NEW
POLYMER
COATING

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Industriale
Maccaferri

Engineering a Better Solution

Today, clients are demanding more from engineering solutions

Do you design for the exposure conditions of today…
… or the exposure and working conditions you expect in the future?

In 120 years, what will the exposure conditions be?

Better than today? Or worse?

Do you consider this uncertainty within your design?

Do you select a product that is more durable to reduce your risk?


The market demands engineering solutions that support and adapt to the **changing needs** of the application.
There is an increasing need for more robust solutions to address the **worsening climate** and operating conditions faced by all structures.

A significant demand on our **woven wire mesh** solutions today is from the **increasingly aggressive** and **highly abrasive** working environments in which these materials are used.

These environments can affect the **polymer coating** and cause damage to the wire, which in turn **compromises the structures.**

Environmental changes present new challenges in the requirements of organic long-term protective coatings, with regard to the **more severe exposure conditions**, namely:

- Loss of mass due to **abrasive** wear
- Reduction of **mechanical properties** (tensile strength/elongation) over time
- Embrittlement due to **low temperature**
- Degradation caused by intense **UV rays**

Ultimately, when coatings are no longer effective, the steel wire beneath will be exposed to accelerated degradation due to corrosion and abrasion effects

…to respond to the increasing challenges, local authorities are already requiring the use of polymer coated products, as primary protection to provide the required long design life

Abrasion in Hydraulic Works

Aggressive Chemical Environments

The exponential growth of urban areas and greater industrial and agricultural processes is resulting in increasingly aggressive chemical environments.

This contamination of the environment, including rivers and the atmosphere, demands greater durability and performance of the works.

Atmospheric pollution

- Acid rain
- Eutrophication
- Soil contamination

Agriculture

- Water Pollution
- Soil Contamination
- Emissions of aggressive chemicals

Watercourse pollution

- Destruction of aquatic life
- Increase of chemical aggression on structures
- Degradation of the environment

Mining works

- Leachate lagoons
- Tailings dams
- Toxic chemicals & reagents
- Heavy metals
- Suspended solids

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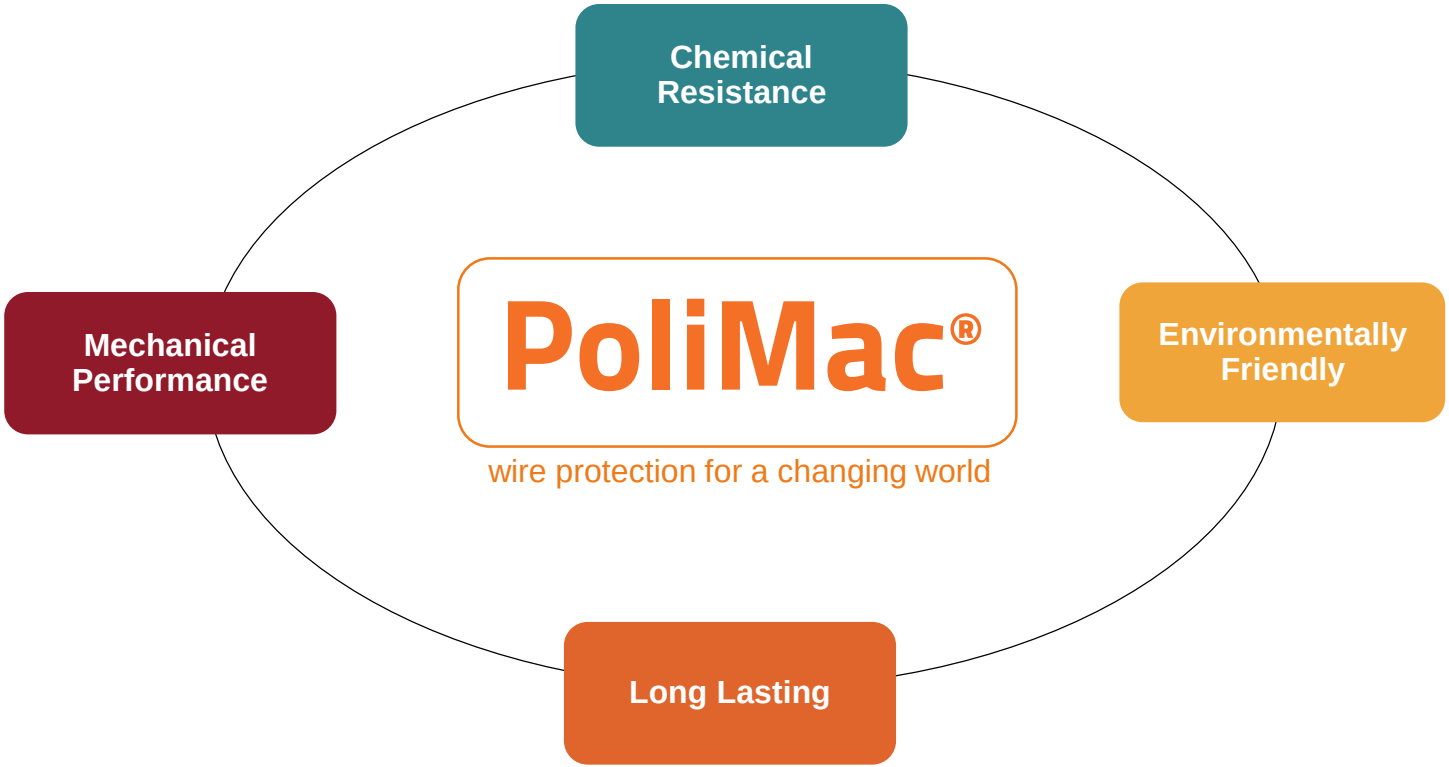
Our response to these new challenges?



