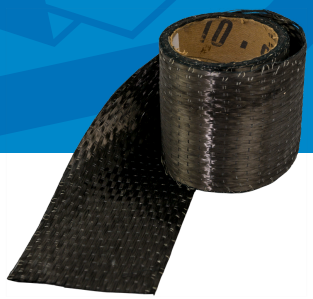
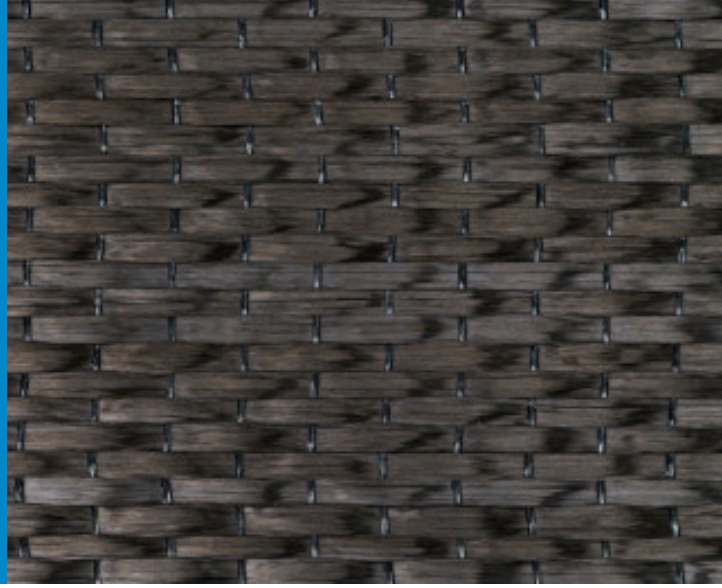
MAPEWRAP C UNI-AX

High-strength unidirectional carbon fibre fabric with a high modulus of elasticity





WHERE TO USE

Recommended for the repair and structural strengthening of under-dimensioned or damaged reinforced concrete, masonry, steel and wooden elements, to improve the flexural strength, shear strength, compressive confinement capacity and combined bending and compression capacity, to upgrade or improve the seismic capacity of structures in high-risk areas, to improve the characteristics of beam-column hinge points and to increase the ductility of confined elements.

Some application examples

- Repairs and static and seismic upgrading of unstable or weak structures where the shear and tensile strength need to be enhanced.
- Confining compressed and pre-stressed members (pillars, bridge piles, chimneys) to improve their load-bearing capacity or ductility.
- Seismic upgrading and restoration work on arched and vaulted structures without increasing their mass and without the risk of liquids percolating towards the inner face.
- Repairing structures damaged by fire.
- Strengthening load-bearing members in buildings whose structural system has been modified due to new architectural requirements or changes in use.
- Seismic upgrading of reinforced concrete industrial buildings.

TECHNICAL CHARACTERISTICS

MapeWrap C UNI-AX is a range of unidirectional carbon fibre fabrics characterised by a high modulus of elasticity and high tensile strength.

The fabric must be applied using two different methods:

- "wet application method" using the epoxy resin for impregnation and bonding **MapeWrap 21**.
- "dry application method" using the epoxy resins for impregnation and bonding **MapeWrap 31** or **MapeWrap 31 T**.

The bonding system is completed by the epoxy grouts for levelling off surfaces **MapeWrap 11** and **MapeWrap 12**, and the epoxy primer for substrate consolidation **MapeWrap Primer 1**.

The use of the grouts **MapeWrap 11** and **MapeWrap 12**, and **MapeWrap Primer 1** is optional but recommended. In particular, the use of the grout is recommended in combination with **MapeWrap 21** and **MapeWrap 31** for

levelling off surfaces with roughness of ± 2 mm or greater and for improving adhesion and facilitating the installation of fabrics with a high weight (equal to or greater than 600 g/m^2).

The bonding products from the **MapeWrap** range comply with the principles of the EN 1504-9 standard ("*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*").

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.

