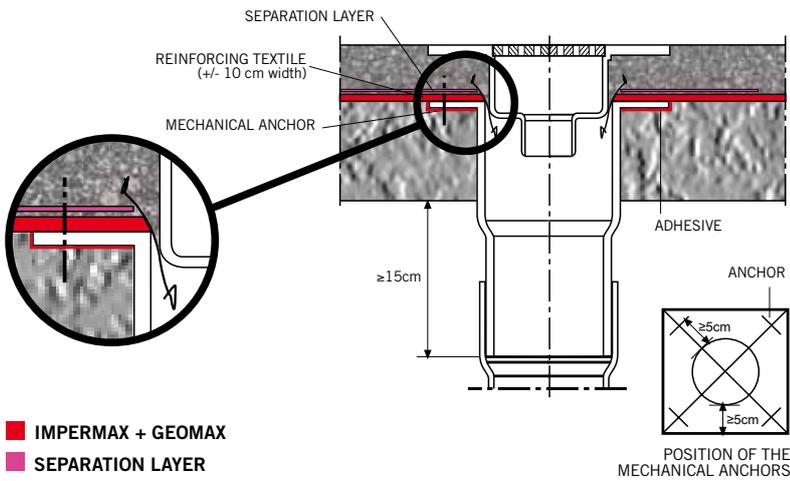


■ IMPERMAX + GEOMAX



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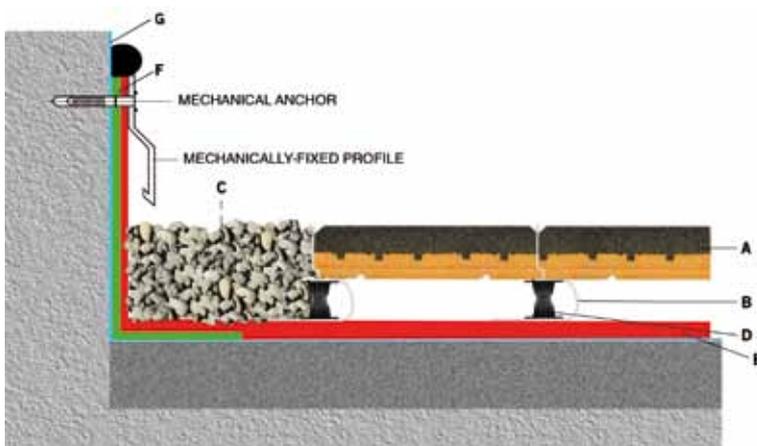
## CASE 2 IMPERMAX UNDER HEAVY PROTECTION



■ IMPERMAX + GEOMAX  
■ SEPARATION LAYER



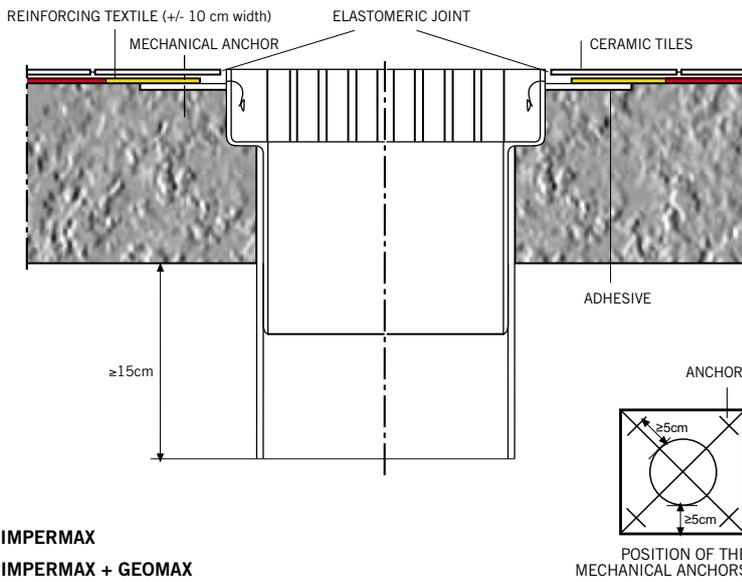
## CASE 3 CONNECTIONS OF THE IMPERMAX GARDEN SYSTEM



- A. RAYSTON DALE
- B. GEOMAX PROTEC (recommended)
- C. Gravel
- D. Adjustable support
- E. IMPERMAX
- F. IMPERMAX+GEOMAX
- G. Primer



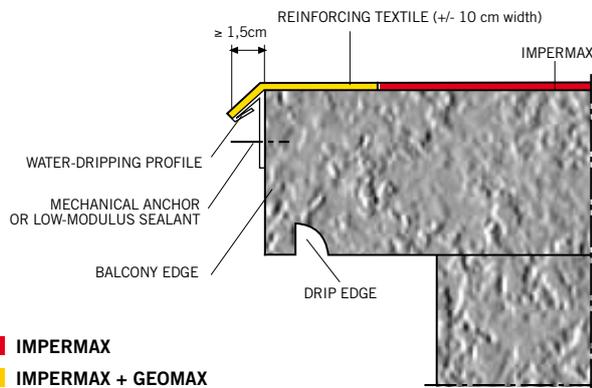
## CASE 4 DRAIN CONNECTION. IMPERMAX UNDER BONDED TILES



- IMPERMAX
- IMPERMAX + GEOMAX

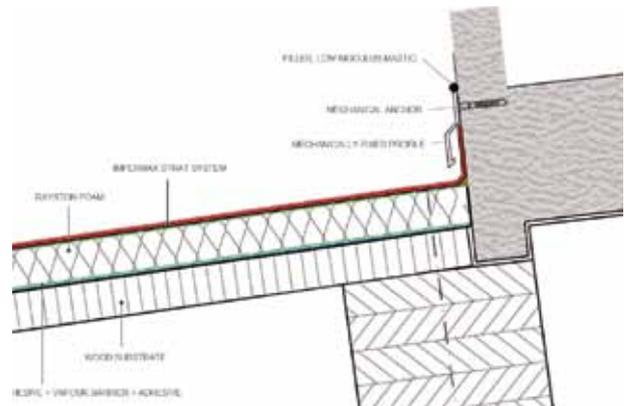
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## CASE 5 CONNECTIONS WITH EDGES