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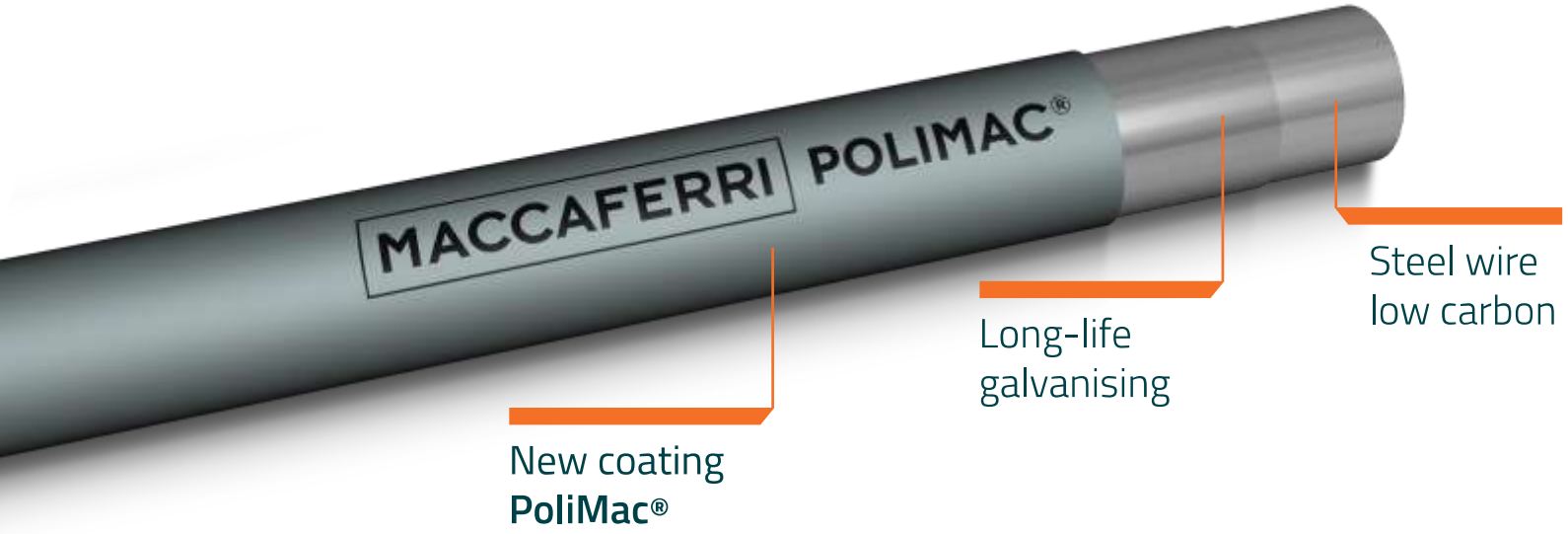
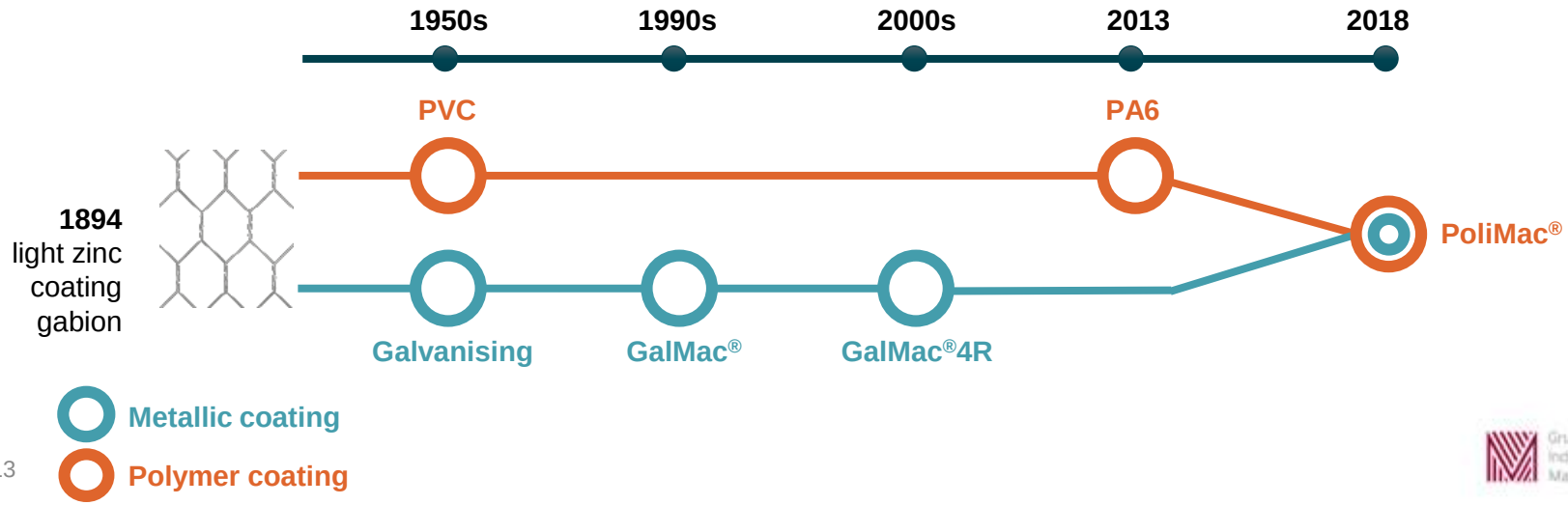
- New **PoliMac®** coating is a polymer blend with excellent adhesion to the wire, specially adapted to withstand the extremely aggressive environments.
- Extensive testing has been carried out to maximise the performance of **PoliMac®** coated steel wire double twist mesh structures.



