

MapeWrap Fiocco System

Unidirectional High-Strength Carbon Fiber or Glass Fiber Cord System for Structural Connections and Anchors

PRODUCTS IN THIS SYSTEM

MapeWrap® 11 • *MapeWrap 12* • *MapeWrap 21* • *MapeWrap 31* • *MapeWrap C Fiocco* • *MapeWrap G Fiocco* • *MapeWrap Primer 1*

DESCRIPTION

MapeWrap Fiocco System is designed for strengthening, static and seismic upgrading of reinforced concrete and masonry structures. The system includes unidirectional carbon fiber (*MapeWrap C Fiocco*) or glass fiber (*MapeWrap G Fiocco*) threads inside a gauze wrapping for a “cord” appearance, impregnated with the structural epoxy resin *MapeWrap 21*. This provides a connection between the concrete/masonry substrate and the *MapeWrap C Uni-Ax*, *Carboplate®* or fiber-reinforced cementitious matrix (FRCM) system.

FEATURES AND BENEFITS

- High strength-to-weight ratio
- Cords can be cut to desired length
- High tensile strength and modulus of elasticity
- Resistance to alkaline hydroxides in the concrete
- Resistance to corrosion, including when chlorides or other aggressive substances are present
- Excellent fatigue strength

WHERE TO USE

- For structural and functional restoration of concrete elements and masonry, including those belonging to history buildings and structures, that have been damaged by inclement weather and natural causes
- *MapeWrap Fiocco* System is used as “structural connection” placed on the inside of old masonry to guarantee a better connection between the substrate (concrete, stone, bricks, wood, etc.) and the strengthening products with either fiber-reinforced polymer (FRP) or FRCM technology.
- For anchoring structural strengtheners made from mesh-strengthening systems on vaulted structures in addition to brick, stone and tuff facing walls
- For connections between old perimeter facing walls and pultruded carbon-fiber sheets (*Carboplate*) or fabrics from the *MapeWrap* line used for structural strengthening of beams, floor slabs, etc.

- For considerable increase of the connection between the reinforcement and the existing substrates

SUITABLE SUBSTRATES

- Concrete and masonry surfaces

SURFACE PREPARATION

- Concrete and masonry surfaces must be fully cured, clean, sound and dry.
- Concrete defects must be repaired with an approved MAPEI repair mortar such as *Planitop® X*, *Planitop XS* or another approved MAPEI repair mortar.
- Ensure that the substrate is dry and that there is no vapor transfer. The presence of humidity will negatively affect the bond of the resin. Do not install the reinforcement if rain or exposure to moisture is anticipated within 24 hours.
- Substrate and ambient temperatures must be between 50°F and 90°F (10°C and 32°C).

Consult MAPEI's Technical Services Department for installation recommendations regarding substrates and conditions not listed.

DRILLING THE ANCHORING HOLES

- The holes drilled in the substrate must be designed according to the diameter of the selected *MapeWrap Fiocco* cord that is impregnated and broadcasted with quartz. Calculate the depth of the holes according to the thickness of the masonry or the dimensions design by the engineer in the concrete.
- After drilling each hole, use compressed air to remove all dust and loose material with a vacuum cleaner.

MIXING

Before product use, take appropriate safety precautions. Refer to the Safety Data Sheets for *MapeWrap 11*, *MapeWrap 12*, *MapeWrap 21*, *MapeWrap 31* and *MapeWrap Primer 1* for details.

- Refer to individual Technical Data Sheets (TDSs) for the epoxies required for the application type as detailed below.
- Do not dilute or modify epoxies. Mix only full units.

PREPARATION OF MAPEWRAP FIOCCO CORD

1. Cut pieces of *MapeWrap Fiocco* cord at a length accounting for the depth of the anchors and the length for the external anchoring to the substrate, per the engineer's design.
2. Unroll the protective gauze from the cord to a length equal to the depth of the anchoring hole. Impregnate this portion with *MapeWrap 21* or *MapeWrap 31*.
3. 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. Hang the *MapeWrap Fiocco* cord impregnated with fresh *MapeWrap 21* or *MapeWrap 31* and leave undisturbed until the resin has hardened. Once hardened after 24 hours of curing, the *MapeWrap Fiocco* cord formed as described above is ready to be applied.

