

MAPEGROUT 450 THIXO

Fiber-reinforced, shrinkage-compensated thixotropic mortar for concrete repair



WHERE TO USE

Surface repair of deteriorated concrete structures on both vertical and horizontal surfaces.

Some application examples

- Repairing deteriorated areas of concrete, corners of pillars and beams, edges of balconies damaged by the oxidation of reinforcing steel.
- Reconstruction of reinforcing rod covers in reinforced concrete structures.
- Smoothing surface defects, such as gravel nests, new casting joints, holes created by formwork spacers, exposed rods etc.
- Filling of rigid joints.
- Repair of surfaces subjected to heavy abrasion (canals, industrial floors, ramps, etc.).
- Smoothing of diaphragm walls and tunnels.
- Repairing viaducts for highways, roads and railways.

TECHNICAL CHARACTERISTICS

Mapegrout 450 Thixo is a ready-mixed powdered mortar composed of high-strength cements, selected aggregates, special additives and synthetic fibres prepared according to a formula developed in the MAPEI Research & Development laboratories. When mixed with water, Mapegrout 450 Thixo becomes an easily workable mortar with high thixotropic properties that can be applied on vertical surfaces without sagging even in great thicknesses and with no need for formwork.

If **Mapegrout 450 Thixo** is prepared by only adding water, it must be cured under damp conditions in order to guarantee that the product expansive properties develop completely and correctly. Unfortunately, it is not easy to guarantee that these conditions are created on site.

However, to guarantee that the expansive properties of **Mapegrout 450 Thixo** are carried out in the open air, 0.25% of **Mapecure SRA**, a special additive which has the property of reducing both plastic and hydraulic shrinkage, may be used to great advantage when added to the mix.

Mapecure SRA has a very important role to play, in guaranteeing better curing of mortar. Also, when mixed with **Mapegrout 450 Thixo**, it may be considered a technologically advanced system, in that the additive has the capacity of slowing down evaporation of the water and of promoting the development of hydration reactions.

Basically, **Mapecure SRA** behaves like an internal curing agent and, thanks to its interaction with some of the main components which make up the cement, it helps to reduce shrinkage by between 20% and 50%

compared with the standard values of the product without the additive. This will obviously lead to a reduced risk of cracking.

Once hardened, **Mapegrout 450 Thixo** has the following properties:

- very high flexural and compressive strength;
- modulus of elasticity, coefficient of thermal expansion and permeability to water vapour similar to those of high quality concrete;
- waterproof;
- high adhesion to old concrete, provided it has been soaked with water beforehand, and also to reinforcing rods, especially if they have been treated with **Mapecer** or **Mapecer 1K**;
- high resistance to abrasion.

Mapegrout 450 Thixo meets the requirements defined by 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 claimed by EN 1504-3 (*Structural and nonstructural repair*) for structural mortars of class R4.

Mapegrout 450 Thixo meets the requirements of IBDiM National Technical Assessment (KOT).

RECOMMENDATIONS

- Do not use **Mapegrout 450 Thixo** on smooth concrete surfaces: roughen them well, and if necessary add reinforcing rods.
- Do not use **Mapegrout 450 Thixo** for anchors (use **Mapecfill**).
- Do not use **Mapegrout 450 Thixo** to repair structures by pouring into formwork (use **Mapegrout Hi-Flow**).
- Do not add cement, aggregates or additives to **Mapegrout 450 Thixo**.
- Do not add water after the mix has started to set.
- Do not apply **Mapegrout 450 Thixo** at temperatures below +5°C.
- Do not use **Mapegrout 450 Thixo** if the packing has been damaged or if it has been opened beforehand.

APPLICATION PROCEDURE

Preparing the substrate

- Remove deteriorated and loose concrete until the substrate is solid, strong and rough. Any previous restoration work which is not soundly bonded should also be removed.
- Clean the concrete and reinforcing rods until free of dust, rust, cement laitance, grease, oils and previously applied paints by sand-blasting.
- Soak the substrate with water. Before repairing with **Mapegrout 450 Thixo** allow the excess water to evaporate. If necessary, use compressed air to facilitate the removal of water.

Preparing the mortar

- Pour into the mixer the amount of water corresponding to the consistency required for the application (15%-16% of the powder – 15% is recommended for spray application).
- Start the concrete mixer and slowly and continuously pour **Mapegrout 450 Thixo** into the water.
- If improved open-air curing of the mortar is required, add **Mapecure SRA** to the final mix at a dosage of 0.25% by weight of the mortar (0.25 kg every 100 kg of **Mapegrout 450 Thixo**).
- Mix for 1-2 minutes, checking the homogeneity of the mix while scraping any unmixed powder off the sides of the mixer; remix for another 2-3 minutes.
- Depending on the quantity being prepared, a mortar mixer or a drilling machine with a stirrer attachment can be used. The mixing must be carried out at low speed to avoid entraining an excess of air into the mix.
- Only in exceptional circumstances should the mortar be mixed by hand. In this case prepare small quantities and mix for at least 5-6 minutes until the slurry is completely smooth and even. It should be remembered that manual preparation requires greater quantities of water which are detrimental to some characteristics of **Mapegrout 450 Thixo**, such as mechanical strength, shrinkage, waterproofing, etc.

Mapegrout 450 Thixo has a pot life of about 1 hour at +20°C. The expansion of **Mapegrout 450 Thixo** has been calculated to compensate for hygro-metric shrinkage. In order to be effective, the expansion must be countered with suitable reinforcement or formwork around the structure.

Without formwork, **Mapegrout 450 Thixo** can only be applied in thicknesses greater than 2 cm if the surface has been roughened and reinforcing rods have been placed, taking care to apply at least 2 cm of cover to the reinforcement.