To satisfy a wide range of structural requirements, **MapeWrap C UNI-AX** is available in different weights (230, 240, 240 W, 300, 300 W, 300 Z, 320, 400, 600, 600 W, 600 Z, 900, 1200 g/m^2), each with different heights:

- **MapeWrap C UNI-AX 230**
- **MapeWrap C UNI-AX 240**
- **MapeWrap C UNI-AX 240 W**
- **MapeWrap C UNI-AX 300**
- **MapeWrap C UNI-AX 300 W**
- **MapeWrap C UNI-AX 300 Z**
- **MapeWrap C UNI-AX 320**
- **MapeWrap C UNI-AX 400**
- **MapeWrap C UNI-AX 600**
- **MapeWrap C UNI-AX 600 W**
- **MapeWrap C UNI-AX 600 Z**
- **MapeWrap C UNI-AX 900**
- **MapeWrap C UNI-AX 1200**

ADVANTAGES

Unlike work carried out using conventional techniques, thanks to their extremely low weight, the fabrics from the **MapeWrap C UNI-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” enable the application of 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 (béton plaqué), **MapeWrap C UNI-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 UNI-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**
  Sandblast the surface to remove all traces of stripping oil, paint, and cement laitance.
- **Damaged**
  Remove damaged and deteriorated parts with a hammer, a jackhammer, or by hydro-scarifying. Remove all traces of rust from the steel reinforcement and protect it by applying **Mapefer** two-component anti-corrosion cementitious mortar or **Mapefer 1K** 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 UNI-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 structures that are to be strengthened with the **MapeWrap C UNI-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.

1. Application of MapeWrap C UNI-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. Application of **MapeWrap 11** or **MapeWrap 12**
5. Preparation of **MapeWrap 21**
6. Impregnation of fabric with **MapeWrap 21**
7. Application of **MapeWrap C UNI-AX** fabric

1.1 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 fluid 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 pot life of **MapeWrap Primer 1** is around 90 minutes at +23°C.

1.2 Application of MapeWrap Primer 1

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

1.3 Preparation of MapeWrap 11 or MapeWrap 12

Choose whether to use **MapeWrap 11** or **MapeWrap 12** according to the surrounding temperature and pot life (the pot life of **MapeWrap 12** is longer 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.

1.4 Application of MapeWrap 11 or MapeWrap 12

On the concrete or masonry surface that has previously been treated with **MapeWrap Primer 1**, while the product is still fresh, apply a 1 mm-thick layer of **MapeWrap 11** or **MapeWrap 12** using a notched trowel, then smooth over the product using a flat trowel to completely remove even the smallest surface defects.

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

1.5 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.

1.6 Impregnation of fabric with MapeWrap 21

Manual impregnation

Cut the **MapeWrap C UNI-AX** 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 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 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.

1.7 Application of MapeWrap C UNI-AX fabric

Check that **MapeWrap 11** or **MapeWrap 12** is still “wet”, then immediately apply **MapeWrap C UNI-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 a 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.

If a finish coating is required, while the resin is still wet, fully broadcast the surface with dry quartz sand **Quartz 1.2** or **Quartz 1.9** (grain sizes 1.2 or 1.9 mm, respectively).

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

Joints

When binding pillars, the overlap of the ends of the strips of **MapeWrap C UNI-AX** must be at least 30 cm.

The same procedure must be followed when different strips applied in parallel have to be joined.

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

2. Procedure for applying MapeWrap C UNI-AX using the "dry application technique" – 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. Application of **MapeWrap 11** or **MapeWrap 12**
5. Preparation of **MapeWrap 31**
6. Impregnation of fabric with **MapeWrap 31**
7. Application of **MapeWrap C UNI-AX** and a second coat of **MapeWrap 31**

2.1 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 fluid 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 pot life of **MapeWrap Primer 1** is around 90 minutes at +23°C.

2.2 Application of MapeWrap Primer 1

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

2.3 Preparation of MapeWrap 11 or MapeWrap 12

Choose whether to use **MapeWrap 11** or **MapeWrap 12** according to the surrounding temperature and pot life (the pot life of **MapeWrap 12** is longer 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.

2.4 Application of MapeWrap 11 or MapeWrap 12

On the concrete or masonry surface that has previously been treated with **MapeWrap Primer 1**, while the product is still fresh, apply a 1 mm-thick layer of **MapeWrap 11** or **MapeWrap 12** using a notched trowel, then smooth over the product using a flat trowel to completely remove even the smallest surface defects.

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

2.5 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 and 1 part by weight of component B.

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

2.6 Impregnation of fabric with 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 a short pile roller.

2.7 Application of MapeWrap C UNI-AX and a second coat of MapeWrap 31

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

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

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

If a finish coating is required, while the resin is still wet, fully broadcast the surface with dry quartz sand **Quartz 1.2** or **Quartz 1.9** (grain sizes 1.2 or 1.9 mm respectively).

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

Joints

When binding pillars, the overlap of the ends of the strips of **MapeWrap C UNI-AX** must be at least 30 cm.

