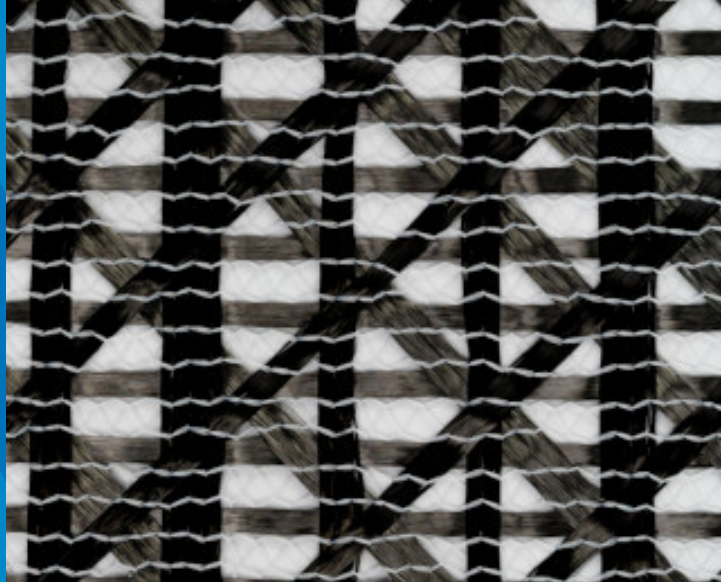
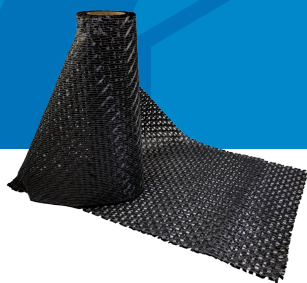


MAPEWRAP C QUADRI-AX

Balanced, high-strength, quadri-directional carbon fibre fabric



WHERE TO USE

This system is recommended for the repair and static upgrading of reinforced concrete structures damaged by aggressive environmental and/or accidental conditions where it is difficult to predict the exact trend of isostatic tensile loads.

Some application examples

- Restoring two-dimensional structures such as plates and sheets, vaulted ceilings, and storage tanks without having to consider the exact trend of tensile loads.
- Seismic upgrading and restoration work on vaulted structures without increasing their mass and without the risk of liquids percolating towards the inner face.
- Cladding beam-pillar hinge points to upgrade their seismic capacity.
- Strengthening load-bearing members in buildings whose structural system has been modified due to new architectural requirements or changes in use.

TECHNICAL CHARACTERISTICS

MapeWrap C QUADRI-AX is a quadridirectional, carbon fibre fabric with a balanced weight characterised by its high modulus of elasticity (comparable to that of steel) and very high tensile strength that can be applied using two different methods:

- "wet application method"
- "dry application method"

using a complete range of epoxy resin products, consisting of:

- **MapeWrap Primer 1**, consolidating product for treating the substrates.
- **MapeWrap 11** and **MapeWrap 12**, skimming compounds for levelling off any defects and sealing the porosity (the workability time of **MapeWrap 12** is higher than that of **MapeWrap 11**).
- **MapeWrap 21**, impregnator for fabric to be used with the "wet application method"
- **MapeWrap 31**, fluid impregnator for fabric to be used with the "dry application method"
- **MapeWrap 31 T**, thixotropic impregnator for fabric to be used with the "dry application method"

With the "wet application method", the fabric is pre-impregnated with **MapeWrap 21** and then applied, while with the "dry application method" the fabric is placed directly over a layer of **MapeWrap 31** or **MapeWrap 31 T** previously applied on the surface of the concrete element to be strengthened.

MapeWrap 31 T, thanks to its thixotropic consistency, can also be used for the preliminary levelling off of the substrate.

The products for bonding from the **MapeWrap** range comply with the principles 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 1504-4, ("Structural bonding").

To satisfy a wide range of structural requirements, **MapeWrap C QUADRI-AX** is available in two different weights (380 and 760 g/m²), each with different heights:

- **MapeWrap C QUADRI-AX 380**
- **MapeWrap C QUADRI-AX 760**

ADVANTAGES

Unlike work carried out using conventional techniques, thanks to their extremely low weight, the fabrics from the **MapeWrap C QUADRI-AX** range can be applied by a smaller team of workers.

With the use of tools that make the application easier, both the "dry application method" and "wet application method" it is possible to apply the product quickly and often without having to interrupt the normal activities that take place in the structure.

