

# GENERAL CATALOGUE

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# 2020



**RUREGOLD**  
INNOVATION & SAFETY FOR BUILDING

Ruregold:  
innovation and safety  
in its genetic code.



The newly established company Ruregold was founded on the prestige of the Ruredil brand. Extensive knowledge of the building reconstruction market and the know-how needed **to provide structural reinforcement solutions is imprinted in its DNA.**

Ruregold focuses its energies on the development of new systems for the reinforcement of concrete and masonry structures with **advanced composite materials, in particular through the FRCM range** which is the first in the world to have **its validity certified internationally.**

The company also provides thorough support to those design engineers who rely on Ruregold's innovative technologies which have already demonstrated their anti-seismic reliability and **increased safety** in structural reinforcement.

#### Laterlite Group

Thanks to the recent acquisition of the company, **Ruregold** is now the fourth company in the **Laterlite Group**, which combines the **Leca** brand with the company **LecaSistemi** and 40% of the associated company **Gras Calce.**

The **Laterlite Group** in this way demonstrates its willingness to expand and strengthen its offer of technical solutions for the building industry, confirming its vocation as a 360-degree partner in sustainable construction and renovation projects.



**Laterlite**

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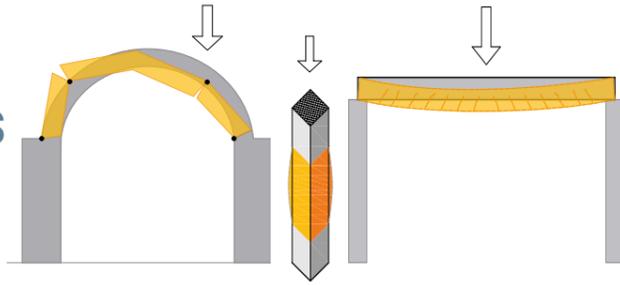


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## Why are structural strengthening systems used?



During the useful life of a building the **load-bearing capacity of the structure can no longer be adequate to carry out the static and dynamic functions** envisaged by the design or caused by variations in the intended use.

The reasons may include:

- **deterioration of materials**, which can cause both the reduction of the resistant section and the diminishing of the mechanical characteristics of the structure,
- a **change in the intended use** of a building, which can lead to an unexpected overload on the load-bearing structural elements,
- unpredictable events such as **subsidence of foundations, strong impacts, fires and earthquakes**, which can cause localized or extensive damage to the entire structure.

While an excess static load generates **problems on the individual structural elements** that are directly affected, **dynamic loads**, such as an earthquake, also put strain on the connections between them, such as the beam-column joints in reinforced concrete structures and the connections between masonry walls, floors, ceilings and vaults in masonry structures.



## Traditional Reinforcement

Traditional reinforcement applications typically entail **replacing or restoring the degraded materials used in the structures (blocks, mortars, concrete, reinforcements) with the aim of reconstructing the original section and continuity**, and increasing the sections to ensure greater load bearing capacity and safety.

In the case of applications aimed at improving the structural performance or counteracting forces detrimental to the structural scheme, in the past wood and iron elements like chains, rods, keys and hoops were inserted into the masonry. In more recent times, we have also seen **applications to confine reinforced concrete pillars, as well as the laying of heavy steel plates on the intrados of beams and slabs glued with epoxy resins** (beton plaqué technique).

These types of applications, which are difficult to perform and significantly interfere with the statics and aesthetics of buildings, also demonstrate **poor durability to maintain the effectiveness of the reinforcement over time**.



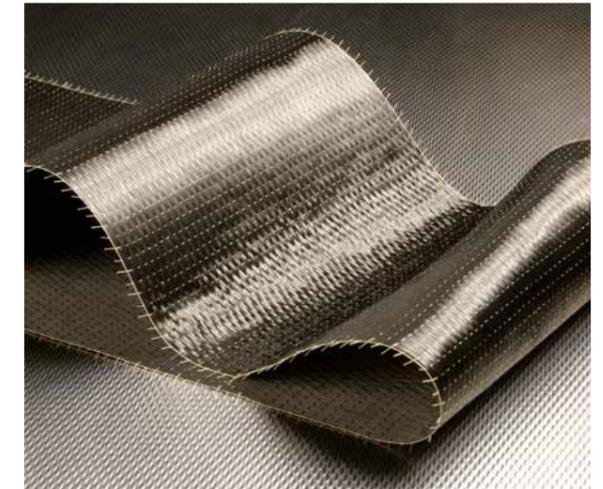
## FRP strengthening with epoxy resins

FRP strengthening systems consist of the **union of a long fiber with high mechanical performance and a matrix that works as an adhesive** between the fibers and the substrate allowing the transfer of stress from the structure to the fibers.

**The fibers used for structural reinforcement, such as carbon and aramid, have high elastic modulus and high tensile strength.**

Thanks to the exceptional mechanical properties of the structural fibers, this technology allows for reinforcement operations using an extremely versatile solution, combining practicality, limited space required, speed of execution, and cost-effectiveness of the intervention compared to traditional techniques.

Compared to traditional techniques, the lightness of FRP systems lends itself well to use on particularly weak or compromised structures, without dangerous increase in



the loads, respecting the architectural character of the building and the functionality of the structural elements. Finally, the ease of installation and the significant ability to adapt to the various shapes of structural elements have also made this material successful in construction.

## FRCM strengthening with inorganic matrix

**FRCM (Fabric Reinforced Cementitious Matrix)** structural strengthening systems consist of the coupling of **a high performance long fiber and a stabilized inorganic matrix used as an adhesive**, replacing the epoxy resins of traditional FRP systems.

The FRCM system overcomes all the limits concerning the safety, reliability, and durability of the mechanical performance of FRP systems, **since the stabilized matrix is more compatible with the substrate than epoxy resins. The matrix also provides effective adhesion** both to the structural fibers of the mesh and to the materials that constitute the substrate, thus ensuring high reliability of the structural reinforcement.



# Inorganic matrix for strengthening systems

## The new reinforcement frontier: FRCM composite materials

**FRCM (Fabric Reinforced Cementitious Matrix)** structural strengthening systems consist of the coupling of a high performance long fiber and a stabilized inorganic matrix used as an adhesive, replacing the epoxy resins of traditional FRP systems.

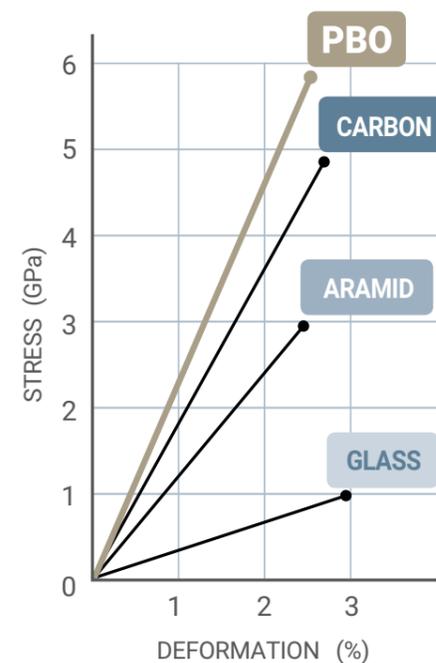
**Ruregold** has introduced a global innovation in the field of structural reinforcements by patenting several FRCM strengthening systems, each of which has been specifically developed to meet the needs related to reinforcement and seismic retrofit of various structures, such as reinforced concrete structures, masonry structures, and infill elements.

Ruregold strengthening systems utilize two different types of fibers, carbon and PBO (poly-paraphenyleneben-zobisoxazole), both synthetic materials with high mechanical performance properties able to absorb the stresses generated by overloads and exceptional events, such as earthquakes. The PBO fibers, compared to carbon fibers,

have tensile strength greater than 40% and elastic modulus greater than 15%.

The adhesives are formulated to match each type of mesh reinforcement system, thus ensuring effective bond to both structural fibers of the mesh and to the materials constituting the substrate, guaranteeing the high reliability of the structural reinforcement.

Ruregold composite reinforcements use woven structural fibers with a specific geometry to guarantee greater versatility of use, that is, a greater ability to manage stresses even in the most complex load situations, such as column buckling, shear strength of panels, bending and shear of beams, and actions in the plane and outside the plane.



## What problems do FRCM solve

Using an inorganic matrix in externally bonded strengthening systems means **overcoming the limits concerning safety, reliability, and durability caused by epoxy resins used in traditional FRP systems.**

FRCM strengthening systems have significant benefits.

- **applicability on damp substrates:** the hydraulic binder is not affected by the presence of moisture;
- **fire resistance:** in direct contact with fire the matrix has a reaction identical to that of the support, that is, it is not combustible, has low smoke emission, and does not release incandescent particles;
- **good resistance to high temperatures:** the inorganic binders maintain their mechanical characteristics and adhesion to the substrate from 40 to 1020 °F (+5 to +550°C);
- **resistance to freeze and thaw cycles;**
- **water vapor permeability:** the matrix prevents condensation phenomena that can entrap humidity and cause damage to wall decorations;
- **non-toxicity:** the matrix is not a harmful product for the health of operators or for the environment, so it can be applied without the use of special protections and can be disposed of without particular precautions;
- **easiness of installation:** the premixed matrix must be mixed with water only and does not require the use of specialized teams for installation;
- **high reliability of the strengthening system even after reaching the rupture load:** the post-cracking ductile behavior prevents the separation of the FRCM system from the reinforced structure;
- **durability even with high ambient humidity:** the adhesive properties of the inorganic matrix to the support do not change at high RH;
- **workability in a wide temperature range:** between 41 and 104 °F (+5 and +40°C) there are no substantial differences in workability, setting, and hardening times;
- **reversibility:** the system provides visual prediction of potential failure. At that stage the system can be removed;
- **speed of application:** thanks to the application of the product "layer on layer".



Application on damp substrates



Fire resistant



Vapor permeability



Non-toxic matrix



Resistant to high temperatures



Resistant to freeze/thaw cycles



Ease of installation



Ecological



Compatible with masonry



Ductility



Passive protection

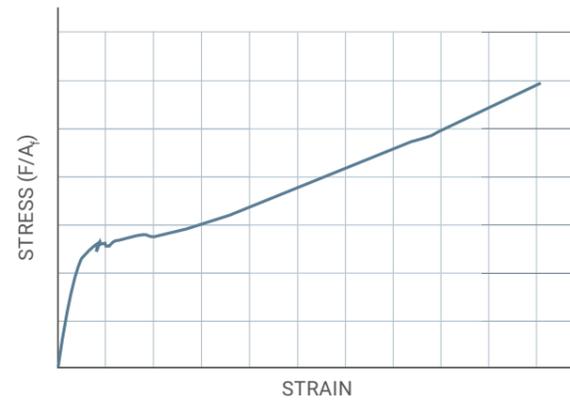


Reversible

# FRCM Features

## Post-cracking ductility

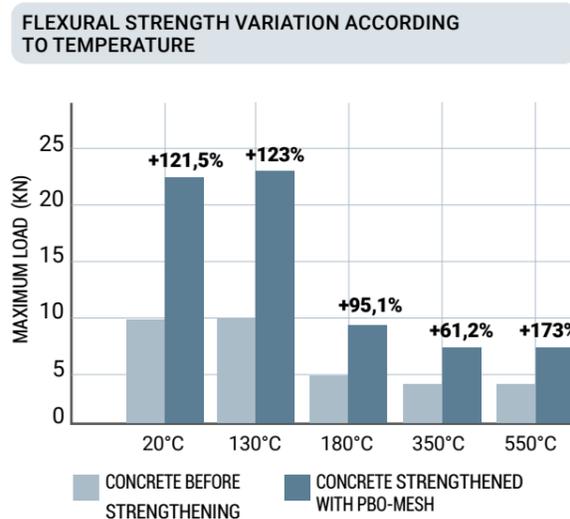
While FRP systems can show brittle fracture behavior under maximum load, Ruregold's FRCM strengthening systems enhance the ductility of the structural elements that they reinforce, in favour of a greater deformation capacity of the single bearing element and an overall increase in the effectiveness of the reinforcement on the entire structure. **Structural strengthening is all the more effective and reliable the more it demonstrates ductile behavior after reaching the maximum load.** This property can be quantified by the area under the load-displacement curve measured during a bending test. The largest is the area, the greater is the capacity of the FRCM system to dissipate energy. **FRCM systems provide exceptional ductility since the deformation of the matrix under load is close to that of the support, ensuring adhesion and structural collaboration of the reinforcement even after the peak of the load.**



Uniaxial traction type stress-strain curve of an FRCM specimen (A, dry fabric area)

## Resistance to high temperatures

Compared to unreinforced concrete, Ruregold's FRCM strengthening systems maintain their effectiveness up to a temperature of 550°C (288°F). Flexural strength was chosen as a significant parameter for this behavior since flexural strength is more sensitive than other parameters, such as compressive strength, to evaluate concrete deterioration caused by heat. The deterioration process begins at 130°C (54°F) and causes a noticeable decline in the mechanical performance of concrete, as reported in the graph. The graph noticeably shows that **Ruregold's strengthening system maintains higher flexural strength than unreinforced concrete as the testing temperature increases.** This is due to the fact that at high temperatures FRCM strengthening systems are able to counter the phenomenon of de-cohesion between aggregates and cement binder, which is the cause of loss of strength of unreinforced concrete.



## Glass transition temperature Fire resistance

Since Ruregold's FRCM strengthening systems do not depend on epoxy resins to externally bond a high-performance mesh reinforcement to the substrate, they are not affected by the risk of de-bonding that occurs when epoxies reach their Tg (glass - transition temperature). When epoxy resins reach their Tg, they change from a glassy to a visco-elastic state thus ceasing to secure the designed bond. Tg of epoxy resins used in commercially available FRP systems typically ranges from 140 to 180 °F (60 to 82°C). In a dry environment ACI 440.2R recommends that FRP service temperature not exceed Tg - 27 °F (Tg - 15°C). The same recommendations comes from European DT 200 R1 2013 (CNR). At a temperature of 113 °F (45°C) it is therefore likely that an FRP system no longer provides the designed reinforcement.

RureGold's FRCM system, subjected to fire reaction tests according to the European standards in force EN 13501-1, **was certified in class A2 or as non-combustible material**, which does not cause toxic fumes and does not form incandescent drops potentially very dangerous for people during a fire. **All FRP systems, on the other hand, have been classified in class "E"**, because they use an organic adhesive that contributes to the generation and/or propagation of the fire and therefore require adequate protection.

## Durability and humidity

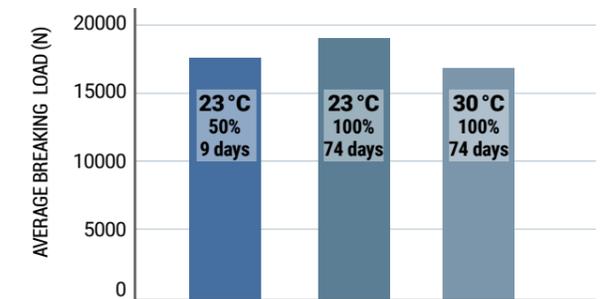
**Ruregold's FRCM (Fabric Reinforced Cementitious Matrix) strengthening systems maintain the specified performance properties independently of the Relative Humidity (RH) and the environment temperature.**

The results of a durability test carried out at the ITC-CNR Laboratory of S. Giuliano Milanese show how deeply environmental conditions influence the mechanical performances of FRP structural strengthenings. Results are summarized in the graphs on the right.

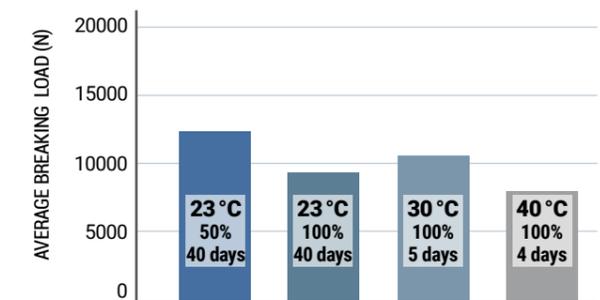
In FRP systems, the presence of moisture on the surface of the structure changes the type of break that from "cohesive", at the interface between support and reinforcement, from "adhesive". It is also noted that the prolonged exposure to moisture causes a progressive worsening of the mechanical shear and flexural strength, which in the interval 73-104°F (23-40°C) becomes increasingly rapid as the temperature increases.

Results similar to the ones obtained at the ITC-CNR Laboratory were also obtained as MIT of Boston and the University of Edinburgh.

FRCM FLEXURAL STRENGTH, AS A FUNCTION OF TEMPERATURE, RH, AND DAYS OF EXPOSURE



FRP FLEXURAL STRENGTH, AS A FUNCTION OF TEMPERATURE, RH, AND DAYS OF EXPOSURE



# FRCM: proven anti-seismic efficacy

## Properties of Ruregold's FRCM strengthening systems

**Strengthening systems in a seismic zone** are aimed at retrofitting the structure to the intensity of the expected seismic action. **Composite materials are particularly suitable** for this purpose since they **increase the ductility** of the structural elements they reinforce. In addition they are **easy to apply**, which allow applications in critical areas that may be difficult to reach, especially in case of historic masonry.

The strategy of seismic retrofit interventions is aimed at **eliminating the brittle fracture mechanism** of load-bearing structural elements and the collapse mechanisms in correspondence of the joints, as well as at **improving the overall deformation capacity of the structure**.

In reinforced concrete structures this requirement is mainly obtained by **increasing the ductility of the plastic hinges**. In masonry structures, the key procedure is box action of load-bearing masonry elements so as to make them more resistant to horizontal ac-

tions, eliminate the orthogonal thrusts to the wall panels and connect the perpendicular load-bearing elements to each other.

**The deformation capacity of the reinforcing element and the adhesion of the reinforcement to the structure** are of fundamental importance for the effectiveness and reliability of FRCM seismic retrofit. Ruregold's FRCM systems assure these characteristics even in extreme conditions, when cracks are forming in the support.

Ruregold is ideal for historic masonry with vaults



## A very challenging test

The **devastating earthquake that hit Aquila, Italy**, on April 6, 2009 also damaged the **Church of S. Maria dei Centurelli** in Caporciano, located about 30 km from the epicenter. The shock recorded at the site was 5.7 on the Richter scale.

The church, which dates back to the 16th century, **had been restored and reinforced in 2002 with Ruregold FRCM strengthening system** in order to repair the extensive damage caused by a **previous earthquake that hit the region in 1997** and to upgrade the structure for seismic response. Although the 1997 seismic actions were much lower than the ones in 2009, the damage was such that some bays of the vault were at risk of collapse.

**What amplified so strikingly** the effect of the **1997 earthquake** on the structure were **the curbs and the concrete trusses** constructed during a restoration that took place in the 1970's. The stiffness of these elements exerted a hammering action on the more deformable walls.



Improvement of the deformation capacity of vaults



Effective anti-seismic protection

In order to provide an effective seismic protection to the structure, the 2002 restoration and reinforcement work entailed the **consolidation of the vertical walls with injections of pozzolanic hydraulic grout** and the **reinforcement of bays and vaults with Ruregold carbon fiber composite system and inorganic matrix**. The reinforcement was such that designers were able to **remove the concrete elements** introduced in the previous restoration in the 1970s.

The violent shocks of the 2009 earthquake, which took loss of human life and seriously damaged many buildings in the area, **did not compromise the structure of the church** strengthened with Ruregold FRCM system. The church only suffered of partial expulsion of a few stone blocks in the weakest part of the façade and the breakage of an internal chain. **The masonry vaults reinforced with the Ruregold system in 2002 remained perfectly in place with no damage thus demonstrating the advanced level of seismic response provided by Ruregold's FRCM strengthening system.**

# Ruregold® strengthening system for concrete structures

## Application diagrams

### CONFINEMENT OF THE COLUMN

- Always round corners to at least a 1/2 in. (13 mm) radius. Repair damaged areas with **MX-R4 Repair** cement-based repair mortar.

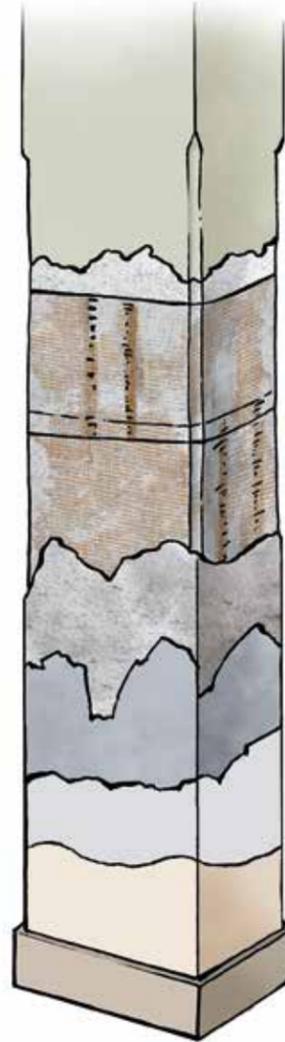
**MX-PBO Concrete:** after having saturated the substrate, apply the first layer of **MX-PBO Concrete** adhesive at a thickness of 1/8 inch (3 mm) to 3/16 inch (5 mm).

- PBO-MESH:** lay the PBO-mesh.

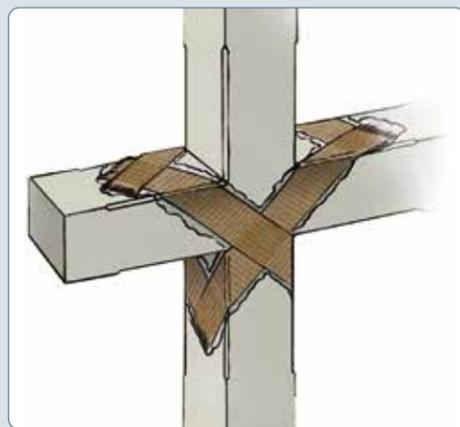
- Press one ply of PBO-mesh slightly into the layer of the adhesive to ensure adhesion;
- the greater grammage of PBO (double thread) must wrap the column;
- overlap the PBO-mesh not less than 10 cm (4 inch), both the wrapping ply and consecutive plies.