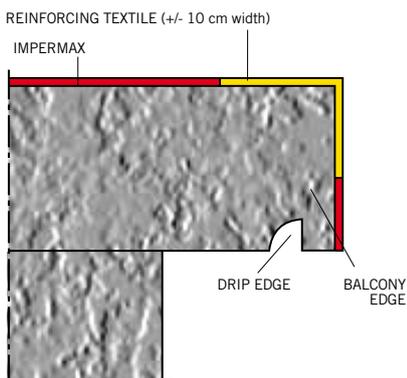


- IMPERMAX
- IMPERMAX + GEOMAX

## CASE 6 CONNECTIONS WITH IMPERMAX STRAT SYSTEM



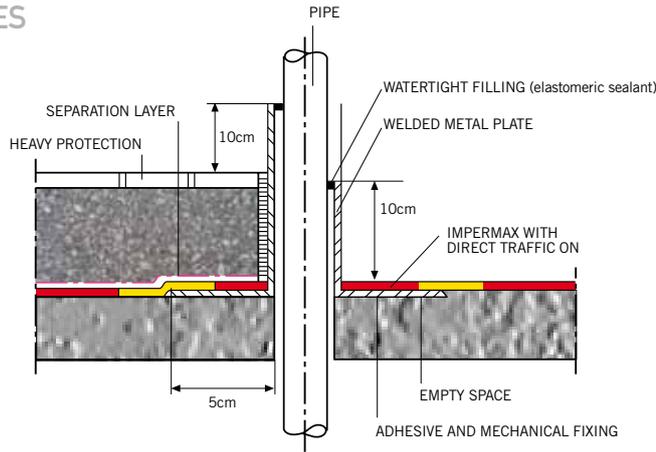
## CASE 7 CONNECTIONS WITH VERTICAL SURFACES



- IMPERMAX
- IMPERMAX + GEOMAX



## CASE 8 PASSING PIPES



- IMPERMAX
- IMPERMAX + GEOMAX
- SEPARATION LAYER

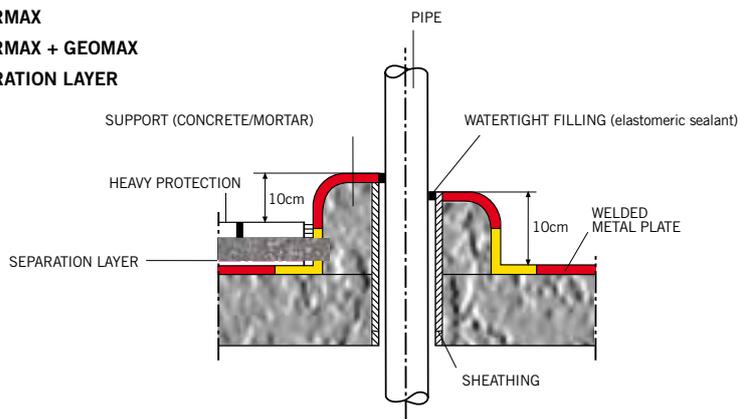
The emerging section of the pipe must be covered for a minimum of 10 cm with the IMPERMAX system.



If flooding is likely, allow for a 20 cm minimum length treatment.

## CASE 9 COPPER PASSING PIPES WITH SHEATHING

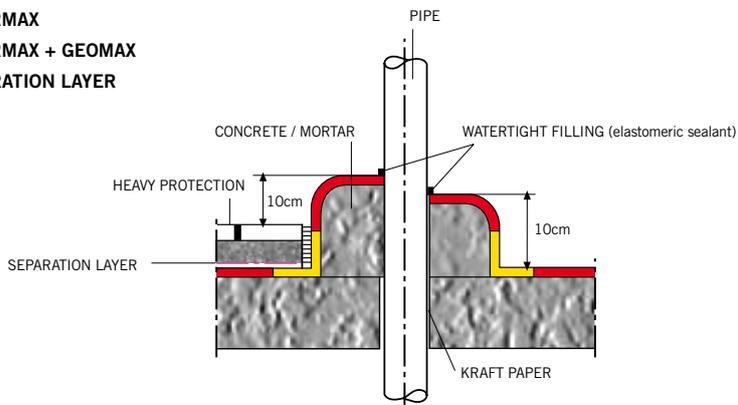
- IMPERMAX
- IMPERMAX + GEOMAX
- SEPARATION LAYER



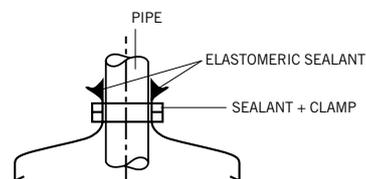
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## CASE 10 PREEXISTING PIPE WITHOUT SHEATHING

- IMPERMAX
- IMPERMAX + GEOMAX
- SEPARATION LAYER



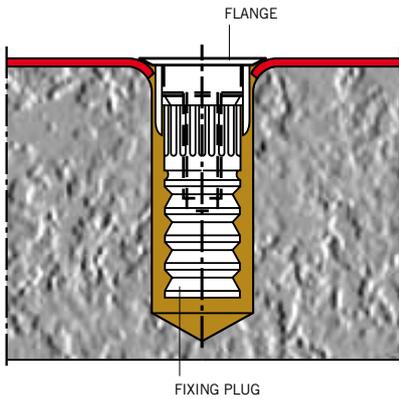
### COVER FOR UNPROTECTED CASES



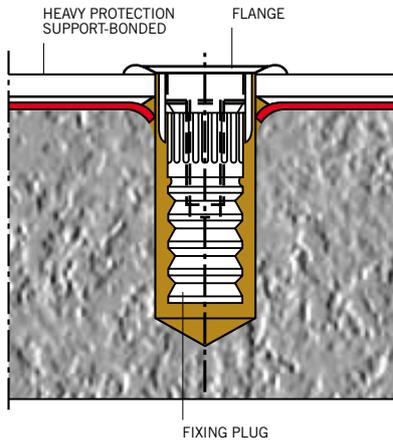
## FIXINGS

Fixing must ensure waterproofing continuity. They are made of fast-curing thermo reactive binders, hydraulic sealing mortars or synthetic resins.