The same procedure must be followed when different strips applied in parallel have to be joined.

After applying and going over the fabric with a roller, **MapeWrap G UNI-AX** must not be moved or adjusted.

3. Procedure for applying MapeWrap C UNI-AX using the “dry application technique" – 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 T**
5. Application of **MapeWrap C UNI-AX** fabric and a second coat of **MapeWrap 31 T**

3.1 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 fluid 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 pot life of **MapeWrap Primer 1** is around 90 minutes at +23°C.

3.2 Application of MapeWrap Primer 1

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

3.3 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.

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

3.4 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.

3.5 Application of MapeWrap C UNI-AX fabric and second coat of MapeWrap 31 T

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

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

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

If a finish coating is required, while the resin is still wet, fully broadcast the surface with dry quartz sand **Quartz 1.2** or **Quartz 1.9** (grain sizes 1.2 or 1.9 mm respectively).

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

Joints

When binding pillars, the overlap of the ends of the strips of **MapeWrap C UNI-AX** must be at least 30 cm.

The same procedure must be followed when different strips applied in parallel have to be joined.

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

4. Wet application procedure (within 24 hours) for additional layers of MapeWrap C UNI-AX

For the "Wet application method", repeat the following operations:

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

For the “Dry application method”:

- Application of the first layer of **MapeWrap 31** or **MapeWrap 31 T**
- Application of the fabric **MapeWrap C UNI-AX**
- Application of an additional 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.*

FINISHING 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 compound 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 **Mapelastic** or **Mapelastic Guard** two-component, elastic cementitious mortars, or as an alternative, a product 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 may 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/m²)	Consumption (g/m²)
MapeWrap 21	230	950-1000
	240 / 240 W	950-1000
	300 / 300 W / 300 Z	1000-1100
	320	1000-1100
	400	1200-1300
	600 / 600 W / 600 Z	1400-1500
	900	2200-2300
	1200	2700-2800
MapeWrap 31	230	950-1000
	240 / 240 W	950-1000
	300 / 300 W / 300 Z	1000-1100
	320	1000-1100
	400	1200-1300
	600 / 600 W / 600 Z	1500-1600
MapeWrap 31 T	230	1600-1700
	240 / 240 W	1600-1700
	300 / 300 W / 300 Z	1700-1800
	320	1700-1800
	400	2000-2100
	600 / 600 W / 600 Z	2400-2500

PACKAGING

The fabrics from the **MapeWrap C UNI-AX** range are available in carton box containing 50 m rolls.

STORAGE

Store in a covered, dry area.

SAFETY INSTRUCTIONS FOR PREPARATION AND APPLICATION

MapeWrap C UNI-AX are articles and referring to the current European regulations (Reg. 1907/2006/EC - REACH) do 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 with a high modulus of elasticity

Appearance:	unidirectional fabric

MECHANICAL PROPERTIES OF DRY FABRIC													
Weight (g/m^2):	230	240	240 W	300	300 W	300 Z	320	400	600	600 W	600 Z	900	1200
Equivalent thickness of dry fabric (mm):	0.129	0.133	0.132	0.164	0.164	0.171	0.180	0.219	0.337	0.337	0.333	0.497	0.666
Load resistant area per unit of width (mm^2/m):	129.2	132.8	132.6	164.3	164.3	171.0	180.0	219.0	337.0	337.0	333	497.0	666.4
Mechanical tensile strength (N/mm^2):	4,900	4,900	4,900	4,900	4,900	4,900	4,900	4,900	4,900	4,900	4,900	4,900	4,900
Tensile modulus of elasticity (GPa):	247	252 ± 2%	245	252±2%	252±2%	245	240	252±2%	252±2%	252±2%	245	252±2%	252±2%
Elongation at failure (%):	2	2	1.95	2	2	2.1	2	2	2	2	2.1	2	2

FINAL PERFORMANCE	
Bond strength to concrete (EN 1542):	> 3 MPa (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.

Please refer to the current version of the Technical Data Sheet, available from our website www.mapei.com

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The contents of this Technical Data Sheet ("TDS") may be copied into another project-related document, but the resulting document shall not supplement or replace requirements per the TDS in force at the time of the MAPEI product installation.

The most up-to-date TDS can be downloaded from our website www.mapei.com.

ANY ALTERATION TO THE WORDING OR REQUIREMENTS CONTAINED OR DERIVED FROM THIS TDS EXCLUDES THE RESPONSIBILITY OF MAPEI.

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