- MX-PBO Concrete:** apply the second and final layer of **MX-PBO Concrete** adhesive at a thickness of 1/8 inch (3 mm) to 3/16 inch (5 mm) so as to completely encapsulate the PBO-mesh.

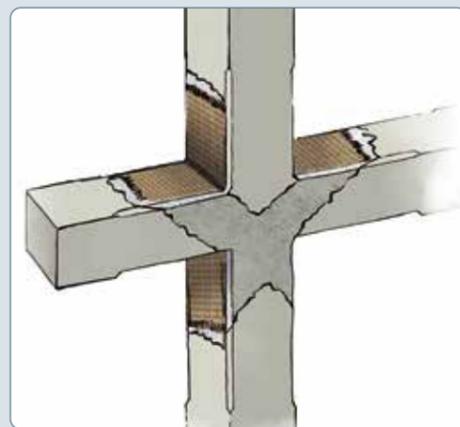
If necessary, apply a skim coat and finish with a paint.



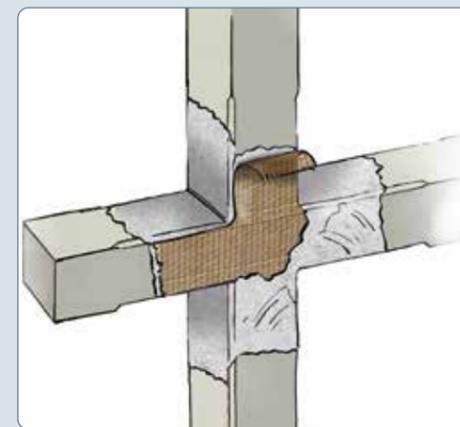
### REINFORCEMENT OF THE BEAM-COLUMN CONNECTION



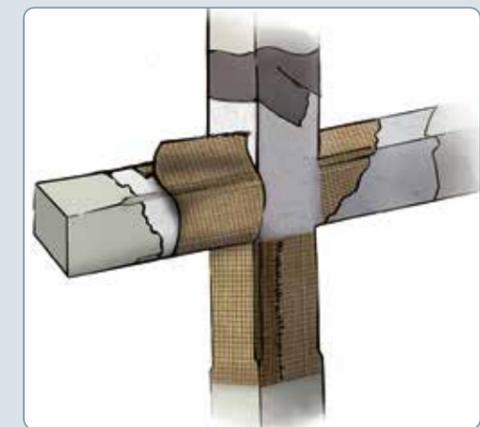
- After preparing the substrate, apply the first layer of **MX-PBO Concrete** adhesive and lay one ply the **PBO-MESH**.



- Apply a second layer of **MX-PBO Concrete** adhesive and embed a strip of **PBO-MESH** at the angles. Then finish with a final layer **MX-PBO Concrete**. Each layer of **MX-PBO Concrete** must be applied when the previous layer is still wet and has not hardened.



- Frontal covering of the joint with **PBO-MESH** and **MX-PBO Concrete** adhesive.



- Confinement of the connections at the joint with **PBO-MESH** reinforcing fabric and **MX-PBO Concrete** adhesive. If necessary, apply a skim coat and finish with a paint.

### FLEXURAL AND SHEAR REINFORCEMENT OF THE BEAM

- After proper cleaning and preparation of the substrate, apply the first layer of **MX-PBO Concrete** adhesive. Depending on the design, lay one or more plies of **PBO-MESH** along the direction of the bars that reinforce the beam. Each ply should be completely embedded **MX-PBO Concrete**.

- Finish with **MX-PBO Concrete** adhesive.

- Depending on the design, create shear reinforcements by embedding one or multiple plies of **PBO-MESH** between two layers of **MX-PBO Concrete** adhesive in the direction perpendicular to the bars that reinforce the beam.

- Finish with **MX-PBO Concrete** adhesive.



## REINFORCEMENT OF THE JOISTS OF CONCRETE AND MASONRY SLABS

After evaluating the suitability of the joists to support the designed loads, damaged concrete must be restored in order to reconstruct missing and degraded sections. Once the repair is completed it is possible to reinforce and strengthen the slab using **PBO-MESH** FRCM system with **MX-PBO Concrete** adhesive.



Before proceeding with the structural strengthening of the slab, remove paint, plaster and any other loose material.

- In the case of joists clad with bricks, remove the concrete cover at the ceiling and rebuild it with **MX-R4 Repair** or **MX-PVA Fibre-reinforced** repair mortars, after passivation of the bars.
- Apply the first layer of **MX-PBO Concrete** adhesive and the first ply of **PBO-MESH** at the ceiling on the joists.
- As required by design, apply a second layer of **MX-PBO Concrete** adhesive and embed the second ply of **PBO-MESH**.

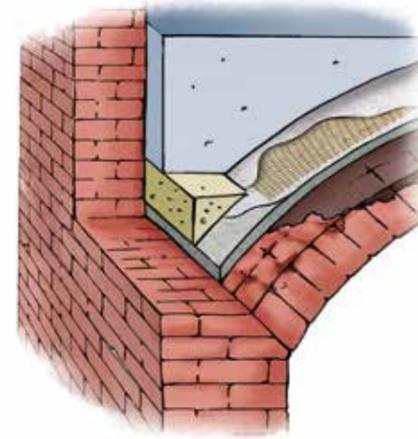
The reinforcement of the concrete-masonry slab structure requires some important precautions both in the planning phase and in the installation phase. Since the concrete joists are very thin structures, if the structure is significantly damaged or undersized, it is often necessary to proceed with the application of more than one layer of **PBO-MESH**.

As regards the installation phase, it is essential, before starting the application, to remove the brick bottom, if present, to ensure the perfect adherence of the reinforcement to the concrete of the joist.

Any plaster or interposed layers must always be removed.

## Ruregold strengthening of masonry structures

### Application diagrams



#### REINFORCEMENT OF VAULTS AND NON-STRUCTURAL COMPONENTS OF CEILING AND WALLS

Before proceeding with strengthening, remove any loose materials/layers and any other residues. Carefully clean and damp the substrate.

- When necessary lay a rough coat of **MX-RW High Performances** or **MX-CP Lime** as a primer.
- Apply a layer of **MX-PVA Fibre-reinforced** with polyvinyl alcohol fibers (PVA) as an alternative reinforcement or in collaboration with the structural strengthening as needed.
- Install the strengthening system over the vaults by laying **PBO-MESH** (or **C-Mesh**) between two layers of **MX-PBO Masonry** (or **MX-C 25 Masonry**) adhesive for masonry applications at 1/8 inch (3 mm) thickness each. Connect the reinforcing mesh to the load-bearing structural elements through the use of **PBO JOINT** (or **C-JOINT**), as necessary.



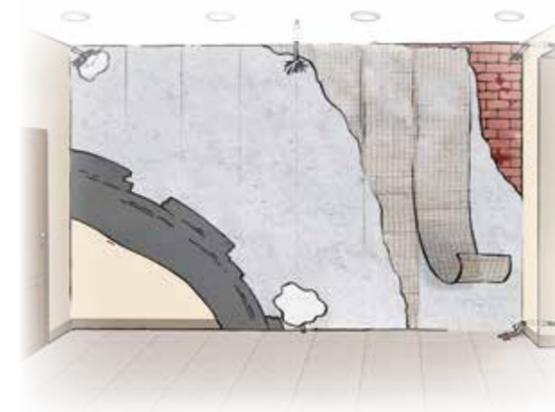
#### REINFORCEMENT OF WALL BAYS

In case of structures with masonry bearing elements, in order to prevent their instability with risk of collapse, the strengthening must be applied by wrapping the masonry elements with **PBO-MESH** (or **C-Mesh**) between two layers of **MX-PBO Masonry** (or **MX-C 25 Masonry**) adhesive on the corner joints and on the string courses up to the height established for the roof.

Before applying Ruregold strengthening system, in order to ensure adhesion of the system to the substrate, pre-existing skim coats and plasters must be removed and the masonry substrate must be clean and damp.

#### REINFORCEMENT OF WALLS TO PREVENT OVERTURNING

- Prepare the substrate and, if necessary, lay a primer layer of **MX-RW High Performances** or **MX-CP Lime**.
- Apply the reinforcement by laying one ply of **PBO-MESH** (or **C-Mesh**) between two layers of **MX-PBO Masonry** (or **MX-C 25 Masonry**) adhesive at 1/8 inch (3 mm) thickness each.
- Connect the system to the load-bearing structure using **PBO JOINT** (or **C-JOINT**) connector.



# Application of Ruregold Strengthening System with inorganic matrix

## Installation phases

### Preparation of the substrate

The substrate must be structurally sound, clean, free of dust, loose parts and without any contaminants, such as paints, release agents, etc. Concrete substrate must be fully cured (28 days) with exposed aggregate. In the presence of macroscopic surface defects >1/4 in. (6,3 mm) deep, use a repair mortar suitable for the nature of the substrate in order to fill irregularities and repair damages. Round any edges to a bending radius of 1 in. (2.6 cm) radius.

### Preparation of the inorganic matrix adhesive

The adhesive is prepared as an ordinary cement-based mortar by pouring potable water into the mixer and then adding water. Mixing procedure requires using 90% of the water and mixing for a minimum of 2 minutes. Then the remaining 10% of water must be added to the mix. Mix for another 2 minutes. Let the adhesive rest for 2-3 minutes. Then mix again for 2-3 minutes. Use a hand-held slow-speed drill and paddle. Alternatively use a mortar mixer with a rotating drum. Do not mix by hand.

### Application of the Ruregold system

The substrate must be wet to saturation with no residual surface water. Apply the first layer of adhesive at a thin thickness of 1/8 inch (3 mm) to 3/16 inch (5 mm) using a smooth metal trowel. Lay a ply of the mesh over the adhesive and lightly press the mesh into the adhesive. Each ply of mesh must be totally encapsulated into the adhesive. Complete the installation adding a final layer adhesive at 1/8 in. (3 mm) thickness so as to completely encapsulate the mesh. Each layer of adhesive must be applied when the previous layer is still wet and has not hardened. The mesh must be lapped 6 in. (15 cm) minimum in the primary direction of fiber orientation. No lapping of the mesh is usually required in the secondary direction.

### Apply a multiple layers of the system as necessary

If the design requires more than one ply of the reinforcing mesh, proceed by laying a second layer of adhesive with 1/8 to 1/6 in. (3 to 4 mm) thickness, and then a second ply of mesh embedding it into the thickness of the adhesive. Repeat the sequence as many times as specified by the designer. Usually Ruregold strengthening system requires from 1 to 3 plies of mesh. It is possible to offset the orientation of the mesh in successive layers by 45°, placing it diagonally versus the previous layer.



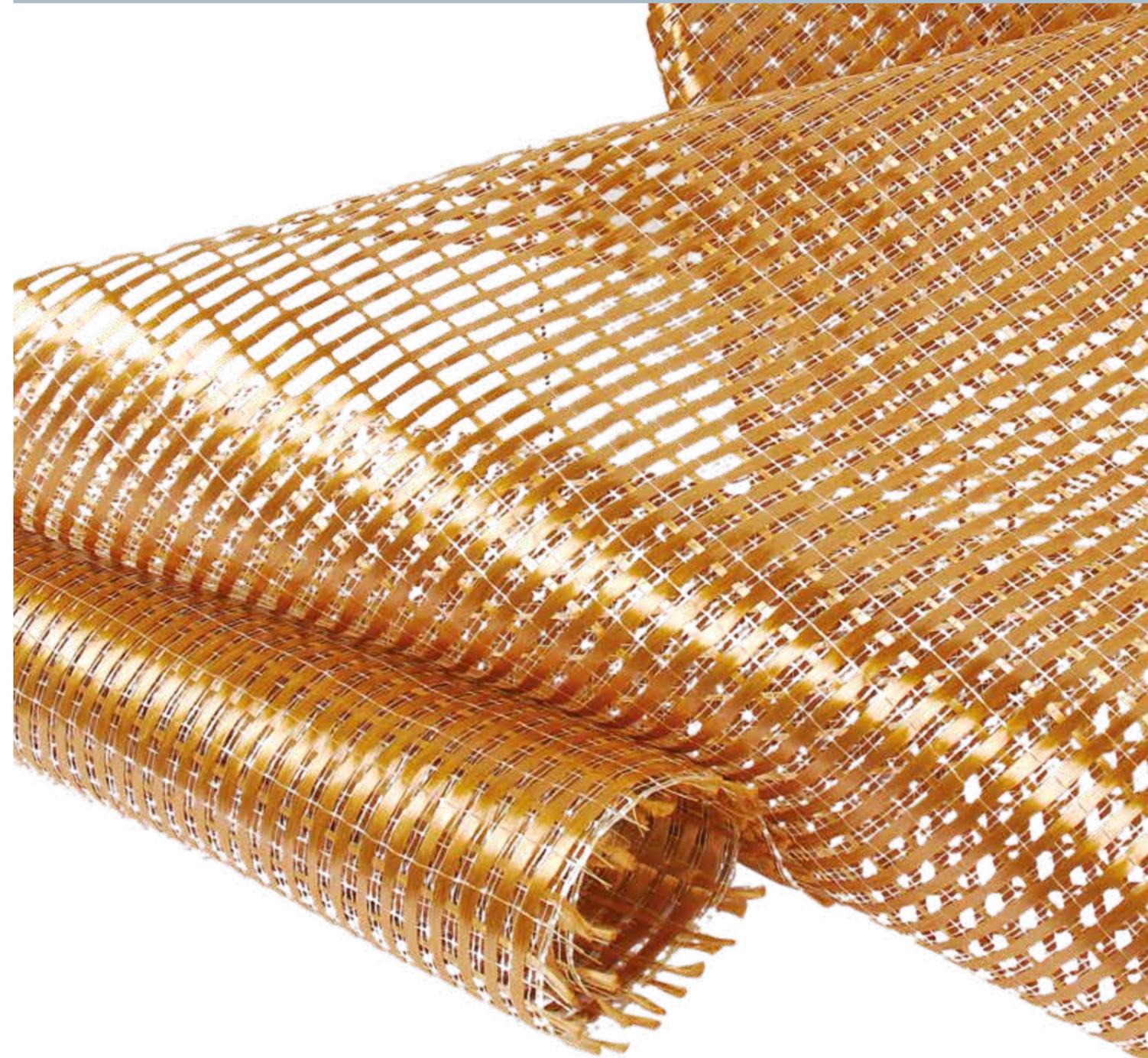
### Possible application of a fiber connector

In some configurations it might be necessary to insert joints, made of PBO or carbon fibers, linking the system to the structure.

Once a hole has been made in the supporting structure, fill it with the adhesive that has been used and insert the joint. The free end of the joint should be opened, spread out in a fan shape and then covered by a surface layer of the adhesive.

# FRCM Strengthening Systems with PBO fibers

PBO fiber composite materials and inorganic matrix for structural strengthening. PBO (Poliparaphenyl Benzobis Oxazole) is the fiber with the highest elastic modulus currently available in the construction market.



# PBO-MESH 105

fka Ruregold XS



**Unidirectional 105 g/m<sup>2</sup> PBO-MESH for FRCM strengthening system with inorganic matrix**

**PBO-MESH 105** is a FRCM structural strengthening system with a unidirectional PBO mesh and stabilized inorganic matrix for reinforced concrete and masonry constructions. The high weight of PBO makes it suitable for heavy-duty applications, especially on concrete and in compact sections such as slab joists. This strengthening system does not use epoxy resins and its performance equals that of traditional FRP with carbon fibers and epoxy binder.



Fire resistant



Wet supports



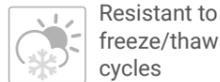
Vapor permeable



Easy to install



Non-toxic matrix



Resistant to freeze/thaw cycles

## THE SYSTEM IS MADE UP OF:



- ▶ **PBO-MESH 105**  
Unidirectional mesh with 105 g/m<sup>2</sup> PBO fiber available in three heights:
  - 10 cm (roll length equal to 30 m)
  - 25 cm (roll length equal to 15 m)
  - 50 cm (roll length equal to 15 m).



- ▶ **MX-PBO Concrete**  
Stabilized inorganic matrix specific for applications on concrete supports (in compliance with the EN 1504-3 Standard).
- ▶ **MX-PBO Masonry**  
Stabilized inorganic matrix specific for applications on masonry supports (in compliance with the EN 998-2).

## PROPERTIES OF THE SYSTEM

- ▶ Increased resistance to simple bending, shear, and combined compressive and bending stress of columns and beams, increased ductility of the joints between beams and columns, and increased resistance in the beam-column joints;
- ▶ Significant increase in the ductility of the reinforced structural element, high energy dissipation capacity and high reliability of the system, even if subjected to cyclical overloads (e.g., earthquake).



## TECHNICAL CHARACTERISTICS

### PROPERTIES OF PBO FIBERS

Tensile strength	5,8 GPa
Elastic modulus	270 GPa
Fiber density	1,56 g/cm <sup>3</sup>
Elongation at rupture	2,5 %

### REACTION TO FIRE CLASSIFICATION (EN 13501-1)

A <sub>2</sub> - no contribution to fire
s <sub>1</sub> - low smoke emission
d <sub>0</sub> - no flaming droplets/particles

### PROPERTIES OF THE UNIDIRECTIONAL MESH

PROPERTY	PBO-MESH 105
Weight of PBO fibers in the mesh	105 g/m <sup>2</sup>
Equivalent thickness of dry fabric in the direction of the warp	0,067 mm
Equivalent thickness of dry fabric in the direction of the weft	0 mm
Tensile strength of the warp per unit of width	370 kN/m
Tensile strength of the weft per unit of width	0 kN/m
Weight of the mesh (support + PBO fibers)	152 g/m <sup>2</sup>

### SPECIFICATIONS FOR THE SUPPLY

Package	30 linear meter rolls, height 10 cm 15 linear meter rolls, height 25 cm 7,5 m <sup>2</sup> rolls (15 m linear meters, height 50 cm)
Consumption	Calculate an overlap of the sheets by about 10 cm at the junctions

### PROPERTIES OF THE INORGANIC MATRIX

PROPERTY	MX-PBO Concrete	MX-PBO Masonry
Water per 100 kg of dry premix	26 – 28 liters	26 – 28 liters
Consistency of the mortar (EN13395-1)	175 +/- 10 mm	170 +/- 10 mm
Specific weight of fresh mortar (EN 1015-6)	1,80 ± 0,05 g/cc	1,65 ± 0,05 g/cc
Volume of fresh mortar for 100 kg of dry premix	about 71 liters	about 77 liters
Compression resistance at 28 days (EN12190)	≥ 40 MPa	> 20 MPa
Bending resistance at 28 days (EN 196-1)	≥ 4 MPa	> 3,5 MPa
Elastic modulus at 28 days (EN 13412)	≥ 7 GPa	> 7,5 GPa

### SPECIFICATIONS FOR THE SUPPLY

Package	25 kg bags	25 kg bags
Consumption of dry premixed mortar	Approx. 1,41 kg/m <sup>2</sup> /mm	Approx. 1,3 kg/m <sup>2</sup> /mm

## FIELDS OF APPLICATION

- ▶ Flexural reinforcement of concrete joists of concrete masonry slabs;
- ▶ Reinforcement of normal and pre-stressed reinforced concrete structures to bending, shear, and torsion;
- ▶ Confinement of columns subject to bending and compression with small and large eccentricity;
- ▶ Increase the resistance to simple bending or bending of columns and beams;
- ▶ Confinement of columns;
- ▶ Improvement of the joints between beams and columns through wrapping;
- ▶ Increased strength of the beam-column joint panels by arranging the fibers according to the tensile isostatics.



The application methods for the correct implementation of the products are shown on the technical data sheet downloadable from the website [www.ruregold.it](http://www.ruregold.it)



# PBO-MESH 88

fka Ruregold XT

**Unidirectional 88 g/m<sup>2</sup> PBO-MESH for FRCM strengthening system with inorganic matrix**

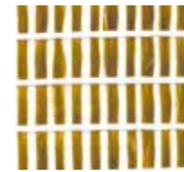


**PBO-MESH 88** is an FRCM structural strengthening system with unidirectional PBO mesh and stabilized inorganic matrix for reinforced concrete and masonry constructions. The high weight of PBO makes it suitable for significant applications on concrete and masonry such as wrapping or shear and bending reinforcements.

This strengthening system does not use epoxy resin and its performance equals that of traditional FRP with carbon fiber sand epoxy binder.

Fire resistant	Wet supports
Vapor permeable	Easy to install
Non-toxic matrix	Resistant to freeze/thaw cycles

## PROPERTIES OF THE SYSTEM:



► **PBO-MESH 88**  
Unidirectional 88 g/m<sup>2</sup> PBO-MESH available in two heights:  
• 25 cm (roll length equal to 15 m)  
• 50 cm (roll length equal to 15 m).



► **MX-PBO Concrete**  
Stabilized inorganic matrix specific for applications on concrete supports (in compliance with the EN 1504-3 Standard).

► **MX-PBO Masonry**  
Stabilized inorganic matrix specific for applications on masonry supports (in compliance with the EN 998-2).

## PROPERTIES OF THE SYSTEM

- Increased resistance to simple bending, shear, and combined compressive and bending stress of columns and beams, increased ductility of the joints between beams and columns, and increased resistance in the beam-column joints;
- Significant increase in the ductility of the reinforced structural element, high energy dissipation capacity and high reliability of the system, even if subjected to cyclical overloads (e.g., earthquake).



## TECHNICAL CHARACTERISTICS

PROPERTIES OF PBO FIBERS	
Tensile strength	5,8 GPa
Elastic modulus	270 GPa
Fiber density	1,56 g/cm <sup>3</sup>
Elongation at rupture	2,5 %

REACTION TO FIRE CLASSIFICATION (EN 13501-1)
A <sub>2</sub> - no contribution to fire
s <sub>1</sub> - low smoke emission
d <sub>0</sub> - no flaming droplets/particles

PROPERTIES OF THE UNIDIRECTIONAL MESH	PBO-MESH 88
Weight of PBO fibers in the mesh	88 g/m <sup>2</sup>
Equivalent thickness of dry fabric in the direction of the warp	0,057 mm
Equivalent thickness of dry fabric in the direction of the weft	0 mm
Tensile strength of the warp per unit of width	310 kN/m
Tensile strength of the weft per unit of width	0 kN/m
Weight of the mesh (support + PBO fibers)	140 g/m <sup>2</sup>

SPECIFICATIONS FOR THE SUPPLY	
Package	15 linear meter rolls, height 25 cm 7,5 m <sup>2</sup> rolls (15 linear meters, height 50 cm)
Consumption	Calculate an overlap of the sheets by about 10 cm at the junctions.

