

MAPEWRAP G QUADRI-AX 1140

Balanced quadridirectional glass fibre fabric



WHERE TO USE

This system is particularly recommended for the repair and static upgrading of masonry and reinforced concrete structures damaged by physical and mechanical phenomenon and the effect of 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, domed covers and storage tanks without having to consider the precise trend of tensile loads.
- Seismic upgrading and restoration of domed structures without increasing their seismic mass and without the risk of liquids percolating towards the intrados.
- Creating sleeves around beam-pillar hinge zones for seismic upgrading.
- Strengthening load-bearing elements in masonry and concrete buildings whose structural system has been modified due to new architectural requirements or change in use.

TECHNICAL CHARACTERISTICS

MapeWrap G QUADRI-AX 1140 is quadridirectional, glass fibre fabric with a balanced weight applied in combination with epoxy resin products:

- **MapeWrap Primer 1** recommended to consolidate substrates;
- **MapeWrap 11** and **MapeWrap 12** recommended for surfaces with 2 mm or more of surface roughness. Application is also recommended to improve adhesion and to make application of heavy fabrics easier (600 g/m² or more) (the workability time of **MapeWrap 12** is higher than **MapeWrap 11**);
- **MapeWrap 21** epoxy resin-based impregnator for applying fabrics using the "wet system".

MapeWrap G QUADRI-AX 1140 is quadridirectional glass fibre fabric. It weighs 1,140 g/m² and is available in two different widths (30 and 48.5 cm) in the following versions:

- **MapeWrap G QUADRI-AX 1140/30**;
- **MapeWrap G QUADRI-AX 1140/48**.

MapeWrap 21 is a solvent-free, epoxy resin-based product with a super-fluid consistency used to impregnate **MapeWrap** and consists of:

- component A (resin);
- component B (catalyser).

MapeWrap 11 / MapeWrap 12 are epoxy grouts with a thixotropic consistency used to level off surfaces and to form structural bonds and consist of:

- component A (resin);
- component B (catalyser).

MapeWrap Primer 1 is epoxy primer used to prepare the surface of concrete, reinforced concrete and masonry elements and helps to improve the bond of **MapeWrap** fabrics. It consists of:

- component A;
- component B.

MapeWrap 31, **MapeWrap 11** and **MapeWrap 12** comply with the principles defined in EN 1504-9 ("Products and systems for protecting and repairing concrete structures: definitions, requirements, quality control and conformity assessment).

General principles for the use of products and systems”) and the minimum requirements of EN 1504-4 (“Structural bonding”).

ADVANTAGES

Unlike work carried out using conventional techniques, thanks to their extremely low weight, fabrics from the **MapeWrap G QUADRI-AX 1140** line may be applied by a smaller team of workers. The product may be also applied extremely quickly, and often without even interrupting the use of the structure.

Compared with the cladding technique with metal plates (beton plaqu ), **MapeWrap G QUADRI-AX 1140** fabrics may be adapted to suit any shape of element requiring repair, they do not require temporary supports during application and any risk of corrosion to the strengthening package is completely eliminated.

RECOMMENDATIONS

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

APPLICATION PROCEDURE

Substrate preparation

Concrete structures

The surface on which **MapeWrap G QUADRI-AX 1140** fabrics are to be applied must be perfectly clean, dry and strong. For masonry structures, remove all crumbling or loose parts and any parts at risk of becoming detached before applying the fabric and, where required, level off the surface by applying a layer of **Planitop HDM Maxi**.

In the case of concrete structures with no significant damage, sandblast the surface to remove all loose parts and all traces of grease, paint and cement laitance.

If the concrete is damaged or deteriorated, remove all damaged parts using a hammer, a jack-hammer or by hydro-scarifying.

Remove all traces of rust from exposed steel reinforcement and apply a coat of **Mapefer** two-component, anti-rust cementitious mortar or **Mapefer 1K** one-component, anti-rust cementitious mortar (refer to the relative Technical Data Sheet for each product for application procedures).

