MAPEI

Mapegrout Easy Flow GF

CE
EN 1504-3

One-component, shrinkage-compensated, sulphate-resistant, thixotropic, inorganic fibre-reinforced mortar for repairing concrete structures where higher ductility is required

WHERE TO USE

Repairing deteriorated concrete structures and/or increasing their section, by application with a rendering machine. The product is particularly suitable when easy pumping over long distances and to elevated positions is required.

Some application examples

- Repairing motorway, road and railway viaduct piles.
- Repairing hydraulic structures, such as canals, dams, breather channels, basins, etc.
- Repairing bearing points in road and railway tunnels.
- Repairing precast concrete structures.
- Structural repairs to deteriorated concrete structures damaged by the presence of sulphates in the ground or in the water.
- Repairing the protective concrete layer on deteriorated concrete structures damaged due to oxidisation of the reinforcement rods.

TECHNICAL CHARACTERISTICS

Mapegrout Easy Flow GF is a pre-blended, one-component thixotropic cementitious mortar, made from sulphate-resistant hydraulic binders, polyacrylonitrile synthetic fibres, inorganic fibres, organic corrosion inhibitors, special admixtures and selected aggregates, according to a formula developed in MAPEI's own Research & Development laboratories.
The inorganic fibres have the following characteristics:

– length:	12 mm;
– diameter:	14 µm;
– tensile elongation:	1700 MPa;
– modulus of elasticity:	72 GPa.

Thanks to its special composition, **Mapegrout Easy Flow GF** is particularly suitable for repairing concrete structures when repair mortar is applied by spray, where the characteristics of the work (considerable height of the structure under repair, such as viaduct piles), the morphology of the site area (little space available to position mixing and pumping units in the vicinity of the structure under repair) and for site organisation requirements, mortar which is easy to pump over long distances and up to considerable heights is required.
After mixing **Mapegrout Easy Flow GF** with water, it forms a mortar with a thixotropic consistency which is very easy to apply, even on vertical surfaces, at a thickness of between 1-10 cm without the need for formworks. For thicknesses over 5 cm, a reinforcement with rebars will be necessary.
Thanks to the characteristics and properties of the admixtures contained in the product, **Mapegrout Easy Flow GF** remains workable for long period, and may be easily pumped, even in hot weather.
Once hardened, **Mapegrout Easy Flow GF** bonds perfectly to well-prepared concrete surfaces, is resistant to aggression from sulphate salts and is waterproof.
To allow the product's expansive properties to develop fully and correctly, **Mapegrout Easy Flow GF** must only be mixed with water and cured in a damp environment. However, it is very difficult to guarantee such conditions on site.
In order to guarantee that its expansive properties develop correctly when cured in the open air, adding **Mapecure SRA** to **Mapegrout Easy Flow GF** offers certain advantages.
After mixing with 0.25% of **Mapecure SRA**, a special curing agent which reduces both plastic and hydraulic shrinkage, the excellent performance characteristics

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of **Mapegrout Easy Flow GF** are further improved.
In fact, **Mapegrout Easy Flow GF** mixed with **Mapecure SRA** may be considered a highly advanced technological system, in that the admix has the capacity of reducing quick evaporation of water from the mortar and favouring the development of hydration. **Mapecure SRA** acts 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% less than the same product without the admix. This means there will be a lower risk of cracking.
The product may also be used without adding **Mapecure SRA**, in those cases where favourable climatic conditions allow for a correct curing cycle.
Mapegrout Easy Flow GF meets the main requirements of EN 1504-9 ("*Products and systems for protecting and repairing concrete structures: definitions, requirements, quality control and conformity assessment. General principles for the use and application of systems*"), and the minimum requirements for EN 1504-3 ("*Structural and non-structural repairs*") for R4-class structural mortars.

RECOMMENDATIONS

- Do not apply **Mapegrout Easy Flow GF** on smooth substrates: create a very rough surface.
- Do not use **Mapegrout Easy Flow GF** to carry out repairs by casting into formwork (use **Mapegrout Hi-Flow**).
- Do not use **Mapegrout Easy Flow GF** for fixing elements in place (use **Mapefill**).
- Do not use **Mapegrout Easy Flow GF** when the temperature is around 0°C or when there is the risk of the temperature falling below 0°C immediately after application.
- Do not add cement or admixtures to **Mapegrout Easy Flow GF**.

APPLICATION PROCEDURE

Preparation of the substrate

- Remove all deteriorated and loose concrete to form a sound, rough and strong substrate. Any areas previously repaired and which are not perfectly bonded must also be removed.
- After preparation, the surface of the substrate must be uneven with irregularities at least 5 mm deep.
- Remove all dust, rust, cement laitance, grease, oil and old paint from the concrete and reinforcement rods by sandblasting.
- Treat reinforcement rods with **Mapefer** or **Mapefer 1K**, according to the procedure illustrated in the relevant data sheet for each product.
- Wait until **Mapefer** or **Mapefer 1K** are dry.
- Saturate the substrate with water.
- Before carrying out repairs with **Mapegrout Easy Flow GF**, wait until excess water has evaporated off. If necessary, use compressed air to help remove excess water.