PROPERTIES OF THE INORGANIC MATRIX	MX-PBO Concrete	MX-PBO Masonry
Water per 100 kg of dry premix	26 – 28 liters	26 – 28 liters
Consistency of the mortar (EN13395-1)	175 +/- 10 mm	170 +/- 10 mm
Specific weight of fresh mortar (EN 1015-6)	1,80 ± 0,05 g/cc	1,65 ± 0,05 g/cc
Volume of fresh mortar for 100 kg of dry premix	approx. 71 liters	approx. 77 liters
Compression resistance at 28 days (EN12190)	≥ 40 MPa	> 20 MPa
Bending resistance at 28 days (EN 196-1)	≥ 4 MPa	> 3,5 MPa
Elastic modulus at 28 days (EN 13412)	≥ 7 GPa	> 7,5 GPa

SPECIFICATIONS FOR THE SUPPLY		
Package	25 kg bags	25 kg bags
Consumption of dry premixed mortar	Approx. 1,41 kg/m <sup>2</sup> /mm	Approx. 1,3 kg/m <sup>2</sup> /mm

## FIELDS OF APPLICATION

- Shear and bending reinforcement of concrete beams;
- Reinforcement of normal and pre-stressed reinforced concrete structures to bending, shear, and torsion;
- Confinement of columns subject to bending and compression with small and large eccentricity;
- Increase the resistance to simple bending or bending of columns and beams;
- Improvement of the joints between beams and columns through wrapping;
- Increased strength of the beam-column joint panels by arranging the fibers according to the tensile isostatics.

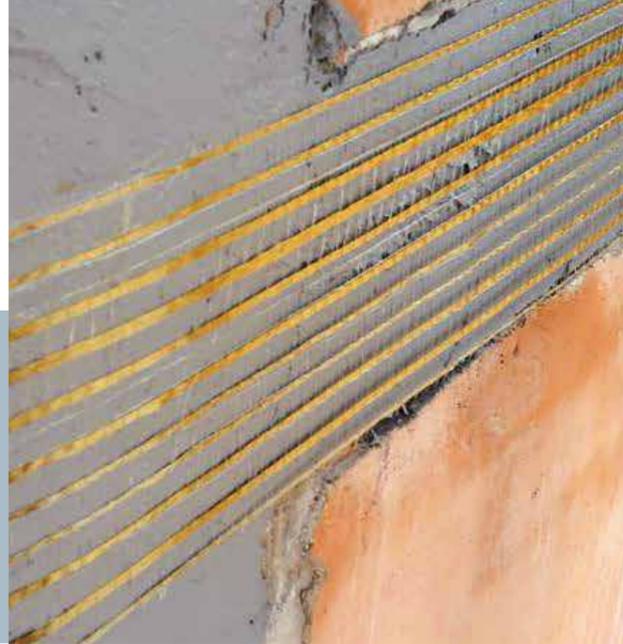


The application methods for the correct implementation of the products are shown on the technical data sheet downloadable from the website [www.ruregold.it](http://www.ruregold.it)



# PBO-MESH 44

fka Ruregold PBO 44 FRCM



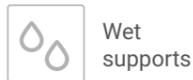
**Unidirectional 44 g/m<sup>2</sup> for FRCM strengthening system with inorganic matrix**

**PBO-MESH 44** is a FRCM structural strengthening system with unidirectional PBO mesh and stabilized inorganic matrix for reinforced concrete and masonry constructions. The high weight of PBO makes it suitable for significant applications on both concrete and masonry, especially for wrapping or shear and bending reinforcements.

This strengthening system does not use epoxy resins and its performance equals that of traditional FRP with carbon fiber sand epoxy binder.



Ecological



Wet supports



Vapor permeable



Easy to install



Non-toxic matrix



Compatible with masonry

## THE SYSTEM IS MADE UP OF:



- ▶ **PBO-MESH 44**  
Unidirectional 44 g/m<sup>2</sup> PBO-MESH available in two heights:
  - 20 cm (roll length equal to 50 m)
  - 25 cm (roll length equal to 50 m).



- ▶ **MX-PBO Concrete**  
Stabilized inorganic matrix specific for applications on concrete supports (in compliance with the EN 1504-3 Standard).
- ▶ **MX-PBO Masonry**  
Stabilized inorganic matrix specific for applications on masonry supports (in compliance with the EN 998-2).

## PROPERTIES OF THE SYSTEM

- ▶ Increases the shear strength of masonry panels, the bearing capacity of columns and pillars, and elimination of the formation of hinges on arches and vaults, favoring the redistribution of tensions within the structure;
- ▶ Significant increase in the ductility of the reinforced structural element, high energy dissipation capacity and high reliability of the system, even if subjected to cyclical overloads (e.g., earthquake);
- ▶ Maintains the normal breathability of the substrate and excludes the formation of superficial condensation, a possible source of deterioration for the wall decorations present.



## TECHNICAL CHARACTERISTICS

### PROPERTIES OF PBO FIBERS

Tensile strength	5,8 GPa
Elastic modulus	270 GPa
Fiber density	1,56 g/cm <sup>3</sup>
Elongation at rupture	2,5 %

### REACTION TO FIRE CLASSIFICATION (EN 13501-1)

A <sub>2</sub> - no contribution to fire
s <sub>1</sub> - low smoke emission
d <sub>0</sub> - no flaming droplets/particles

### PROPERTIES OF THE UNIDIRECTIONAL MESH

PROPERTIES OF THE UNIDIRECTIONAL MESH	PBO-MESH 44
Weight of PBO fibers in the mesh	44 g/m <sup>2</sup>
Equivalent thickness of dry fabric in the direction of the warp	0,028 mm
Equivalent thickness of dry fabric in the direction of the weft	0 mm
Tensile strength of the warp per unit of width	155 kN/m
Tensile strength of the weft per unit of width	0 kN/m
Weight of the mesh (support + PBO fibers)	84 g/m <sup>2</sup>

### SPECIFICATIONS FOR THE SUPPLY

Package	Rolls of 50 linear meters, height 20 cm Rolls of 50 linear meters, height 25 cm
Consumption	Calculate an overlap of the sheets by about 10 cm at the junctions.

### PROPERTIES OF THE INORGANIC MATRIX

PROPERTIES OF THE INORGANIC MATRIX	MX-PBO Concrete	MX-PBO Masonry
Water per 100 kg of dry premix	26 – 28 liters	26 – 28 liters
Consistency of the mortar (EN13395-1)	175 +/- 10 mm	170 +/- 10 mm
Specific weight of fresh mortar (EN 1015-6)	1,80 ± 0,05 g/cc	1,65 ± 0,05 g/cc
Volume of fresh mortar for 100 kg of dry premix	approx. 71 liters	approx. 77 liters
Compression resistance at 28 days (EN12190)	≥ 40 MPa	> 20 MPa
Bending resistance at 28 days (EN 196-1)	≥ 4 MPa	> 3,5 MPa
Elastic modulus at 28 days (EN 13412)	≥ 7 GPa	> 7,5 GPa

### SPECIFICATIONS FOR THE SUPPLY

Package	25 kg bags	25 kg bags
Consumption of dry premixed mortar	Approx. 1,41 kg/m <sup>2</sup> /mm	Approx. 1,3 kg/m <sup>2</sup> /mm

## FIELDS OF APPLICATION

- ▶ Shear and bending reinforcement of the masonry with respect to the actions in and out of the plane;
- ▶ Reinforcement of bending, shear and torsion in reinforced concrete structures;
- ▶ Confinement of columns subject to bending and compression with small and large eccentricity;
- ▶ Increase the resistance to simple bending or bending of columns and beams;
- ▶ Confinement of reinforced concrete and masonry columns;
- ▶ Improvement of the ductility of the joints between beam and columns through wrapping;
- ▶ Increased strength of the beam-column joint panels by arranging the fibers according to the tensile isostatics.



The application methods for the correct implementation of the products are shown on the technical data sheet downloadable from the website [www.ruregold.it](http://www.ruregold.it)

# PBO-MESH 70/18

fka Ruregold XP



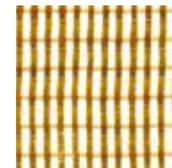
**Bi-directional PBO of 70+18 g/m<sup>2</sup> mesh for FRCM strengthening system with inorganic matrix**

**PBO-MESH 70/18** is an FRCM structural strengthening system with bidirectional PBO-MESH and a stabilized inorganic matrix for reinforced concrete and masonry constructions. The structure of this PBO-MESH makes it suitable for applications such as the wrapping of concrete columns or the reinforcement of beam-column nodes.

This strengthening system does not use epoxy resins and its performance equals that of traditional FRP with carbon fibers and epoxy binder.

Fire resistant	Wet supports
Vapor permeable	Easy to install
Non-toxic matrix	Resistant to freeze/thaw cycles

## THE SYSTEM IS MADE UP OF:



- ▶ **PBO-MESH 70/18**  
Bi-directional PBO fiber mesh with 70 g/m<sup>2</sup> in warp and 18 g/m<sup>2</sup> in weft available in two heights:
  - 50 cm (roll length equal to 15 m)
  - 100 cm (roll length equal to 15 m).



- ▶ **MX-PBO Concrete**  
Stabilized inorganic matrix specific for applications on concrete supports (in compliance with the EN 1504-3 Standard).
- ▶ **MX-PBO Masonry**  
Stabilized inorganic matrix specific for applications on masonry supports (in compliance with the EN 998-2 Standard).

## PROPERTIES OF THE SYSTEM

- ▶ Increased resistance to simple bending, shear, and combined compressive and bending stress of columns and beams, increased ductility of the joints between beams and columns, and increased resistance in the beam-column joints;
- ▶ Significant increase in the ductility of the reinforced structural element, high energy dissipation capacity and high reliability of the system, even if subjected to cyclical overloads (e.g., earthquake);



## TECHNICAL CHARACTERISTICS

### PROPERTIES OF PBO FIBERS

Tensile strength	5,8 GPa
Elastic modulus	270 GPa
Fiber density	1,56 g/cm <sup>3</sup>
Elongation at rupture	2,5 %

### REACTION TO FIRE CLASSIFICATION (EN 13501-1)

A <sub>2</sub> - no contribution to fire
s <sub>1</sub> - low smoke emission
d <sub>0</sub> - no flaming droplets/particles

### PROPERTIES OF THE BIDIRECTIONAL MESH

	PBO-MESH 70/18
Weight of PBO fibers in the mesh	88 g/m <sup>2</sup>
Equivalent thickness of dry fabric in the direction of the warp	0,0455 mm
Equivalent thickness of dry fabric in the direction of the weft	0,0115 mm
Tensile strength of the warp per unit of width	254,0 kN/m
Tensile strength of the weft per unit of width	63,4 kN/m
Weight of the mesh (support + PBO fibers)	126 g/m <sup>2</sup>

### SPECIFICATIONS FOR THE SUPPLY

Package	15 m <sup>2</sup> rolls (15 linear meters, height 100 cm) 7,5 m <sup>2</sup> rolls (15 linear meters, height 50 cm)
Consumption	Calculate an overlap of the sheets by about 10 cm at the junctions.

### PROPERTIES OF THE INORGANIC MATRIX

	MX-PBO Concrete	MX-PBO Masonry
Water per 100 kg of dry premix	26 – 28 liters	26 – 28 liters
Consistency of the mortar (EN13395-1)	175 +/- 10 mm	170 +/- 10 mm
Specific weight of fresh mortar (EN 1015-6)	1,80 ± 0,05 g/cc	1,65 ± 0,05 g/cc
Volume of fresh mortar for 100 kg of dry premix	approx. 71 liters	approx. 77 liters
Compression resistance at 28 days (EN12190)	≥ 40 MPa	> 20 MPa
Bending resistance at 28 days (EN 196-1)	≥ 4 MPa	> 3,5 MPa
Elastic modulus at 28 days (EN 13412)	≥ 7 GPa	> 7,5 GPa

### SPECIFICATIONS FOR THE SUPPLY

Package	25 kg bags	25 kg bags
Consumption of dry premixed mortar	Approx. 1,41 kg/m <sup>2</sup> /mm	Approx. 1,3 kg/m <sup>2</sup> /mm

## FIELDS OF APPLICATION

- ▶ Improvement of the ductility of the joints between beams and columns through wrapping;
- ▶ Confinement of reinforced concrete and masonry columns;
- ▶ Increased strength of the beam-column joint panels by arranging the fibers according to the tensile isostatics;
- ▶ Shear and bending reinforcement of concrete beams;
- ▶ Reinforcement of normal and pre-stressed reinforced concrete structures to bending, shear, and torsion;
- ▶ Confinement of columns subject to bending and compression with small and large eccentricity;
- ▶ Increased strength of masonry elements.



The application methods for the correct implementation of the products are shown on the technical data sheet downloadable from the website [www.ruregold.it](http://www.ruregold.it)



# PBO-MESH 22/22

fka Ruregold XR



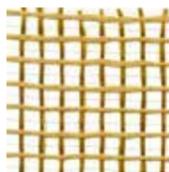
**Bi-directional 22+22 g/m<sup>2</sup> PBO-MESH for FRCM strengthening system with inorganic matrix**

**PBO-MESH 22/22** is an FRCM structural strengthening system with bidirectional PBO-MESH and a stabilized inorganic matrix for reinforced concrete and masonry constructions. The limited weight of PBO makes it suitable for applications especially on masonry for wrapping vaults or masonry walls.

This strengthening system does not use epoxy resins and its performance equals that of traditional FRP with carbon fibers and epoxy binder.

- Ecological
- Wet supports
- Vapor permeable
- Easy to install
- Non-toxic matrix
- Compatible with masonry

## THE SYSTEM IS MADE UP OF:



► **PBO-MESH 22/22**  
Bi-directional 22 g/m<sup>2</sup> PBO fiber in warp and 22 g/m<sup>2</sup> in weft available in one height:  
• 100 cm (roll length 15 m).



► **MX-PBO Concrete**  
Stabilized inorganic matrix specific for applications on concrete supports (in compliance with the EN 1504-3 Standard).

► **MX-PBO Masonry**  
Stabilized inorganic matrix specific for applications on masonry supports (in compliance with the EN 998-2 Standard).

## PROPERTIES OF THE SYSTEM

- Increases the shear strength of masonry panels, the bearing capacity of columns and pillars, and the elimination of the formation of hinges on arches and vaults, favoring the redistribution of tensions within the structure;
- Increases the shear strength of masonry panels, the bearing capacity of columns and pillars, and the elimination of the formation of hinges on arches and vaults, favoring the redistribution of tensions within the structure;
- Maintains the normal breathability of the substrate and excludes the formation of superficial condensation, a possible source of deterioration for the wall decorations present.



## TECHNICAL CHARACTERISTICS

PROPERTIES OF PBO FIBERS		REACTION TO FIRE CLASSIFICATION (EN 13501-1)
Tensile strength	5,8 GPa	A <sub>2</sub> - no contribution to fire
Elastic modulus	270 GPa	s <sub>1</sub> - low smoke emission
Fiber density	1,56 g/cm <sup>3</sup>	d <sub>0</sub> - no flaming droplets/particles
Elongation at rupture	2,5 %	

PROPERTIES OF THE BIDIRECTIONAL MESH	PBO-MESH 22/22
Weight of PBO fibers in the mesh	44 g/m <sup>2</sup>
Equivalent thickness of dry fabric in the direction of the warp	0,014 mm
Equivalent thickness of dry fabric in the direction of the weft	0,014 mm
Tensile strength of the warp per unit of width	77,5 kN/m
Tensile strength of the weft per unit of width	77,5 kN/m
Weight of the mesh (support + PBO fibers)	72 g/m <sup>2</sup>

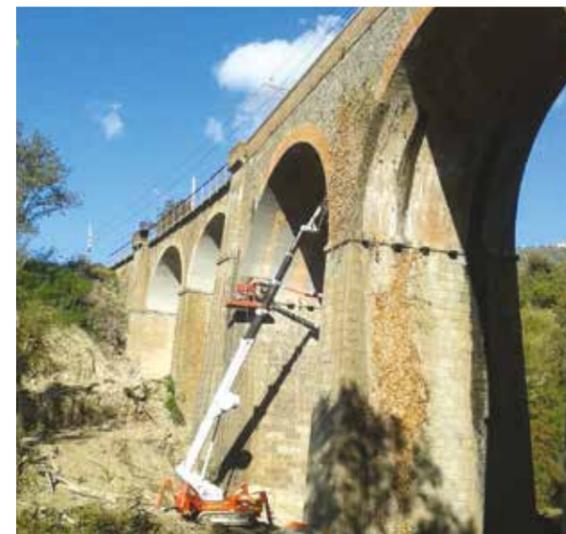
SPECIFICATIONS FOR THE SUPPLY	
Package	15m <sup>2</sup> rolls (15 linear meters, 100 cm height)
Consumption	Calculate an overlap of the sheets by about 10 cm at the junctions.

PROPERTIES OF THE INORGANIC MATRIX	MX-PBO Concrete	MX-PBO Masonry
Water per 100 kg of dry premix	26 – 28 liters	26 – 28 liters
Consistency of the mortar (EN13395-1)	175 +/- 10 mm	170 +/- 10 mm
Specific weight of fresh mortar (EN 1015-6)	1,80 ± 0,05 g/cc	1,65 ± 0,05 g/cc
Volume of fresh mortar for 100 kg of dry premix	approx. 71 liters	approx. 77 liters
Compression resistance at 28 days (EN12190)	≥ 40 MPa	> 20 MPa
Bending resistance at 28 days (EN 196-1)	≥ 4 MPa	> 3,5 MPa
Elastic modulus at 28 days (EN 13412)	≥ 7 GPa	> 7,5 GPa

SPECIFICATIONS FOR THE SUPPLY		
Package	25 kg bags	25 kg bags
Consumption of dry premixed mortar	Approx. 1,41 kg/m <sup>2</sup> /mm	Approx. 1,3 kg/m <sup>2</sup> /mm

## FIELDS OF APPLICATION

- Consolidation of vaults;
- Shear and bending reinforcement of masonry with respect to the actions in and out of the plane;
- Wraps around slabs between floors and on corner joints of wall bays;
- Seismic retrofitting;
- Increased resistance to simple bending and combined compressive and bending stress of columns and beams;
- The replacement of regular reinforced slabs with slabs reinforced with fiber glass, or welded wire mesh;
- Improvement of the ductility of the joints between beams and columns through wrapping.



The application methods for the correct implementation of the products are shown on the technical data sheet downloadable from the website [www.ruregold.it](http://www.ruregold.it)



# PBO-MESH 10/10

fka Ruregold XA



**Bi-directional 10+10 g/m<sup>2</sup> PBO mesh for FRCM strengthening system with inorganic matrix**

**PBO-MESH 10/10** is an FRCM structural strengthening system with bidirectional PBO mesh and a stabilized inorganic matrix for reinforced concrete structures. The limited weight makes it suitable to prevent overturning and for the reinforcement of non structural components, often with the use of PBO connectors.

This strengthening system does not use epoxy resins and its performance equals that of traditional FRP with carbon fibers and epoxy binder.



Ecological



Wet supports



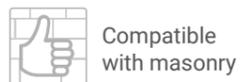
Vapor permeable



Passive protection



Reversible



Compatible with masonry

## PROPERTIES OF THE SYSTEM

- ▶ It eliminates the risk of triggering local collapse mechanisms due to the overturning of infill walls, thanks also to the connector that is inserted between the wall and the beam/slab;
- ▶ Increases the shear strength of masonry panels, the bearing capacity of columns and pillars, and the elimination of the formation of hinges on arches and vaults, favoring the redistribution of tensions within the structure;
- ▶ Significant increase in the ductility of the reinforced structural element, high energy dissipation capacity and high reliability of the system, even if subjected to cyclical overloads (e.g., earthquake).

## THE SYSTEM IS MADE UP OF:



- ▶ **PBO-MESH 10/10**  
Bi-directional 10 g/m<sup>2</sup> in warp and 10 g/m<sup>2</sup> in weft PBO fiber mesh available in two heights:
  - 50 cm (roll length 15 m)
  - 100 cm (roll length 15 m).



- ▶ **MX-PBO Masonry**  
Stabilized pozzolanic inorganic matrix in compliance with the EN 998-2 Standard.



- ▶ **PBO-JOINT**  
Connection element made of PBO fiber, Ø 3 and 6 mm, 10 m long.



- ▶ **MX-PBO JOINT**  
Stabilized inorganic matrix for the application of PBO-JOINT.



## TECHNICAL CHARACTERISTICS

### PROPERTIES OF PBO FIBERS

Tensile strength	5,8 GPa
Elastic modulus	270 GPa
Fiber density	1,56 g/cm <sup>3</sup>
Elongation at rupture	2,5 %

### REACTION TO FIRE CLASSIFICATION (EN 13501-1)

A <sub>2</sub> - no contribution to fire
s <sub>1</sub> - low smoke emission
d <sub>0</sub> - no flaming droplets/particles

### PROPERTIES OF THE BIDIRECTIONAL MESH

	PBO-MESH 10/10
Weight of PBO fibers in the mesh	20 g/m <sup>2</sup>
Thickness for the calculation of the PBO section at 0° and 90°	0,0064 mm

### SPECIFICATIONS FOR THE SUPPLY

Package	15 m <sup>2</sup> rolls (15 linear meters, 100 cm height) 7,5 m <sup>2</sup> rolls (15 linear meters, 50 cm height)
Consumption	Calculate an overlap of the sheets by about 10 cm at the junctions.

### PROPERTIES OF THE CONNECTOR

	PBO-JOINT	
Diameter	3 mm	6 mm
Tensile strength	2413 MPa	1860 MPa

### SPECIFICATIONS FOR THE SUPPLY

Package	Dispenser with 10 m, Ø 3 mm / Dispenser with 10 m, Ø 6 mm
Consumption	In addition to the length required for the hole itself calculate an additional 15 cm for each end.