### DIRECT FIXING IMPERMAX ROOF WITH DIRECT TRAFFIC ON



### DIRECT FIXING IMPERMAX ON HEAVY PROTECTIVE LAYER



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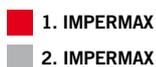
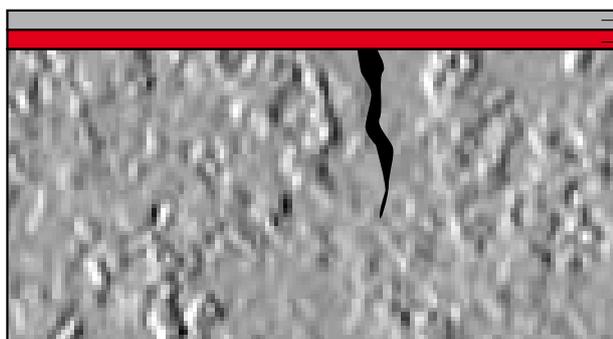
## CRACKS/FISSURES

Cracks between 0,3 mm and 2 mm will be bridged with IMPERMAX and GEOMAX-reinforced (with a minimum 3 cm overlap at both sides)

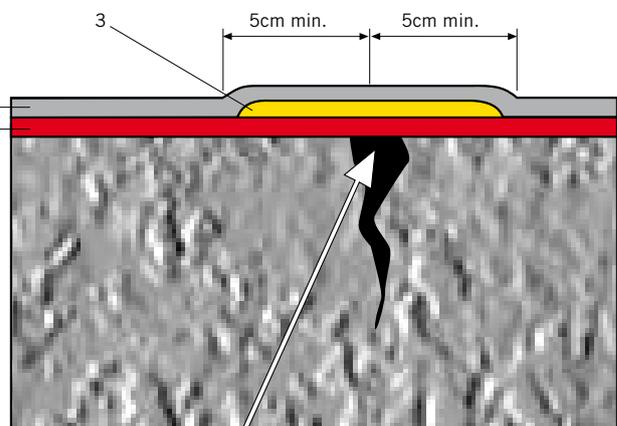
Cracks bigger than 2 mm will be treated as expansion joints are.

Cracks smaller than 0,3 mm will be covered with IMPERMAX, without additional reinforcement.

### <0,3mm MICRO-FISSURES



### 0,3-2mm WIDE FISSURES

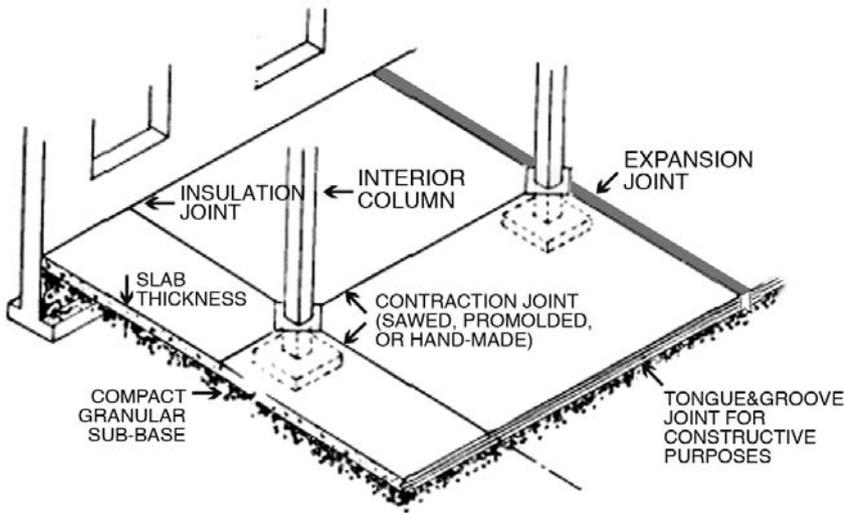


FILLED WITH A LOW-MODULUS PU SEALANT

## TYPES OF JOINTS

Joints in concrete slabs or screeds allow material to move, preventing irregular crack formation. These cracks are formed by setting or shrinking of the material, temperature changes or effects of applied loads.

There are several kinds of joints. Each one requires a different sealing method, depending on the joint depth and characteristics.



Joints must be sealed in order to prevent water from entering or passing into the support base. They facilitate cleaning and provide material continuity across the edges, preventing cracks under traffic stress.

Rayston systems provide, as a main benefit, a membrane with an important elongation capability, based on a liquid polyurethane (IMPERMAX/IMPERMAX 2K-based).

**NOTE:** The joint treatment method, as described in this manual, is only valid for joints with a movement range up to 50% of the joint size (e.g. 10 to 15 cm). If bigger movements are possible, mechanical joints must be installed, working independently from the waterproofing materials.

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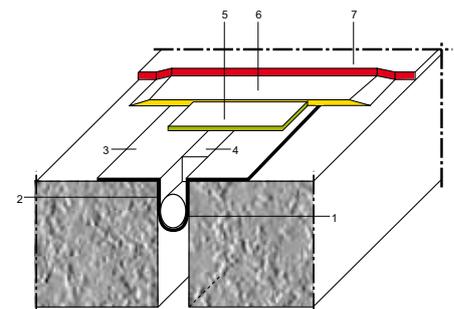
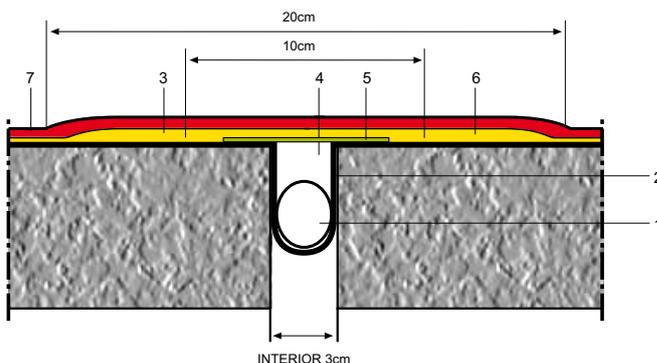


Mechanical joint

## EXPANSION JOINTS

Expansion joints allow movement, both vertical and horizontal, between the slab, walls, columns, manholes or any point where contractions can occur. These joints are placed along all the slab thickness in order to ensure the slab edges are isolated from the adjoining structures.

For the deepest joints, use RAYFOND RAYSTON as a backer rod, to minimize cost and prevent IMPERMAX dripping.



1. Backer rod (PE foam)  
2. GEOMAX

3. IMPERMAX + GEOMAX  
4. Low modulus PU sealant

5. Spacer (PE)  
6. IMPERMAX + GEOMAX  
7. IMPERMAX

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## GLASSWARE



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### SKYLIGHT / LIGHT TUBE

Being a liquid product, IMPERMAX is easily adapted to the forms of every case.

It is important to reinforce the IMPERMAX membrane with GEOMAX.