3.1. Coatings

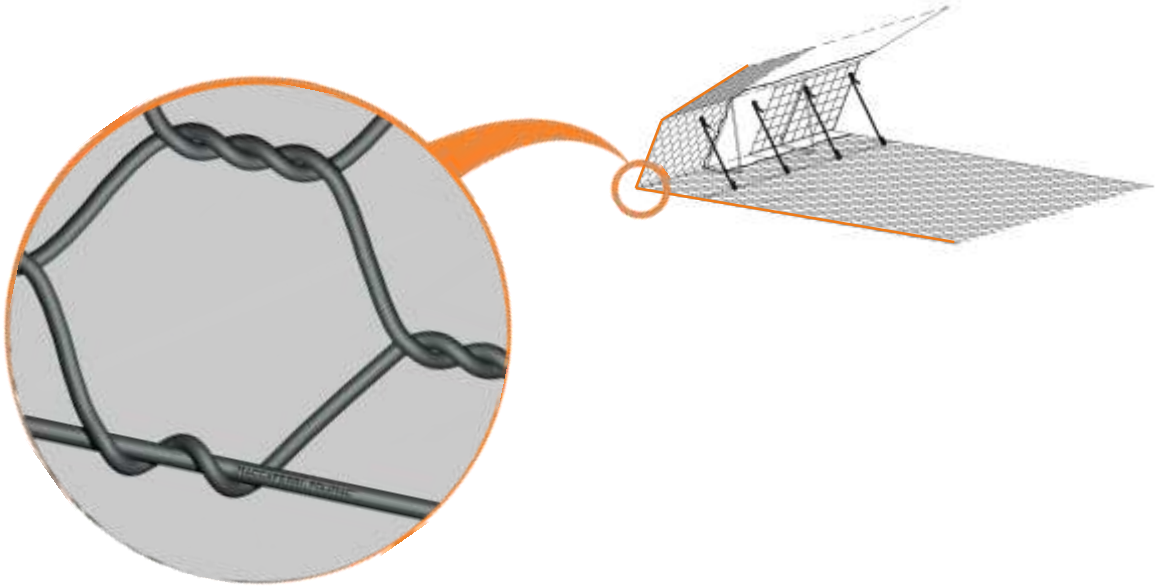
- Since 1879, our steel wire double twist mesh solutions have been continuously improved.
- Better coatings have been introduced to meet the evolution of demand in the market.



How to identify PoliMac®?

To identify the coating, the Maccaferri double twist mesh solutions will have a selvedge wire with **PoliMac®** printed on it.

GalMac® + PoliMac®



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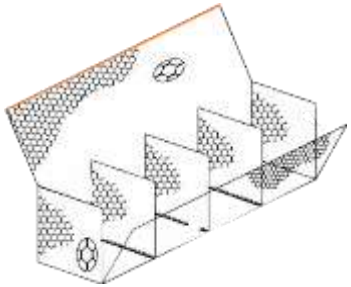
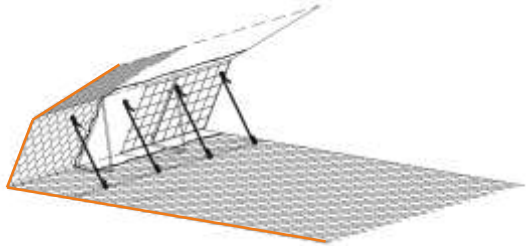
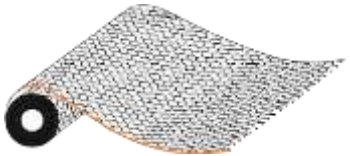


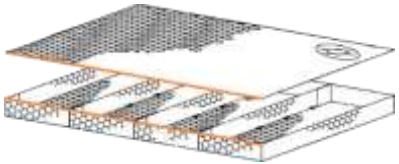
Gabion



Green Terramesh®

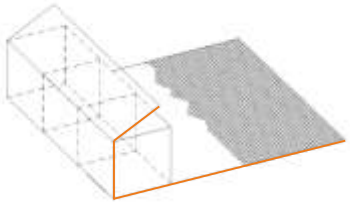


Mesh and Rockfall netting



Reno Mattress®

Sack Gabion



Terramesh® System

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5.1 Compliance testing: standards EN 10223-3 and EN 10245-3

Normative	Clause	Characteristic
EN 10223-3	6.5	Relationship between core diameter and diameter of the coating
EN 10223-3	6.6	Resistance to cracking under loads
EN 10223-3	6.7.3	UV exposure resistance
EN 10245-3	4	Coating classification
EN 10245-3	5.1.4	Melt flow index
EN 10245-3	5.1.5	Tensile strength requirements
EN 10245-3	5.1.6	Elongation requirements

PoliMac® complies with the requirements of

- **EN 10223-3**
- **EN 10245-3**

However…

EN 10223-3 provides **no guidance** for abrasion performance of wire for civil and environmental engineering applications

Therefore, we had to develop **new test methods** derived from other engineering sectors where **abrasion resistance** is tested.