### PROPERTIES OF THE INORGANIC MATRIX

	MX-PBO Masonry	MX-PBO JOINT
Water per 100 kg of dry premix	26 – 28 liters	-
Water for 5 kg of dry premix mortar	-	1,0 - 1,05 liters
Consistency of the mortar (EN13395-1)	170 +/- 10 mm	190 +/- 10 mm
Specific weight of fresh mortar (EN 1015-6)	1,65 ± 0,05 g/cc	1,80 ± 0,05 g/cc
Volume of fresh mortar for 100 kg of dry premix	approx. 77 liters	
Volume of fresh mortar for 5 kg of dry premix	-	approx. 3,4 liters
Compression resistance at 28 days (EN12190)	> 20 MPa	> 40 MPa
Bending resistance at 28 days (EN 196-1)	> 3,5 MPa	> 3 MPa
Elastic modulus at 28 days (EN 13412)	> 7,5 GPa	> 18,5 GPa

### SPECIFICATIONS FOR THE SUPPLY

Package	25 kg bags	5 kg bags
Consumption of dry premixed mortar	1,3 Kg/m <sup>2</sup> /mm	8 - 10 kg for 10 m connector

## FIELDS OF APPLICATION

- ▶ Light interventions on load-bearing masonry structures and on infill walls;
- ▶ The replacement of regular reinforced slabs with slabs reinforced with fiber glass, synthetic materials, or welded wire mesh;
- ▶ Creation of an anti-overturning system for vertical non-bearing infill structures, limiting cracks that can lead to collapse or overturning of the infill wall itself.

The application methods for the correct implementation of the products are shown on the technical data sheet downloadable from the website [www.ruregold.it](http://www.ruregold.it)

# PBO-JOINT

fka Ruregold JX Joint

**PBO connector to anchor FRCM systems on concrete and masonry elements**



**PBO-JOINT** is a unidirectional PBO fiber connection system for the anchoring of the existing structures and the PBO FRCM structural strengthening systems. The connection must be made on site and consists of a bundle of long unidirectional PBO fibers held together in a special mesh which gives the bundle a cylindrical shape.

## THE SYSTEM IS MADE UP OF:



► **PBO-JOINT**  
Connection element made of PBO fiber, Ø 3 and 6 mm, 10 m long.



► **MX-PBO JOINT**  
Stabilized inorganic matrix for the application PBO-JOINT.



Ecological



Wet supports



Vapor permeable



Easy to install



Non-toxic matrix



Compatible with masonry

## SYSTEM PROPERTIES

- Elimination of the risk of triggering local collapse mechanisms due to the overturning of infill walls, thanks also to the connector that is inserted between the partition and the beam/slab;
- Effective connection between the building structure and the applied strengthening systems, to achieve the continuity necessary to guarantee the reliability of the reinforcement;
- Excellent adhesion to any building material: normal and pre-stressed reinforced concrete, or masonry.



## TECHNICAL CHARACTERISTICS

### PROPERTIES OF PBO FIBERS

Tensile strength	5,8 GPa
Elastic modulus	270 GPa
Fiber density	1,56 g/cm <sup>3</sup>
Elongation at rupture	2,5 %

### REACTION TO FIRE CLASSIFICATION (EN 13501-1)

A <sub>2</sub> - no contribution to fire
s <sub>1</sub> - low smoke emission
d <sub>0</sub> - no flaming droplets/particles

### PROPERTIES OF THE CONNECTOR

	PBO-JOINT	
Diameter	3 mm	6 mm
Tensile strength	2413 MPa	1860 MPa

### SPECIFICATIONS FOR THE SUPPLY

Package	Dispenser with 10 m, Ø 3 mm / Dispenser with 10 m, Ø 6 mm
Consumption	In addition to the length required for the hole itself calculate an additional 15 cm for each end.

### PROPERTIES OF THE INORGANIC MATRIX

	MX-PBO JOINT
Consistency of the mortar (EN13395-1)	190 mm ± 10 mm
Specific weight of fresh mortar (EN 1015-6)	1,80 ± 0,05 g/cc
Water for 5 kg of dry premix mortar	1 - 1,05 liters
Compression Resistance (EN12190)	40,0 MPa
Bending Resistance (EN 196-1)	3,0 MPa
Secant modulus (EN 13412)	18.500 MPa

### SPECIFICATIONS FOR THE SUPPLY

Package	5 kg buckets
Consumption of dry premixed mortar	8 - 10 kg for 10 m of connector

## FIELDS OF APPLICATION

- Connection of strengthening systems with FRCM composite materials with PBO fibers and organic matrix;
- Realization of structural connections where it is not possible to close the PBO-MESH wrap on itself;
- Anchorage of the traditional reinforced slab with PBO mesh.



The application methods for the correct implementation of the products are shown on the technical data sheet downloadable from the website [www.ruregold.it](http://www.ruregold.it)



# FRCM Strengthening Systems with CARBON fibers

Carbon fiber composite materials and inorganic matrix for structural strengthening

## Accessories

### Ruregold Gun

Professional manual gun to insert the **MX-PBO JOINT** matrix in the holes, made with nylon tube and provided with nozzle with rigid extension and flexible fitting to facilitate its use even in the most difficult positions.



### Ruregold Scissors

Special scissors to cut PBO-MESH.



# C-MESH 182

fka Ruredil X Mesh Uniax



**Unidirectional 182 g/m<sup>2</sup> carbon fiber for FRCM strengthening system with inorganic matrix**

**C-MESH 182** is a FRCM structural strengthening system with unidirectional carbon mesh and stabilized inorganic matrix for reinforced concrete and masonry constructions. The increased weight of carbon makes it suitable for applications on concrete and masonry such as wraps or shear or bending reinforcements.

This strengthening system does not use epoxy resins and its performance equals that of traditional FRPs with carbon fibers and epoxy binder.



Fire resistant



Wet supports



Vapor permeable



Easy to install



Non-toxic matrix



Resistant to freeze/thaw cycles



► **C-MESH 182**  
182 g/m<sup>2</sup> unidirectional carbon fiber mesh available in the following heights:  
• 25 cm (roll length equal to 15 m).



► **MX-C 50 Concrete**  
Stabilized inorganic matrix specific for applications on concrete supports (in compliance with the EN 1504-3 Standard).

► **MX-C 25 Masonry**  
Stabilized inorganic matrix specific for applications on masonry supports (in compliance with the EN 998-2 Standard).

## PROPERTIES OF THE SYSTEM

- Increased resistance to simple bending, shear, and combined compressive and bending stress of columns and beams, increased ductility of the joints between beams and columns, and increased resistance in the beam-column joints;
- Significant increase in the ductility of the reinforced structural element, high energy dissipation capacity and high reliability of the system, even if subjected to cyclical overloads (e.g., earthquake).



## TECHNICAL CHARACTERISTICS

### PROPERTIES OF CARBON FIBERS

Tensile strength	4,9 GPa
Elastic modulus	250 GPa
Fiber density	1,81 g/cm <sup>3</sup>
Elongation at rupture	1,9 %

### REACTION TO FIRE CLASSIFICATION (EN 13501-1)

A <sub>2</sub> - no contribution to fire
s <sub>1</sub> - low smoke emission
d <sub>0</sub> - no flaming droplets/particles

### PROPERTIES OF THE UNIDIRECTIONAL MESH

PROPERTY	C-MESH 182
Weight of carbon fibers in the mesh	182 g/m <sup>2</sup>
Equivalent thickness of dry fabric in the direction of the warp	0,100 mm
Equivalent thickness of dry fabric in the direction of the weft	0,00 mm
Tensile strength of the warp per unit of width	498,0 kN/m
Tensile strength of the weft per unit of width	0,0 kN/m
Total weight of the mesh	273 g/m <sup>2</sup>

### SPECIFICATIONS FOR THE SUPPLY

Package	15 linear meter rolls, height 25 cm
Consumption	Calculate an overlap of the sheets by about 10 cm at the junctions.

### PROPERTIES OF THE INORGANIC MATRIX

PROPERTY	MX-C 50 Concrete	MX-C 25 Masonry
Consistency of the mortar (EN13395-1)	100 mm	165 mm
Specific weight of fresh mortar (EN 1015-6)	1,80 ± 0,05 g/cc	1,50 ± 0,05 g/cc
Water per 100 kg of dry premix	36 - 37 liters	26 - 28 liters
Compressive strength (EN 196-1)	≥ 40 MPa (at 28 days)	> 20,0 MPa (at 28 days)
Bend resistance (EN 196-1)	≥ 4,0 MPa (at 28 days)	> 3,5 MPa (at 28 days)
Secant modulus (EN 13412)	≥ 7 GPa (at 28 days)	> 7000 MPa (at 28 days)

### SPECIFICATIONS FOR THE SUPPLY

Package	25 kg bags	25 kg bags
Consumption of dry premixed mortar	1,4 Kg/m <sup>2</sup> /mm	1,2 Kg/m <sup>2</sup> /mm

## FIELDS OF APPLICATION

- Shear and bending reinforcement of concrete beams;
- Reinforcement of normal and pre-stressed reinforced concrete structures to bending, shear, and torsion;
- Confinement of columns subject to bending and compression with small and large eccentricity;
- Increase the resistance to simple bending or combined compressive and bending stress of columns and beams;
- Improvement of the ductility of the joints between beams and columns by wrapping;
- Increased strength of the beam-column node panels by arranging the fibers according to the tensile isostatics.



The application methods for the correct implementation of the products are shown on the technical data sheet downloadable from the website [www.ruregold.it](http://www.ruregold.it)

# C-MESH 84/84

fka Ruredil X Mesh C10



**Bidirectional 84+84 g/m<sup>2</sup> carbon mesh for FRCM strengthening system with inorganic matrix**

**C-MESH 84/84** is an FRCM structural strengthening system with bi-directional carbon mesh and stabilized inorganic matrix for reinforced concrete and masonry constructions. The increased weight of carbon makes it suitable for applications on concrete and masonry such as wraps or shear or bending reinforcements. This strengthening system does not use epoxy resins and its performance equals that of traditional FRPs with carbon fibers and epoxy binder.



Fire resistant



Wet supports



Vapor permeable



Easy to install

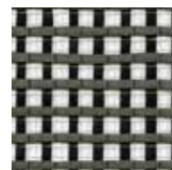


Compatible with masonry



Resistant to freeze/thaw cycles

## THE SYSTEM IS MADE UP OF:



### C-MESH 84/84

Bidirectional mesh in 84 g/m<sup>2</sup> carbon fiber in warp and 84 g/m<sup>2</sup> in weft available in the following height:

- 100 cm (roll length equal to 15 m).



### MX-C 50 Concrete

Stabilized inorganic matrix specific for applications on concrete supports (in compliance with the EN 1504-3 Standard).

### MX-C 25 Masonry

Stabilized inorganic matrix specific for applications on masonry supports (in compliance with the EN 998-2 Standard).

## TECHNICAL CHARACTERISTICS

### PROPERTIES OF CARBON FIBERS

Tensile strength	4,9 GPa
Elastic modulus	250 GPa
Fiber density	1,82 g/cm <sup>3</sup>
Elongation at rupture	1,9 %

### REACTION TO FIRE CLASSIFICATION (EN 13501-1)

A <sub>2</sub> - no contribution to fire
s <sub>1</sub> - low smoke emission
d <sub>0</sub> - no flaming droplets/particles

### PROPERTIES OF THE BIDIRECTIONAL MESH

	C-MESH 84/84
Weight of carbon fibers in the mesh	168 g/m <sup>2</sup>
Equivalent thickness of dry fabric in the direction of the warp	0,047 mm
Equivalent thickness of dry fabric in the direction of the weft	0,047 mm
Tensile strength of the warp per unit of width	231,0 kN/m
Tensile strength of the weft per unit of width	231,0 kN/m
Total weight of the mesh	204 g/m <sup>2</sup>

### SPECIFICATIONS FOR THE SUPPLY

Package	15 m <sup>2</sup> rolls (15 linear meters, height 100 cm)
Consumption	Calculate an overlap of the sheets by about 10 cm at the junctions.

### PROPERTIES OF THE INORGANIC MATRIX

	MX-C 50 Concrete	MX-C 25 Masonry
Consistency of the mortar (EN13395-1)	100 mm	165 mm
Specific weight of fresh mortar (EN 1015-6)	1,80 ± 0,05 g/cc	1,50 ± 0,05 g/cc
Water per 100 kg of dry premix	36 - 37 liters	26 - 28 liters
Compressive strength (EN 196-1)	≥ 40 MPa (at 28 days)	> 20,0 MPa (at 28 days)
Bend resistance (EN 196-1)	≥ 4,0 MPa (at 28 days)	> 3,5 MPa (at 28 days)
Secant modulus (EN 13412)	≥ 7 GPa (at 28 days)	> 7000 MPa (at 28 days)

### SPECIFICATIONS FOR THE SUPPLY

Package	25 kg bags	25 kg bags
Consumption of dry premixed mortar	1,4 Kg/m <sup>2</sup> /mm	1,2 Kg/m <sup>2</sup> /mm

## PROPERTIES OF THE SYSTEM

- ▶ Increases the shear strength of masonry panels, the bearing capacity of columns and pillars, and the elimination of the formation of hinges on arches and vaults, favoring the redistribution of tensions within the structure;
- ▶ Significant increase in the ductility of the reinforced structural element, high energy dissipation capacity and high reliability of the system, even if subjected to cyclical overloads (e.g., earthquake);
- ▶ Maintains the normal breathability of the substrate and excludes the formation of superficial condensation, a possible source of deterioration for the wall decorations present.



## FIELDS OF APPLICATION

- ▶ Consolidation of vaults;
- ▶ Shear and bending reinforcement of masonry with respect to the actions in and out of the plane;
- ▶ Wraps around slabs between floors and on corner joints of wall bays;
- ▶ Seismic retrofitting;
- ▶ Increase the resistance to simple bending or combined compressive and bending stress of columns and beams;
- ▶ Replacement of the traditional reinforced slab with glass or electro-welded steel mesh;
- ▶ Improvement of the ductility of the joints between beams and columns through wrapping.

The application methods for the correct implementation of the products are shown on the technical data sheet downloadable from the website [www.ruregold.it](http://www.ruregold.it)

# C-MESH 42/42

fka Ruredil X Mesh TC30

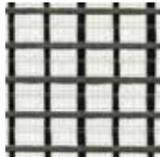


**Bidirectional 42+42 g/m<sup>2</sup> carbon mesh for FRCM strengthening system with inorganic matrix**

**C-MESH 42/42** is an FRCM structural strengthening system with bi-directional carbon mesh and stabilized inorganic matrix for the reinforcement of masonry structures. The light weight makes it suitable to prevent overturning and for the reinforcement of non structural components, often with the use of PBO connectors. This strengthening system does not use epoxy resins and its performance equals that of traditional FRPs with carbon fibers and epoxy binder.

-  Ecological
-  Wet supports
-  Vapor permeable
-  Passive protection
-  Reversible
-  Compatible with masonry

## THE SYSTEM IS MADE UP OF:

-  **C-MESH 42/42**  
Bidirectional carbon fiber mesh 42 g/m<sup>2</sup> in warp and 42 g/m<sup>2</sup> in weft available in one height:  
• 100 cm (roll length equal to 15 m).
-  **MX-C 25 Masonry**  
Stabilized inorganic matrix specific for applications on masonry supports (in compliance with the EN 998-2 Standard).
-  **C-JOINT**  
Connection element in carbon fiber, Ø 6, 10 and 12 mm, length 10 m.
-  **MX-C JOINT**  
Stabilized inorganic matrix for the application of C-JOINT.

## THE SYSTEM IS MADE UP OF:

- ▶ It eliminates the risk of triggering local collapse mechanisms due to the overturning of infill walls, thanks also to the connector that is inserted between the wall and the beam/slab;
- ▶ Increases the shear strength of masonry panels, the bearing capacity of columns and pillars, and the elimination of the formation of hinges on arches and vaults, favoring the redistribution of tensions within the structure;
- ▶ Significant increase in the ductility of the reinforced structural element, high energy dissipation capacity and high reliability of the system, even if subjected to cyclical overloads (e.g., earthquake).



The application methods for the correct implementation of the products are shown on the technical data sheet downloadable from the website [www.ruregold.it](http://www.ruregold.it)

## TECHNICAL CHARACTERISTICS

PROPERTIES OF CARBON FIBERS		REACTION TO FIRE CLASSIFICATION (EN 13501-1)		
Tensile strength	4,9 GPa	A <sub>2</sub> - no contribution to fire		
Elastic modulus	250 GPa	s <sub>1</sub> - low smoke emission		
Fiber density	1,82 g/cm <sup>3</sup>	d <sub>0</sub> - no flaming droplets/particles		
Elongation at rupture	1,9 %			

PROPERTIES OF THE BIDIRECTIONAL MESH	C-MESH 42/42
Weight of carbon fibers in the mesh	84 g/m <sup>2</sup>
Thickness for the calculation of the carbon section at 0° and 90°	0,023 mm

SPECIFICATIONS FOR THE SUPPLY	
Package	15 m <sup>2</sup> rolls (15 linear meters, height 100 cm)
Consumption	Calculate an overlap of the sheets by about 10 cm at the junctions.

PROPERTIES OF THE CONNECTOR	C-JOINT		
Diameter	6 mm	10 mm	12 mm
Tensile strength	1225 MPa	1221 MPa	1263 MPa

SPECIFICATIONS FOR THE SUPPLY	
Package	10 m dispenser.
Consumption	In addition to the length required for the hole itself calculate an additional 15 cm for each end.

PROPERTIES OF THE INORGANIC MATRIX	MX-C 25 Masonry	MX-C JOINT
Consistency of the mortar (EN13395-1)	165 mm	190 mm
Specific weight of fresh mortar (EN 1015-6)	1,50 ± 0,05 g/cc	1,80 ± 0,05 g/cc
Water per 100 kg of dry premix	26 - 28 liters	-
Water for 5 kg of dry premix mortar	-	1,0 - 1,05 liters
Compressive strength (EN 196-1)	> 20,0 MPa (at 28 days)	40,0 MPa
Bend resistance (EN 196-1)	> 3,5 MPa (at 28 days)	3,0 MPa
Secant modulus (EN 13412)	> 7000 MPa (at 28 days)	18.500 MPa

SPECIFICATIONS FOR THE SUPPLY		
Package	25 kg bags	5 kg buckets
Consumption of dry premixed mortar	1,2 Kg/m <sup>2</sup> /mm	8 - 10 kg for 10 m of connector

## FIELDS OF APPLICATION

- ▶ Light interventions on load-bearing masonry elements and on infill walls;
- ▶ Replacement of the traditional reinforced slab made with glass, synthetic or electro-welded steel mesh;
- ▶ Creation of an anti-overturning system for vertical non-load-bearing closing elements, limiting the cracks that may lead to the collapse or overturning of the infill wall.



# C-JOINT

fka Ruredil X Joint

**Carbon connector for anchoring FRCM systems to concrete and masonry**



**C-JOINT** is a connection system made of unidirectional carbon fibers for the creation of an anchor between the existing structures and FRCM carbon structural strengthening systems. The connection must be made on site and consists of a bundle of long unidirectional carbon fibers held together in a special mesh which gives the bundle a cylindrical shape.

## THE SYSTEM IS MADE UP OF:



► **C-JOINT**  
Carbon fiber connection element, Ø 6, 10 and 12 mm, 10 m long.



► **MX-C JOINT**  
Stabilized inorganic matrix for the application of C-JOINT.

-  Ecological
-  Wet supports
-  Vapor permeable
-  Easy to install
-  Non-toxic matrix
-  Compatible with masonry

## PROPERTIES OF THE SYSTEM

- It eliminates the risk of triggering local collapse mechanisms due to the overturning of infill walls, thanks also to the connector that is inserted between the wall and the beam/slab;
- Effective connection between the building structure and the applied strengthening systems, to achieve the continuity necessary to guarantee the reliability of the reinforcement;
- Excellent adhesion to any building material: normal and pre-stressed reinforced concrete, or masonry.



## TECHNICAL CHARACTERISTICS

PROPERTIES OF CARBON FIBERS		REACTION TO FIRE CLASSIFICATION (EN 13501-1)	
Tensile strength	4,9 GPa	A <sub>2</sub> - no contribution to fire	
Elastic modulus	250 GPa	s <sub>1</sub> - low smoke emission	
Fiber density	1,82 g/cm <sup>3</sup>	d <sub>0</sub> - no flaming droplets/particles	

PROPERTIES OF THE CONNECTOR	C-JOINT		
Diameter	6 mm	10 mm	12 mm
Tensile strength	1225 MPa	1221 MPa	1263 MPa

SPECIFICATIONS FOR THE SUPPLY	
Package	10 m dispenser.
Consumption	In addition to the length required for the hole itself calculate an additional 15 cm for each end.

PROPERTIES OF THE INORGANIC MATRIX	MX-C JOINT
Consistency of the mortar (EN13395-1)	190 mm
Specific weight of fresh mortar (EN 1015-6)	1,80 ± 0,05 g/cc
Water for 5 kg of dry premix mortar	1,0 - 1,05 liters
Compressive strength (EN 196-1)	40,0 MPa
Bend resistance (EN 196-1)	3,0 MPa
Secant modulus (EN 13412)	18.500 MPa

SPECIFICATIONS FOR THE SUPPLY	
Package	5 kg buckets
Consumption of dry premixed mortar	8 - 10 kg for 10 m of connector

## FIELDS OF APPLICATION

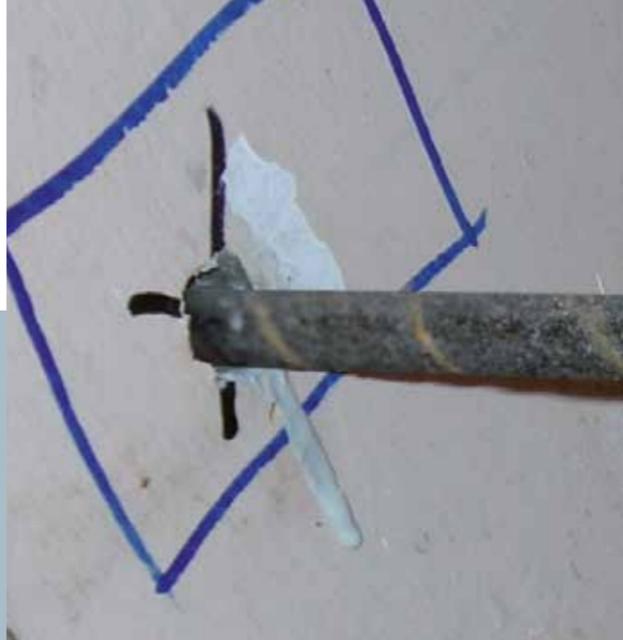
- Connection of FRCM composite materials reinforce cement systems with carbon fibers and inorganic matrix;
- Realization of structural connections where it is not possible to close the carbon mesh wrap on itself;
- Anchoring of the traditional reinforced slab with carbon mesh.



