

MAPEGROUT T60

Fibre-reinforced, sulphate-resistant thixotropic mortar for repairing concrete



WHERE TO USE

Repair of degraded concrete structures or reinforced concrete structures subject to sulphate attack.

Some application examples

- Canal linings, hydraulic works, and tunnels that require resistance to sulphate attack.
- Repair and reconstruction of concrete coverings damaged by corroded reinforcing bars.
- Filling of rigid joints (e.g. between base and column, cracks in floors, joints between walls, etc.).
- Repair of precast structures.

TECHNICAL CHARACTERISTICS

Mapegrout T60 is a one-component pre-blended thixotropic cement-based mortar composed of sulphate-resistant hydraulic binders, synthetic polyacrylonitrile fibres, organic corrosion inhibitors, select aggregates and special water-retaining admixtures developed in MAPEI Research Laboratories.

If **Mapegrout T60** is prepared by adding only water, it must be cured in a damp environment to allow the product's expansive properties to develop fully and correctly. However, it is very difficult to guarantee these conditions on site. Therefore, to allow expansion in the open air, **Mapegrout T60** may also be admixed with 0.25% of **Mapecure SRA**, a special admixture that reduces plastic and hydraulic shrinkage.

Mapecure SRA carries out an extremely important role and guarantees better curing of the mortar. When mixed with **Mapegrout T60**, it can be considered a technologically advanced system, as it is able to reduce the rapid evaporation of water and promote the development of hydration reactions.

Mapecure SRA acts basically as an internal curing agent and, thanks to its interaction with some of the main components in the cement, reduces final shrinkage by 20% to 50% compared with the same product without the admixture, which means there is also a lower risk of cracking.

Mapegrout T60 may be used also without adding **Mapecure SRA**, when the environmental conditions permit optimal curing.

Mapegrout T60 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 use of products and systems"*) and the minimum requirements of EN 1504-3 (*"Structural and non-structural repair"*) for structural mortars of class R4.

RECOMMENDATIONS

- Do not use **Mapegrout T60** on smooth surfaces: roughen the surface thoroughly and add rebars if necessary.
- Do not add cement or admixtures to **Mapegrout T60**.
- Do not pour **Mapegrout T60** into forms for repairing works (use **Mapegrout Hi-Flow Zero**).
- Do not use **Mapegrout T60** for anchoring (use **Mapecure Zero** or **Mapecure R**).

APPLICATION PROCEDURE

TECHNICAL INFORMATION FOR APPLICATION

Composition of the mix:	100 kg of Mapegrout T60 16.5-17.5 kg of water 0.25 % Mapecure SRA (optional*)
Coat thickness:	from 10 to 100 mm. (please refer to "Application of mortar" paragraph)
Application temperature range:	substrate and surrounding temperature from +5°C to +35°C
Pot life of mix:	approx. 60 min. (at +20°C)
Waiting time between coats:	max. 1-2 h

*To allow expansion in air

Preparation of the substrate

- Remove deteriorated and loose concrete down to the solid, strong and roughened part of the substrate. Any previous repair work that is no longer thoroughly bonded must also be removed through suitable means (mechanical demolition, hydroscarifying, etc).
- Clean concrete and reinforcing rods from residues of previous scarifying works, dust, cement laitance, rust, grease, oils, paint residues and any other contaminants, through sandblasting or high pressure water jets. Once prepared, the concrete surface to be repaired must be completely visible and have an uneven texture with at least 5 mm peak roughness, with inert fraction completely exposed and free from laitance, in order to grant correct adhesion of the mortar to the substrate.
- Saturate the substrate with water, then wait until the excess water has evaporated and the surface is dry before repairing with **Mapegrout T60**. To facilitate the elimination of free water, use compressed air if needed.

Preparation of the mortar

- Pour into the mixer the amount of water needed to obtain the consistency required for the application.