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PoliMac®

wire protection for a changing world

- Abrasion Resistance 

- Resistance to Low Temperature 
- UV Resistance 
- Resistance to Installation Damages 
- Chemical Resistance 

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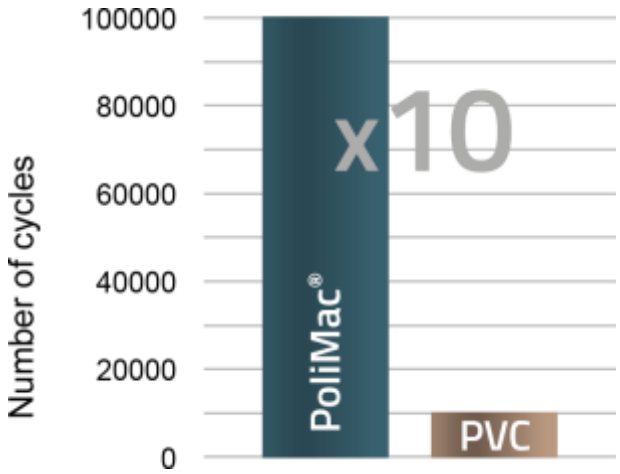
PNEUMATIC PISTON
Adapted from the standard
***EN 60229** "Wires and Electrical Cables"*

10x

- The plastic coating is abraded by a **steel point** in contact with the wire.
- A pneumatic piston drives the steel point **up and down** the coated wire.
- The specimens are 600mm long and the test speed is 300 mm/s.
- When **complete loss** of the plastic protective coating occurs at a location in the sample, the circuit closes and the test is concluded.



PoliMac® offers 10x better abrasion resistance than traditional polymer coating.

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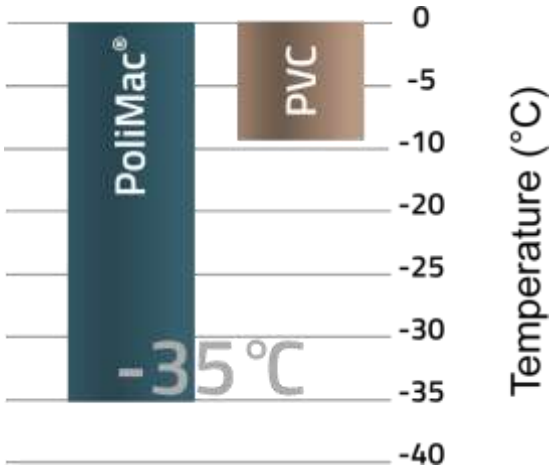
LOW TEMPERATURE BRITTLENESS

ASTM D 746 *"Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact"*

- The test provides for the evaluation of long-time effects introduced by low-temperature
- The test establishes the temperature at which 50 % of the specimens tested would probably fail