The application methods for the correct implementation of the products are shown on the technical data sheet downloadable from the website [www.ruregold.it](http://www.ruregold.it)

# C-BAR

fka Ruredil X Bar



**Pultruded carbon bar with improved adhesion for FRCM structural strengthening system**

# FRP Strengthening Systems with CARBON fibers

Composite system in carbon fiber and epoxy resin for structural strengthening

**C-BAR** is a connection system consisting of pultruded carbon fiber bars with improved adhesion, obtained by sandblasting, with differentiated diameter to meet different structural needs. It is especially used in shear and bending reinforcements of concrete or masonry structures. It guarantees an effective and safe anchorage to any type of substrate, allowing the rigidity of the structure to be increased to the service loads and increasing the load-bearing capacity of the reinforced structure.

### THE SYSTEM IS MADE UP OF:



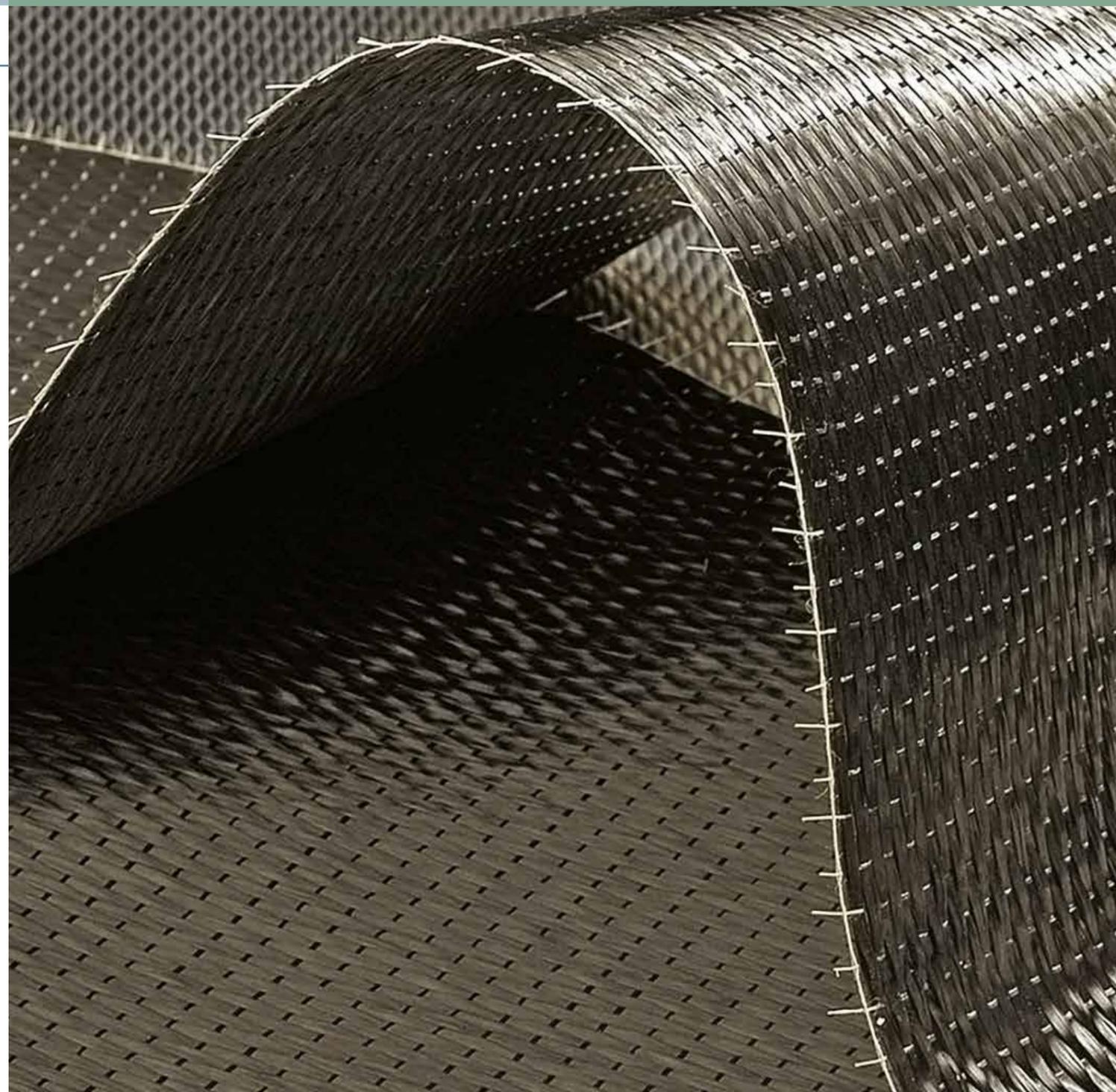
► **C-BAR**  
Pultruded carbon bar with improved adhesion available in the following versions:  
• Ø 7,5 mm (3 m bar);  
• Ø 10 mm (3 m bar).



► **MX-C Bar**  
Stabilized inorganic matrix for the application of C-BAR.

### TECHNICAL CHARACTERISTICS

PROPERTIES OF THE PULTRUDED CARBON BARS	C-BAR 7,5	C-BAR 10,0
Nominal diameter (mm)	7,5	10,0
Minimum guaranteed section (mm <sup>2</sup> )	44	78
Fiber section (mm <sup>2</sup> )	26	47
Tensile strength (MPa)	1800	1800
Tensile modulus (GPa)	130	130
<b>SPECIFICATIONS FOR THE SUPPLY</b>		
Package	3 m bar Ø 7,5 mm	3 m bar Ø 10 mm
Consumption of dry premixed mortar	Calculate a length equal to that of the hole	
PROPERTIES OF THE ADHESIVE	MX-C Bar	
Water for 25 kg of powder	7,5 - 8,0 liters	
Fresh pourable adhesive for 25 kg of powder	16 liters	
Consistency of fresh mortar	210 mm	
Specific weight of fresh mortar (EN 1015-6)	2,00 ± 0,05 g/cc	
Adhesion to the support	≥ 3 MPa the support breaks	
Adherence to the bar	≥ 25 MPa	
Reaction to fire (EN 13501-1)	Euroclass A1	
<b>SPECIFICATIONS FOR THE SUPPLY</b>		
Package	25 kg bags	
Consumption	Approx. 1,5 kg/m <sup>2</sup> per mm of thickness	



# C-WRAP

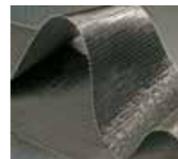
fka Ruredil X Wrap

## Unidirectional carbon fabric for FRP strengthening system with epoxy resin



**C-WRAP** is a connection system made of unidirectional carbon fibers for the construction of FRP structural strengthening systems.

The reinforcement is to be carried out on site and provides for the application of the primer on the appropriately prepared support, before proceeding with the impregnation of the fabric with the epoxy resin.



### C-WRAP

Unidirectional carbon fiber fabric available in the following versions:

- 200 g/m<sup>2</sup> (h 25/50 cm and length 50 m)
- 310 g/m<sup>2</sup> (h 20/25/50 cm and length 26 m)
- 400 g/m<sup>2</sup> (h 25 cm and length 26 m)
- 600 g/m<sup>2</sup> (h 20/25/50 cm and length 26 m).



### C-PRIMER WRAP

Special epoxy primer with high impregnating power for the application of C-WRAP.



### C-RESIN WRAP

Special epoxy resin with high adhesive power for the application of C-WRAP.

## FIELDS OF APPLICATION

- ▶ Structural reinforcement of concrete elements to bending, shear, and torsion;
- ▶ Confinement of columns subject to bending and compression with small and large eccentricity;
- ▶ Improvement of the rigidity of the beam-column joints;
- ▶ Anti-seismic reinforcement of undersized or damaged elements.

## PROPERTIES OF THE SYSTEM

- ▶ High mechanical strength even on supports with a complex morphology;
- ▶ Minimum overloads especially on severely damaged structures;
- ▶ Applicability on any type of structure: concrete, masonry, wood or steel;
- ▶ Maximum versatility and adaptability to the geometries of the structures;
- ▶ Extremely reduced thickness, minimal space needed.



The application methods for the correct implementation of the products are shown on the technical data sheet downloadable from the website [www.ruregold.it](http://www.ruregold.it)

## TECHNICAL CHARACTERISTICS

PROPERTIES OF THE CARBON FABRIC (according to Guidelines) CLASS 210C				
Elastic modulus of the fabric (referring to the net area of the fibers) 2:1	210 GPa			
Resistance of the fabric (referring to the net area of the fibers)	2700 MPa			
C-WRAP GEOMETRIC AND PHYSICAL PROPERTIES	200 g/m <sup>2</sup>	310 g/m <sup>2</sup>	400 g/m <sup>2</sup>	600 g/m <sup>2</sup>
Density of the fibers [g/cm <sup>3</sup> ]	1,80	1,80	1,80	1,80
Mass of fabric per unit area [g/m <sup>2</sup> ]	200	310	400	600
Density of the resin [g/cm <sup>3</sup> ]	1,10 (± 0,05)	1,10 (± 0,05)	1,10 (± 0,05)	1,10 (± 0,05)
Equivalent area [mm <sup>2</sup> /m]	111,60	167,03	222,53	339,33
Equivalent thickness [mm]	0,112	0,167	0,223	0,339
Fraction by weight of the fibers in the composite	0,340	0,286	0,345	0,430
Fraction in volume of the fibers in the composite	0,240	0,200	0,244	0,550
Primer glass transition temperature [°C]	+58	+58	+58	+58
Resin glass transition temperature [°C]	+67	+67	+67	+67
Limit temperatures, minimum and maximum, of use [°C]	-10/+43	-10/+43	-10/+43	-10/+43
Reaction to fire [Euroclass]	E	E	E	E

C-WRAP MECHANICAL PROPERTIES (single layer)	200 g/m <sup>2</sup>	310 g/m <sup>2</sup>	400 g/m <sup>2</sup>	600 g/m <sup>2</sup>
Elastic modulus of the fabric referring to the net area of the fibers - average value (GPa)	232	246	247	221
Resistance of the fabric referring to the net area of the fibers - characteristic value (MPa)	2.712	3.253	2.916	2.900
Deformation at rupture - calculated in the event of elastic linear behavior (%)	1,17	1,32	1,18	1,31

### SPECIFICATIONS FOR THE SUPPLY

Package	Various sizes (see price list)			
Consumption	Overlap of about 10 cm at the junctions			

C-WRAP MECHANICAL PROPERTIES (triple layer)	200 g/m <sup>2</sup>	310 g/m <sup>2</sup>	400 g/m <sup>2</sup>	600 g/m <sup>2</sup>
Elastic modulus of the fabric referring to the net area of the fibers - average value (GPa)	233	245	252	227
Resistance of the fabric referring to the net area of the fibers - characteristic value (MPa)	2.843	3.469	3.201	2.808
Deformation at rupture - calculated in the event of elastic linear behavior (%)	1,22	1,42	1,27	1,24

### SPECIFICATIONS FOR THE SUPPLY

Package	Various sizes (see price list)	
Consumption	Overlap of about 10 cm at the junctions	

PROPERTIES OF RESINS	C-PRIMER WRAP	C-RESIN WRAP
Catalysis ratio (A:B)	2:1	2:1
Specific weight (A + B) at 17°C	1,00 - 1,10 kg/liters	1,05 - 1,15 kg/liters
Workability (EN ISO 9514) at 23°C	45 - 60 minutes	45 - 60 minutes
Compressive strength (ASTM D965)	≥ 60 MPa	≥ 60 MPa
Adherence/bond strength EN 12188	≥ 14 MPa	≥ 14 MPa
Reaction to fire (EN 13501-1)	Euroclass E	Euroclass E
Glass transition temperature (DSC ISO 11357-2)	+58 °C	+67 °C

### SPECIFICATIONS FOR THE SUPPLY

Package	Buckets of 4 + 2 kg	Buckets of 4 + 2 kg
Consumption	~ 0,25 Kg/m <sup>2</sup>	1° layer ~ 0,5 kg/m <sup>2</sup> after the 2° layer ~ 0,25 kg/m <sup>2</sup>

# C-QUADRIWRAP

fka Ruredil X Quadriwrap 380

## Four-axis carbon fabric for FRP strengthening system with epoxy resin



**C-QUADRIWRAP** is a four-axis carbon fiber connection system for the construction of FRP structural strengthening systems.

The reinforcement is to be carried out on site and provides for the application of the primer on the adequately prepared substrate, before proceeding with the impregnation of the fabric with the epoxy resin.

### FIELDS OF APPLICATION

- ▶ Structural reinforcement of concrete elements to bending, shear, and torsion;
- ▶ Confinement of columns subject to bending and compression with small and large eccentricity;
- ▶ Improvement of the rigidity of the beam-column joints;
- ▶ Anti-seismic reinforcement of undersized or damaged elements.

### PROPERTIES OF THE SYSTEM

- ▶ High mechanical strength even on supports with complex morphology;
- ▶ Minimum overloads especially on severely damaged structures;
- ▶ Applicability on any type of structure: concrete, masonry, wood or steel;
- ▶ Maximum versatility and adaptability to the geometries of the structures;
- ▶ Extremely reduced thickness, minimal space needed.

### THE SYSTEM IS MADE UP OF:



#### ▶ C-QUADRIWRAP

Four-axis fabric made of carbon fiber, available in the following heights:

- 30 cm (roll length equal to 50 m)
- 48,5 cm (roll length equal to 50 m).



#### ▶ C-PRIMER WRAP

Special epoxy primer with high impregnating power for the application of C-QUADRIWRAP.



#### ▶ C-RESIN WRAP

Special epoxy resin with high adhesive power for the application of C-QUADRIWRAP.



The application methods for the correct implementation of the products are shown on the technical data sheet downloadable from the website [www.ruregold.it](http://www.ruregold.it)

### TECHNICAL CHARACTERISTICS

PROPERTIES OF THE CARBON FABRIC (according to Guidelines) CLASS 210C	
Elastic modulus of the fabric (referring to the net area of the fibers) 2:1	210 GPa
Resistance of the fabric (referring to the net area of the fibers)	2700 MPa

GEOMETRIC AND PHYSICAL PROPERTIES	C-QUADRIWRAP
Density of the fibers [g/cm <sup>3</sup> ]	1,80
Mass of fabric per unit area [g/m <sup>2</sup> ]	373 (± 3%) - total
Density of the resin [g/cm <sup>3</sup> ]	1,10 (± 0,05)
Equivalent area [mm <sup>2</sup> /m]	203,33 - total
Equivalent thickness [mm]	0,203
Fraction by weight of the fibers in the composite	0,318
Fraction in volume of the fibers in the composite	0,222
Primer glass transition temperature [°C]	+58
Resin glass transition temperature [°C]	+67
Limit temperatures, minimum and maximum, of use [°C]	-10/+43
Reaction to fire [Euroclass]	E

MECHANICAL PROPERTIES	C-QUADRIWRAP (single layer)
Elastic modulus of the fabric referring to the net area of the fibers - average value (GPa)	307
Resistance of the fabric referring to the net area of the fibers - characteristic value (MPa)	3.860
Deformation at rupture - calculated in the event of elastic linear behavior (%)	1,26

SPECIFICATIONS FOR THE SUPPLY	
Package	Various sizes (see price list)
Consumption	Overlap of about 10 cm at the junctions

MECHANICAL PROPERTIES	C-QUADRIWRAP (triple layer)
Elastic modulus of the fabric referring to the net area of the fibers - average value (GPa)	302
Resistance of the fabric referring to the net area of the fibers - characteristic value (MPa)	4.389
Deformation at rupture - calculated in the event of elastic linear behavior (%)	1,45

SPECIFICATIONS FOR THE SUPPLY	
Package	Various sizes (see price list)
Consumption	Overlap of about 10 cm at the junctions

PROPERTIES OF RESINS	C-PRIMER WRAP	C-RESIN WRAP
Catalysis ratio (A:B)	2:1	2:1
Specific weight (A + B) at 17°C	1,00 - 1,10 kg/liters	1,05 - 1,15 kg/liters
Workability (EN ISO 9514) at 23°C	45 - 60 minutes	45 - 60 minutes
Compressive strength (ASTM D965)	≥ 60 MPa	≥ 60 MPa
Adherence/bond strength EN 12188)	≥ 14 MPa	≥ 14 MPa
Reaction to fire (EN 13501-1)	Euroclass E	Euroclass E
Glass transition temperature (DSC ISO 11357-2)	+58 °C	+67 °C

SPECIFICATIONS FOR THE SUPPLY		
Package	Buckets of 4 + 2 kg	Buckets of 4 + 2 kg
Consumption	~ 0,25 Kg/m <sup>2</sup>	1° layer ~ 0,5 kg/m <sup>2</sup> after the 2° layer ~ 0,25 kg/m <sup>2</sup>

# C-LAM

fka Ruredil X Lam

## Pultruded carbon strip with improved adhesion for FRP structural strengthening system



**C-LAM** is a strengthening system composed of pultruded carbon fiber strips to provide bending reinforcement on any type of support.

The reinforcement is to be carried out on site and, after having adequately prepared the support, requires the impregnation of the strips with the specific epoxy resin.

### THE SYSTEM IS MADE UP OF:



#### C-LAM

Pultruded carbon strips available as follows:

- 50 S, 50 mm width, 25 m roll
- 100 S, 100 mm width, 25 m roll
- 120 S, 120 mm width, 50 m roll
- 50 H, 50 mm width, 50 m roll
- 100 H, 100 mm width, 25 m roll
- 120 H, 120 mm width, 25 m roll.



#### C-RESIN LAM

Special epoxy resin with high adhesive power for the application of C-LAM fabric.

### PROPERTIES OF THE SYSTEM

- ▶ Reinforcement of deteriorated or undersized structures, advantageously replacing traditional techniques for strength, lightness, and ease of application;
- ▶ Increase in flexural strength, and therefore the operating load of the structure;
- ▶ Reduction of stresses and deformations of reinforced structural elements.



The application methods for the correct implementation of the products are shown on the technical data sheet downloadable from the website [www.ruregold.it](http://www.ruregold.it)

### TECHNICAL CHARACTERISTICS

**C-LAM S PROPERTIES** (according to Guidelines) CLASS C150/2300

**C-LAM H PROPERTIES** (according to Guidelines) CLASS C200/1800

TABLE OF VALUES	C-LAM S	C-LAM H
Elastic modulus of the fabric (referring to the net area of the fibers)	150 GPa	200 GPa
Resistance of the fabric (referring to the net area of the fibers)	2300 MPa	1800 MPa

GEOMETRIC AND PHYSICAL PROPERTIES	C-LAM
Thickness fabric	1,4 mm
Width	50 - 100 - 120 mm
Length	variable up to 50 m
Color	black
Density of the fiber	1,8 g/cm <sup>3</sup>
Density of the matrix	1,2 g/cm <sup>3</sup>
Fiber content (by volume)	68%
Fiber content (by weight)	76%
Pultrusion resin glass transition temperature	+120°C
Bonding resin glass transition temperature	+63°C
Limit temperature, minimum and maximum, of use	-10/+48 °C
Application temperatures	+5/+40 °C
Reaction to fire [Euroclass]	E

MECHANICAL PROPERTIES	C-LAM S	C-LAM H
Tensile modulus (GPa)	171,00	206,00
Tensile strength - average value (MPa)	2.898	2.213
Tensile strength - characteristic value (MPa)	2.792	2.013
Tensile fracture deformation (%)	1,69	1,07

SPECIFICATIONS FOR THE SUPPLY	
Package	Various sizes (see price list)
Consumption	According to the application length

PROPERTIES OF THE ADHESIVE	C-RESIN LAM
Catalysis ratio (A:B)	4:1
Specific weight (A + B)	1,55 - 1,75 kg/liters
Workability (EN ISO 9514) at 23°C	40 - 60 minutes
Compressive strength (ASTM D965)	≥ 60 MPa
Adherence/bond strength (EN 12188)	≥ 14 MPa
Reaction to fire (EN 13501-1)	Euroclass E
Glass transition temperature (DSC ISO 11357-2)	+63 °C

SPECIFICATIONS FOR THE SUPPLY	
Resin package	Buckets of 4 + 1 kg
Consumption	Approx. 0.35 kg/m for 50 mm fabric. Approx. 0.80 kg/m for 100 mm fabric. Approx. 1.00 kg/m for 120 mm fabric. (the yield is also a function of the possible crossing of the fabric and may therefore increase)

# C-JOINT

fka Ruredil X Joint

## Carbon fiber connector to anchor FRP systems on concrete and masonry



**C-JOINT** is a connection system made of unidirectional carbon fibers for the construction of an anchor between existing structures and carbon FRP structural strengthening systems.

The connection must be made on site and consists of a bundle of long unidirectional carbon fibers held together in a special mesh which gives the bundle a cylindrical shape.

### THE SYSTEM IS MADE UP OF:



- ▶ **C-JOINT**  
Carbon fiber connection element, Ø 6, 10 and 12 mm, 10 m long.



- ▶ **C-RESIN JOINT**  
Special epoxy resin with high adhesive power for the application of the C-JOINT connector.

