



# MAPEI

# MapeWrap C FIOCCO MapeWrap G FIOCCO

**Cord made from mono-directional, high-strength carbon fibre or glass fibre to be impregnated with MapeWrap 21, used to make “structural connections”**



## WHERE TO USE

Structural and functional restoration of concrete elements and masonry, including those of historical interest, which have been damaged by inclement weather and natural causes.

**MapeWrap C Fiocco** and **MapeWrap G Fiocco** are “structural connection” systems placed on the inside of old masonry to guarantee a better connection between substrates (concrete, stone, bricks, wood, etc.) and strengthening products from the MAPEI **FRP System**.

## Some application examples

- Anchoring structural strengthening made from the **Mapegrid** strengthening system on vaulted ceilings and masonry facing walls in brick, stone and tuff.
- Connections between old perimeter facing walls and carbon fibre pultruded sheets (**Carboplate**) and fabrics from the MAPEI **FRP System** range used for structural strengthening of beams, floor slabs, etc.

## TECHNICAL CHARACTERISTICS

**MapeWrap C Fiocco** and **MapeWrap G Fiocco** are part of the MAPEI **FRP System** range of products, an innovative system for strengthening and static upgrading of reinforced cement, concrete and masonry structures. The products include mono-directional carbon (**MapeWrap C Fiocco**) or glass (**MapeWrap G Fiocco**) fibre threads wrapped in a gauze sheath which gives it its characteristic “cord” appearance. The “cords” are available in various diameters: 6, 8, 10 and 12 mm. The cord may be used in combination with fabrics from the MAPEI **FRP System** range, **Carboplate**

sheets and strengthening systems made using **Mapegrid** to improve anchorage, particularly for flexural and shear strengthening interventions.

Thanks to its composition and production process, which guarantees the same properties in all points, **MapeWrap C Fiocco** and **MapeWrap G Fiocco** have the following characteristics:

- high tensile strength;
- lightweight;
- resistant to alkaline hydroxides in the concrete;
- resistant to corrosion, including when chlorides or other aggressive substances are present;
- excellent fatigue strength.

## ADVANTAGES

Considerable increase of the connection between strengtheners used for structural elements and old substrates. High durability of materials used for building or repairing civil and industrial structures in aggressive environments where “reinforced connections” need to be applied.

**MapeWrap Fiocco** eliminates the risks deriving from corrosion to the reinforcement when steel is used. Also, thanks to its very low weight, it may be installed very quickly without the use of special lifting means, and in many cases, without closing off the structure while in service.

## RECOMMENDATIONS

- Workers must be provided with protective gloves and goggles and anti-solvent safety masks.

**MapeWrap C  
FIOCCO**  
**MapeWrap G  
FIOCCO**



MapeWrap C Fiocco



MapeWrap G Fiocco

- After impregnating the end of the cord with **MapeWrap 21** and inserting it into the masonry, sprinkle it with dry, quartz sand.
- The substrate in which the **MapeWrap Fiocco** is inserted must be dry, clean and mechanically strong.

## APPLICATION PROCEDURE

### Application phases

1. Preparation of the substrate
2. Drilling the holes
3. Preparation of **MapeWrap Fiocco**
4. Preparation of **MapeWrap Primer 1**
5. Application of **MapeWrap Primer 1**
6. Preparation of **MapeWrap 31**, **MapeWrap 11** or **MapeWrap 12**
7. Application of **MapeWrap 31**, **MapeWrap 11** or **MapeWrap 12**
8. Insertion of **MapeWrap Fiocco**

### 1. Preparation of the substrate

If the structure to be reinforced or where the bows are to be inserted is particularly deteriorated, repair the various elements before applying the **MapeWrap Fiocco**. We recommend removing damaged and deteriorated parts using a hammer, a jack-hammer or by hydro-scarifying. If there are metal reinforcement rods, remove all traces of rust and protect them using **Mapefer** two-component anti-corrosion cementitious mortar or **Mapefer 1K** mono-component anti-corrosion cementitious mortar (please refer to the respective Technical Data Sheet for each product for application procedures). Repair the surfaces using products from the **Mapegrout** or **Mape-Antique** range or **Planitop HDM/Planitop HDM Maxi** (choose the most suitable product according to the characteristics and type of structure).