The junction must be treated in the same way as the junctions with vertical structures and passing pipes.



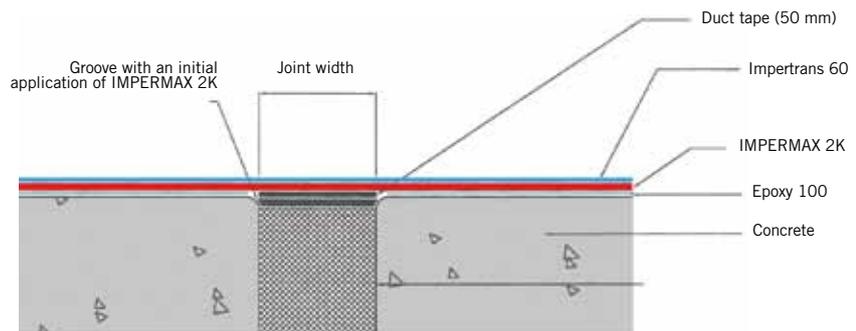
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# IMPERMAX 2K

## DETAILS AND CRITICAL POINT TREATMENT WITH HOT-APPLIED SPRAY SYSTEMS

### EXPANSION JOINT

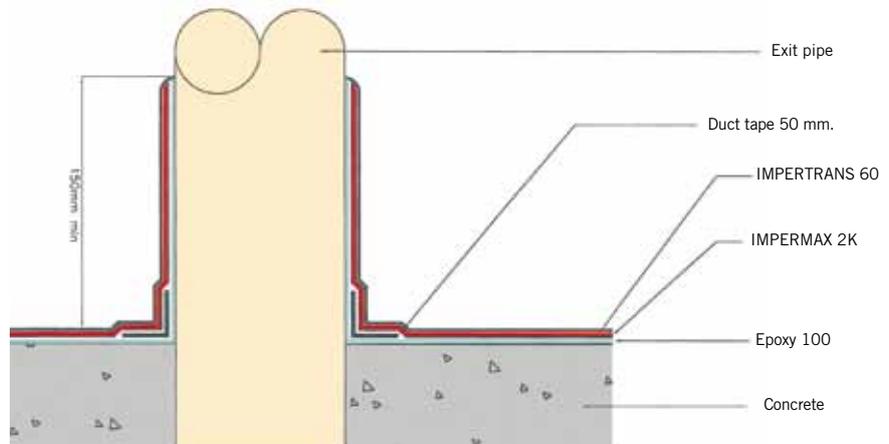
This scheme allows a movement up to 50% of the joint width



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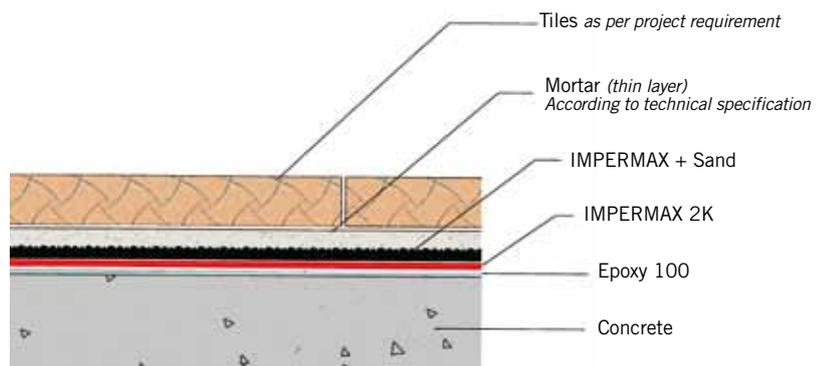
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### PASSING PIPES



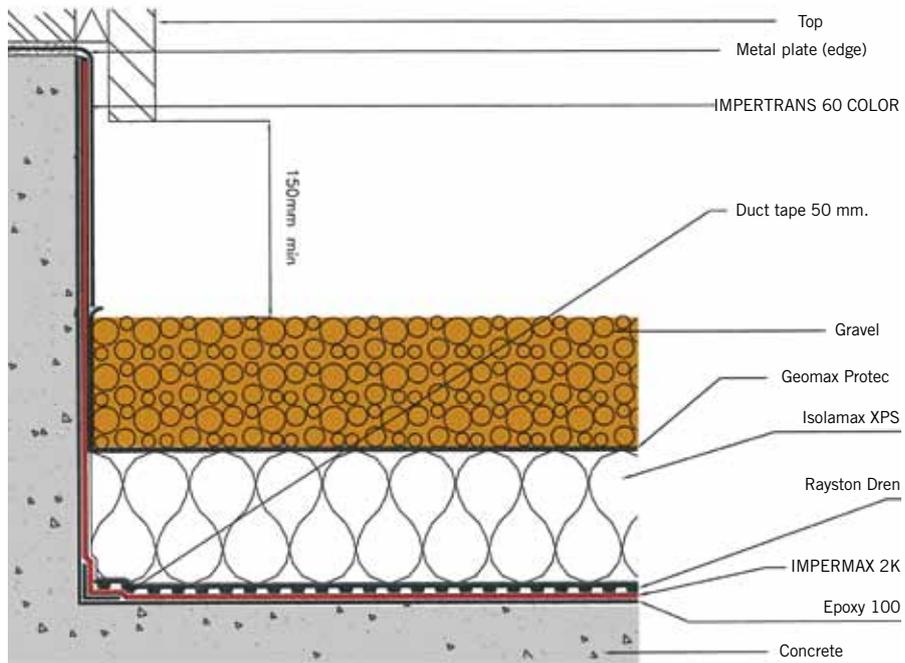
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### WIDE AREAS WATERPROOFING