### PROPERTIES OF THE SYSTEM

- ▶ It eliminates the risk of triggering local collapse mechanisms due to the overturning of infill walls, thanks also to the connector that is inserted between the wall and the beam/slab;
- ▶ Effective connection between the building structure and the applied strengthening systems, to achieve the continuity necessary to guarantee the reliability of the reinforcement;
- ▶ Excellent adhesion to any building material: normal and pre-stressed reinforced concrete, or masonry.



### TECHNICAL CHARACTERISTICS

#### PROPERTIES OF CARBON FIBERS

Tensile strength	4,9 GPa
Elastic modulus	250 GPa
Fiber density	1,82 g/cm <sup>3</sup>

#### PROPERTIES OF THE CONNECTOR C-JOINT

Nominal diameter	6 mm	10 mm	12 mm
Tensile strength	1225 MPa	1221 MPa	1263 MPa

#### SPECIFICATIONS FOR THE SUPPLY

Package	10 m dispenser
Consumption	In addition to the length required for the hole itself calculate an additional 15 cm for each end.

#### PROPERTIES OF THE ADHESIVE

PROPERTY	C-RESIN JOINT
Catalysis ratio (A:B)	2:1
Specific weight (A + B)	0,90 - 0,96 kg/liter
Workability (EN ISO 9514) at 23°C	25 minutes (on 150g mass)
Compressive strength (ASTM D965)	≥ 50 MPa
Adherence/bond strength (EN 12188)	≥ 16 MPa
Reaction to fire (EN 13501-1)	Euroclass E
Glass transition temperature (DSC ISO 11357-2)	+45 °C

#### SPECIFICATIONS FOR THE SUPPLY

Resin package	4 + 2 kg buckets (A + B)
Consumption	About 1.5 kg/liter of volume to be filled, also considering the impregnation of the connector

### FIELDS OF APPLICATION

- ▶ Connection of FRP strengthening systems;
- ▶ Realization of structural connections where it is not possible to close the carbon mesh wrap on itself;
- ▶ Anchoring of the traditional reinforced slab with carbon mesh.



The application methods for the correct implementation of the products are shown on the technical data sheet downloadable from the website [www.ruregold.it](http://www.ruregold.it)

# C-BAR

fka Ruredil X Bar

**Pultruded carbon fiber bar with improved adhesion for FRP structural strengthening**



# STRUCTURAL PLASTERS

Slabs reinforced with glass or steel mesh and specific mortars for the restoration and consolidation of concrete and masonry structures

**C-BAR** is a connection system consisting of pultruded bars in improved carbon fiber, obtained by sandblasting, with differentiated diameters to meet different structural needs. It is especially used in shear and bending reinforcements of concrete or masonry structures. It guarantees an effective and safe anchorage to any type of substrate, allowing the rigidity of the structure to be increased to the service loads and increasing the load-bearing capacity of the reinforced structure.

### THE SYSTEM IS MADE UP OF:



► **C-BAR**  
Pultruded carbon bar with improved adhesion available in the following versions

- Ø 7,5 mm (3 m bar);
- Ø 10 mm (3 m bar);



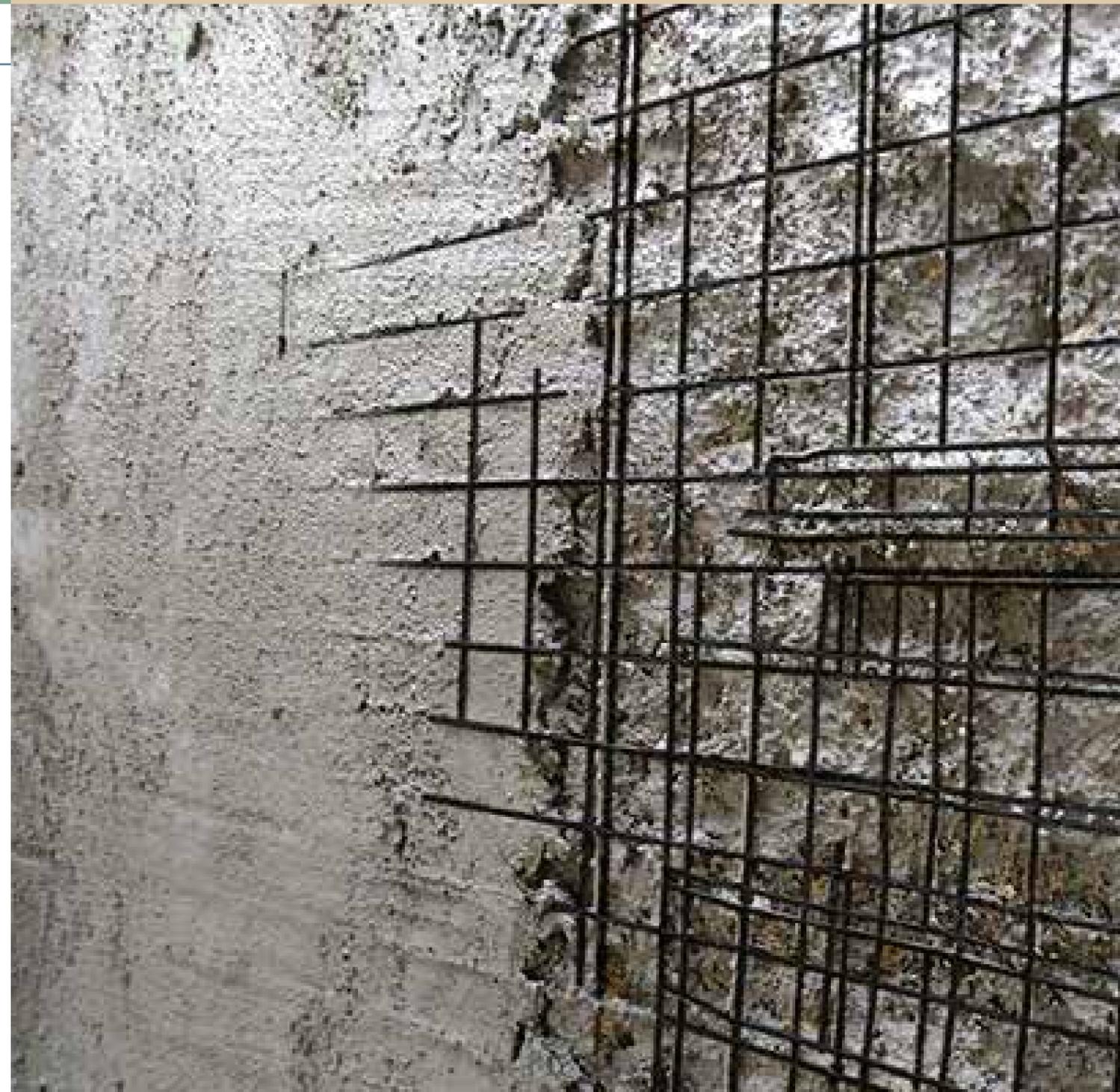
► **C-RESIN JOINT**  
Special epoxy resin with high adhesive power for the application of C-BAR bars.

### TECHNICAL CHARACTERISTICS

PROPERTIES OF THE PULTRUDED CARBON BARS	C-BAR 7,5	C-BAR 10,0
Nominal diameter (mm)	7,5	10,0
Minimum guaranteed section (mm <sup>2</sup> )	44	78
Fiber section (mm <sup>2</sup> )	26	47
Tensile strength (MPa)	1800	1800
Tensile modulus (GPa)	130	130

PROPERTIES OF THE ADHESIVE	C-RESIN JOINT
Catalysis ratio (A:B)	2:1
Specific weight (A + B)	0,90 - 0,96 kg/liter
Workability (EN ISO 9514) at 23°C	25 minutes (on 150g mass)
Compressive strength (ASTM D965)	≥ 50 MPa
Adherence/bond strength (EN 12188)	≥ 16 MPa
Reaction to fire (EN 13501-1)	Euroclass E
Glass transition temperature (DSC ISO 11357-2)	+45 °C

SPECIFICATIONS FOR THE SUPPLY	
Resin package	4 + 2 kg buckets (A + B)
Consumption	Approx. 1.5 kg/liter of volume to be filled



# Structural Plasters

There is no specific regulatory references for calculating the increased resistance of a masonry element after applying a special plaster reinforced with a mesh, but in some national technical construction standards (such as the Italian NTCs), it is recommended that a **containment mesh be inserted in the consolidating plaster and the plaster be regarded as "structural plaster"**.

In case of masonry walls and partitions, key parameters in the design of the structural plaster are the thickness and the mechanical characteristics of the cement-based mortar in addition to the material used for the reinforcing mesh. The mesh can be of different nature, texture and weight. **Glass and Steel mesh are all offered by Ruregold.**

The structural plaster can be positioned on one or both sides of the vertical elements to be upgraded. Based on design, **pass-through systems** may be installed to ensure the adhesion of the structural plaster to the vertical element. Ruregold has connectors of various kinds in a flexible or semi-rigid "cord".

For structural strengthening, especially with respect to horizontal actions (earthquakes), **FRCM** (Fiber Reinforced Cementitious Matrix) **technologies** based on carbon or PBO fiber are preferable to structural plaster.

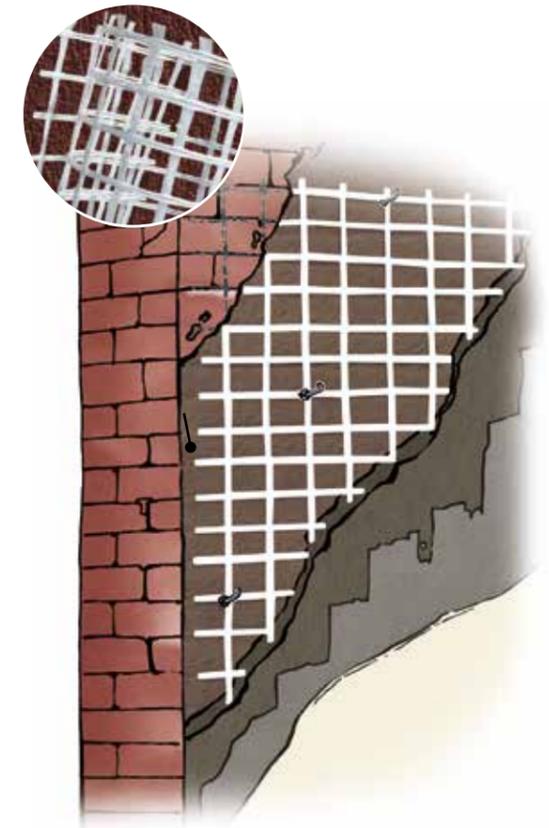
As an alternative to the structural plaster with a mesh, it is possible to use a structural mortar such as **MX-PVA Fibre-reinforced** with polyvinylalcohol fibers which create a three-dimensional reinforcement inside the matrix. This type of structural plaster does not need the use of connectors.



# Structural Plasters

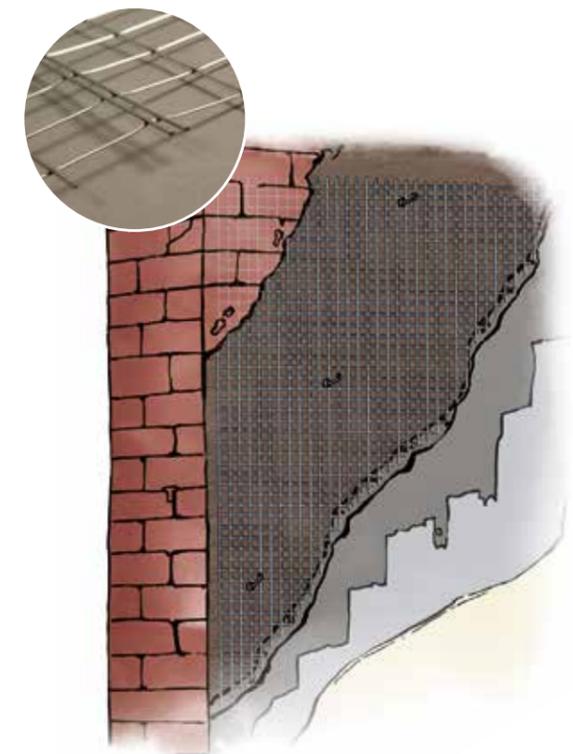
## WITH FIBERGLASS MESH

- Apply a rough coat of **MX-CP Lime** at approximately 3/16 in. (0.5 cm) thickness so as to prepare the surface.
- If required, drill of the support for the installation of the connectors. In case of cord connectors, proceed to grout them with the suitable mortar, **MX-C JOINT**.
- Apply the first layer of **MX-CP Lime** or **MX-RW High Performances** structural mortar with a trowel or by spray.
- Apply a sheet of **G-Mesh** (fiberglass) over the entire surface. Overlap the mesh on both sides to ensure continuity.
- Spread the final layer of mortar with a trowel or spray, making sure to properly incorporate the reinforcement mesh.
- Open, spread out the connectors, fiber glass-based **G-JOINT**, and anchor them with the specific mortar, **MX-C JOINT**.
- Apply the finishing layer of mortar with a suitable thickness.



## WITH STEEL MESH SHEETS

- Apply a rough coat **MX-CP Lime** at approximately 3/16 in. (0.5 cm) thickness so as to prepare the surface.
- If required, drill the support, insert anchor rods **C-BAR** and proceed to grout them with the suitable mortar **MX-C Bar**.
- Apply the first layer of **MX-CP Lime** or **MX-RW High Performances** structural mortar with a trowel or by spray.
- Apply a sheet of **STUCANET SN** steel mesh over the entire surface. Overlap the mesh on both sides to ensure continuity.
- Spread the final layer of mortar with a trowel or by spray, making sure to properly encapsulate both the reinforcing mesh and the connectors.
- Apply the finishing layer of mortar with a suitable thickness.



# G-MESH 450

## Alkali-resistant fiberglass mesh



**G-MESH 450** is an alkali-resistant fiberglass mesh weighing 450 gr/m<sup>2</sup>, suitable for the restoration of masonry structures (brick, stone, tuff, etc.) with MX-RW High Performances and MX-CP Lime mortars. The special coating gives further resistance to alkalis. When properly applied to the substrate, it gives the plaster suitable resistance to the stresses to which the underlying masonry is subject.



Ecological



Wet supports



Compatible with masonry



Fire resistant



Vapor permeable



Easy to install

### THE SYSTEM IS MADE UP OF:



#### ► G-MESH 450

Fiberglass mesh of approx. 450 g/m<sup>2</sup>, mesh size 33 x 35 mm.



#### ► MX-RW High Performances

Plaster mortar compatible with high strength masonry for structural plasters.

#### ► MX-CP Lime

Plaster mortar compatible with lime based masonry for structural plasters.

### PROPERTIES OF THE SYSTEM

- Reinforced with alkali resistant fiber;
- High compatibility with masonry;
- Ideal for historic and listed buildings;
- Breathability and vapor permeability;
- Resistant to fire and high temperatures;
- Easy to apply;
- Practical to use.



### TECHNICAL CHARACTERISTICS

MESH PROPERTIES	G-MESH 450
Mesh composition	Alkali-resistant fiber mesh + anti-alkaline coating
Weight uncoated mesh	369 g/m <sup>2</sup> ± 5 %
Weight coated mesh	450 g/m <sup>2</sup> ± 5 %
Mesh size	Aprox. 33 x 35 mm
SPECIFICATIONS FOR THE SUPPLY	
Package	Roll of 50 linear meters, height 100 cm
Consumption	Calculate overlapping the sheets by about 15 cm at the junctions

PROPERTIES OF FINISHING MORTAR	MX-RW High Performances	MX-CP Lime
Compressive strength 3/7/28 days	≥ 26; ≥ 34; ≥ 49,5 MPa	≥ 3; ≥ 6; ≥ 15 MPa
Bending resistance 3/7/28 days	≥ 3,1; ≥ 3,8; ≥ 5,5 MPa	≥ 0,6; ≥ 1,2; ≥ 2 MPa
Elastic modulus at 28 days	≥ 15 GPa	≥ 8,5 GPa
SPECIFICATIONS FOR THE SUPPLY		
Package	25 kg bags on 1,000 kg pallets	
Consumption of dry premixed mortar	About 18 Kg/m <sup>2</sup> /cm	About 15 Kg/m <sup>2</sup> /cm

### FIELDS OF APPLICATION

- Structural plasters with alkali resistant reinforcement;
- Consolidation of listed and historical constructions;
- Structural plasters of masonry structures;
- Structural plaster on walls, vaults, and infill walls;
- Protection of non-structural components;
- Post-earthquake restoration and reconstruction of masonry elements;
- Reinforced cement.



The application methods for the correct implementation of the products are shown on the technical data sheet downloadable from the website [www.ruregold.it](http://www.ruregold.it)

## G-JOINT

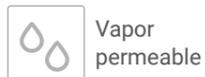
Connector made of unidirectional alkali resistant fiberglass



**G-JOINT** is a unidirectional alkali resistant fiberglass connector for the construction of the anchor between existing structures and G-Mesh 450. The connection must be made on site and consists of a bundle of long unidirectional fibers held together in a special mesh which gives the bundle a cylindrical shape. To be applied with MX-C JOINT matrix.



Ecological



Vapor permeable



Compatible with masonry



Non-toxic matrix

### THE SYSTEM IS MADE UP OF:



► **G-JOINT**  
Fiberglass connector, available in diameters Ø 6/10/12 mm



► **MX-C JOINT**  
Stabilized inorganic matrix for impregnation and anchoring of the G-JOINT connector.

### TECHNICAL CHARACTERISTICS

CONNECTOR PROPERTIES	G-JOINT	
Diameter	6 mm	10 mm
Fiber density	2,68 g/cm <sup>3</sup>	
Tensile strength	719 MPa	777 MPa
Deformation at rupture	0,63%	0,87%
Elastic modulus	86 GPa	77 GPa
Dry fabric equivalent surface	14,33	24,18

SPECIFICATIONS FOR THE SUPPLY	
Package	Dispenser da 10 m
Consumption	In addition to the length required for the hole itself calculate an additional 15 cm for each end.

PROPERTIES OF THE MATRIX	MX-C JOINT
Consistency (EN 13395-1)	190 mm
Specific weight fresh mortar	1,80 ± 0,05 g/cc
Water for 5 kg	1 - 1,05 liters (equal to 20%)
Compressive strength (EN196-1)	40,0 MPa
Flexural strength (EN 196-1)	3,0 MPa
Secant modulus (EN 13412)	18.500 MPa

SPECIFICATIONS FOR THE SUPPLY	
Package	5 kg buckets
Consumption	8 - 10 kg for 10 m of connector.

### FIELDS OF APPLICATION

- Structural plasters;
- Connections of vaults, perimeter walls.

The application methods for the correct implementation of the products are shown on the technical data sheet downloadable from the website [www.ruregold.it](http://www.ruregold.it)

## GS-JOINT

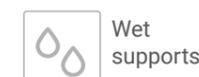
Ready-to-use semi-rigid alkali resistant fiberglass connector



**GS-JOINT** is a 40 cm semi-rigid fiberglass connector for the anchoring of the G-Mesh 450 system to existing structures. The 20 cm intended for the anchorage is pre-impregnated and semi-rigid, the other 20 cm are soft so as to be opened up like a fan and then impregnated and anchored with the MX-C JOINT matrix.



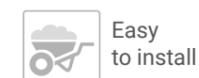
Ecological



Wet supports



Compatible with masonry



Easy to install

### THE SYSTEM IS MADE UP OF:



► **GS-JOINT**  
Semi-rigid fiberglass connector, available in diameters Ø 8/10/12 mm.



► **MX-C JOINT**  
Stabilized inorganic matrix for the impregnation and anchoring of the GS-JOINT connector.

### TECHNICAL CHARACTERISTICS

PROPERTIES OF THE GS-JOINT CONNECTOR			
Fiber type	Alkali resistant glass		
Type of covering	polyester resin		
Binder agent	Organic cement mortar		
Length	40 cm		
Diameter	8 mm	10 mm	12 mm
Rupture force *	4,1 kN	6,3 kN	7,8 kN
Rupture	Rupture of the fibers in the upper part	Extraction	Extraction
Elastic module**	40-50 GPa		
Tensile capacity	1%		

SPECIFICATIONS FOR THE SUPPLY	
Package	Connector Ø 8 mm - box of 100 pz Connector Ø 10 mm - box of 100 pz Connector Ø 12 mm - box of 100 pz
Consumption	1 connector per hole

PROPERTIES OF THE MATRIX	MX-C JOINT
Consistency (EN 13395-1)	190 mm
Specific weight fresh mortar	1,80 ± 0,05 g/cc
Water for 5 kg	1 - 1,05 liters (equal to 20%)
Yield for 10 m of connector	8 - 10 kg
Compressive strength (EN 196-1)	40,0 MPa
Flexural strength (EN 196-1)	3,0 MPa
Secant modulus (EN 13412)	18.500 MPa

\* ETAG 029 Test method Annex A

\*\* The elastic modulus is established between 20% and 40% of the final load.

SPECIFICATIONS FOR THE SUPPLY	
Package	5 kg buckets
Consumption	Depending on the hole

### FIELDS OF APPLICATION

- Structural plasters;
- Connections of vaults, perimeter walls.

The application methods for the correct implementation of the products are shown on the technical data sheet downloadable from the website [www.ruregold.it](http://www.ruregold.it)

# S-MESH 600/900

## High resistance galvanized steel fiber unidirectional fabric



**S-MESH** is a high strength micro-strand steel fiber fabric, suitable for the restoration of concrete and masonry structures (brick, stone, tuff, etc.). The galvanizing treatment gives durability to the system. Applied appropriately to the support, it gives the plaster high resistance to the stresses to which the underlying structure is subject.



Ecological



Wet supports



Compatible with masonry



Resistant to freeze/thaw cycles

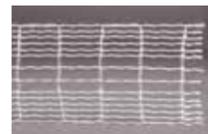


Vapor permeable



Easy to install

### THE SYSTEM IS MADE UP OF:



#### ► S-MESH 600/900

Steel fiber fabric in weights of 600 g/m<sup>2</sup> e 900 g/m<sup>2</sup> available in the following heights:

- 10 cm (roll length equal to 30 m)
- 30 cm (roll length equal to 30 m).