### 2. Drilling the holes

**MapeWrap Fiocco** has an outside diameter of 6, 8, 10 or 12 mm. The holes drilled in the masonry must be at least 18/20 mm in diameter and at least 20 cm deep (the depth of the holes must be calculated according to the thickness of the masonry). If the above guidelines are followed, the material injected into the holes will completely embed the **MapeWrap Fiocco** and provide sufficient anchorage with the substrate. After drilling the hole, remove all dust and loose material with compressed air.

### 3. Preparation of MapeWrap Fiocco

Cut pieces of **MapeWrap Fiocco** at least 40 cm long (the length must be calculated according to the thickness of the masonry). Unroll the protective gauze from the cord to a length equal to the depth of the hole. Impregnate this portion with **MapeWrap 21** and then roll the gauze back to cover the impregnated part.

In order to guarantee a good bond when embedding the cord in the hole, the surface of the impregnated portion of cord must be saturated with dry quartz sand to make it rough. Once hardened, the "bow" formed as described above is ready to be applied.

### 4. Preparation of MapeWrap Primer 1

The two components which make up **MapeWrap Primer 1** must be mixed together. Pour component B into component A and mix with a low-speed drill with a mixing attachment until the resin is completely blended. Mixing ratio: 3 parts by weight of component A and 1 part by weight of component B. To avoid dosage errors, use the entire contents of the two components. If only partial quantities are required, use high-precision electronic scales to weigh out the components (this procedure may also be adopted for the other products). Once prepared, the workability time of **MapeWrap Primer 1** is 90 minutes at +23°C.

### 5. Application of MapeWrap Primer 1

After drilling and preparing the holes, apply the **MapeWrap Primer 1** using a round brush or pipe-cleaner.

If the surface is particularly absorbent, apply a second coat of **MapeWrap Primer 1** once the first coat has been completely absorbed. Then apply **MapeWrap 31**, **MapeWrap 11** or **MapeWrap 12** (choose the most suitable product according to the type of substrate) while the product underneath is still "fresh".

### 6. Preparation of MapeWrap 31, MapeWrap 11 or MapeWrap 12

The choice of which product to use must be made according to the type of hole to be filled. For horizontal holes, holes in ceilings or holes in particularly porous substrates, it is better to use **MapeWrap 11** or **MapeWrap 12** epoxy grout, while for holes in floors, holes at a slight angle or holes in compact substrates without internal cracks (e.g. concrete), it is better to use **MapeWrap 31** epoxy resin with a medium viscosity.

### MapeWrap 11 or MapeWrap 12

**MapeWrap 11** or **MapeWrap 12** must be chosen according to the surrounding temperature and workability time (**MapeWrap 12** has a higher workability time than **MapeWrap 11**).

Pour component B into component A and mix with a low-speed drill with a mixing attachment until they form an even, grey paste.

Mixing ratio for both products: 3 parts by weight of component A and 1 part by weight of component B. At +23°C **MapeWrap 11** is workable for around 40 minutes after mixing while **MapeWrap 12** is workable for around 60 minutes.

### MapeWrap 31

Pour component B into component A and mix with a low-speed drill with a mixing attachment until they form an even, yellow paste. Mixing ratio: 4 parts in weight of component A and 1 part in weight of component B. After mixing, the product remains workable for approximately 40 minutes at +23°C.

TECHNICAL DATA (typical values)		
PRODUCT IDENTITY		
	MapeWrap C Fiocco	MapeWrap G Fiocco
Type of fibre:	high-strength carbon	Type E glass
Appearance:	"cord" formed by mono-directional fibres wrapped in a protective gauze sheath	
Density (g/cm³):	1.8	2.62
Tensile strength (N/mm²):	4,830	2,560
Modulus of elasticity (N/mm²):	230,000	80,700
Elongation at breakage (%):	2	> 3
Equivalent surface area of dry fabric (mm²):		
– Ø 6:	15.70	16.34
– Ø 8:	21.24	21.45
– Ø 10:	26.79	27.58
– Ø 12:	31.40	32.69

## 7. Application of MapeWrap 31, MapeWrap 11 or MapeWrap 12

Completely fill the holes previously treated with **MapeWrap Primer 1** while it is still "fresh". **MapeWrap 11** and **MapeWrap 12** must be applied inside the holes using an empty silicon tube and an extrusion gun, while **MapeWrap 31** may be applied by pouring it into the holes.