Repair the surface of concrete using products from the **Mapegrout** line. Wait around three weeks before applying **MapeWrap G QUADRI-AX 1140**. If strengthening work needs to be carried out immediately due to logistics constraints, use **Adesilex PG1** or **Adesilex PG2** to carry out repair work.

Seal any cracks present in the structure by injecting them with **Epojet** or **Epojet LV** (to be used only if there is no water seeping into the cracks) or with **Foamjet T** or **Foamjet F** (in the case of cracks with water seeping into them).

Round off all sharp edges and corners on concrete or masonry elements and structures which are to be strengthened with **MapeWrap G QUADRI-AX 1140** (such as beams and pillars) with a jack-hammer or other suitable tools to form a radius of at least 2 cm.

Wet-system application technique for MapeWrap G QUADRI-AX 1140

Application phases

1. Preparation of **MapeWrap Primer 1**.
2. Application of **MapeWrap Primer 1**.
3. Preparation of **MapeWrap 11** or **MapeWrap 12**.
4. Application of **MapeWrap 11** or **MapeWrap 12**.
5. Preparation of **MapeWrap 21**.
6. Impregnation of the fabric with **MapeWrap 21**.
7. Application of **MapeWrap G QUADRI-AX 1140** fabric.

1. 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 drill at low-speed with a mixing attachment until the resin is completely blended. Mixing ratio: 3 parts in weight of component A and 1 part in 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 around 90 minutes at +23°C.

2. Application of MapeWrap Primer 1

Make sure the surface of the masonry or concrete is as flat as possible and apply an even coat of **MapeWrap Primer 1** with a brush or roller.

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

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 for **MapeWrap 11**). Pour component B into component A and mix

with a drill at low-speed with a mixing attachment until an even, grey paste is obtained. Mixing ratio for both products: 3 parts in weight of component A and 1 part in 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**, while the primer is still wet apply a layer around 1 cm thick of **MapeWrap 11** or **MapeWrap 12** with a notched spreader, then smooth over the surface with a flat spreader 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 in weight of component A and 1 part in weight of component B. The product remains workable for approximately 40 minutes at +23°C.

6. Impregnating the fabric with MapeWrap 21

Manual impregnation

Cut the **MapeWrap G QUADRI-AX 1140** to the sizes required 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 this operation.

Mechanical impregnation

As an alternative to manual impregnation, simple equipment with a bowl and a series of rollers may be used. This makes it easier and safer for the operator to saturate the fabric and remove the excess resin.

This equipment is particularly recommended when a large number of interventions need to be carried out on a 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 it has been impregnated.

7. Application of MapeWrap G QUADRI-AX 1140 fabric

Make sure the layer of **MapeWrap 11** or **MapeWrap 12** is still wet, then immediately apply the **MapeWrap G QUADRI-AX 1140** fabric making sure there are no folds or creases.

Check to make sure the layer of **MapeWrap 11** or **MapeWrap 12** is still wet and then immediately start applying the **MapeWrap G QUADRI-AX 1140**. Spread it out flat with your hands (while wearing protective rubber gloves) and go over the surface with a **MapeWrap Roller** in the main direction of the fabric so that it is completely embedded in 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, broadcast the surface with 0.9 mm to 1.2 mm quartz sand.

(For further information on the technical characteristics of each resin product used for the **MapeWrap G QUADRI-AX 1140** system refer to the relative Technical Data Sheet).

Joints

Overlap the ends of the strips of **MapeWrap G QUADRI-AX 1140** by at least 20 cm. The same procedure must be followed when strips applied in a longitudinal direction have to be joined.

After applying and pressing the fabric with the special roller, the **MapeWrap G QUADRI-AX 1140** fabric must not be moved or adjusted.

Wet application procedure (within 24 hours) for additional layers of **MapeWrap G QUADRI-AX 1140** fabric

Repeat the following operations:

- impregnate the fabric with **MapeWrap 21**;
- apply the **MapeWrap G QUADRI-AX 1140** fabric.

Note

If more layers of fabric need to be applied, 24 hours after applying the previous layer, sand the surfaces of the hardened resin. Where possible, it is recommended to broadcast the surface of the resin with fine sand to make a good keying surface for the next layers.

