

MAPEFILL ZERO

Fluid mortar with positive internal tension



CO₂ FULLY OFFSET PRODUCTS

Mapefill Zero is part of the *CO₂ Fully Offset in the Entire Life Cycle* line of products. CO₂ emissions measured throughout the life cycle of products from the Zero line in 2023 using Life Cycle Assessment (LCA) methodology, verified and certified with EPDs, have been offset through the acquisition of certified carbon credits in support of renewable energy and forestry protection projects. A commitment to the planet, to people and to biodiversity. For more details on how emissions are calculated and on climate mitigation projects financed through certified carbon credits, visit the webpage zero.mapei.com.

WHERE TO USE

For precision anchoring of machinery and metallic structures.
Repairing damaged structures that require the use of free-flowing mortars.

Some application examples

- Anchoring machine tools by casting below the machine base.
- Anchorage structural steel work.
- Filling rigid joints between elements in concrete and precast concrete structures.
- Installations below wall level.

TECHNICAL CHARACTERISTICS

Mapefill Zero is a pre-blended powdered grout composed of high strength cement, graded aggregates and special admixtures with an expansive agent formulated by the MAPEI research laboratories. Thanks to its particular formulation the product has excellent fatigue behaviour up to at least 300,000 cycles, which gives repaired structures a high level of resistance to cracking, including when subject to dynamic loads induced during normal service conditions. This particular characteristic, together with the requirements of EN 1504, helps increase the durability of elements restored with **Mapefill Zero**.

Mapefill Zero when mixed with water is transformed into a fluid grout without segregation that is able to fill intricate spaces.

Mapefill Zero is a product with positive internal constraint. In confined anchoring conditions, stresses induced by external loads are lower than those generated by the positive constraint within the mortar.

Mapefill also has the following qualities:

- excellent impermeability to water;
- excellent adhesion to iron and concrete;
- excellent resistance to dynamic/mechanical stress;
- modulus of elasticity and thermal expansion coefficient similar to those of high-quality concrete;
- **Mapesfill Zero** does not contain metal aggregates or aluminium dust;
- resistant to lubricants.

Mapesfill Zero is a product with very low emission of volatile organic compounds (VOC), which safeguards the health and safety of installers and final users. It is certified as EC1 Plus by the German association GEV.

Mapesfill Zero helps earn important LEED credits.

Mapesfill Zero meets all the main requirements for 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 1504-3 ("*Structural and non-structural repair*") for R4 class mortars as well as EN 1504-6 ("*Anchoring of reinforcing steel bar*").

RECOMMENDATIONS

- Do not use **Mapesfill Zero** for vertical applications by spray or trowel (use **Mapesgrout Thixotropic Zero**).
- Do not add cement or admixtures to **Mapesfill Zero**.
- Do not add water when the mix has started to set.
- Do not use **Mapesfill Zero** if the bag is damaged or has already been opened.
- Do not apply **Mapesfill Zero** at temperatures below +5°C.

APPLICATION PROCEDURE

TECHNICAL INFORMATION FOR THE APPLICATION

Composition of the mix:	100 kg Mapesfill Zero 14.5-15.5 kg of water
Coat thickness:	10 to 100 mm <i>(for greater thicknesses see the paragraph "Application of the mortar")</i>
Application temperature range:	surrounding and substrate temperature from +5°C to +35°C
Pot life of mix:	approx. 90 minutes (at +20°C)

Preparation of the substrate

- Remove all deteriorated, detaching or contaminated concrete until a rough, sound and resistant substrate is obtained. Remove any previous repair work or coating if not perfectly adhering to the substrate, using suitable tools (mechanical demolishing, hydroscarifying etc.).
- Clean concrete from previous scarifying works and clean reinforcing rods from dust, cement laitance, rust, grease, oil, paint and other contaminants through sandblasting and high-pressure water jets.
- After preparation, the concrete surface to be repaired must be rough, with inert fraction exposed to allow correct adhesion of the mortar to the substrate.

Preparation of the mortar

Pour 3.5 litres of water into a cement mixer and then slowly add **Mapesfill Zero**. Mix for at least 3 minutes, remove from the sides of the concrete mixer any powder that is not well blended. Add the remaining water (without exceeding the recommended amount of 3.6-3.85 l) and remix for another 2-3 minutes until a fluid homogeneous mix is obtained.

Depending on the quantity being prepared, a mortar mixer or a drilling machine with a stirrer attachment can be used. Avoid stirring an excess of air into the mix.

Mixing by hand is not recommended.

Instructions for the preparation of mortar for Lab testing samples can be found in the TECHNICAL DATA section.

Application of the mortar

Pour **Mapefill Zero** from one side only in a continual flow encouraging the discharge of air bubbles into the appropriate area which should not be less than twice the diameter of the bar to be anchored.

The use of **Mapefill Zero** for connecting precast concrete elements and the filling of rigid joints is recommended for thicknesses up to 100 mm.

It is not necessary to vibrate the grout mechanically; to facilitate the filling of spaces that are particularly difficult, use a wood list or an iron rod.