Compared to the cladding technique with metal plates (beton plaqu ), **MapeWrap C QUADRI-AX** fabric can be adapted to suit any shape of element or structure to be repaired, it does not require temporary supports during application and there is no risk of corrosion of the strengthening system.

RECOMMENDATIONS

All workers must use protective gloves and goggles and anti-solvent safety masks.

APPLICATION PROCEDURE

Preparation of the substrate

The surface on which **MapeWrap C QUADRI-AX** is to be applied must be perfectly clean, dry, and strong.

Masonry structures

Before applying the fabric, remove all loose or crumbling areas or areas at risk of becoming detached and level off the surfaces with a layer of **Planitop HDM Maxi**.

Wooden structures

Repair wooden elements and structures, where required, by applying adhesives from the **Mapewood** range.

Concrete structures

▪ Not damaged

Remove by sanding all traces of tripping oil, varnish, paint, and cement laitance.

▪ Damaged

remove all damaged areas with a hammer, a jackhammer, or by hydro-scarifying.

Remove all traces of rust from the steel reinforcement and protect them by applying **Mapefer** two-component anti-corrosion cementitious mortar or **Mapefer 1K Zero** one-component anti-corrosion cementitious mortar.

Repair the concrete surfaces with products from the **Mapegrout** range. Wait at least three weeks before applying **MapeWrap C QUADRI-AX**.

If strengthening work on concrete structures needs to be carried out immediately, use **Adesilex PG1** or **Adesilex PG2**.

Seal any cracks in the structure by injecting them with **Epojet** or **Epojet LV** (suitable only for dry or slightly damp cracks) or with **Foamjet T** or **Foamjet F** (suitable for damp cracks or if water is seeping in).

Refer to the relevant Technical Data Sheet for details on how to apply the aforementioned products.

Round off all sharp edges and corners on concrete or masonry elements and structures that are to be strengthened with the **MapeWrap C QUADRI-AX** (such as beams and pillars) with a jackhammer or other suitable tools. It is recommended to round them off to a radius of at least 2 cm, in compliance with CNR-DT 200 R1/2013.

Application of MapeWrap C QUADRI-AX using the "wet application method"

Application phases

1. Preparation of **MapeWrap Primer 1**
2. Application of **MapeWrap Primer 1**

3. Preparation of **MapeWrap 11** or **MapeWrap 12**
4. Preparation of **MapeWrap 11** or **MapeWrap 12**
5. Preparation of **MapeWrap 21**
6. Impregnation of fabric with **MapeWrap 21**
7. Application of **MapeWrap C QUADRI-AX**

1. Preparation of MapeWrap Primer 1

The two components of **MapeWrap Primer 1** must be mixed together.

Pour component B into component A and mix with a drill at low speed 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.

Do not use partial quantities: to avoid the risk of accidental dosage mistakes, use the whole package; if only partial quantities are required, use a precision electronic scale to weigh the components (this procedure must also be adopted for the other products).

Once prepared, the workability time of **MapeWrap Primer 1** is around 90 minutes at +23°C.

2. Application of MapeWrap Primer 1

Apply an even coat of **MapeWrap Primer 1** with a brush or roller on the clean, dry concrete surface.

If the surface is particularly absorbent, apply a second coat of **MapeWrap Primer 1** once the first coat has been completely absorbed.

Finally, skim the surface with **MapeWrap 11** or **MapeWrap 12** while the previously applied coat is still fresh.

3. Preparation of MapeWrap 11 or MapeWrap 12

Choose whether to use **MapeWrap 11** or **MapeWrap 12** according to the surrounding temperature and workability times. The workability time of **MapeWrap 12** is higher than that of **MapeWrap 11**.

Pour component B into component A and mix with a drill at low speed 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** remains workable for approximately 35 minutes after mixing, while **MapeWrap 12** remains workable for approximately 50 minutes.

MapeWrap 11 is particularly recommended if the surrounding temperature is between +5°C and +23°C, while **MapeWrap 12** is recommended for higher temperatures.

4. Application of MapeWrap 11 or MapeWrap 12

On concrete surfaces treated beforehand with **MapeWrap Primer 1**, apply a coat approx 1 mm thick of **MapeWrap 11** or **MapeWrap 12** with a notched trowel.

Then smooth over the surface with a flat trowel to eliminate any imperfections on the surface.

Using the same product, fill and round off the corners to form a fillet with a radius of at least 2 cm.

5. Preparation of MapeWrap 21

Pour component B into component A and mix with a drill at low speed with a mixing attachment until the resin is completely blended.

Mixing ratio: 4 parts by weight of component A and 1 part by weight of component B.

The product remains workable for approximately 40 minutes at +23°C.