Application	Litres of water per 25 kg bag
Trowel	approx. 4.1-4.3
Spray	approx. 4.2-4.4

- Start the mixer and slowly add **Mapegrout T60** to the water in a continuous flow.
- If improved open-air curing of the mortar is required, add **Mapecure SRA** to the mix phase at a dosage of 0.25% by weight of the mortar (0.25 kg every 100 kg of **Mapegrout T60**).
- Mix for 1 to 2 minutes, then check to make sure the mix is well blended. Scrape any unmixed powder from the bottom and the sides of the mixer. Mix again for another 2 to 3 minutes.
- Depending on the amount needed, a mortar mixer or a drill with a mixing attachment may also be used. Mix at low speed to avoid entraining air.

Remember that mixing by hand requires a larger amount of water. This adversely affects several of the mortar's properties, including mechanical strength, shrinkage, watertightness, etc.

Mapegrout T60 remains workable for approx. 1 hour at +20°C.

The expansion of **Mapegrout T60** is calculated to compensate for hygrometric shrinkage. For it to be effective, the expansion needs to be restrained by rebars or restraints inserted into the substrate.

If **Mapegrout T60** is applied without formwork in a thickness greater than 5 cm, reinforcing rods (coated with an at least 2 cm thick layer of protective mortar) must be applied beforehand. Thinner layers can be applied also without reinforcing rods, but the substrate must be roughened enough to compensate the expansion before the application of the mortar. Expansion of the product takes place during the first few days of hardening. Instructions for the preparation of mortar samples for lab testing are reported in the TECHNICAL DATA section.

Application of the mortar

Mapegrout T60 may be applied with a spatula or trowel on vertical surfaces in layers up to 10 cm thick per coat, or on ceilings in layers up to 2 cm thick per coat, without the use of reinforcing rebars.

For application thickness between 10 and 50 mm repair can be carried out in one single coat. In case of repair thickness over 30 mm, the use of reinforcing rebars is required.

For application thickness between 50 and 100 mm repairs must be carried out in more coats (also consecutive), with application of reinforcing rebars and at least 2 cm covering. Apply approximately $\frac{3}{4}$ of the total thickness in one coat until the rebar is completely covered, using a suitable tool to create a surface roughness between 5 and 10 mm (10 mm notched trowel). The second coat may be applied after 24 hours. Before application, scarify the first coat with high pressure water jets until a clean and laitance-free substrate with at least 5 mm roughness is obtained.

Mapegrout T60 may also be applied using a suitable double-mixing piston or worm-screw type rendering machine. The product is not compatible with application through continuous mixing type rendering machine. For repairing concrete faces (e.g. balconies, columns, beams, etc.) we recommend treating the rebars with **Mapefer** or **Mapefer 1K Zero** after sanding them.

PRECAUTIONS TO BE TAKEN DURING AND AFTER APPLICATION

- Only use bags of **Mapegrout T60** which have been stored on their original pallets.
- In warm weather store the material in a cool place. Use cold water to prepare the mortar.
- In cold weather, store the product in a place which is protected from frost and use lukewarm water to prepare the mortar.
- To optimise the product's performance it is advisable to carefully cure **Mapegrout T60**, specifically in hot and windy weather. Spray water on the substrate during pouring and immediately cover the surface with a waterproof sheet for at least 3 days.
Surface anti-evaporant products may be used instead of wet curing; such products must be selected according to following works to be carried out.

CLEANING

Mortar that has not yet hardened can be removed from tools with water. After setting, cleaning is very difficult and can only be done mechanically.

CONSUMPTION

18.5 kg/m² per cm of thickness if used pure and 14.5 kg/m² if used mixed with 30% of 3 to 6-8 mm aggregate.

PACKAGING

25 kg bags.

STORAGE

Mapegrout T60 may be stored for up to 12 months in its original packaging.