#### ► MX-R4 Repair

Mortar for restoration of high-strength concrete for structural plasters.

#### ► MX-RW High Performances

Plaster mortar compatible with high strength masonry for structural plasters.

#### ► MX-CP Lime

Plaster mortar compatible with lime-based masonry for structural plasters.

### PROPERTIES OF THE SYSTEM

- High strength reinforcement;
- Steel in micro-strands;
- With suitable mortar it is ideal for reinforcing both concrete and masonry.



### TECHNICAL CHARACTERISTICS

PROPERTY OF THE FABRIC	S-MESH 600	S-MESH 900
<b>MICRO-STRAND*</b>		
Description	No. 3 strands in a wrap (3x0,54) of high-carbon steel**	
Diameter	0,94 mm	
Ultimate tensile strength	> 2100 MPa	
Yield strength	> 1700 MPa	
Elongation at break	> 2,2%	
Elastic module	180 GPa	
Weight of zinc***	30 g/m <sup>2</sup>	
Linear density	5,35 g/m	
Type of wrap	Acrylic	

<b>Mesh</b>		
Number of strands in the fabric	13 or 37 (h. 10 cm or h 30 cm)	17 or 51 (h. 10 cm or h 30 cm)
Total steel section	8,93 or 25,42 mm <sup>2</sup> (h 10 cm or h 30 cm)	11,68 or 35,03 mm <sup>2</sup> (h 10 cm or h 30 cm)
Steel weight	650 g/m <sup>2</sup>	910 g/m <sup>2</sup>
Fabric resistance	175 N/mm	245 N/mm
Thickness	1,75 mm	1,75 mm

<b>SPECIFICATIONS FOR THE SUPPLY</b>		
Package	30 m rolls, h 10 cm and 30 cm	
Consumption	15 cm overlap at junctions	

PROPERTIES OF FINISHING MORTAR	MX-R4 Repair	MX-RW High Performances	MX-CP Lime
Compressive strength 3/7/28 days	> 30; > 37; > 54 MPa	≥ 26; ≥34; ≥ 49,5 MPa	≥ 3; ≥ 6; ≥ 15 MPa
Bending resistance 3/7/28 days	> 3,5; > 4,5; > 7 MPa	≥ 3,1; ≥ 3,8; ≥ 5,5 MPa	≥ 0,6; ≥ 1,2; ≥ 2 MPa
Elastic modulus at 28 days	≥ 24 GPa	≥ 15 GPa	≥ 8,5 GPa

<b>SPECIFICATIONS FOR THE SUPPLY</b>			
Package	25 kg bags on 1,000 kg pallets		
Consumption of dry premixed mortar	18 Kg/m <sup>2</sup> /cm	18 Kg/m <sup>2</sup> /cm	15 Kg/m <sup>2</sup> /cm

\* Iso 16120-2: non-alloy steel wire rod for conversion to wire — part 2: specific requirements for general purpose wire rod and en 10244-2: steel wire and wire products. Non-ferrous metallic coatings on steel wire. - Part 2: zinc or zinc alloy coatings.

\*\* According to iso 16120-2: from c78d to c86d or equivalent.

\*\*\* According to en 10244-2

### FIELDS OF APPLICATION

- Structural plasters with galvanized steel reinforcement;
- Consolidation of listed and historical constructions;
- Structural plasters of masonry structures and concrete elements;
- Reinforced plaster on vaults;
- Protection of non-structural components;
- Post-earthquake restoration and reconstruction of masonry elements.



The application methods for the correct implementation of the products are shown on the technical data sheet downloadable from the website [www.ruregold.it](http://www.ruregold.it)

# STUCANET SN

Electro-welded mesh in high galvanized or stainless steel



**STUCANET SN** is a high galvanized or stainless steel electro-welded mesh, suitable for the restoration of masonry structures (brick, stone, tuff, etc.) as are MX-RW High Performances and MX-CP Lime mortars. When properly applied to the substrate, it gives the plaster suitable resistance to the stresses to which the underlying masonry is subject.



## THE SYSTEM IS MADE UP OF:



► **STUCANET SN**  
Galvanized or stainless steel mesh in 2,40 x 0,70 m (1,68 m<sup>2</sup>) panels.



► **MX-RW High Performances**  
Plaster mortar compatible with high strength masonry for structural plasters.

► **MX-CP Lime**  
Plaster mortar compatible with lime-based masonry for structural plasters.



► **Stucanet expansion anchors M6-F8-L45**  
Expansion anchors for fastening the mesh to the support.



► **Stucanet washer 9 x 70**  
Washer for fastening the mesh to the support.

## PROPERTIES OF THE SYSTEM

- For the consolidation of structural plasters where a reinforcement that is considerably alkali-resistant is required;
- Easy to apply;
- Practical to use.



## TECHNICAL CHARACTERISTICS

MESH PROPERTIES	STUCANET SN
Longitudinal and transversal wires	1,5 mm
Reinforcement wires	1,5 + 2,0 mm
Measurement of the mesh	38 x 50 mm
Measurement of side meshes	38 x 27 mm
Tensile strength	> 350 N/mm <sup>2</sup>
Zinc coating	60 g/m <sup>2</sup>
SPECIFICATIONS FOR THE SUPPLY	
Package	2,40 x 0,70 m (1,68 m <sup>2</sup> ) panels on pallets with 375 panels
Consumption	Provide an overlap of at least 10 cm

PROPERTIES OF FINISHING MORTAR	MX-RW High Performances	MX-CP Lime
Compressive strength 3/7/28 days	≥ 26; ≥ 34; ≥ 49,5 MPa	≥ 3; ≥ 6; ≥ 15 MPa
Bending resistance 3/7/28 days	≥ 3,1; ≥ 3,8; ≥ 5,5 MPa	≥ 0,6; ≥ 1,2; ≥ 2 MPa
Elastic modulus at 28 days	≥ 15 GPa	≥ 8,5 GPa
SPECIFICATIONS FOR THE SUPPLY		
Package	25 kg bags on 1,000 kg pallets	
Consumption of dry premixed mortar	About 18 Kg/m <sup>2</sup> /cm	About 15 Kg/m <sup>2</sup> /cm

## FIELDS OF APPLICATION

- For the consolidation of structural plasters where a reinforcement that is considerably alkali-resistant is required;
- Easy to apply;
- Practical to use.



The application methods for the correct implementation of the products are shown on the technical data sheet downloadable from the website [www.ruregold.it](http://www.ruregold.it)

## MX-R4 Repair



Fiber-reinforced thixotropic shrinkage-compensated mortar for applications on concrete

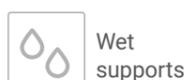
**MX-R4 Repair** is a premix based on cement, select aggregates, super-fluidifying additives, shrinkage control agents for both the plastic phase (UNI 8996) and the hardened phase (UNI 8147), and polypropylene fibers. After the addition of water, a thixotropic mortar is obtained, highly adhesive to concrete, brick and iron, durable, and suitable for repairs and structural coverings, without shrinkage.

It is ready to use: just add water to obtain a thixotropic mixture with no bleeding or segregation phenomena. It can be applied by trowel or spray.

For a surface finish that ensures a high aesthetic quality of the intervention, use a suitable finishing coat.



Freeze/thaw cycle



Wet supports



Easy to install



Fire resistant

### TECHNICAL CHARACTERISTICS

PROPERTIES OF THE MORTAR	MX-R4 Repair
Water per 100 kg of dry premix mortar	15 – 16 liters
Consistency of the mortar (EN 13395-1)	170 +/- 10 mm
Specific weight of fresh mortar (EN 1015-6)	1,70 ± 0,05 g/cc
Volume of fresh mortar per 100 kg of dry premix	about 55 liters
Compression resistance at 1, 7, 28 days (EN12190)	≥ 30; ≥ 37; ≥ 54 MPa
Bending resistance at 1, 7, 28 days (EN 196-1)	≥ 3,5; ≥ 4,5; ≥ 7 MPa
Elastic modulus at 28 days (EN 13412)	≥ 24 GPa
Bond strength to concrete at 28 days (EN 1542)	≥ 2 MPa
Reaction to fire (EN 13501-1)	Euroclass A1
Resistance to sulphates (ASTM C88)	No degradation after 15 cycles
SPECIFICATIONS FOR THE SUPPLY	
Package	25 kg bags on 1,000 kg pallets
Consumption of dry premixed mortar	About 18 Kg/m <sup>2</sup> /cm

### THE PRODUCT:



#### ► MX-R4 Repair

Fiber-reinforced thixotropic mortar for the restoration of concrete and the preparation of the substrate for the application of structural reinforcements.

### FIELDS OF APPLICATION

- Repair of damaged concrete elements;
- Preparation layer for the application of concrete reinforced with composite materials for structural purposes;
- Repair of viaducts, beams and columns for highways, roads and railway lines;
- Filling of rigid joints;
- Structural coverings.

The application methods for the correct implementation of the products are shown on the technical data sheet downloadable from the website [www.ruregold.it](http://www.ruregold.it)

## PASSIVATING



Anti-corrosion mortar for reinforcing bars

**PASSIVATING** is a one-component, reddish-colored mortar based on cementitious binders, synthetic resins, microsilica and special corrosion inhibiting additives

### THE PRODUCT:



#### ► PASSIVATING

Single-component mortar (powder) with an anti-corrosion effect on reinforcement bars

### FIELDS OF APPLICATION

- Anti-corrosive protection of reinforcement bars of reinforced concrete.
- Used in the repair of concrete to alkalinize and passivate the reinforcing bars.
- Suitable before applying the appropriate thixotropic mortar MX-R4 Repair.

### TECHNICAL CHARACTERISTICS

PROPERTIES OF THE MORTAR	PASSIVATING
Appearance	Reddish powder
Apparent specific weight	1.2 g/cm <sup>3</sup>
Application thickness	1 mm each application
Water content of mix	About 25%
Workability time (pot-life)	1 hour max.*
Range of application temperatures	from +5°C TO +35°C
HARDENED PRODUCT	
Density	1,700 Kg/m <sup>3</sup>
Protection against corrosion	Passivation
* Value expressed at (20 ± 2)°C and (65 ± 5)% relative humidity. Lower temperatures lengthen curing and hardening times	
SPECIFICATIONS FOR THE SUPPLY	
Package	5 kg buckets
Indicative amounts required	Approx. 1.6 kg/m <sup>2</sup> /mm

The application methods for the correct implementation of the products are shown on the technical data sheet downloadable from the website [www.ruregold.it](http://www.ruregold.it)

# MX-RW High Performances



## High performance mortar for the structural restoration of masonry

**MX-RW High Performances** is a premixed mortar based on a high pozzolan hydraulic binder and low salt content, select aggregates, additives, and polypropylene fibers.

Its particular composition excludes the possibility of chemical reactions with salts (sulphates, carbonates, nitrates, chlorides, etc.) present in the walls of old buildings. A thixotropic mortar is obtained by adding water. The mix is highly adhesive to masonry, tuff, and stone, durable, and suitable for repairs and structural plasters without shrinkage.

It is ready to use: just add water to obtain a thixotropic mixture with no bleeding or segregation phenomena. It can be applied by trowel or spray.

In cases where a high aesthetic quality of the surface is required, use a suitable finishing coat.



Ecological



Vapor permeable



Easy to install



Compatible with masonry

## PROPERTIES

- ▶ High mechanical resistance to compression and bending;
- ▶ Excellent adherence to masonry;
- ▶ High breathability;
- ▶ Complete compatibility with historical masonry;
- ▶ Absence of shrinkage cracking;
- ▶ No bleeding;
- ▶ High impermeability to water and aggressive aqueous solutions;
- ▶ High resistance to chemical agents (chlorides, sulphates, acid rain, carbon dioxide, etc.);
- ▶ Resistance to freezing and thawing cycles;
- ▶ Ease and speed of installation and finishing.



## THE PRODUCT:



### MX-RW High Performances

Fiber-reinforced thixotropic mortar for the restoration of masonry, the construction of structural plasters and the preparation of the substrate for the application of structural reinforcements.

### Complies with EN 998-2

MX-RW High Performances complies with EN 998-2 Mortar for general purposes for external use in elements subject to building code requirements (G).



## TECHNICAL CHARACTERISTICS

PROPERTIES OF THE MORTAR	MX-RW High Performances
Water per 100 kg of dry premix mortar	15 - 16 liters
Consistency of the mortar (EN 1015-3)	170 +/- 10 mm
Specific weight of fresh mortar (EN 1015-6)	2,10 ± 0,05 g/cc
Volume of fresh mortar per 100 kg of dry premix	about 55 liters
Fresh mortar workability time (20°C)	about 60 min.
Soluble chlorides (CEN/TC 125)	< 10 ppm
Soluble Nitrites/Nitrates (CEN/TC 125)	< 10 ppm
Mg <sup>++</sup> (CEN/TC 125)	< 350 ppm
Ca <sup>++</sup> (CEN/TC 125)	< 350 ppm
Na <sup>+</sup> (CEN/TC 125)	< 350 ppm
K <sup>+</sup> (CEN/TC 125)	< 350 ppm
Porosity of the mortar (Normal 4/80) - pore volume with d < 0.5	68%
Porosity of the mortar (Normal 4/80) - open porosity	23%
Water absorption (EN 1015-18)	0,2 ((kg/(m <sup>2</sup> xmin <sup>0,5</sup> )))
Water vapor permeability (EN 1745-5.4.4)	μ 15/35 as per table
Thermal conductivity/Density (EN 1745-5.4.6)	(λ <sub>10,dry</sub> ) 0,82 W/mK (as per table)
Adhesive strength (EN 1015-12)	≥ 0,6 N/mm <sup>2</sup> – FP: C
Reaction to fire (EN 13501-1)	Euroclass A1
Compression resistance at 3, 7, 28 days (EN 1015-11)	≥ 26; ≥ 34; ≥ 49,5 MPa
Bending resistance at 3, 7, 28 days (EN 1015-11)	≥ 3,1; ≥ 3,8; ≥ 5,5 MPa
Elastic modulus at 28 days (EN 13412)	≥ 15 GPa
SPECIFICATIONS FOR THE SUPPLY	
Package	25 kg bags on 1,000 kg pallets
Consumption of dry premixed mortar	About 18 Kg/m <sup>2</sup> /cm

## FIELDS OF APPLICATION

- ▶ Repair of damaged masonry structures;
- ▶ Structural plasters reinforced with glass or steel fibers for the reinforcing of infill walls;
- ▶ Reinforcement load bearing outer layers reinforced with glass or steel fibers to consolidate vaults;
- ▶ Preparation layer on masonry elements (brick, tuff, stone) for the application of structural reinforcements with composite materials;
- ▶ Reconstruction of masonry with the "like for like" replacement technique;
- ▶ Consolidation of existing walls by restoring the sealing of joints (whether reinforced or not).



The application methods for the correct implementation of the products are shown on the technical data sheet downloadable from the website [www.ruregold.it](http://www.ruregold.it)

# MX-CP Lime



**Pure natural hydraulic lime (NHL 3.5) based mortar for the structural restoration of masonry**

**MX-CP Lime** is a pure natural hydraulic lime (NHL 3.5) pre-mix mortar for the restoration of masonry, breathable and compatible with any masonry support. After adding water, the mix is highly adhesive to masonry, tuff, and stone. It is durable, and suitable for repairs and structural plasters. The product is provided in ready-mixed bags: just add water to obtain a mix that can be applied by hand or with traditional plastering machines (e.g. PFT G4). The porosity of the finished product is such as to enable adequate water vapor permeability. The mortar is highly resistant to aggressive agents.



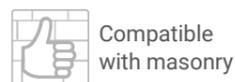
Ecological



Vapor permeable



Easy to install



Compatible with masonry

## PROPERTIES

- ▶ Highly compatible with historical masonry;
- ▶ Eco-friendly hydraulic binder;
- ▶ Excellent adherence to masonry;
- ▶ High breathability;
- ▶ Ease and speed of application and finishing.



## THE PRODUCT:



- ▶ **MX-CP Lime**  
Pure natural hydraulic lime (NHL 3.5) based mortar for the structural restoration of masonry, construction of structural plasters, and the preparation of the substrate for the application of structural reinforcements.

**Complies with EN 998-1 and EN 998-2**  
MX-CP Lime meets the requirements of the EN 998-1 Standard for internal/external plasters for general use (GP).

Apply in a maximum thickness of 2 cm for a single coat and not less than 5 mm.  
Higher thicknesses must be realized in several layers, waiting for the previous layer to dry before applying the next one.

## TECHNICAL CHARACTERISTICS

PROPERTIES OF THE MORTAR	MX-CP Lime
Water per 25 kg bag	about 5 liters
Format	powder
Granulometry	0-2.5 mm
Mineral nature of the aggregate	silicon carbide
Density of fresh mortar (EN 1015-6)	approx. 1750 kg/m <sup>3</sup>
Density of hardened mortar (dry; EN 1015-10)	approx. 1600 kg/m <sup>3</sup>
Water absorption (EN 1015-18)	W1
Water vapor permeability (EN 1015-19)	$\mu \leq 15$
Thermal conductivity/Density (EN 1745)	( $\lambda_{10, dry}$ ) 0.67 W/mK (tabulated data)
Adhesion to brick support	$\geq 1$ N/mm <sup>2</sup>
Flame resistance (D.M. 10/03/2005)	Euroclass A1 (incombustible)
Compressive strength 28 days (EN 998-1 CS IV and 998-2)	> 15 N/mm <sup>2</sup>
Minimum application thickness	15 mm
Maximum application thickness per layer	20 mm
Application temperature	from +5°C to +35°C
Resistance to freezing and thawing (EN 998-1)	NPD
SPECIFICATIONS FOR THE SUPPLY	
Package	25 kg bags on 1,500 kg pallets
Yield	approx. 14.5 Kg/m <sup>2</sup> /cm of thickness

## FIELDS OF APPLICATION

- ▶ Renovation of degraded walls;
- ▶ Structural plasters reinforced with glass or steel fibers for the reinforcement of infill walls;
- ▶ Reinforcement of vaults with outer layers reinforced with glass or steel fibers;
- ▶ Preparation of the substrate on masonry elements (brick, tuff, stone) for the application of composite structural reinforcements;
- ▶ Reconstruction of masonry with the "like for like" replacement technique;
- ▶ Consolidation of existing walls with repointing interventions.



The application methods for the correct implementation of the products are shown on the technical data sheet downloadable from the website [www.ruregold.it](http://www.ruregold.it)

# MX-PVA Fibre-reinforced

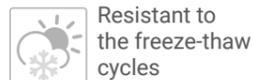


High performance mortar for the structural restoration of walls with polyvinyl alcohol fibers

**MX-PVA Fibre-reinforced** is a premixed mortar based on a high pozzolan hydraulic binder and low salt content, select aggregates, additives, and polyvinylalcohol fibers.

Its particular composition excludes the possibility of chemical reactions with salts (sulphates, carbonates, nitrates, chlorides, etc.) present in the walls of old buildings. Following the addition of water, a highly adhesive, thixotropic mortar without shrinkage is obtained. It is durable and suitable to improve the ductility and toughness of masonry structures.

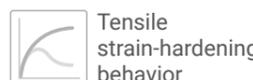
It is ready to use: just add water to obtain a thixotropic mixture with no bleeding or segregation phenomena. It can be applied by trowel or spray. In cases where a high aesthetic quality of the surface is required, use a suitable finishing coat.



Resistant to the freeze-thaw cycles



Vapor permeable



Tensile strain-hardening behavior



Compatible with masonry

## PROPERTIES

- ▶ High capacity to absorb energy after cracking;
- ▶ High ductility and toughness;
- ▶ Increased tensile and flexural strength even after cracking;
- ▶ Excellent resistance to impact, wear and dynamic loads in general;
- ▶ No corrosion of PVA fibers;
- ▶ Excellent adhesion to masonry structures;
- ▶ High breathability;
- ▶ Complete compatibility with historical masonry;
- ▶ Absence of shrinkage cracking;
- ▶ High resistance to chemical agents (chlorides, sulphates, acid rain, carbon dioxide, etc.);
- ▶ Ease and speed of installation and finishing.



## THE PRODUCT:



### ▶ MX-PVA Fibre-reinforced

Thixotropic mortar reinforced with polyvinyl alcohol fibers for the structural restoration of masonry, the construction of reinforced load bearing outer plasters and layers.

### Complies with EN 998-2

MX-PVA Fibre-reinforced complies with EN 998-2 Mortar for general purposes for external use in elements subject to building code requirements (G).

**The structural PVA fibers** provide resistance to the composite material, modifying the stress-deformation ratio. The three-dimensional contribution of the fibrous reinforcement is particularly noticeable in the post-cracking phase, considerably increasing the material's ability to absorb energy and slow down the cracking process.

It follows that MX-PVA Fibre-reinforced effectively replaces the use of the reinforced slab with reinforcement mesh, considerably reducing the thickness (only 3 cm compared to 7 or 8 cm needed for a standard reinforced slab).