6. Impregnation of fabric with MapeWrap 21

Manual impregnation

Cut the **MapeWrap C QUADRI-AX** to the size required with scissors, and impregnate it by dipping it for a few minutes in a rectangular plastic bowl filled approximately 1/3 with **MapeWrap 21**.

Take the fabric from the bowl, leave it to drip for a few seconds, and then remove all the excess resin by squeezing it gently with your hands without wringing it to prevent damaging the fibres. Wear rubber gloves when carrying out these operations.

Impregnation by machine

As an alternative to manual impregnation, simple equipment consisting of a bowl and a series of rollers can be used. Such equipment makes the impregnation and dripping operation easier and safer for the operator, and it is particularly recommended when a large number of interventions need to be carried out on a single structure over a large area of the surface.

This system will guarantee that the resin is distributed evenly in every part of the fabric.

Apply the fabric immediately after impregnating it.

7. Application of MapeWrap C QUADRI-AX

Check that **MapeWrap 11** or **MapeWrap 12** is still wet, then immediately apply the **MapeWrap C QUADRI-AX** making sure there are no folds or creases.

After flattening the fabric out by hand (always wear rubber gloves), go over the surface several times with **MapeWrap Roller**, rigid rubber roller, in the same direction as that of the fibres so that the fabric penetrates perfectly into the **MapeWrap 11** or **MapeWrap 12** epoxy grout.

Then go over the surface again with the **MapeWrap Roller** to completely remove all the air bubbles.

While the resin is still wet, fully broadcast the surface with dry quartz sand **Quartz 1.2** or **Quartz 1.9** respectively with grain sizes 1.2 and 1.9 mm.

For further information on the technical characteristics of each resin product used for the **MapeWrap C QUADRI-AX**, refer to the related Technical Data Sheet.

Joists

When binding pillars, the overlap of the ends of the strips of **MapeWrap C QUADRI-AX** must be at least 30 cm. It is not necessary to overlap the strips in the longitudinal direction of the fabric: it is sufficient to apply the fabric strips side by side.

After applying and going over the fabric with **MapeWrap Roller**, **MapeWrap C QUADRI-AX** must not be moved or adjusted.

Procedure for applying MapeWrap C QUADRI-AX using the "dry application method" – with fluid impregnator MapeWrap 31

Application phases

1. Preparation of **MapeWrap Primer 1**
2. Application of **MapeWrap Primer 1**
3. Preparation of **MapeWrap 11** or **MapeWrap 12**
4. Preparation of **MapeWrap 11** or **MapeWrap 12**
5. Preparation of **MapeWrap 31**
6. Application of the first coat of **MapeWrap 31**
7. Application of **MapeWrap C QUADRI-AX** and second coat of **MapeWrap 31**

1. Preparation of MapeWrap Primer 1

The two components of **MapeWrap Primer 1** must be mixed together.

Pour component B into component A and mix with a drill at low speed 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.

Do not use partial quantities: to avoid the risk of accidental dosage mistakes, use the whole package; if only partial quantities are required, use a precision electronic scale to weigh the components (this procedure must also be adopted for the other products).

Once prepared, the workability time of **MapeWrap Primer 1** is around 90 minutes at +23°C.

2. Application of MapeWrap Primer 1

Apply an even coat of **MapeWrap Primer 1** with a brush or roller on the clean, dry concrete surface.

If the surface is particularly absorbent, apply a second coat of **MapeWrap Primer 1** once the first coat has been completely absorbed.

Finally, skim the surface with **MapeWrap 11** or **MapeWrap 12** while the previously applied coat is still fresh.

3. Preparation of MapeWrap 11 or MapeWrap 12

Choose whether to use **MapeWrap 11** or **MapeWrap 12** according to the surrounding temperature and workability times. The workability time of **MapeWrap 12** is higher than that of **MapeWrap 11**.

Pour component B into component A and mix with a drill at low speed 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** remains workable for approximately 35 minutes after mixing, while **MapeWrap 12** remains workable for approximately 50 minutes.

MapeWrap 11 is particularly recommended if the surrounding temperature is between +5°C and +23°C, while **MapeWrap 12** is recommended for higher temperatures.

4. Application of MapeWrap 11 or MapeWrap 12

On concrete surfaces treated beforehand with **MapeWrap Primer 1**, apply a coat approx 1 mm thick of **MapeWrap 11** or **MapeWrap 12** with a notched trowel.

Then smooth over the surface with a flat trowel to eliminate any imperfections on the surface.

