

MAPEGROUT T60

Sulphate-resistant, fibre-reinforced shrinkage compensated thixotropic mortar for the repair of 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 the MAPEI Research Laboratories.

If **Mapegrout T60** is prepared by only adding water, it must be cured under damp conditions in order to guarantee that the product's expansive properties develop completely and correctly. However, there is no guarantee that these conditions can be created on site.

Therefore, to guarantee that the expansive properties of **Mapegrout T60** take place when drying in the open air, 0.25% of **Mapecure SRA**, a special admixture 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 T60**, it may be considered a technologically advanced system, in that the admixture has the capacity of slowing down evaporation of the water and of promoting the development of hydration reactions.

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 admixture. This will obviously lead to a reduced risk of cracking phenomena.

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 claimed by 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**).

- Do not use **Mapegrout T60** for anchoring (use **Mapefill** or **Mapefill R**).

APPLICATION PROCEDURE

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.
- Once prepared, the concrete surface to be repaired must have an uneven texture with at least 5 mm peak roughness.
- Sandblast the concrete and the reinforcing bars until they are free of dirt, rust, cement laitance, grease, oil, varnish or old paint.
- Saturate the substrate with water.
- Before repairing with **Mapegrout T60**, wait until the excess water has evaporated. 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 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 an agitator attachment may also be used. Mix at low speed to avoid entraining air.
- Avoid mixing manually unless absolutely necessary. If so, mix small amounts at a time for at least 5 to 6 minutes until a completely homogeneous paste is obtained.

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.

Buildups of **Mapegrout T60** without restraints in thicknesses of more than 3 cm should be done only after inserting rebars and roughening the surface of the concrete, taking care to cover the reinforcement with a layer at least 2 cm thick.

Lesser thicknesses can be applied without rebars as long as the substrate has been thoroughly roughened to counter the expansion. The expansion phase ends during the first days of hardening.

Application of the mortar

Mapegrout T60 may be applied with a spatule 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 form-work.

It may also be applied using a suitable piston or worm-screw type rendering machine, such as a Turbosol or Putzmeister. Do not use a 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** after sanding them.

When further coats of **Mapegrout T60** are needed, leave the previous hardened coat rough and wet the surface with water.

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 at a temperature of +20°C, and use lukewarm water to blend the mortar.
- After applying **Mapegrout T60**, we recommend that it is cured carefully, especially in hot or windy weather, to avoid the water evaporating too quickly and causing the formation of surface cracks due to plastic shrinkage. Spray water on the surface 8-12 hours after applying 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 either **Mapecure E** anti-evaporation treatment in water 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 coating 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 anti-evaporation treatment, on the other hand, a final protective layer of **Elastocolor Pittura** or **Elastocolor Rasante** may be applied directly on the treated surface without having to remove it.

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 product is available in special 25 kg vacuum-packed polyethylene bags which may be stored outside for the entire construction phase of the job. Rain has no effect on its characteristics.

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.

Mapegrout T60: sulphate-resistant, compensated-shrinkage cementitious mortar reinforced with polyacrylonitrile fibres for repairing concrete, in compliance with the requirements of EN 1504-3 R4	
TECHNICAL DATA (typical values)	
PRODUCT IDENTITY	
Class according to EN 1504-3:	R4
Type:	CC
Consistency:	powder
Colour:	grey
Maximum size of aggregate (mm):	2.5
Bulk density (kg/m ³):	1350
Dry solids content (%):	100
Chloride ions content: – minimum requirement ≤ 0.05% - according to EN 1015-17 (%):	≤ 0.05
APPLICATION DATA OF PRODUCT (at +20°C - 50% R.H.)	
Colour of mix:	grey
Mixing ratio:	100 parts of Mapegrout T60 with 16.5-17.5 parts of water (approximately 4.1-4.4 litres of water per 25 kg bag) and 0.25% of Mapecure SRA (one 0.25 kg bottle every 4 bags of Mapegrout T60)
Consistency of mix:	thixotropic
Density of mix (kg/m ³):	2200
pH of mix:	> 12.5
Application temperature range:	from +5°C to +35°C
Pot life of mix:	approximately 1 hour
Waiting time between each layer:	max 1-2 hours

FINAL PERFORMANCE (17% mixing water - mixing and compaction according to EN 196-1)

Performance characteristic	Test method	Requirements according to EN 1504-3 for R4-class mortar	Performance of product
Compressive strength (MPa):	EN 12190	≥ 45 (after 28 days)	20 (after 1 day) 45 (after 7 days) 60 (after 28 days)
Flexural strength (MPa):	EN 196/1	not required	4 (after 1 day) 7 (after 7 days) 8 (after 28 days)
Compressive modulus of elasticity (GPa):	EN 13412	≥ 20 (after 28 days)	27 (after 28 days)
Bond strength on concrete (substrate in MC 0.40 - water/cement ratio = 0.40) according to EN 1766 (MPa):	EN 1542	≥ 2 (after 28 days)	> 2 (after 28 days)
Bond strength to substrates determined by shear (MPa):	EN 12615 mod.	not required	≥ 3.5 (after 7 days) ≥ 5.0 (after 28 days)
Contrasted expansion (µm/m):	UNI 8147 method A	not required	400 (after 1 day)
Crack resistance:	"O-Ring" test	not required	no cracks after 180 days (*)
Resistance to accelerated carbonation:	EN 13295	depth of carbonation ≤ reference concrete (type MC 0.45, water/cement ratio = 0.45) according to UNI 1766	meets specifications
Impermeability to water – penetration depth - (mm):	EN 12390/8	not required	< 5
Capillary absorption (kg/m ² ·h ^{0.5}):	EN 13057	≤ 0.5	< 0.25
Slip-resistance of steel reinforcement rods – bonding stress (MPa):	RILEM-CEB-FIP RC6-78	not required	> 25
Thermal compatibility measured as bond strength according to EN 1542 (MPa): – freeze-thaw cycles with de-icing salts: – storm cycles: – dry thermal cycles:	EN 13687/1 EN 13687/2 EN 13687/4	≥ 2 (after 50 cycles) ≥ 2 (after 30 cycles) ≥ 2 (after 30 cycles)	> 2 > 2 > 2
Resistance to freeze- thaw cycles in the presence of salts - flaking (g/m ²):	EN 12390/9	not required	< reference concrete (XF4) (**)
Exposure class:	EN 206/1	not required	X0 XC1, XC2, XC3, XC4 XD1, XD2, XD3 XS1, XS2, XS3 XF1, XF2, XF3, XF4 (**) XA1, XA2, XA3
Reaction to fire:	EN 13501-1	Euroclass	A1

The strength of **Mapegrout 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).

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

(**) **Mapegrout 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.

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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