## 8. Insertion of MapeWrap Fiocco

Once the holes have been filled, insert the **MapeWrap Fiocco** prepared as described previously slowly and carefully, so that the excess **MapeWrap** is expelled from the holes. The excess **MapeWrap** must then be removed with a metal trowel. In order to avoid the section where the **MapeWrap Fiocco** is to be placed becoming too thick and to increase its adhesion, the part of the "fiocco" which has not been inserted into the holes must be splayed open, impregnated with **MapeWrap 31** and applied on the structure to be connected. A layer of **MapeWrap 31** must also be applied on the substrate before applying the splayed "fiocco". Even though epoxy resin is an insulating material, if steel elements need to be connected using **MapeWrap C Fiocco**, we recommend applying an "insulating" layer of glass fibre fabric between the two elements. If this precaution is not taken, "galvanic currents" may be generated because of the different electro-chemical potential between the metal and the carbon fibres, thus causing corrosion. Apply an even layer of **MapeWrap 31** (please refer to the product's

Technical Data Sheet for preparation instructions) on the grout applied previously while it is still "fresh" with a brush or short-haired roller. Then immediately lay **MapeWrap G UNI-AX** fabric on the **MapeWrap 31** while it is still "fresh", making sure it is applied without any creases or folds. Apply a second layer of **MapeWrap 31** and then pass over the surface using a **MapeWrap Roller** so that the adhesive completely penetrates into the fibres of the fabric and any air bubbles entrapped during its application are completely eliminated. The splayed carbon "fiocco" may now be applied.

**Note:** If a finishing coat is to be applied, the final layer of epoxy resin must be saturated with fine, dry sand while it is still "fresh" to guarantee a good bond with the next product.

## Protective coating

Various protective coatings may be applied once the epoxy strengthening system has completely hardened according to the finish required, for example **Mapelast** flexible cementitious mortar, **Elastocolor Paint** flexible acrylic paint, **Planitop 200** mono-component cementitious mortar, **Planitop HDM** or **Planitop HDM Maxi** two-component, pozzolanic-reaction cementitious mortar, etc. (please refer to each product's relative Technical Data Sheet for application instructions).

The products mentioned above form an efficient barrier against UV rays, which make them particularly recommended for structures exposed to direct sunlight.

## PRECAUTIONS TO BE TAKEN DURING AND AFTER APPLICATION

- The temperature during application operations must be at least +5°C and the structure must also be dry and protected from rain and dust carried by the wind.
- After completing the application operations, make sure the treated surfaces are kept at a temperature higher than +5°C until the products are completely cured.
- Protect the surface from rain for at least 24 hours if the temperature does not drop below +15°C and for at least 3 days if the temperature is lower.

## Cleaning

Because of the high bond strength of the epoxy systems above, we recommend cleaning work tools with solvent (such as ethanol, xylene, thinners, etc.) before they harden.

## PACKAGING

MapeWrap G Fiocco and MapeWrap C Fiocco are available in various diameters packed in boxes containing 10 metre rolls.

## STORAGE

Store in a covered dry area.

## SAFETY INSTRUCTIONS FOR PREPARATION AND INSTALLATION

Workers must wear protective, waterproof rubber gloves, goggles and anti-solvent safety masks when preparing and applying these epoxy systems. Avoid the products coming into contact with the skin and eyes.

If they come into contact, wash off with plenty of soap and water and seek medical attention. If the products are applied in closed environments, make sure they are well ventilated to guarantee a continuous circulation of fresh air. While using or handling these products, never use naked flames and do not smoke.

FOR PROFESSIONAL USE.

## WARNING

*Although the technical details and recommendations contained in this product data sheet correspond to the best of our knowledge and experience, all the above information must, in every case, be taken as merely indicative and subject to confirmation after long-term practical application: for this reason, anyone who intends to use the product must ensure beforehand that it is suitable for the envisaged application: in every case, the user alone is fully responsible for any consequences deriving from the use of the product.*

Please refer to the current version of the Technical Data Sheet, available from our web site [www.mapei.com](http://www.mapei.com)

**All relevant references  
for the product are available  
upon request and from  
[www.mapei.com](http://www.mapei.com)**