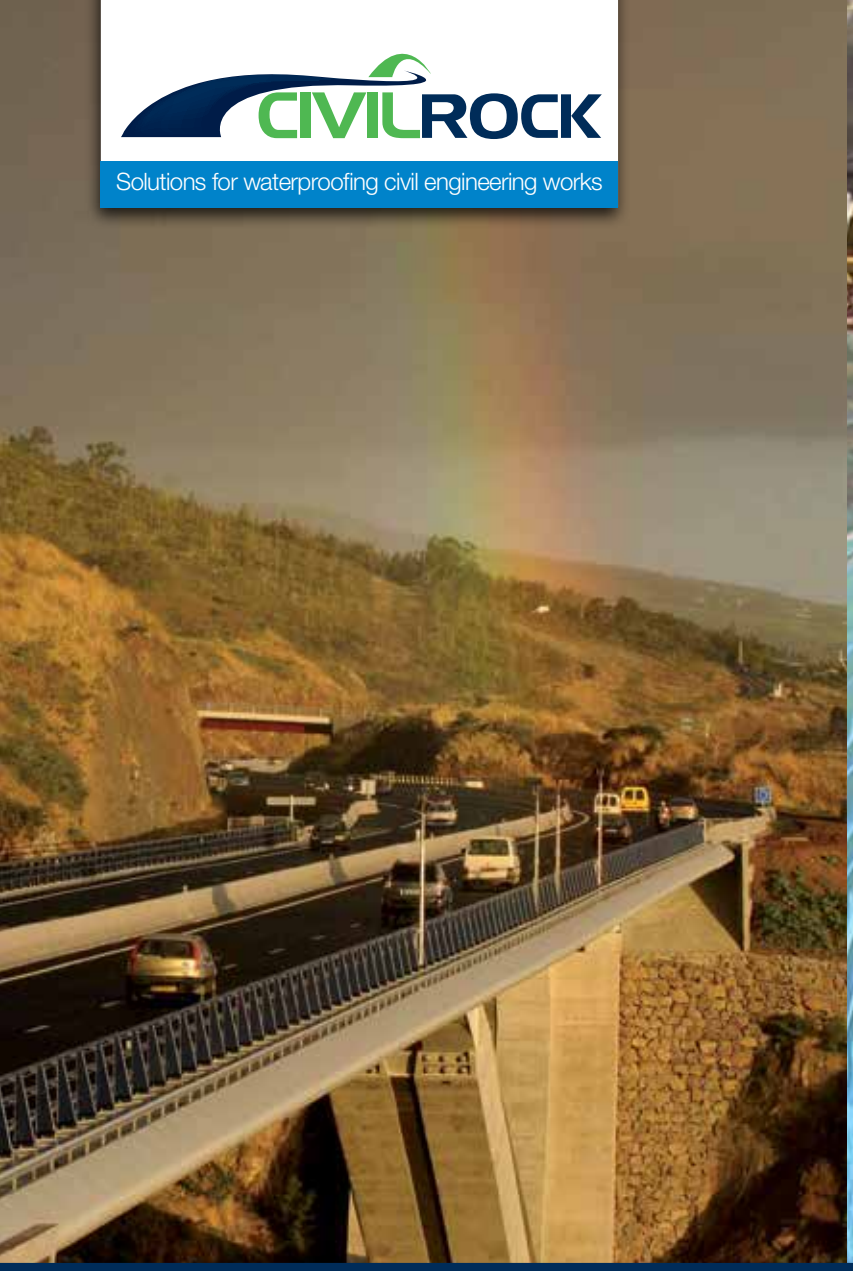
CIVILROCK

Solutions for waterproofing civil engineering works



Civil Engineering

Underground Works Hydraulic Bridges

bridges & civil engineering works

SOPREMA GROUP

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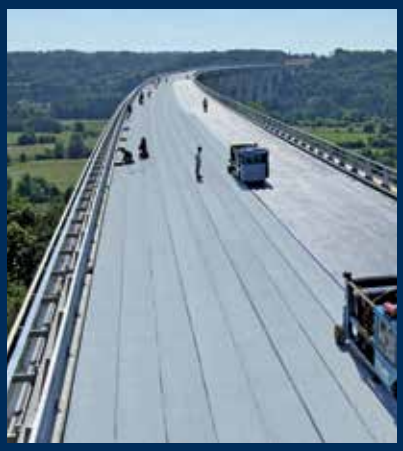


unique expertise

SOPREMA introduction

An independent group since its creation over 100 years ago, **SOPREMA** is firmly established as one of the world's leading waterproofing companies, producing more than 150 million square metres of membranes a year.