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## INVERTED ROOF

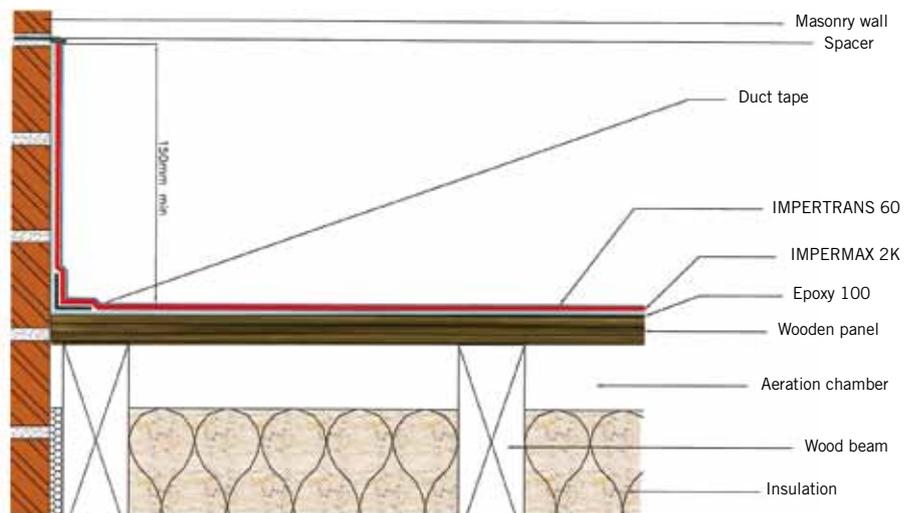


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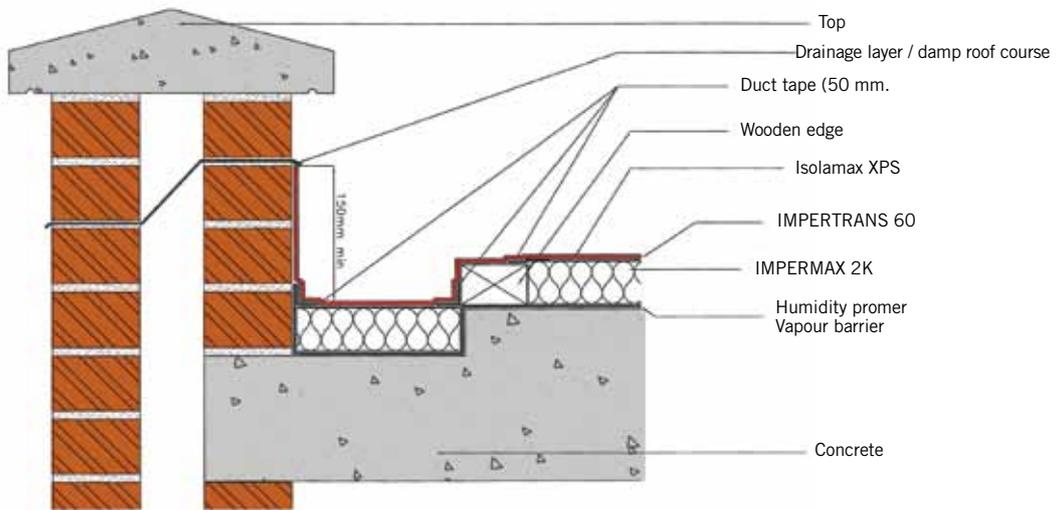
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## TRADITIONAL ROOF



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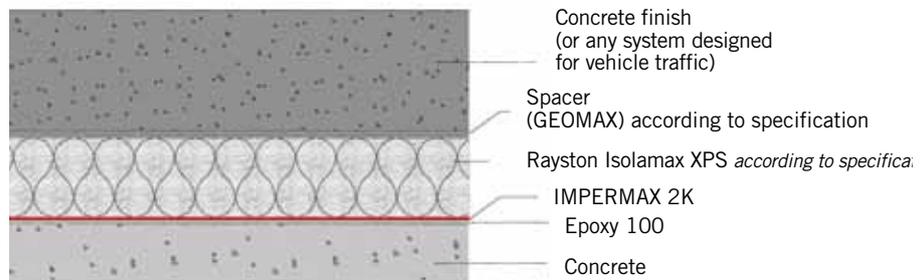
## TRADITIONAL ROOF



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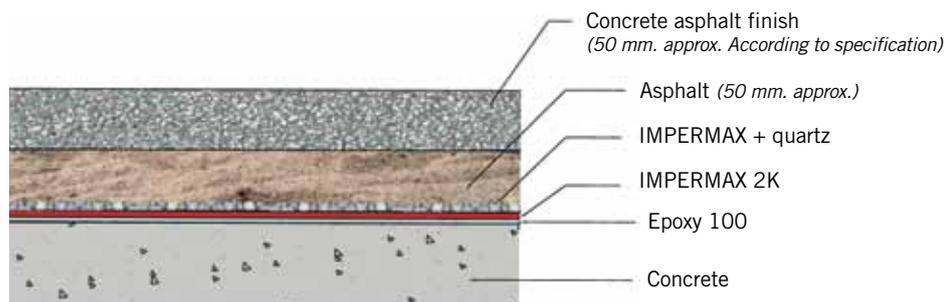
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## INSULATED ROOF WITH VEHICLE TRAFFIC



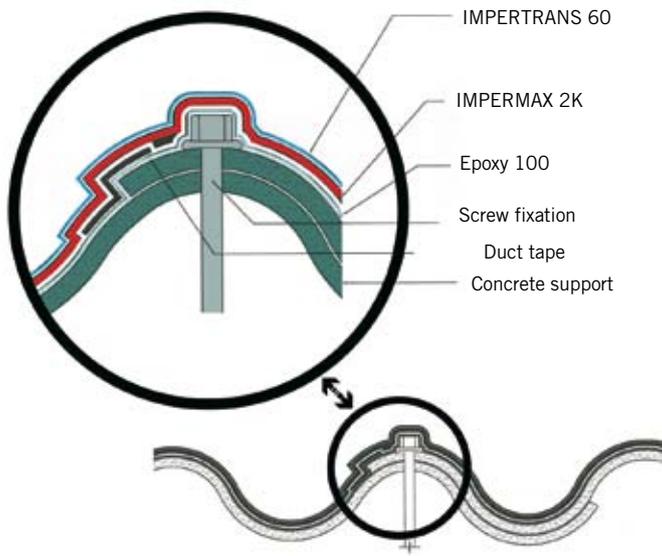
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## ROOF WITH ASPHALT CONCRETE FINISH



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## SANDWICH PANEL / CONCRETE TILES