Addition of fine gravel

For filling cavities that have dimensions greater than those indicated, add **Gravel 6-10** of a grain size that varies according to the thickness of the pour. If **Gravel 6-10 VAGA** is used, it is possible to add up to 50% of dry product.

Example: 2 25 kg bags of **Mapefill Zero** + 1 25 kg bags of **Gravel 6-10**.

Because certain characteristics may vary, such as workability and strength, it is advisable to carry out preliminary tests at the work site or to consult our Technical Services Department.



Product mixing



Anchoring of precast pillar



Anchoring of street furniture

INSTRUCTIONS TO BE OBSERVED BEFORE AND AFTER APPLICATION

- In hot weather it is advisable not to expose the material to sun and to use cold water in preparing the mix.
- In cold weather it is advisable to use lukewarm water to prepare the mortar.
- After casting, **Mapefill Zero** must be properly cured; the surface of grout exposed to the air must be protected from rapid water evaporation that can cause the formation of surface cracks due to plastic shrinkage especially in hot and/or windy weather.
- Spray water on surface exposed to air the first 24 hours of curing or apply an anti-evaporation product.

CLEANING

Before hardening, the mortar can be cleaned from tools with water. After setting, cleaning is very difficult and it can only be removed mechanically.

CONSUMPTION

2 kg/dm³ of cavity to be filled.

PACKAGING

25 kg bags.

STORAGE

Mapefill Zero may be stored for up to 12 months in its original packaging.

The special 25 kg vacuum-packed polyethylene bags offer better protection of the product from rainfall. Some characteristic of the product are heavily influenced by storage conditions. It is advisable to stock the product in a dry and covered area at a temperature between +5°C and +35°C, in its original unopened packaging.

SAFETY INSTRUCTIONS FOR PREPARATION AND APPLICATION

Instructions for the safe use of our products can be found on the latest version of the Safety Data Sheet, available from our website www.mapei.com.

PRODUCT FOR PROFESSIONAL USE.

TECHNICAL DATA (typical values)

PRODUCT IDENTITY

Consistency:	powder
Colour:	grey
Maximum size of aggregate:	2.5 mm
Ion-chloride content according to EN 1015-17 (minimum requirement according to EN 1504 $\leq 0.05\%$):	$\leq 0.05\%$

TECHNICAL INFORMATION FOR PRODUCT PREPARATION

Composition of the mix:	100 parts by weight of Mapefill Zero with 15% water.
Preparation of the mix:	Mix the product in compliance with the standard EN 196-1
Curing conditions:	CC according to Annex A – EN 12190

CHARACTERISTICS OF FRESH MIX (at +20°C - 50% R.H.)

Colour of mix:	grey
Consistency of the mix:	fluid
Slip value of mortar after mixing (according to EN13395-2):	> 55 cm
Bleeding:	none
Density of the mix:	2250 kg/m ³

FINAL PERFORMANCE

According to curing defined in test methods

Performance characteristics	Test method	Requirements EN 1504-3 R4	Requirements EN 1504-6	Product performance
Compressive strength: - 1 day - 7 days - 28 days	EN 12190	- - ≥ 45 MPa	not required	38 MPa 68 MPa 80 MPa
Flexural strength: - 1 day - 7 days - 28 days	EN 196-1	not required	not required	6.5 MPa 9.0 MPa 10.0 MPa
Modulus of elasticity in compression:	EN 13412	≥ 20 GPa	not required	28 GPa
Adhesion to concrete by pull-off:	EN 1542	≥ 2.0 MPa	not required	> 2.0 MPa
Shear strength:	EN 12615	not required	not required	≥ 6.0 MPa
Resistance to accelerated carbonation:	EN 13295	Carbonation depth \leq to reference concrete	not required	test passed
Capillary absorption:	EN 13057	≤ 0.5 kg/m ² ·h ^{0.5}	not required	< 0.5 kg/m ² ·h ^{0.5}

Water impermeability – depth of penetration:	EN 12390-8	not required	not required	< 5 mm
Restrained expansion (24 h):	UNI 8147 A method ASTM C 806	not required	not required	≥ 300 µm/m
Volume variation during the plastic phase:	ASTC C940	not required	not required	≥ 0.3%
Pull-out strength of steel rebar – displacement at load of 75 kN:	EN 1881	not required	≤ 0.6 mm	< 0.6 mm
Pull-out strength of ϕ 8 mm steel rebar – tension of adhesion t_{dm} :	EN 10080 Annex D (in compliance with recommendation RILEM RC 6)	not required	not required	> 25 MPa
Tensile splitting strength:	EN 12390-6	not required	not required	> 6 MPa
Thermal compatibility:				
– freeze-thaw cycles with de-icing salts (50 cycles):	EN 13687-1	≥ 2.0 MPa		≥ 2.0 MPa
- thunder-shower cycles (30 cycles):	EN 13687-2	≥ 2.0 MPa	not required	≥ 2.0 MPa
- thunder-shower cycles (30 cycles):	EN 13687-4	≥ 2.0 MPa		≥ 2.0 MPa
Quality of surface contact area - bearing area:	ASTM C1339	not required	not required	> 85%
Reaction to fire:	EN 13501-1	Euroclass	Euroclass	A1, A1 _{FL}

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

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