PRODUCT APPLICATION

Read all installation instructions thoroughly before installation.

1. Apply *MapeWrap Primer 1* using a round brush or pipe cleaner in the anchoring holes and at the perimeter where the *MapeWrap Fiocco* cord will be installed.
2. If the substrate is particularly absorbent, apply a second coat of *MapeWrap Primer 1* once the first coat has been completely absorbed. While the *MapeWrap Primer 1* is still tacky, apply and inject *MapeWrap 11*, *MapeWrap 12* or *MapeWrap 31* in the anchoring hole and at the perimeter at perimeter where the *MapeWrap Fiocco* cord will be installed.
3. The product choice must be made according to the type of the substrate and of the hole to be filled. For horizontal holes, holes in ceilings and holes in particularly porous substrates, it is better to use *MapeWrap 11* or *MapeWrap 12* epoxy resin, while for holes in floors, holes at a slight angle and holes in very compact substrates without internal cracks (such as concrete), using *MapeWrap 31* epoxy resin with a medium viscosity is recommended.
4. *MapeWrap 11* should be used in temperatures between 40°F and 73°F (4°C and 23°C), and *MapeWrap 12* should be used in temperatures above 73°F (23°C) because it has a longer pot life.
5. *MapeWrap 11* or *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.
6. Once the holes have been filled, slowly and carefully insert *MapeWrap Fiocco* cord end treated with *MapeWrap 21* or *MapeWrap 31*, prepared as previously described, to help expel the excess resin from the holes. Remove the excess resin with a metal trowel. To prevent the section where *MapeWrap Fiocco* cord is to be applied from becoming too thick and to increase its adhesion, splay the remaining part of the “bows” (the part not inserted in the holes) and spread the fibers over the structure to be connected.
7. Apply a coat of *MapeWrap 11*, *MapeWrap 12* or *MapeWrap 31* on the substrate before applying the splayed “bows” and then impregnate all the fibers with the same product. While the resin is still wet, broadcast the surface with dry quartz sand to create a rough bonding surface for the next step.
8. 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.
9. Once hardened (after about 1 to 2 days at 73°F or 23°C) and if required by the engineer or if exposed to UV rays, coat the cured epoxy resin with a protective coating such as *Mapelastic®*, *Elastocolor® Coat* or *Elastocolor Flex*. The epoxy resin should not be exposed more than 3 days to UV rays, particularly in direct sunlight.
10. The system will reach its full strength after 7 days at 73°F (23°C) and 50% relative humidity (RH).



Drilling the hole



Impregnating a portion of MapeWrap Fiocco cord



Curing for 24 hours



Inserting MapeWrap Fiocco cord in the hole



The splayed end of a piece of MapeWrap Fiocco cord



Impregnating the MapeWrap Fiocco cord



Broadcast with quartz sand

CLEANUP

Due to the high bond strength of *MapeWrap Primer 1*, *MapeWrap 11*, *MapeWrap 12*, *MapeWrap 21* and *MapeWrap 31* on metal, clean any tools used with solvents (ethyl alcohol, toluene, etc.) before the product dries. Cured material can only be removed mechanically. Dispose of material in accordance with local disposal regulations.

LIMITATIONS

- Application temperature of the epoxy adhesive being used should be between 50°F and 90°F (10°C and 32°C). Contact MAPEI's Technical Services Department for installation recommendations when ambient temperatures are above or below this temperature range.
- Design calculations and project review should be carried out by an independent licensed engineer with carbon-fiber-reinforced polymer (CFRP) design experience, and in accordance with all local, state/provincial and federal building codes. Additional design examples/guidelines are available upon request from MAPEI's Technical Services Department or through the MAPEI Structural Design tool at structuraldesign.mapei.com.
- Protect the surface from rain for at least 24 hours if the temperature remains at or above 60°F (15°C), or for at least 3 days if the temperature is lower.
- Even though epoxy resin is an insulating material, if steel elements need to be connected using *MapeWrap C Fiocco*, apply an "insulating" layer of glass fiber 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 fibers, thus causing corrosion. Contact MAPEI’s Technical Services Department for details.