The special 25 kg vacuum-packed polyethylene bag offers a better protection from accidental rain. Some characteristics of **Mapegrout T60** make it particularly sensitive to improper storage conditions; it is advisable to stock the product in a dry and covered place at a temperature between +5 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

Class according to EN 1504-3:	R4
Type according to EN 1504-1:	CC
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 ≤ 0.05%)	≤ 0.05 %

TECHNICAL INFORMATION FOR THE PREPARATION OF THE PRODUCT

Composition of the mix:	100 parts by weight of Mapegrout T60 with 17% of water
Preparation of mix:	mixing of product according to EN 196-1

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

Colour of mix:	grey
Consistency of mix:	tixotropic
Density of mix:	2200 kg/m ³

FINAL PERFORMANCES according to curing times defined in test methods

Performance characteristic	Test method	Requirements EN 1504-3 R4	Product performance
Compressive strength: - 1 day - 7 days - 28 days	EN 12190	- - ≥ 45 MPa	20 MPa 45 MPa 60 MPa
Flexural strength: - 1 day - 7 days - 28 days	EN 196-1	not required	4 MPa 7 MPa 8 MPa
Compressive modulus of elasticity:	EN 13412	≥ 20 GPa	27 GPa
Direct tensile adhesion to concrete:	EN 1542	≥ 2.0 MPa	> 2.0 MPa
Shear adhesion to substrate: - 7 days - 28 days	EN 12615 mod.	not required	≥ 3.5 MPa ≥ 5.0 MPa
Contrasted expansion (24 h):	UNI 8147 A method	not required	400 µm/m
Resistance to cracking:	"O Ring Test"	not required	no cracks after 180 days ⁽¹⁾
Resistance to accelerated carbonation:	EN 13295	carbonation depth ≤ than reference concrete	meets specifications
Impermeability to water – penetration depth:	EN 12390-8	not required	< 5 mm

Capillary absorption:	EN 13057	$\leq 0.5 \text{ kg/m}^2 \cdot \text{h}^{0.5}$	$< 0.25 \text{ kg/m}^2 \cdot \text{h}^{0.5}$
Pull-out strength of steel rebar – tension of adhesion:	RILEM-CEB-FIP RC6-78	not required	$> 25 \text{ MPa}$
Thermal compatibility			
– freeze-thaw cycles using de-icing salts (50 cycles):	EN 13687-1	$\geq 2.0 \text{ MPa}$	$> 2.0 \text{ MPa}$
- storm cycles (30 cycles)	EN 13687-2	$\geq 2.0 \text{ MPa}$	$> 2.0 \text{ MPa}$
- dry thermal cycles (30 cycles):	EN 13687-4	$\geq 2.0 \text{ MPa}$	$> 2.0 \text{ MPa}$
Resistance to freeze-thaw cycles in presence of salts – flaking:	EN 12390-9	not required	$< \text{than reference concrete (XF4)}^{(2)}$
Exposure class:	/	not required	X0 XC1, XC2, XC3, XC4 XD1, XD2, XD3 XS1, XS2, XS3 XF1, XF2, XF3, XF4 ⁽²⁾ XA1, XA2, XA3
Reaction to fire:	EN 13501-1	Euroclass	A1

NOTES:

Preparation of samples: compaction according to EN 196-1.

(1) Performance figures obtained by adding 0.25% of **Mapecure SRA**

(2) **Mapecrout T60** was tested according to EN 12390-9 and in comparison with reference concrete with a class XF4 mix design according to EN 206-1.

The strength of **Mapecrout T60** with added 30% of gravel on the weight of the mortar is the same as for that of the same mortar as is (with the same amount of mixing water).

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. The values declared in the TECHNICAL DATA table (typical values) were obtained in compliance with test methods and curing cycles defined in the technical standards referenced therein. Therefore, please note that the use of test procedures or methods other than those indicated in the table could lead to different values and that, in such cases, any liability of our company is excluded.

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

www.mapei.com

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317-11-2023 en (IT)

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