Smaller thicknesses can be applied without reinforcing rods as long as the substrate is sufficiently rough to be able to counter the expansion. This expansion phase is completed during the first days of curing.

Applying the mortar

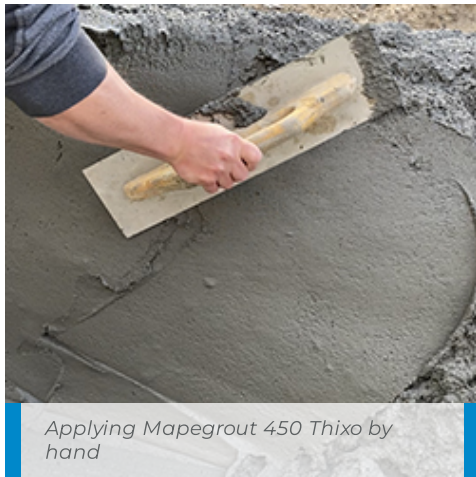
The mix can be applied with a flat or gauging trowel with no need for formwork even on vertical surfaces or ceilings; the maximum thickness allowed is 50 mm per coat.

Mapegrout 450 Thixo can also be sprayed with a suitable piston or worm screw type rendering machine (Turbosol - Putzmeister), excluding continuous mixing machines.

Apply **Mapegrout 450 Thixo** after treating the reinforcing rods with **Mapefer** or with **Mapefer 1K**.

When a further coat of **Mapegrout 450 Thixo** is necessary, it must be applied before the previous one has completely set (not more than 4 hours at +23°C).

The repair process is complete when a smoothing coat of **Monofinish** or **Mapefinish** and a coat of **Elastocolor Paint** have been applied.



Applying Mapegrout 450 Thixo by hand



Applying Mapegrout 450 Thixo by spraying



Finishing the surface of Mapegrout 450 Thixo

PRECAUTIONS TO BE TAKEN DURING AND AFTER APPLICATION

- Only use bags of **Mapegrout 450 Thixo** which have been stored on their original pallets.
- In hot weather, store the product in a cool place and use only cold water to blend the mortar.
- In cold weather, store the product in a place which is protected from frost at a temperature of +20°C, and use tepid water to blend the mortar.
- After laying **Mapegrout 450 Thixo**, we recommend that it is cured carefully, especially in hot or windy weather, to avoid the water evaporating off too quickly and causing the formation of surface cracks due to plastic shrinkage.

Spray water on the surface after 8-12 hours of laying the mortar, and repeat the operation every 3-4 hours for at least the first 48 hours. As an alternative, after tamping the mortar, spread on a layer of **Mapecure E** anti-evaporation treatment in watery emulsion with a low-pressure pump, **Mapecure S** solvent-based curing film for mortar and concrete, or **Elastocolor Primer** solvent-based, high-penetration primer for absorbent substrates and curing agent for repair mortar. **Mapecure E** and **Mapecure S**, as with all the best quality products in the same category which are currently available on the market, impede bonding of successive dressing layers. Therefore, if a smoothing layer or paint is to be applied later, they must be completely removed by sandblasting.

If **Elastocolor Primer** is used as an antievaporation treatment, on the other hand, a final protective layer of **Elastocolor Paint** or **Elastocolor Rasante** may be applied directly on the treated surface without having to remove it.

CLEANING

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

COVERAGE

19 kg/m² per cm of thickness.

PACKAGING

25 kg bags.

STORAGE

Mapegrout 450 Thixo may be stored for up to 12 months in its original 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

Class according to EN 1504-3:

R4

Type:

PCC

Consistency:

powder

Colour:

grey

Maximum aggregate size:

2,5 mm

Bulk density:

1250 kg/m³

Dry solid content:

100%

Chloride ions content:

- minimum requirements ≤ 0.05% - according to EN 1015-17:

≤ 0,05 %

APPLICATION DATA (at +20°C - 50% R.H.)

Colour of mix:

grey

Mixing ratio:

100 parts of **Mapegrout 450 Thixo** with 15-16 parts of water (3.75-4 l of water for a bag of 25 kg **Mapegrout 450 Thixo**)

Consistency of mix:

thixotropic

Density of mix:

2100 kg/m³

pH:

> 12

Application temperature range:

from +5°C to +35°C

Pot life of mix:

approx. 1 h

FINAL PERFORMANCE (15% mixing water)

Performance characteristic:	Test method	Requirements according to EN 1504-3 for R4 class mortar	Product performance
Compressive strength:	EN 12190	≥ 45 MPa (after 28 days)	55 MPa (after 28 days)
Flexural strength:	EN 196-1	not required	6.5 MPa (after 28 days)
Compressive modulus of elasticity:	EN 13412	≥ 20 GPa (after 28 days)	26 GPa (after 28 days)
Bond strength to concrete (MC 0.40 type substrate according to EN 1766:	EN 1542	≥ 2 MPa (after 28 days)	> 2 MPa (after 28 days)
Resistance to accelerated carbonation:	EN 13295	Depth of carbonation ≤ reference concrete (MC 0.45 type with w/c ratio = 0.45) according to EN 1766	meets specifications
Capillary absorption:	EN 13057	≤ 0,5 kg/m ² · h ^{0,5}	< 0,5 kg/m ² · h ^{0,5}
Thermal compatibility, measured as bond strength according to EN 1542: – freeze-thaw cycles with deicing salts	EN 13687-1	≥ 2 MPa (after 50 cycles)	> 2 MPa
Reaction to fire:	EN 13051	Euroclass	A1

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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Mapei Polska Sp. z o.o.

ul. Gustawa Eiffela, 14 44-109 Gliwice



+48-32-7754450



www.mapei.pl



info@mapei.pl

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