Product Performance Properties

	<i>MapeWrap C Fiocco</i>	<i>MapeWrap G Fiocco</i>
Fiber material	High-strength carbon	Type E glass
Color	Black	White
Shelf life	Unlimited in proper storage conditions; store in a dry place with no exposure to direct sunlight	Unlimited in proper storage conditions; store in a dry place with no exposure to direct sunlight
Density	112.37 lbs. per cu. ft. (1.8 g per cm ³)	124.86 per cu. ft. (2.66 g/cm ³)
Tensile strength of fibers	700,350 psi (4 830 MPa)	332,050 psi (2 290 MPa)
Modulus of elasticity of fibers	33,930,000 psi (234 000 MPa)	11,803,000 psi (81 400 MPa)
Elongation at failure	2%	2.8%
Equivalent surface area of dry fabric		
1/4" (6 mm) diameter	0.024 sq. in. (15.43 mm ²)	0.023 sq. in. (14.44 mm ²)
5/16" (8 mm) diameter	0.032 sq. in. (20.72 mm ²)	0.029 sq. in. (18.95 mm ²)
3/8" (10 mm) diameter	0.040 sq. in. (25.77 mm ²)	0.038 sq. in. (24.36 mm ²)
1/2" (12 mm) diameter	0.048 sq. in. (31.08 mm ²)	0.045 sq. in. (28.87 mm ²)

Packaging

<i>MapeWrap 11</i>	Kit: 1 U.S. gal. (3.79 L)
<i>MapeWrap 12</i>	Kit: 1 U.S. gal. (3.79 L)
<i>MapeWrap 21</i>	Kit: 1 U.S. gal. (3.79 L)
<i>MapeWrap 31</i>	Kit: 1 U.S. gal. (3.79 L)
<i>MapeWrap C Fiocco</i>	1/4" x 32.8 ft. (6 mm x 10 m) 5/16" x 32.8 ft. (8 mm x 10 m) 3/8" x 32.8 ft. (10 mm x 10 m) 1/2" x 32.8 ft. (12 mm x 10 m)
<i>MapeWrap G Fiocco</i>	5/16" x 32.8 ft. (8 mm x 10 m)
<i>MapeWrap Primer 1</i>	Kit: 1 U.S. gal. (3.79 L)

ADDITIONAL INFORMATION

Refer to the Safety Data Sheet (SDS) for specific data related to health and safety as well as product handling.

For information on MAPEI's commitment to sustainability and transparency, as well as how MAPEI products may contribute to green building standards and certification systems, contact sustainability_USA@mapei.com (USA) or sustainability-durabilite@mapei.com (Canada).

WARNING

The test results shown in the TECHNICAL DATA table were obtained in compliance with test methods and curing cycles, if applicable, defined in the industry standards referenced on the Technical Data Sheet. Please note that the use of test procedures or methods other than those indicated in the table could lead to different values and that, in such cases, any liability of our company is excluded.

LEGAL NOTICE

The contents of this Technical Data Sheet ("TDS") may be copied into another project-related document, but the resulting document shall not supplement nor replace requirements per the TDS in effect at the time of the MAPEI product installation. For the most up-to-date TDS and warranty information, please visit our website at www.mapei.com. **ANY ALTERATIONS TO THE WORDING OR REQUIREMENTS CONTAINED IN OR DERIVED FROM THIS TDS SHALL VOID ALL RELATED MAPEI WARRANTIES.**

Before using, the user must determine the suitability of our products for the intended use, and the user alone assumes all risks and liability. **ANY CLAIM SHALL BE DEEMED WAIVED UNLESS MADE IN WRITING TO US WITHIN FIFTEEN (15) DAYS FROM DATE IT WAS, OR REASONABLY SHOULD HAVE BEEN, DISCOVERED.**

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For the most current product data and BEST-BACKEDSM warranty information,
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