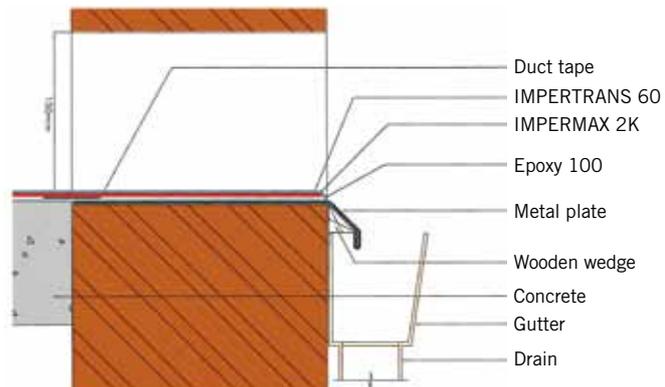


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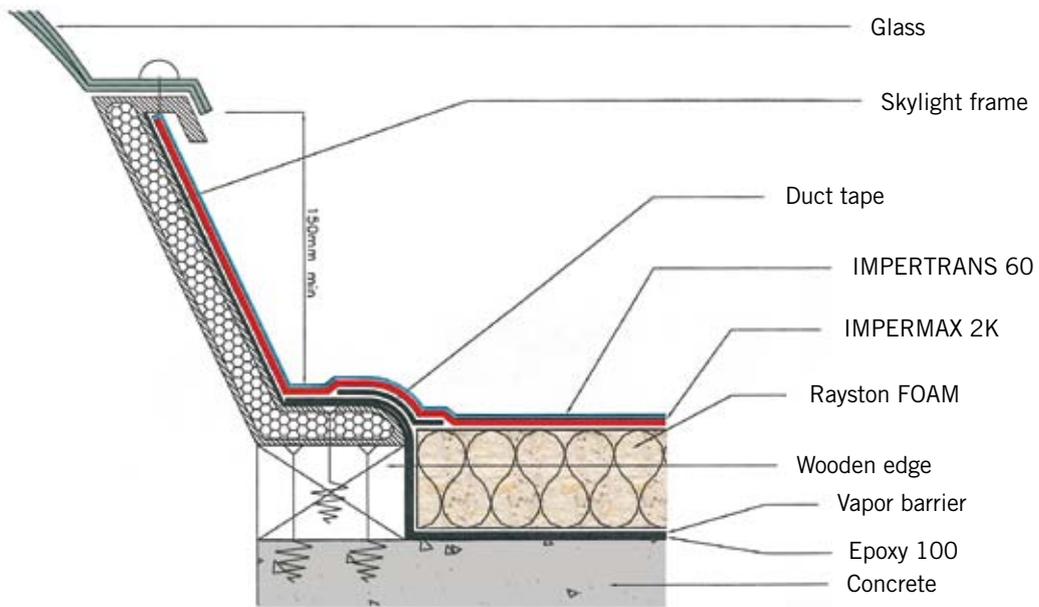


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## STORMWATER DRAINAGE JUNCTIONS

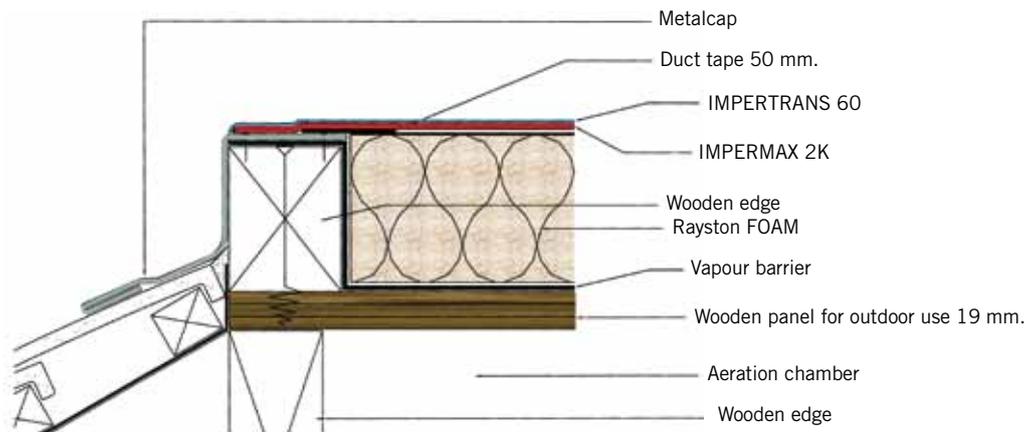


## SKYLIGHTS

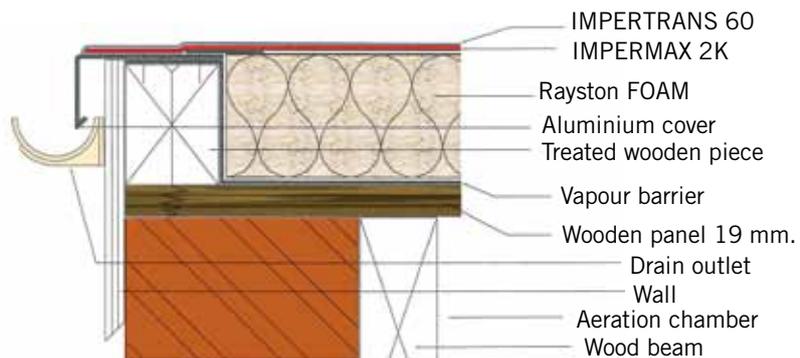


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## STANDARD / MANSARD ROOF



## DRAIN OUTLET



# MAINTENANCE AND REPAIRING

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## MAINTENANCE

A maintenance work must be carried out on the IMPERMAX / IMPERMAX 2K treated roofs according to the intended use. This work includes the following tasks:

- Leaf removal
- Grass, moss, vegetation, dirt removal
- Keep storm water system in good working order.
- Ensure gratings are in place, in order to prevent gutter obstructions.
- Check proper condition of several structures (flashing, seams, retaining walls...)
- Verification of possible damages due to improper use.

If aesthetic appearance of the roof is an important issue, it is essential to regularly clean the surface with water (*some detergent may be added*), according to the use.

It may be necessary to reapply decorative layers (Impertrans, Colodur) if they are worn out due to traffic, weather, corrosion, UV...).

## REPAIRING

**All repairing must be done on clean and dry supports.**

**All torn or detached areas must be wholly removed.**

### SUPERFICIAL DAMAGE

If the damage on the protective layer is superficial, the surface must be treated with a mechanical sanding using a suitable abrasive disc. Next, it must be cleaned with Rayston Solvent and, finally, apply a coat of PU PRIMER Rayston (100 to 150 gr/m<sup>2</sup>). Finish with the IMPERMAX / IMPERMAX 2K previously specified.