Using the same product, fill and round off the corners to form a fillet with a radius of at least 2 cm.

5. Preparation of MapeWrap 31

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

Mixing ratio: 4 parts by weight of component A with 1 part by weight of component B.

The product remains workable for approximately 40 minutes after mixing, at a temperature of +23°C.

6. Application of the first coat of MapeWrap 31

Apply a first, even coat of **MapeWrap 31** of approx. 0.5 mm thickness on **MapeWrap 11** or **MapeWrap 12** while still wet using a brush or roller.

7. Application of MapeWrap C QUADRI-AX and second coat of MapeWrap 31

Immediately lay by hand (wear protective, waterproof rubber gloves) the **MapeWrap C QUADRI-AX** fabric over **MapeWrap 31** while it is still wet, making sure it is applied without any creases or folds and pass over the surface several times with a **MapeWrap Roller** so that the adhesive completely penetrates into the fibres of the fabric.

Apply a second coat of **MapeWrap 31** over **MapeWrap C QUADRI-AX**.

Pass the **MapeWrap Roller** over the impregnated fabric, to eliminate completely any air bubbles formed during the application.

While the resin is still wet, fully broadcast the surface with dry quartz sand **Quartz 1.2** or **Quartz 1.9** respectively with grain sizes 1.2 and 1.9 mm. (Further information on the technical characteristics of each resin product used for the **MapeWrap C QUADRI-AX** refer to the related Technical Data Sheet).

Joints

When binding pillars, the overlap of the ends of the strips of **MapeWrap C QUADRI-AX** must be at least 30 cm. It is not necessary to overlap the strips in the longitudinal direction of the fabric: it is sufficient to apply the fabric strips side by side.

After applying and going over the fabric with **MapeWrap Roller**, **MapeWrap C QUADRI-AX** must not be moved or adjusted.

Procedure for applying MapeWrap C QUADRI-AX using the "dry application method" – with thixotropic impregnator MapeWrap 31 T

Application phases

1. Preparation of **MapeWrap Primer 1**
2. Application of **MapeWrap Primer 1**
3. Preparation of **MapeWrap 31 T**
4. Application of the first coat of **MapeWrap 31**
5. Application of **MapeWrap C QUADRI-AX** and second coat of **MapeWrap 31 T**

1. Preparation of MapeWrap Primer 1

The two components of **MapeWrap Primer 1** must be mixed together.

Pour component B into component A and mix with a drill at low speed with a mixing attachment until the resin is completely blended. Mixing ratio: 3 parts by weight of component A with 1 part by weight of component B.

To avoid dosage mistakes, use the whole amount of the two components. If only partial quantities are required, use a precision electronic scale to weigh out the components (this procedure must also be adopted for the other products).

Once prepared, the workability time of **MapeWrap Primer 1** is around 90 minutes at +23°C.

2. Application of MapeWrap Primer 1

Apply an even coat of **MapeWrap Primer 1** with a brush or roller on the clean, dry concrete surface.

If the surface is particularly absorbent, apply a second coat of **MapeWrap Primer 1** once the first coat has been completely absorbed.

Finally, skim the surface with **MapeWrap 11** or **MapeWrap 12** while the previously applied coat is still fresh.

3. Preparation of MapeWrap 31 T

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

Mixing ratio: 4 parts by weight of component A and 1 part by weight of component B.

Do not use partial quantities: to avoid the risk of accidental dosage mistakes, use the whole package; if only partial quantities are required, use a precision electronic scale to weigh the components (this procedure must also be adopted for the other products).

After mixing, the product remains workable for approximately 50 minutes at +23°C.

4. Application of the first coat of MapeWrap 31 T

Apply a first, even coat of **MapeWrap 31 T** of approx. 1 mm thickness with a flat trowel.

5. Application of MapeWrap C QUADRI-AX and of a second coat of MapeWrap 31 T

Immediately lay by hand (wear protective, waterproof rubber gloves) the **MapeWrap C QUADRI-AX** fabric over **MapeWrap 31 T** while it is still wet, making sure it is applied without any creases or folds and pass over the surface several times with a **MapeWrap Roller** so that the adhesive completely penetrates into the fibres of the fabric.

Apply a second coat of **MapeWrap 31 T** over **MapeWrap C QUADRI-AX**.

Pass the **MapeWrap Roller** over the impregnated fabric, to eliminate completely any air bubbles formed during the application. While the resin is still wet, fully broadcast the surface with dry quartz sand **Quartz 1.2** or **Quartz 1.9** respectively with grain size 1.2 and 1.9 mm. (Further information on the technical characteristics of each resin product used for the **MapeWrap C QUADRI-AX** refer to the related Technical Data Sheet).