Wet application procedure (within 24 hours) for additional layers of MapeWrap G QUADRI-AX 1140 fabric

Repeat the following operations:

- impregnate the fabric with **MapeWrap 21**;
- apply the **MapeWrap G QUADRI-AX 1140** fabric.

Note

If more layers of fabric need to be applied, 24 hours after applying the previous layer, sand the surfaces of the hardened resin. Where possible, it is recommended to broadcast the surface of the resin with fine sand to make a good keying surface for the next layers.

PROTECTIVE COATING

Once the resin-based products used in the system have hardened (approx. 1-2 days at +23°C), the surface may be finished off with a skim-coat of fine-textured cementitious compound such as **Planitop 200** or **Planitop 210** (refer to the relative Technical Data Sheet). For external applications, protect the system once the resin products have completely hardened by applying a coat of **Mapelastic** two-component cementitious mortar. 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 may be dressed with fire-resistant 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 operations must be at least +5°C (or at least +10°C if **MapeWrap Primer 1** has been used) and the structure must also be dry and protected from rain and dust carried by the wind.
- After completing the work, keep the treated surfaces at a temperature of more than +5°C (+10°C if **MapeWrap Primer 1** has been used).
- Protect surfaces 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.

PRECAUTIONS TO BE TAKEN WHEN HANDLING THE PRODUCTS

Workers must wear protective, waterproof rubber gloves, goggles and anti-solvent safety masks when preparing and applying epoxy systems. Avoid contact with the eyes and skin. If the products come into direct contact, wash well with water and soap 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. Never use naked flames and do not smoke while using or handling these products. For further information please refer to the Safety Data Sheet for each product.

CLEANING

Epoxy systems form an extremely strong bond and it is recommended to clean all work tools with solvent (such as ethanol, toluene, etc.) before they harden.

CONSUMPTION OF EPOXY SYSTEMS

Priming, levelling off and skimming surfaces				
				Consumption (g/m ²)
MapeWrap Primer 1				250-300
MapeWrap 11 o MapeWrap 12				1500-1600 per mm of thickness
Impregnating MapeWrap G QUADRI-AX 1140				
	Type (QUADRI-AX)	Consumption (g/m ²)	Width (cm)	Consumption (g/m)
MapeWrap 21	1140	600-700	30	180-210
			48.5	290-340
MapeWrap 31	1140	900-1000	30	270-300
			48.5	440-490

PACKAGING

MapeWrap G QUADRI-AX 1140 fabric is available in 50 metre rolls in a cardboard box in the following versions:

	Weight (g/m ²)	Width (cm)	Surface area (m ² /m)	Surface area (m ² /roll)
MapeWrap G QUADRI-AX 1140/30	1140	30	0.3	15
MapeWrap G QUADRI-AX 1140/48	1140	48.5	0.485	24.25

STORAGE

Store in a dry, covered area.

SAFETY INSTRUCTIONS FOR PREPARATION AND APPLICATION

MapeWrap G QUADRI-AX 1140 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 protective gloves and goggles and follow the safety requirements of the workplace.

PRODUCT FOR PROFESSIONAL USE.

TECHNICAL DATA (typical values)	
PRODUCT IDENTITY	
Type of fibre:	type E glass
Appearance:	balanced quadridirectional fabric
Density (kg/dm ³):	2.6
MAPEWRAP G QUADRI-AX 1140/30 and MAPEWRAP G QUADRI-AX 1140/48	
Weight (g/m ²):	1,140
Number of threads:	2,000
Diameter of threads (µm):	600 tex (warp): 12 ± 2, 1,200 tex (weave): 17 ± 2
Equivalent thickness of dry fabric (mm):	0.1096
Resistant area per unit of width (mm ² /m):	438.4
Tensile strength (MPa):	2,600
Tensile modulus of elasticity (GPa):	73
Elongation at failure (%):	3.5-4
FINAL PERFORMANCE	
Adhesion to concrete (MPa):	> 3 (failure of concrete)

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 website www.mapei.com

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