PoliMac® maintain its properties right down to -35°C

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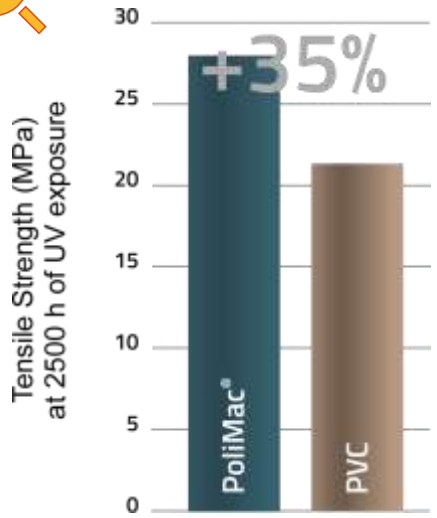
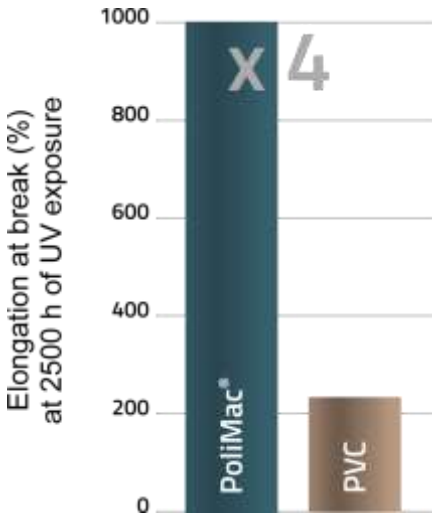
RESISTANCE AFTER UV EXPOSURE

ISO 4892-3 "*Plastics - Methods of exposure to laboratory light sources (Fluorescent UV lamps)"*
ISO 527-1*"Determination of Tensile Properties"*

- PoliMac® was exposed to UV radiation an apparatus designed to simulate the weathering effects that occur when materials are exposed in actual end-use environments to global solar radiation.
- PoliMac® tensile strength and elongation were measured after 2,500 hours of UV exposure.





PoliMac® has better tensile strength resistance before and after 2500 hr of exposure to UV rays and four times better elongation at break

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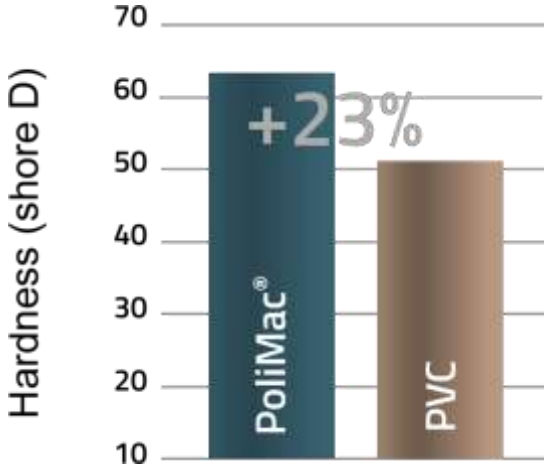
HARDNESS TEST

ASTM D 2240 *"Standard Test Method for Rubber Property - Durometer Hardness"*

- This test method is based on the penetration of a specific type of indentor when forced into the material under specified conditions.
- The indentation hardness is inversely related to the penetration and is dependent on the elastic modulus and viscoelastic behaviour of the material.



PoliMac® is 23% harder than traditional polymeric coatings providing better resistance to impact and installation damage.

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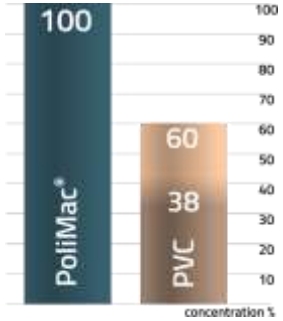
Sulphuric Acid

Widely found in various industrial applications such as oil refining and vehicle batteries. It is a highly corrosive strong mineral acid and oxidising agent.

Rivers

Soils

Mining

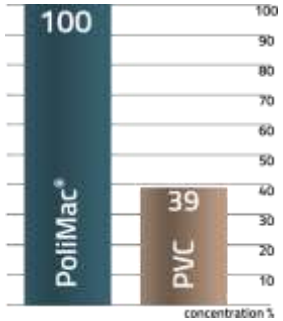


Formic Acid

Used in the production of germicides and disinfectants. It is highly corrosive.

Rivers

Soils



Resist with limitations

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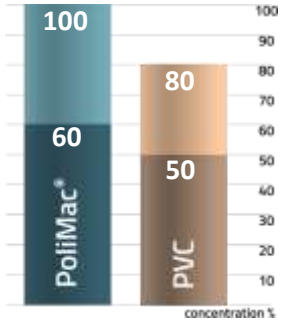
Nitric Acid

Widely used in the refining and extraction of ores in general, and the manufacture of explosives and fertilizers. It is a highly corrosive mineral acid and oxidizing agent.