SOPREMA has a global industrial presence with a workforce of over 4 300 individuals and a turnover exceeding 1.2 billion Euros. With 15 production facilities, including 11 in Europe, 18 subsidiaries and 40 distributors, 4 training centres and 5 research and development laboratories which are heavily focused on sustainable development, we operate in more than 80 Countries around the World.

Close collaboration between a dedicated team of specialists and the research and development laboratories, means that our product portfolio is innovative and perfectly in step with the demands of the market and current standards.

Thanks to its acquisition in 2007 of **FLAG SPA**, an Italian company producing synthetic membranes, **SOPREMA** has strengthened its expertise in the field of synthetic waterproofing.

FLAG develops high performance synthetic membrane made of both PVC and TPO for waterproofing tunnels, underground structures, retention ponds, canals, etc.

A leader in this market, **FLAG** has over 40 years experience and has accompanied its clients everywhere in the world, to lay over 100 million square metres of waterproofing membranes.

for all civil engineering projects

SOPREMA has a wide range of products to meet the needs of all types of civil engineering structures:

- Bituminous waterproofing
- Synthetic waterproofing (PVC and TPO)
- Liquid waterproofing

In order to meet the specific demand, **SOPREMA** has created the **CivilRock®** range, which offers products designed to support the requirements of civil engineers for all types of structures:

- Civil engineering structures, bridges and cars parks
- Tunnels, underground & basement structures
- Basins, hydropower dams, canals, lakes, ponds and tanks including those to be used to store potable water

CivilRock® covers all the activities connected to these structures, which were previously covered by the group's different brands: **SOPREMA**, **FLAG**, **Alsan®**… This has given us the chance to offer a more complete range which better matches the requirements of clients, project managers and contractors.

With its different types of products, **CivilRock®** offers waterproofing or sealing solutions adapted to virtually all built structures.

All the **SOPREMA** group's factories are certified ISO 9001 with some also certified ISO 14001, ISO 16001, ISO 18001.

WHY MUST STRUCTURES BE WATERPROOFED?

Road and railway bridges, car parks and podium decks are subject to particularly high stresses due to load-unload cycles and their frequency.

Even if it is capable of resisting a wide variety of mechanical stresses, reinforced concrete (whether prestressed or not) is vulnerable to water ingress as it contains innumerable micro-cracks and minor imperfactions into which water can run. This leads to a phenomenon known as concrete carbonation, which is one of the most important factors in the durability of concretes.

The combination of hydrated lime (contained in the cement) and the carbonic acid in the air forms calcium carbonate and releases water, the pH of the concrete falls and the corrosion of the steel begins.Furthermore, this water often contains salts or hydrocarbons, which accelerate the process.

HOW SHOULD STRUCTURES BE WATERPROOFED?

From the beginning, **SOPREMA** has worked with particularly strong thermo-fusible waterproofing membranes adapted to the constraints of civil engineering structures and bridges.

CivilRock® thus offers a complete range of bituminous membranes which meet most of the technical and normative requirements across Europe. The membranes are complimented by:

- Primers suited to all types of surfaces and offering different technical advantages (pore filler…) or environmental advantages (solvent-free…).
- Upstand products made of bitumen-polyurethane resin which facilitate application and guarantee consistent quality.

For several years, **CivilRock®** has also offered liquid waterproofing solutions for protecting structures.

By offering the advantages of rapid execution and excellent mechanical resistance, these solutions allow the waterproofing layers to be directly trafficable (light traffic).

Lightweight and available in different colours, these are ideal coatings for car parks (not part of the building) and pedestrian walkways. These solutions must be applied by specialised contractors.

The Langwies viaduct waterproofed in 1912 with a **Mammouth®** membrane.

Rail structures are expected to have a lifespan of about a hundred years. It is therefore essential to waterproof them to ensure they meet this requirement. Good waterproofing protects structures against external aggression and reduces maintenance costs.