### EXTENSIVE DAMAGE

If damage to the IMPERMAX / IMPERMAX 2K membrane is considerable, it is important to investigate the cause and find out the solution. Next, a sanding must be done and all the detached material must be removed. Once this procedure is completed, apply the IMPERMAX / IMPERMAX 2K system as usual.

### DAMAGE AFFECTING MORE THAN 5% OF TOTAL AREA

When more than 5% of the membrane area is degraded, removal of the whole membrane is advisable. If less than 5% is affected, only damaged areas need to be removed.



Maintenance begins after the job is finished, and requires periodical inspections, at least once a year

# TROUBLESHOOTING

Liquid waterproofing systems may present a range of problems arising from defective application procedures, unsuitable supports, adverse weather conditions...

Here are described some of the more usual problems, with the probable causes and how to fix them.

## BLISTERS / BUBBLES

### CAUSES

- Mixing too fast. Excessive stirring speed. Trapped air bubbles have no time to leave the liquid
- Moisture in the support, or coming from beneath
- Applied coat is too thick (IMPERMAX monocomponent membrane can only be applied in up to 1 kg/m<sup>2</sup> coats)
- Application on an unsealed hot support. Upward flows of warm air or water vapour
- Application under extreme sunlight or high temperatures
- Failure to use spike roller after application
- Premature application, before complete curing of the previous coat
- Defective, unbalanced mixing ratio of IMPERMAX 2K

### SOLUTION

Wait until cure. Cut and remove blisters. Fill cavities and reapply IMPERMAX / IMPERMAX 2K.

## ADHESION FAILURE

### CAUSES

- Wet support. PU membranes IMPERMAX / IMPERMAX 2K must be applied only on dry supports, at 3° C over dew point
- Incompatible support (*polyethylene, polypropylene, etc*)
- Application before full cure of the previous coat

### SOLUTION

- Sanding, removal of detached areas and support repairing

## SAGGING

### CAUSES

- Applied coat is too thick

### SOLUTIONS

Sanding and application of the rest of the recommended number of coats.



## APPLICATION OF IMPERMAX WITH COLD-APPLIED SPRAYING EQUIPMENT

### MINIMUM REQUIREMENTS OF THE AIRLESS SPRAYER

TECHNICAL CHARACTERISTICS	
Power	3.1 KW (230V)
Maximum pressure	228 bar
Weight	83 Kg.
Maximum flow output	6,6 l/min.
Flow output at 120 bar	5,6 l/min.
Maximum tip size	0,052"
Tip model	427



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**NOTE:** When using airless sprayers, it is very important not to apply the product to an excessive thickness. This may cause a foamed layer due to the expansion of the trapped air. It is recommended to apply in 3 or 4 coats of 0,5-0,7 kg/m<sup>2</sup> each instead.

## APPLICATION OF IMPERMAX 2K WITH HOT-APPLIED SPRAYING EQUIPMENT

### MINIMUM REQUIREMENTS

TECHNICAL CHARACTERISTICS	
Electrical requirements	35 A-400 V, three-phase AC
Maximum working pressure	240 bar (24,0 MPa, 3500 psi)
Weight	198 Kg.
Maximum flow output	7,6 l/min.
Maximum hose length	94 m.
Air consumption at 7 bar	See note (1)
Heater power	15 300 W



(1) Air supply is needed for the delivery pump and spraying gun operation.  
A 3-HP (metric) air compressor is recommended.

**NOTE:** Recommended temperature for application using hot applied spraying equipment is set between 60° C and 70° C. Optimum application conditions are:

**Pressure:** 150 bar

**Product temperature at the delivery tank:** 70° C

**Product temperature at the hose:** 65° C

# COMPLEMENTARY PRODUCTS

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## RAYSTON ACCELERANTS

The IMPERMAX polyurethane membrane cures quickly enough in most conditions. However, there are situations (low humidity, low temperature) where a shorter curing time is desirable.

**The RAYSTON range of products includes three different accelerants to be chosen according to the different needs.**

### PUR CAT

(Mixing ratio 1 kg. / 25 kg. IMPERMAX)

Improves curing speed and surface appearance.

### SUPER ACCELERANTS

(Mixing ratio 1,5 kg. / 25 kg. IMPERMAX)

Due to its dark colour, the super accelerator turns the original IMPERMAX colour to strong yellow, but allows application of a single 2-kg/m<sup>2</sup> coat provided the support is properly prepared and sealed.

### MEGA ACCELERANTS

(Mixing ratio 2,5 kg. / 25 kg.)

This product speeds up curing rate so that the membrane becomes stable against raindrop markings after only 30 minutes.

## GEOMAX GEOMAX PROTECT

Needle punched, heat bonded fabric, made of synthetic fibre, specifically designed as a complementary element of highly elastic IMPERMAX membranes. Ideal for situations where an additional protection or reinforcement is required or when a better thickness build-up is desired with a minimum loss of mechanical properties.

Available options:



### GEOMAX

80 gr./m<sup>2</sup> 100 m rolls  
Width: 30 cm and 1.5 m



### GEOMAX PROTECT

200 gr./m<sup>2</sup> 100 m rolls  
Width: 200 cm

## RAYSTON FIBER 30/200 gr.

Fibre mat made of random-oriented glass filaments giving a regular pad. The fibres are glued with a styrene-soluble emulsion.

Excellent compatibility with all types of polyester resins. Recommended for contact moulding. It is easy to handle and gives final products good mechanical properties.



## BACKER ROD RAYFOND RAYSTON

RAYFOND is a closed-cell polyethylene foam rod suitable for filling the voids in all kinds of expansion joints, both vertical and horizontal.

Use of this product is recommended where the joints are to be sealed afterwards, in any kind of roofs, screeds, walls, panels and preformed slabs.

## RAYSTON SOLVENT

Solvent mixture, 100% compatible with the products used for the solvent-born RAYSTON product manufacture. Very useful for viscosity adjustments and tool cleaning.



## PIGMENT PASTES

Many times, it is necessary to finish waterproofing layers with colour stable, decorative topcoats, and colour-adjusted to the RAL chart.

These pigment pastes are combined with the aliphatic, light and UV stable resins IMPERTRANS and COLODUR.



## NATURAL OR TINTED QUARTZ SAND / CORUNDUM AND GLASS BEADS

Depending on the desired antiskid properties (in wet or dry floors), our systems can comply with all the requirements as per Standard XP P 05-11, for private or public spaces (swimming pools, restaurants, terraces, stands, etc.)