Joints

When binding pillars, the overlap of the ends of the strips of **MapeWrap C QUADRI-AX** must be at least 30 cm. It is not necessary to overlap the strips in the longitudinal direction of the fabric: it is sufficient to apply the fabric strips side by side.

After applying and going over the fabric with **MapeWrap Roller**, **MapeWrap C QUADRI-AX** must not be moved or adjusted.

Wet application method (within 24 hours) for additional layers of MapeWrap C QUADRI-AX

For the "wet application method" repeat the following operations:

- Impregnation of fabric with **MapeWrap 21**
- Application of **MapeWrap C QUADRI-AX**

For the "dry application method":

- Application of the first coat of **MapeWrap 31**
- Application of **MapeWrap C QUADRI-AX**
- Application of a second coat of **MapeWrap 31** or **MapeWrap 31 T**

Note: if additional layers of fabric need to be applied after more than 24 hours, the surface of the hardened resin must be roughened up by sanding.

FINISH AND PROTECTIVE COATING

Once the epoxy products used in the system have hardened (approx. 1-2 days at +23°C), the surface can be finished off with a skim-coat of fine-textured cementitious compounds such as **Planitop 200** or **Planitop 210** (refer to the related Technical Data Sheet).

If the strengthened area is to be covered by a false ceiling, the aforementioned finishing procedure is not required.

For external applications, protect the system once the epoxy systems have completely hardened by applying a coat of **Mapelast** or **Mapelast Guard**, two-component, elastic cementitious mortar, or as an alternative, products from the **Elastocolor** range (refer to the related Technical Data Sheet).

This product forms an efficient barrier against UV rays, which makes it particularly recommended for structures exposed to direct sunlight.

To protect the system from fire, it can be dressed with panels, which are usually made from calcium-silicate, or with a layer of intumescent render, as specified in article 4.8.2.3 of CNR DT 200 R1/2013.

PRECAUTIONS TO BE TAKEN DURING AND AFTER APPLICATION

- The temperature during application must be at least +5°C (or +10°C in the case of **MapeWrap Primer 1**) and the structure must be dry and protected from rain and dust carried by the wind.
- After completing the application, make sure the treated surfaces are kept at a temperature over +5°C (or over +10°C if **MapeWrap Primer 1** had been used).
- Protect strengthened surfaces from rain for at least 24 hours if the temperature does not drop below +15°C, or for at least 3 days if the temperature is lower.

CLEANING

The epoxy systems described form an extremely strong bond, so it is recommended to clean all work tools with solvent (such as ethanol, toluene, etc.) before the products harden.

CONSUMPTION OF EPOXY SYSTEMS

Priming, levelling and skimming the surfaces	Consumption (g/m ²)
MapeWrap Primer 1	250-300
MapeWrap 11 or MapeWrap 12	1500-1600

Impregnator	Weight (g/m ²)	Consumption (g/m ²)
MapeWrap 21	380	800-1000
	760	1900-2100
MapeWrap 31	380	1100-1300
MapeWrap 31 T	380	1600-1800

PACKAGING

The fabrics of the **MapeWrap C QUADRI-AX** range are available in carton boxes containing 50 m rolls.

STORAGE

Store in a covered, dry area.

SAFETY INSTRUCTIONS FOR PREPARATION AND APPLICATION

MapeWrap C QUADRI-AX is an article and referring to the current European regulations (Reg. 1906/2007/CE - REACH) does not require the preparation of the Safety Data Sheet. During use, it is recommended to wear gloves and goggles and follow the safety requirements of the workplace.

PRODUCT FOR PROFESSIONAL USE.

TECHNICAL DATA (typical values)

PRODUCT IDENTITY

Type of fibre:

high-strength carbon

Consistency:

balanced quadridirectional fabric

MECHANICAL PROPERTIES OF DRY FABRIC

Weight (g/cm ³):	380	760
Equivalent thickness of dry fabric for single direction (mm):	0.053	0.106
Load-resistant area per unit of width for single direction (mm ² /m):	53.1	106.1
Tensile strength (MPa):	> 4800	> 4800
Maximum load per unit of width (kN/m):	> 254	> 500
Tensile modulus of elasticity (GPa):	230	230
Elongation at failure (%):	2.1	2.1

FINAL PERFORMANCE PROPERTIES

Bond to concrete (MPa):	> 3 (failure of concrete)
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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.

Please refer to the current version of the Technical Data Sheet, available from our website

www.mapei.com

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