CivilRock® manufactures specific bituminous membranes for all the road surfaces used in Europe.

The CivilRock® teams have obtained for their products a large number of certifications and technical approvals all over Europe.

BITUMINOUS SOLUTIONS FOR CIVIL ENGINEERING STRUCTURES AND BRIDGES

The membranes in the **CivilRock®** range are made from a bitumen binder modified by an SBS elastomer polymer (for flexibility and ease of laying) with a non-woven polyester reinforcement (for the mechanical properties) and top and underside protection layers.
After cleaning and coating the substrate with cold applied primer, the sheet is welded by thermo-fusion to obtain total adhesion.
As well as guaranteeing waterproofing, the bituminous membranes offered by **CivilRock®** have many characteristics and advantages:

- Total adherence to the deck by heat welding.
- Mechanical resistance to follow the movements of the substrate.
- Resistance to chemical and biological agents (hydrocarbons, salts…).
- Resistance to thermal shocks and perforation due to the protective layer (asphalt, coated materials, ballast…).
- Compatibility and adherence with all types of wearing course.
- Long membrane service life thanks to the use of special bituminous binders.

BITUMINOUS SOLUTIONS FOR STAND ALONE CAR PARKS

The traffic on car parks does not require the membrane to be fully bonded to the substrate. Furthermore, the thermal exchanges inside slabs are often very high as they are not very thick.
It is therefore recommended that a partially bonded waterproofing layer be laid which, whilst ensuring perfect water-tightness, avoids the problems that can arise due to gas surfacing in the concrete.

CIVILROCK® SOLUTIONS FOR THE APPLICATION OF BITUMINOUS MEMBRANES

6 AUTOMATED INSTALLATION

The **Macaden®** and the **Mini-Macaden®** are self-propelled machines developed and operated for over 10 years by **SOPREMA** for the laying of rolls of heat-weldable membranes on civil engineering structures such as bridges and car parks.
The **Macaden®** unwinds, welds and rolls the bituminous membranes, guaranteeing:

- Consistent membrane laying quality over the entire structure, whatever the time of day.
- Rapid installation.
- Safety - no flame is involved and manual operations are limited.
- Financial savings, thanks to a reduced labour requirement and shorter site downtime.

The **Macaden®** allows installation o 1,800m² a day with just two operators. The **Macaden®** includes two hot air nozzles to pre-heat the substrate to a temperature over 100°C; it unwinds "Jumbo" rolls (190 m length), welds the membrane to the substrate and continuously rolls it with two smoothing rollers. Blistering is reduced and even eliminated. The use of Jumbo rolls reduces the number of joints and therefore lessens the risk of defects. Self-propelled, independent and self-guided, the **Macaden®** allows you to work in difficult conditions: whatever the outdoor temperature (down to -10°C) or wind conditions.

The **Mini-Macaden®** is self-propelled and self-guided. It unwinds, welds and rolls 8 or 10 m rolls. Small enough to be transported in a van, it is extremely mobile and will enable installation of up to 1,000 m² a day with 4 people,whatever the outdoor temperature (>0°C) or wind conditions. Its patented system of hot air nozzles, tried and tested over several years, ensures consistent and uniform distribution of the hot air over the whole of the membrane, improving laying quality. The flame-free system reduces the risk of accidents and gas consumption (50% less than manual torching). Using the **Mini-Macaden®** improves operators' working conditions by limiting handling and manual torching operations.

LIQUID WATERPROOFING SOLUTIONS

Attractive, long-lasting and functional are the main advantages offered by liquid waterproofing solutions thanks to their quality, reliability and an extremely wide choice of colours.
Irreproachable waterproofing systems and long-lasting wear resistance are indispensable for areas where they are used as a surface course: car parks, pedestrian walkways or areas subject to light traffic, accessible slabs…
The waterproofing systems used in these types of circumstances must retain their elastic properties over time to withstand extreme mechanical stresses. Furthermore, they also serve signage purposes: colouring of zones, arrow markings…
For the main surface, **CivilRock®** proposes quick-setting PMMA resin-based solutions which guarantee durable protection even on the most complex substrates.