## TECHNICAL CHARACTERISTICS

PROPERTIES OF THE MORTAR	MX-PVA Fibre-reinforced
Water per 100 kg of dry premix mortar	16 - 17 liters
Consistency of the mortar (EN 1015-3)	170 +/- 10 mm
Specific weight of fresh mortar (EN 1015-6)	1,85 ± 0,05 g/cc
Volume of fresh mortar per 100 kg of dry premix	about 63 liters
Fresh mortar workability time (20°C)	about 50 min.
Solublesulfates(CEN/TC 125)	< 10 ppm
Soluble chlorides (CEN/TC 125)	< 10 ppm
Soluble Nitrites/Nitrates (CEN/TC 125)	< 10 ppm
Mg <sup>++</sup> (CEN/TC 125)	< 350 ppm
Ca <sup>++</sup> (CEN/TC 125)	< 350 ppm
Na <sup>+</sup> (CEN/TC 125)	< 350 ppm
K <sup>+</sup> (CEN/TC 125)	< 350 ppm
Porosity of the mortar (Normal 4/80) - pore volume with d<0.5	68%
Porosity of the mortar (Normal 4/80) - open porosity	22%
Water absorption (EN 1015-18)	≤ 0,2 ((kg/(m <sup>2</sup> xmin <sup>0,5</sup> )))
Water vapor permeability (EN 1745-5.4.4)	μ 15/35 as per table
Thermal conductivity/Density (EN 1745-5.4.6)	(λ <sub>10,dry</sub> ) 0,83 W/mK (as per table)
Adhesion (EN 1015-12)	≥ 0,6 N/mm <sup>2</sup> – FP: C
Reaction to fire (EN 13501-1)	Euroclass A1
Compression resistance at 1, 7, 28 days (EN 1015-11)	≥ 10; ≥ 24; ≥ 45 MPa
Bending resistance at 1, 7, 28 days (EN 1015-11)	≥ 2; ≥ 3; ≥ 7 MPa
Elastic modulus at 28 days (EN 13412)	≥ 15 GPa
SPECIFICATIONS FOR THE SUPPLY	
Package	25 kg bags on 1,000 kg pallets
Consumption of dry premixed mortar	About 15,9 Kg/m <sup>2</sup> /cm

## FIELDS OF APPLICATION

- ▶ Restoration of structures subject to shock loads
- ▶ Fiber-reinforced plasters (without reinforcement mesh) for the restoration of infill walls;
- ▶ Reinforcement of load bearing outer layers (without reinforcement mesh) to consolidate vaults;
- ▶ Consolidation of existing walls by repointing with fiber reinforced mortar.
- ▶ Interventions in structures exposed to severe chemical-environmental conditions;
- ▶ Repair of damaged masonry structures
- ▶ Preparation layer on masonry elements (brick, tuff, stone) for the application of structural reinforcements with composite materials.



The application methods for the correct implementation of the products are shown on the technical data sheet downloadable from the website [www.ruregold.it](http://www.ruregold.it)

# MX INJECT



Special binder for injection grouts for the consolidation of masonry structures

**MX INJECT** is a pozzolanic hydraulic binder with low salt content that, when mixed with water, makes it possible to make injectable grout compatible with the materials used in the existing masonry.

The particular chemical composition of MX Inject excludes the possibility of a chemical reaction with the salts (sulfates, carbonates, nitrates, chlorides, etc.) present in the walls of old buildings.

MX INJECT mortar is applied for the structural consolidation of masonry.

## THE PRODUCT:



### ► MX INJECT

Pozzolanic hydraulic binder with low salt content for marking injectable grout compatible with the materials used in the existing masonry.

#### Complies with EN 998-2

MX INJECT complies with EN 998-2 Mortar for general purposes for external use in elements subject to building code requirements (G).

GROUT PROPERTIES	MX INJECT
Water per 100 kg of dry premix mortar	30 - 32 liters
Specific weight of fresh mortar (EN 1015-6)	1,80 ± 0,05 (g/cc)
Volume of fresh mortar per 100 kg of dry premix mortar	about 73 liters
Consumption of dry premixed mortar	approx. 1,37 Kg/m <sup>2</sup> /mm
Soluble sulfates (CEN/TC 125)	< 10 ppm
Soluble chlorides (CEN/TC 125)	< 10 ppm
Soluble Nitrites/Nitrates (CEN/TC 125)	< 10 ppm
Mg <sup>++</sup> , Ca <sup>++</sup> , Na <sup>+</sup> , K <sup>+</sup>	< 5, < 50, < 20, < 5 ppm
Water permeability (DIN 1048, mod. 300 h at 7 atm)	= 0,05 cm
Water absorption (EN 1015-18)	0,4 ((kg/(m <sup>2</sup> xmin <sup>0,5</sup> )))
Water vapor permeability (EN 1745-5.4.4)	μ 15/35 as per table
Thermal conductivity/Density (EN 1745-5.4.6)	(λ <sub>10,dry</sub> ) 0,83 W/mK (as per table)
Reaction to fire (EN 13501-1)	Euroclass A1
Compression resistance at 1, 7, 28 days (EN 1015-11)	≥ 15; ≥ 28; ≥ 36 MPa
Bending resistance at 1, 7, 28 days (EN 1015-11)	≥ 1,7; ≥ 3,1; ≥ 4 MPa
Elastic modulus at 28 days (EN 13412)	≥ 15 GPa
SPECIFICATIONS FOR THE SUPPLY	
Package	25 kg bags on 1,000 kg pallets
Consumption of dry premixed mortar	Approx. 1,345 Kg/dm <sup>3</sup>

## PROPERTIES

- Consistency (malleable, fluid, superfluid) and consequent workability, variable according to the amount of binder and water;
- Adequate mechanical properties;
- Chemical-physical compatibility with pre-existing masonry;
- Good resistance to freeze-thaw cycles;
- Good resistance to soluble salts.

The application methods for the correct implementation of the products are shown on the technical data sheet downloadable from the website [www.ruregold.it](http://www.ruregold.it)

# Micro-concrete

Micro-concrete reinforced with steel or synthetic fibers for the jacketing the construction of reinforcement layers for concrete elements.



## Structural reinforcement with Micro-concretes with tensile strain-hardening behavior



Fiber-reinforced micro-concretes are composite materials characterized by a cementitious matrix and discontinuous reinforcing fibers. The matrix usually consists of a high-performance mortar or concrete, while the fibers can be made of steel, polymers or carbon.

Micro-concretes are innovative technologies that have been increasingly adopted for the repair and structural upgrade of existing structures on the basis of their residual tensile strength in the post-cracked phase.

The most common uses of micro-concretes for repair and structural upgrade are as follows:

- construction of thin diaphragms up to 1 + 3/16 in. (3 cm) that are cast-in-place over existing horizontal surfaces.
- construction of thin jackets (up to 1+ 9/16 in. (4 cm) thickness, over reinforced concrete frames with or without the addition of primary supplemental reinforcement.

The main advantage in the use of micro-concretes is linked to the high tensile strength that is reached in the post-cracking phase. This enables a substantial reduction of the thickness of micro-concrete jacket compared to traditional jackets with materials with lower ductility.



## Controlled dissipation of energy



### The role of micro-cracking

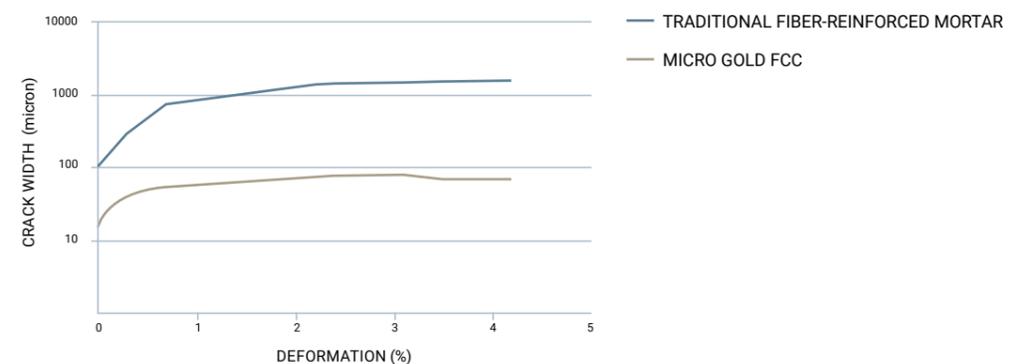
Fiber-reinforced micro-concretes can safely increase the capacity of a concrete structural element to sustain flexural and/or shear stress beyond its elastic limits. The increased load-bearing capacity depends on the ability of micro-concrete to dissipate energy through the formation of micro-cracks, which can be considered as an experimental evidence of the energy-dissipation mechanism. The amplitude of the micro-cracks depends on the type of fiber and its quantity.

The graph below shows that at a deformation of 1% the amplitude of micro-cracks stabilizes at around 80 microns for Micro Gold FCC, which is Ruregold's micro-concrete containing structural synthetic fibers. On the other hand, the amplitude of the micro-cracks in tra-

ditional fiber-reinforced mortars (with polymeric fibers and metal fibers) exceeds 500 microns.

This is a dangerous value for the durability of both concrete and reinforcement. At 1000 microns cracks are so wide that allow the penetration of aggressive chemical and environmental agents, such as chlorides and acid rains, which can deteriorate concrete and induce corrosion in the rebars.

FORMATION OF MICROCRACKS



# Experimental load/deformation curves



The six graphs at page 83 show the load/deformation CMOD (Crack Mouth Opening Displacement) curves, according to EN 14651 standard, measured after 28-day curing. The area below the blue lines is a strong indicator of the ductility of the two Ruregold Micro Gold concretes products: Micro Gold FCC containing structural polymer fibers and Micro Gold Steel with steel fibers.

The curves on the left represent the stress-strain behavior when the products are tested for tensile strength. There is evidently a major difference between the behavior of micro-concretes and traditional fiber-reinforced mortars, which are characterized by a softening behavior (green line), or with traditional R4 mortars which are not reinforced (yellow line) and show fragile behavior.

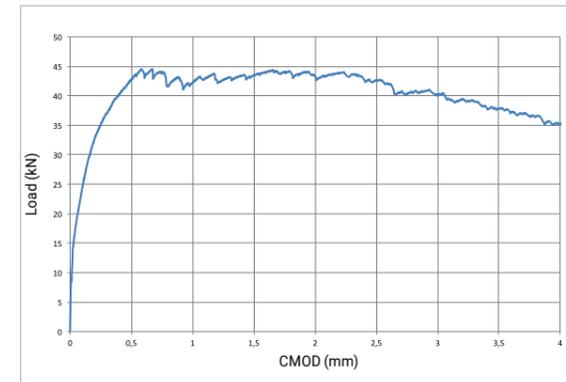
The curves on the right depict the stress-strain behavior when Ruregold micro-concretes are tested for flexural strength and the relative values of  $f_{Rf}$ , determined according to the provisions of EN 14651.1. The area underlying the curve is evidence of the high ductility of the Ruregold products, which can be advantageously used for seismic retrofitting of reinforced concrete structures, without the addition of reinforcing bars.

The summary table below compares the residual flexural tensile strength -  $f_{Rf}$  (MPa) of the three different products.

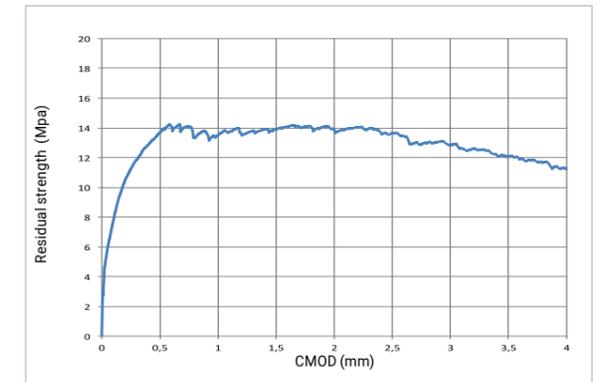
### RESIDUAL FLEXURAL TENSILE STRENGTH - $F_{Rf}$ (MPa)

	MICRO GOLD FCC	MICRO GOLD STEEL
CMOD 1= 0,5 mm	$f_{R1} = 8,05$	$f_{R1} = 13,75$
CMOD 2= 1,5 mm	$f_{R2} = 10,90$	$f_{R2} = 13,90$
CMOD 3= 2,5 mm	$f_{R3} = 12,70$	$f_{R3} = 13,60$
CMOD 4= 3,5 mm	$f_{R4} = 11,60$	$f_{R4} = 12,10$

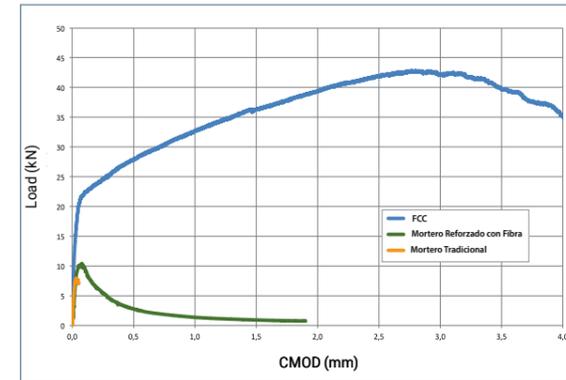
# Test results



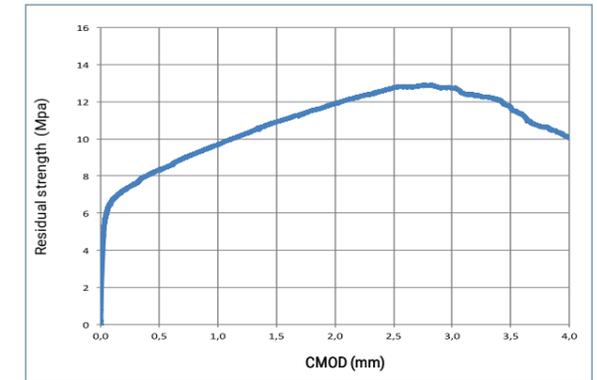
Micro Gold Steel: load deformation EN 14651



Micro Gold Steel: residual bending strength EN 14651



Micro Gold FCC: load deformation EN 14651



Micro Gold FCC: residual bending strength EN 14651



# MICRO GOLD STEEL

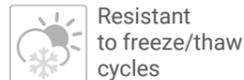


## Micro-concrete reinforced with metal fibers for structural reinforcement and seismic retrofit



**Micro Gold Steel** is a pre-mixed mortar reinforced with metal fibers developed for seismic retrofit and the further reinforcement of reinforced concrete structures even without the use of additional metal components. A highly ductile and lasting mortar, pourable, and strongly adhesive to any type of substrate is obtained with the addition of the proper amount of water.

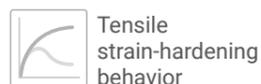
It has a hardening behavior after the post-cracking phase, that is, it increases the resistance to residual tensile stresses, unlike traditional structural fiber reinforced mortars. This mechanical behavior, characterized by a very high capacity of energy absorption, enables the use of Micro Gold Steel for the seismic retrofit of different reinforced concrete structures adding limited thicknesses ranging from 15 to 45 mm.



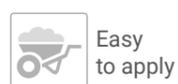
Resistant to freeze/thaw cycles



Fire resistant



Tensile strain-hardening behavior



Easy to apply

## PROPERTIES

- ▶ The presence of metal fibers in the cement matrix improves the mechanical characteristics;
- ▶ Extremely ductile and tenacity higher than that of traditional fiber-reinforced mortars;
- ▶ In the post-cracking phase, the three-dimensional contribution of the fibers increases the ability to absorb energy;
- ▶ High mechanical resistance to compression and bending;
- ▶ Ability to support loads even after the first cracking occurs;
- ▶ Easy and quick application and finishing;
- ▶ Resistance to freezing and thawing cycles.

## THE PRODUCT:



### ▶ MICRO GOLD STEEL

Bi-component micro cement reinforced with steel fibers.

Units of 103.5 Kg approx. composed of:

- **Part A** no. 4 bags of dry premix 25 kg/each
- **Part B** no. 1 box of steel fibers 3.5 Kg.

### Complies with the EN 1504 standard

Micro Gold Steel meets the requirements defined in EN 1504-9 ("Products and systems for the protection and repair of concrete structures: Definitions, requirements, quality control and evaluation of conformity. General principles for the use of products and systems") and the minimum requirements of EN 1504-3 ("Structural and non-structural repair") and EN 1504-6 ("Anchoring steel reinforcement") for class R4 structural mortars.



## TECHNICAL CHARACTERISTICS

MICRO CEMENT PROPERTIES	MICRO GOLD STEEL
Maximum diameter inert	1 mm
Water for 4 bags of dry premix (100 kg) +1 pack fibers (3.5 kg)	12 – 14 liters
Consistency of the mortar (EN 13395-1)	250 +/- 20 mm
Specific weight of fresh mortar (EN 1015-6)	2,30 ± 0,05 g/cc
Volume of fresh mortar per 100 kg of dry premix	about 50 liters
Restrained expansion 1 day	> 0,04%
Compression resistance at 1; 7; 28 days (EN 12190)	> 70; > 80; > 110 MPa
Tensile strength at 28 days (CNR 204/2006)	7 MPa
Elastic modulus at 28 days (EN 13412)	35 GPa
Bond strength to the smooth bar at 28 days RILEM-CEB-FIP-RC6-78	> 4 MPa
Bond strength to the improved adhesion bar at 28 days RILEM-CEB-FIP-RC6-78	> 25 MPa
Bond strength to concrete at 28 days (EN 1542)	≥ 2 MPa
Reaction to fire (EN 13501-1)	Euroclass A1
SPECIFICATIONS FOR THE SUPPLY	
Package	103.5 Kg Units: Part A no. 4 bags of dry premix mortar 25 kg/each + Part B no. 1 bag of fibers 3.5 Kg
Consumption	About 19,5 Kg/m <sup>2</sup> /cm

## FIELDS OF APPLICATION

- ▶ Application where good serviceability limit states and very high ultimate limit states are required;
- ▶ Thin jackets (15-45 mm) even without reinforcement on reinforced concrete structures, beams, joints, foundations, and walls;
- ▶ Thin load bearing outer layers (15-45 mm) on slabs made of: brick and cement, wood, beams, bricks, or corrugated sheets;
- ▶ Restoration of reinforced concrete beams, pillars;
- ▶ Refurbishing of bridge decks;
- ▶ Restoration of tunnel crowns;
- ▶ Restoration of special pavements (airport runways, etc.);
- ▶ Replacement of structural plaster with arc welded steel mesh.



The application methods for the correct implementation of the products are shown on the technical data sheet downloadable from the website [www.ruregold.it](http://www.ruregold.it)

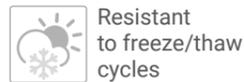
# MICRO GOLD FCC



## Micro-concrete reinforced with synthetic fibers for structural reinforcement and seismic retrofit



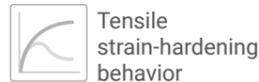
**Micro Gold FCC** is a pre-mixed mortar reinforced with synthetic fibers developed for seismic retrofit and the further reinforcement of reinforced concrete structures even without the use of additional metal components. A highly ductile and lasting mortar, pourable, and strongly adhesive to any type of substrate is obtained with the addition of the proper amount of water. It has a hardening behavior after the post-cracking phase, that is, it increases the resistance to residual tensile stresses, unlike traditional fiber reinforced structural mortars. This mechanical behavior, characterized by a very high capacity of energy absorption, enables the use of Micro Gold FCC for the seismic retrofit of different reinforced concrete structures adding limited thicknesses ranging from 15 to 45 mm.



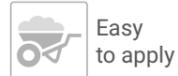
Resistant to freeze/thaw cycles



Fire resistant



Tensile strain-hardening behavior



Easy to apply

## PROPERTIES

- ▶ The presence of synthetic fibers in the cement matrix improves durability characteristics;
- ▶ Extremely ductile and tenacity higher than that of traditional fiber-reinforced mortars;
- ▶ In the post-cracking phase, the three-dimensional contribution of the fibers increases the ability to absorb energy;
- ▶ High mechanical resistance to compression and bending;
- ▶ Ability to support loads even after the first cracking occurs;
- ▶ Easy and quick application and finishing;
- ▶ Resistance to freezing and thawing cycles.

## THE PRODUCT:



### ▶ MICRO GOLD FCC

Bi-component micro cement reinforced with synthetic fibers.

Approx. 102 Kg units composed of:

- **Part A** no. 4 bags of dry premix 25 Kg/each
- **Part B** no. 1 box of synthetic fibers 2 Kg.

### Complies with the EN 1504 standard

Micro Gold FCC meets the requirements defined in EN 1504-9 ("Products and systems for the protection and repair of concrete structures: Definitions, requirements, quality control and evaluation of conformity. General principles for the use of products and systems") and the minimum requirements of EN 1504-3 ("Structural and non-structural repair") and EN 1504-6 ("Anchoring steel reinforcement") for class R4 structural mortars.



## TECHNICAL CHARACTERISTICS

MICRO CEMENT PROPERTIES	MICRO GOLD FCC
Maximum diameter inert	3 mm
Water for 4 bags of dry premix (100 kg) + 1 pack fibers (2 kg)	11 – 13 liters
Consistency of the mortar (EN 13395-1)	200 +/- 20 mm
Specific weight of fresh mortar (EN 1015-6)	2,30 ± 0,05 g/cc
Volume of fresh mortar per 100 kg of dry premix	about 50 liters
Restrained expansion 1 day	> 0,04%
Compression resistance at 1; 7; 28 days (EN 12190)	> 65; > 70; > 85 MPa
Tensile strength at 28 days (CNR 204/2006)	6 MPa
Elastic modulus at 28 days (EN 13412)	30 GPa
Bond strength to the smooth bar at 28 days RILEM-CEB-FIP-RC6-78	> 4 MPa
Bond strength to the improved adhesion bar at 28 days RILEM-CEB-FIP-RC6-78	> 25 MPa
Bond strength to concrete at 28 days (EN 1542)	≥ 2 MPa
Reaction to fire (EN 13501-1)	Euroclass A1
SPECIFICATIONS FOR THE SUPPLY	
Package	102 Kg Units: Part A no. 4 bags of dry premix mortar 25 kg/each + Part B no. 1 bag of fibers 2 Kg
Consumption	About 20 Kg/m <sup>2</sup> /cm

## FIELDS OF APPLICATION

- ▶ Application where good serviceability limit states;
- ▶ For use in highly aggressive environments (marine, industrial / chemical), in contact with deicing salts, sulphate waters and in urban environments with acid rains and carbonation risk;
- ▶ Thin jackets (15-45 mm), even without reinforcement, on reinforced concrete structures, beams, joints, foundations, and walls with a high risk of corrosion;
- ▶ Thin load bearing outer layers on slabs made of: brick and cement, wood, beams, bricks, or corrugated sheets;
- ▶ Restoration of reinforced concrete beams, pillars;
- ▶ Refurbishing of bridge decks;
- ▶ Restoration of tunnel crowns;
- ▶ Restoration of special pavements (airport runways, etc.);
- ▶ Repair of structural elements subject to Stray-Current Corrosion.



The application methods for the correct implementation of the products are shown on the technical data sheet downloadable from the website [www.ruregold.it](http://www.ruregold.it)



R.S.A. seismic retrofit  
Municipality of Giovinazzo (BA)

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