Rivers

Soils

Mining



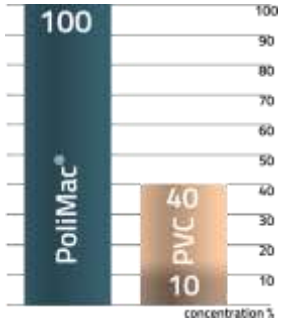
Acetic Acid

Used mainly in the production of commercial vinegar. It is also commonly used in the manufacture of PET bottles or as a solvent in general use. It is corrosive and flammable.

Rivers

Soils

Urban waste



Resist with limitations

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Tests – Chemical Resistance: Other Chemical Elements

Sodium Hydroxide

Used in industrial applications such as effluent treatment, detergent and soap manufacturing, and cellulose treatment. It is highly corrosive. PVC does not withstand temperatures above 60 °C but PoliMac® is resistant.

Benzyl Alcohol

Used mainly in the production of soaps, perfumes, in ink solvents and as an epoxy resin base. PVC does not resist but PoliMac® offers great resistance.

Ammonia / Azane

A highly corrosive alkaline solution, found in the production and composition of dyes, cleaning products and fertilizers. PVC does not offer resistance, but PoliMac® displays excellent resistance.

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PoliMac® coating is highly suited for use in projects with abrasive or chemically aggressive environments including

- Hydraulic works
- Infrastructure works
- Environmental works
- Mining works

When environmental exposure is expected to be aggressive, the use of PoliMac® coated products is recommended for hydraulic, geotechnical and rockfall applications

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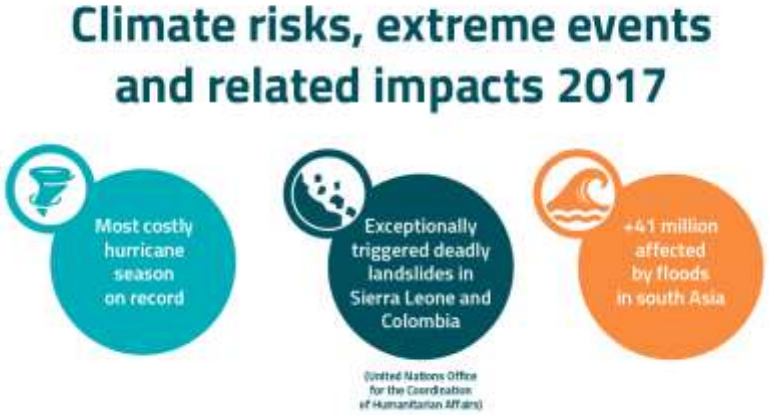
The evidence of climate change and the induced weather events require more durable solutions



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Developed to face more challenging conditions, PoliMac® is the new long lasting and sustainable coating to respond to more aggressive environmental exposure and more demanding operating conditions.

PoliMac® can be also extruded onto thicker wire diameters enabling the production of new combinations of double twist wire mesh than PVC coated products

- Abrasion Resistance (10x)
- Resistance to low temperature
- UV Resistance
- Resistance to Installation Damages
- Chemical Resistance

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International standards already require the designer to identify the **environmental conditions** at the design stage of a structure, assessing their significance in relation to the design working life of the structure.

The design should take into account the deterioration of a structure to ensure the desired performance over its **entire working life**.

In order to meet durability requirements, the design of civil engineering structures should consider the environmental condition expected over the working life of the structure.