Furthermore, the use of resins in the **CivilRock®** range for renovation work offers an obvious economic advantage:
- As a general rule, they do not involve any cost for removing the existing surface.
- The length of time taken for the work - and therefore the site downtime - is kept to the strict minimum.
- The service life of the coatings is longer, which means they need to be retreated less often.
- A new, attractive look increases client loyalty.

CivilRock® also offers products made from polyurethane and epoxy resins.

SYNTHETIC WATEPROOFING SOLUTIONS

Solutions using synthetic membranes underneath road structures are not widely known but they are sometimes able to meet particularly demanding construction constraints.
Flagon® A is a PVC membrane, developed by **FLAG** R&D laboratories over 30 years ago, specifically for use where there may be traces of oil or hydrocarbons. This membrane is ideal for waterproofing car parks and in fact, due to its special formulation containing particular plasticisers, **Flagon® A** is compatible with temporary direct contact from oils and hydrocarbons.
Flagon® A can be produced either smooth on both sides or with a non-woven geotextile on one side of between 300 and 500 g/m². With the geotextile backed membrane it is possible to achieve a totally independent waterproofing system or full adhesion, with an adhesive, to the substrate.
The adhered solution is only suited to areas with little or light traffic, but it can be implemented very rapidly after casting the structure.

SOLUTIONS FOR CIVIL ENGINEERING WORKS DIRECTLY UNDER BITUMINOUS CONCRETE

	Antirock® P	EP5 Performa	EP5 Performa PL	EP5 impact
Intended use	Road bridges Rail bridges (with protection)	Road bridges	Road bridges	Road bridges
Primer	**Elastocol® 500 TP** **Glacivap®** **Aquadere® TP**	**Elastocol® 500 TP** **Glacivap®** **Aquadere® TP**	**Elastocol® 500 TP** **Glacivap®** **Aquadere® TP**	**Elastocol® 500 TP** **Glacivap®** **Epoxy Primer**
Thickness / Weight	4.0 mm / 5.3 kg/m²	5.2 mm / 6,4 kg/m²	5.0 mm / 6,2 kg/m²	5.1 mm / 6.4 kg/m².
Certifications	France: technical approval SETRA – approval SNCF Portugal: INEC Romania: CCF Laboratories Lithuania: SPSC	Lithuania: SPSC Serbia: Institut IMS a.d.Beograd	Poland: technical approval IBDIM	

SOLUTIONS FOR CAR PARKS (NOT PART OF BUILDINGS, NOT RAMPS)

	Antirock® RSI	Soprastick® SI ASP	Flagon® A
Intended use	Partially bonded bituminous membrane for car parks surfaced with asphalt conrete, stone mastic asphalt or soft asphalt	Partially bonded bituminous membrane for car parks surfaced with hot rolled asphalt or mastic asphalt	Plasticised PVC membrane treated to withstand hydrocarbons for waterproofing under a heavy protective layer
Primer	**Elastocol® 500 TP,** **Aquadere® TP**	**Elastocol® 500 TP,** **Aquadere® TP**	
Thickness / Weight	4.0 mm / 5.7 kg/m²	2.5 mm / 3.2 kg/m²	1.5 mm / 1.8 kg/m², 2.0 mm / 2.4 kg/m² or 2.4mm / 2.7 kg/m²
Certifications	CPP SOCOTEC (France)	CPP ALPHA CONTROLE (France)	