Preparation of the mortar

- Pour 90% of the recommended quantity of water, according to the application technique, into a cement mixer:

APPLICATION PROCEDURE	LITRES OF WATER FOR EACH 25 KG BAG
Trowel	3.9-4.0
Spray	4.0-4.2

- Switch on the cement mixer and then slowly add **Mapegrout Easy Flow GF** in a continuous flow to the water.
- If better curing in open air is required, add 0.25% **Mapecure SRA** in weight of the mortar after mixing (0.25 kg every 100 kg of **Mapegrout Easy Flow GF**).
- Mix for 1-2 minutes, make sure that all the ingredients are well blended, remove all powder which has stuck to the walls of the mixer, add water to form the consistency required and continue mixing for a further 2-3 minutes.
- A mortar mixer or drill with a mixer fitting may also be used, according to the quantity of mortar required. Mixing must be carried out at a low speed to avoid the entrapment of air.

Mapegrout Easy Flow GF remains workable for approximately 1 hour at +20°C.

Application of the mortar

The mortar is usually applied using either a piston or worm-screw spray rendering machine, such as a Turbosol or a Putzmeister, except continuous mixing machines. **Mapegrout Easy Flow GF** may also be applied by trowel on vertical surfaces without using formwork. The maximum thickness to be applied for each layer is approximately 100 mm.
If more than one layer of **Mapegrout Easy Flow GF** is required, we recommend leaving a rough surface on each previously hardened layer and wetting the substrate with water.

PRECAUTIONS TO BE TAKEN DURING AND AFTER APPLICATION

- Only use bags of **Mapegrout Easy Flow GF** which have been stored on their original pallets.
- In hot weather, store the product in a cool area and use cold water to prepare the mix.
- In cold weather, store the product in a closed area at a temperature of +20°C and protect from frost. Use lukewarm water to prepare the mortar.
- After application, and particularly in hot or windy weather, we recommend curing **Mapegrout Easy Flow GF** carefully, to avoid the mixing water evaporating too quickly, otherwise surface cracks may appear due to plastic shrinkage.
  Spray water on the surface 8-12 hours after applying the mortar and then repeat this operation (every 3-4 hours) for at least the first 48 hours.
  After tamping the surface of the mortar, apply **Mapecure E** anti-evaporation agent in watery emulsion with a low pressure pump, **Mapecure S** film-forming curing agent for mortar and concrete or **Elastocolor Primer**, high-penetration solvent fixing agent for absorbent surfaces and curing agent for repair mortar.
  Mapecure E and **Mapecure S**, as with all the best products in this category available on the market, impede the bond of

TECHNICAL DATA (typical values)

PRODUCT IDENTITY	
Class according to EN 1504-3:	R4
Type:	CC
Consistency:	powder
Colour:	grey
Bulk density (kg/m³):	1,350
Maximum size of aggregate (mm):	2.5
Dry solids content (%):	100
Ion chloride content: **– minimum requirement ≤ 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 Easy Flow GF** with 15.5-16.5 parts of water (approximately 3.9-4.2 litres of water per 25 kg bags) and 0.25% of **Mapecure SRA** (1 x 0.25 kg canister every 4 bags of **Mapegrout Easy Flow GF**)
Consistency of mix:	thixotropic
Slump according to EN 13395/1 (mm):	175
Density of the mix (kg/m³):	2,200
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:	maximum 1-2 hours

FINAL PERFORMANCE (16% 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) > 50 (after 7 days) > 60 (after 28 days)
Flexural strength (MPa):	EN 196/1	not required	7 (after 1 day) 9 (after 7 days) 11 (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)
Impeded contraction in open air (μm/m):	UNI 8147 mod.	not required	400 after 1day (*)
Warp test:	//	not required	convex (*)
Crack resistance:	"O Ring Test"	not required	no cracks after 180 days (*)
Resistance to accelerated carbonation:	EN 13295	carbonation depth ≤ reference concrete (MC 0.45 type 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/m²·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 bonding according to EN 1542 (MPa): **– freeze-thaw cycles with deicing salts:** **– thunder-shower cycle:** **– dry thermal cycle:**	 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/m²):	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
Reaction to fire:	EN 13501-1	Euroclass	A1

*(*) Performance reached by adding 0.25% of **Mapecure SRA***

*(**) **Mapegrout Easy Flow GF** was tested according to EN 12390-9 and in comparison with reference concrete with a class XF4 mix design according to EN 206-1.*

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successive layers. Therefore, if smoothing and levelling compound or paint is to be applied, they must be completely removed. If **Elastocolor Primer** is used to block evaporation, the smoothing and levelling layer or final protective layer of **Elastocolor Paint** or **Elastocolor Rasante** may be applied directly on the surface without removing it.

Cleaning
Mortar which has not yet hardened may be washed from tools using water. Once hardened, cleaning is much more difficult, and must be removed mechanically.

CONSUMPTION
18.5 kg/m^2 per cm of thickness.

PACKAGING
25 kg bags.

STORAGE
Mapegrout Easy Flow GF may be stored up to 12 months in its original packaging. The special packaging, made from 25 kg vacuum-packed polyethylene bags, allows the product to be stored outside for the entire duration 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.

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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