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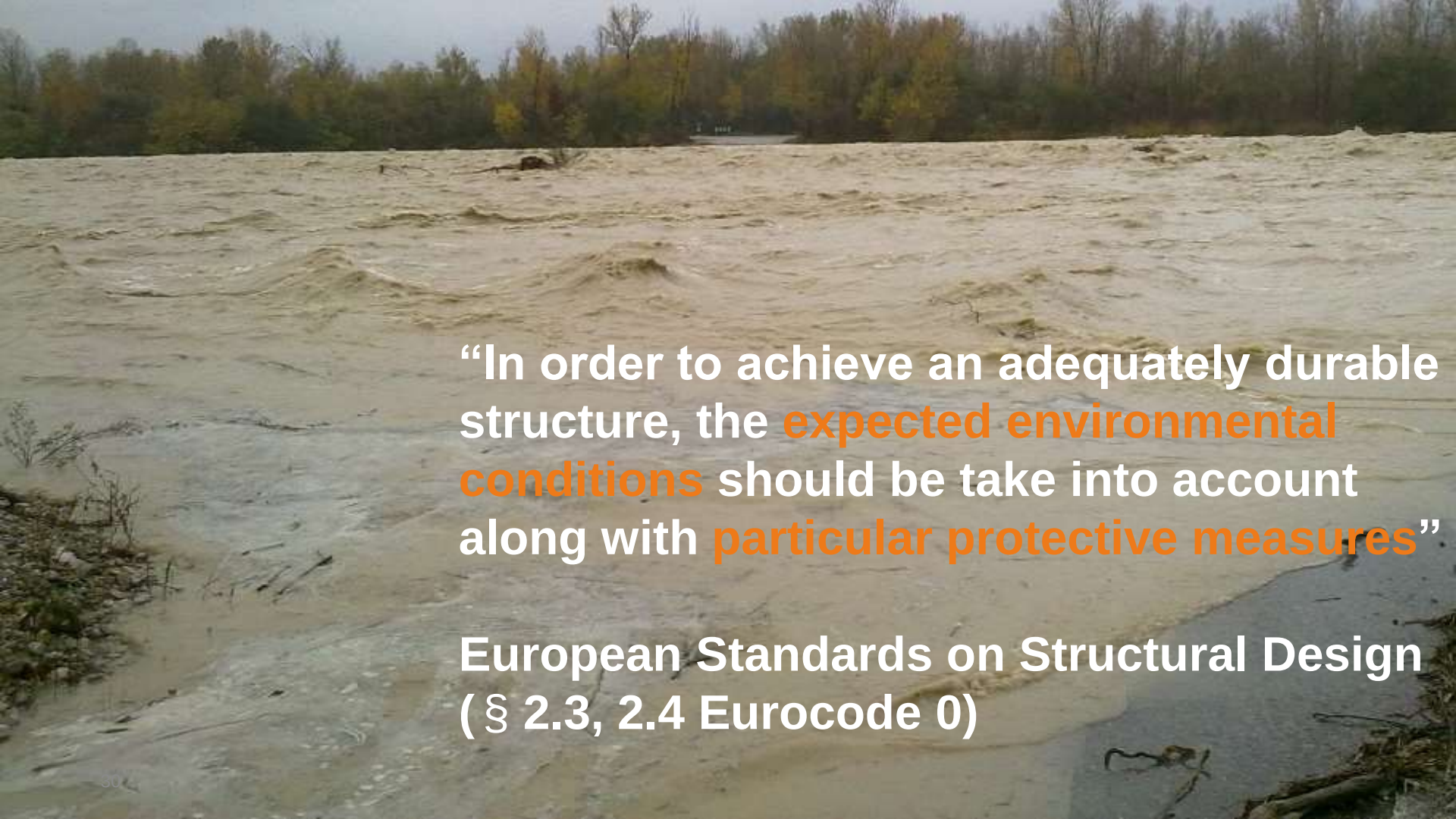
“In order to achieve an adequately durable structure, the expected environmental conditions should be take into account along with particular protective measures”
European Standards on Structural Design
(§ 2.3, 2.4 Eurocode 0)

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PoliMac® in Geotechnical and Rockfall Works

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Soil reinforcement with Terramesh® System

Gabion walls

Retaining walls

Soil reinforcement with Green Terramesh®

Erosion control

Rockfall protection

Slope protection

Rockfall Embankments

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WIRE PROTECTION FOR A CHANGING WORLD

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