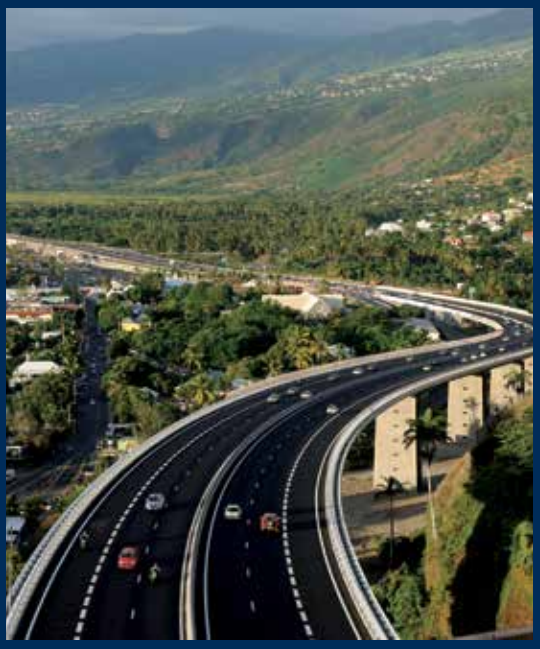
DIRECTLY UNDER ASPHALT

	Antirock® ASP SR	Antirock® ASP 40	EP5 Performa	Mammouth® ES
Intended use	Road bridges	Road bridges Rail bridges	Road bridges Rail bridges	Pavements.
Primer	**Elastocol® 500 TP** **Aquadere® TP**	**Elastocol® 500 TP** **Aquadere® TP**	**Elastocol® 500 TP** **Aquadere® TP**	**Elastocol® 500 TP** **Aquadere® TP** **Epoxy primer**
Thickness / Weight	3.5 mm / 3.9 kg/m²	4.0 mm / 4.3 kg/m²	5.2 mm / 6.4 kg/m²	4.5 mm / 6.75 kg/m².
Certifications	France: technical approval SETRA	France: approval SNCF	Lithuania: SPSC Serbia: Belgrade Institute a.d. IMS	

OTHER PRODUCTS

- **Elastocol® 500 TP:** Universal primer.
- **Glacivap®:** Primer/core filler.
- **Aquadere® TP:** Solvent-free primer.
- **Antirock® PR:** Bituminous membrane for backfilled parts of structures.
- **Flashing® TP:** For waterproofing upstands and details.
- **EP 120:** Resurfacing mortar for concrete bridge decks.
- **Alsan® RS:** PMMA resin processes for waterproofing car parks.
- **Sopraseal® B:** Bituminous sealing.
- **JTB2:** Mastic for hydrocarbon-resistant joints (kerosene…).
- **Paruvel®:** Solar protection for bituminous products.
- **Protecdrain® and Protecdrain® Filtre:** Drainage sheet.
- **Soprafeutre® Ballast:** Mechanical protection underneath ballast (with **AntiRock® P).**
- **Sopramur® :** Waterproof coating for foundations.

major references



civil engineering works

major references

REFERENCES CIVIL ENGINEERING STRUCTURES

France:

- La Cotière viaduct (A 432) - 30,000 m²
- St Paul, La Grande Ravine and La Ravine Fontaine viaducts (Route des Tamarins) - 48,400 m²
- Le Bec and La Risle viaducts (A 28) - 30,000 m²
- Charles de Gaulle ring road (Avignon) - 14,000 m²
- La Gravette viaduct (La Roche / Grane) - 24,000 m²
- Meaux south-west bypass - 38,000 m²
- Choisy le Roi interchange (A86) - 13,000 m²
- Covering of A1 motorway (Paris - Bourget) - 20,000 m²
- Viaducts over the Rhône, Ventabren, lots 21 and 22 (South-east TGV line) - 100,000 m²
- Perpignan Figueras high speed rail line - 37,000 m²
- Charles de Gaulle Airport (Roissy Satellite 3) - 23,000 m²
- Pantin car park (RATP) - 4,000 m²
- CORA supermarket car park (Nancy) - 38,000 m²

Russia:

- Kalliningrad bridge - 5,000 m²

Switzerland:

- Felsenauviadukt (A1, Bern) - 30,000 m²
- Hardbrücke, Stadtautobahn (city motorway bridge) (Zürich) - 40,000 m²

Poland:

- Gnydia bridge (Gdansk) - 60,000 m²
- A2 Poznan motorway (Poznan) - 12,600 m²

Czech Republic:

- Melnik bridge (Prague) - 11,500 m²
- 1/39 Debr bridge - 6,000 m²

in Europe

Spain:

- Subtramo XIII and XV (A.V.E. Madrid - Barcelona) - 58,000 m²

Portugal:

- Villa Real bridge (Regua) - 40,000 m²
- Villa pouca de Aguiar Viaduct (A24) - 25,000 m²

Bulgaria:

- Plovdiv bridge - 6,000 m²

Slovakia:

- Bridges over the C202 and D2020 - 13,800 m²

Greece:

- Araxthos bridge - 23,800 m²
- Greveniotikos bridge -13,250 m²
- Metsovo bridge - 12,600 m²

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