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## RAYSTON SLOW SOLVENT

Ideal option where high temperatures cause a premature skin formation, with possible blister development underneath. Slows down the surface skin formation, allowing for a defect-free surface.



# EXAMPLES OF COMPLETED WORKS

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Projects in different countries:

Spain, France, United Kingdom, Ireland, Netherlands, Germany, Portugal, Italy, Belgium, Romania, Czech Republic, Hungary, Slovenia, Bulgaria, Latvia, Brazil, Chile, Argentina, Panama, Paraguay, Bahrain, United Arab Emirates, Israel, Australia

## IMPERMAX RAYSTON



1

- **Roof refurbishment of the pre-boarding modules at Barcelona Airport**  
Barcelona, Spain (1)



2

- **Car park roof of the new terminal, Alicante Airport**  
Alicante, Spain (2)
- **Roofs and surrounding elements of the New Terminal Building at Alicante Airport.** Alicante, Spain (3)



3

- **Refurbishment of the St. Ambroi Football Stadium**  
St. Ambroi, France
- **Foster Wheeler European Headquarters**  
United Kingdom (4)
- **Roof of Bricorama centers**  
Epernay and Voisins-le-Bretonneux, France (5)
- **Château pond**  
St. Emilion, France (6)
- **Plymouth Albion Rugby Club Stadium**  
United Kingdom (7)
- **Koi fish tanks waterproofing**  
Nijverdal, Netherlands (8)
- **IDI building roof**  
Valencia, Spain

- **Roof waterproofing of stormwater tank**  
Valdemarín, Madrid, Spain (9)



4



5

- **Swimming pool, locker rooms and roof of the Arroyo de la Miel Sports Center**  
Benalmádena, Málaga, Spain (10)



6



7

- **Dulcesol machinery workshop**  
Gandía, Spain

- **Flamingo Hotel roof**  
Tarragona, Spain

- **Planter repairing, Carrefour shopping center**  
Vélez, Málaga, Spain (11)

- **Roofs of drinking water tanks at desalination plant**  
San Pedro del Pinatar, Murcia, Spain



8



9

- **Decorative public fountain**  
Rivas Vaciamadrid, Spain (12)

- **Hotel Montaña car park flooring**  
Cerler, Spain

- **Diageo Group warehouse roof**  
Kilmarnock, Scotland (13)



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11

- **Roof for motor traffic in a Nissan car dealer**  
Barcelona, Spain

- **Restaurant Peñarrubia Roof.**  
Gijón, Spain (14)

- **Terrace treatment**  
Bahrain (15)

- **Caprabo shopping center roof**  
Mollerussa, Lleida, Spain (16)



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13

- **Autogrill service area roof**  
L'Hospitalet de l'Infant, Spain (17)

- **Codorniu roofs**  
Barcelona, Spain (18)

- **Treated dome**  
Prague, Czech Republic (19)

- **Roofs of drinking water tanks from desalination plants**  
Rabassa, Alicante, Spain (20)



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15

- **Inside walls and roof of drinking water tanks at Lugo**  
Lugo, Spain

- **Pavement waterproofing at Mercat de la Libertat**  
Barcelona, Spain (21)

- **Ford car dealer**  
Altea, Alicante, Spain (22)



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• **Drinking water tanks**  
Alhaurín de la Torre, Málaga, Spain

• **Car park roof at La Vega farmers' co-op**  
Vara de Quart, Valencia, Spain

• **Dobbies Garden Centre ponds**  
United Kingdom

• **Pond at Cambridge**  
United Kingdom (23)

• **Shopping centre car park**  
Hartlepool, United Kingdom (24)

• **Sturgeon ponds**  
France

• **Waterproofing of patios and common areas at Torres Coprosa**  
Oviedo, Spain (25)

• **Roof and terrace waterproofing of new residential building**  
Corbeanca, Romania

• **Roof waterproofing on PVC**  
Watford, United Kingdom (26)

• **Roof waterproofing and insulation at Costains St. Paul Place**  
United Kingdom

• **Roof waterproofing and insulation of the Las Arenas bullring**  
Barcelona, Spain (27)

• **Roof. Muir of Ord**  
Scotland (28)

• **Dome waterproofing**  
Hungary (29)

• **Roof and corridor waterproofing**  
Koper, Slovenia

• **Metal roof waterproofing**  
Epernay, France

• **Residential building terrace**  
Bordeaux, France

• **Florida Arena Sports Center**  
Oviedo, Spain (30)

# IMPERMAX 2K RAYSTON

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- **La Gavina roof**  
L'Hospitalet de l'Infant, Tarragona  
Spain



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- **Community building roof**  
Andalusia, Spain



- **Roof refurbishment**  
Andalusia, Spain





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## The Krypton Chemical Technical Department supports you in all your projects.

Whatever your new construction or refurbishment need is, Krypton Chemical makes available to you a wide range of systems and services to cover all waterproofing demands.

In new construction, we collaborate in the project, and in refurbishment works, we coordinate with technicians, installers, owners etc, a visit to the job site in order to inspect, and in-situ detect if necessary, possible anomalies affecting the roof, both in the perimeter and in the base.

After visit, a report is written and the suitable combination of Rayston systems is prescribed in order to solve the defects and to adapt the roof to the CTE requirements as regards the thermal insulation and the energy efficiency.

While the projects are being executed, our Technical and Sales Departments follow their development, in order to verify the systems are being applied according to the stated prescription and thus being able to give the final guarantee covering all the waterproofing works.

# CONCLUSIONS

Construction systems for liquid waterproofing based on IMPERMAX and IMPERMAX 2K membranes, **offer great number of solutions and possibilities for modern construction.**

They are duly **certified by laboratories and influential organizations** and in the hands of Krypton Chemical-certified installers.

These alternative systems are worth taking into account for new construction and refurbishment projects. A **guarantee supported by a ten-year working**, research and development experience in countries all over the world can be offered.

Progress and developments in the field of polymer chemistry provide a **wider range of possibilities in the construction of more solid, habitable, sustainable and safer buildings.**

Krypton Chemical is definitely committed to **innovation** and provides solutions for every project according to the needs and characteristics of each job, both in the planning, design and execution.

We invite you to follow us in this exciting field of waterproofing and enter into the world of possibilities that modern technology has to offer.

Krypton Chemical is member of the Spanish Waterproofing Society

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**RAYSTON 2011  
KRYPTON CHEMICAL**

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