

MAPEGROUT EASY FLOW

One-component sulphate-resistant, fibre-reinforced, shrinkage-compensated, thixotropic mortar especially suitable for repairing concrete structures by using a spray rendering machine



WHERE TO USE

Repair of deteriorated concrete structures by using a spray rendering machine. The product is especially suitable when easy pumping is required even over long distances and under constant high heads.

Some application examples

- Repair of highway viaduct pillars by using a spray rendering machine.
- Repair of hydraulic works such as canals, dams, spillways, basins, etc.
- Repair of road and railway tunnels.
- Repair of precast concrete structures.
- Structural repair of concrete structures which have been deteriorated by sulphate salts in the water or ground.
- Repair of concrete structures damaged by corroded reinforcing bars.

TECHNICAL CHARACTERISTICS

Mapegrout Easy Flow is a one-component pre-blended packed thixotropic cement based mortar composed of sulphate-resistant hydraulic binders, synthetic polyacrylonitrile fibres, organic corrosion inhibitors, special water-retainers, expansive admixtures and selected aggregates prepared according to a formula developed in MAPEI Research & Development laboratories.

Thanks to its composition, **Mapegrout Easy Flow** is especially suitable for repairing, by spraying, concrete structures where the technical characteristics (considerable heights that need to be repaired, e.g. viaduct pillars, cooling towers, etc), the job-site logistics (e.g. lack of available space for mixing and pumping equipment near the structure to be repaired) and the organisational needs require easy pumping over long distances and constant high head.

Once mixed with water, **Mapegrout Easy Flow** acquires a thixotropic consistency and extended workability. The mortar does not harden in the pump's pipes. Thanks to this property, it is possible to safely repair even extended vertical surfaces. After hardening, **Mapegrout Easy Flow** resists sulphate salt attack, is watertight and adheres perfectly to concrete surfaces provided they have been adequately prepared.

To have a correct and complete development of the expansive properties, **Mapegrout Easy Flow**, prepared by adding only water, must cure in a moist environment, a difficult condition to guarantee on site.

In order for the expansive properties to develop in open air, **Mapegrout Easy Flow** can be admixed with **Mapecure SRA**. **Mapegrout Easy Flow**'s performances greatly improve if admixed with 0.25% **Mapecure SRA**, a special admixture that can reduce both plastic and hydraulic shrinkage.

Mapecure SRA in fact, carries out a very important function ensuring an improved curing of the mortar.

Mapegrout Easy Flow mixed with **Mapecure SRA** can be considered as a technologically advanced system because the admixture can reduce the rapid evaporation of the mixing water and helps the development of the hydration reactions.

Mapecure SRA acts as an interior curing agent and, thanks to the interaction with several main cement components, final shrinkage from 20 to 50% less with respect to standard values of the product that has not been admixed can be obtained. The risk of cracking also is reduced.

Mapegrout Easy Flow meets all the main requirements of EN 1504-9 Standards ("Products and systems for the protection and repair of concrete structures: definitions, requirements, quality control and conformity assessment. General

principles for the use of products and systems") and the minimum requirements for EN 1504-3 Standards ("Structural and non-structural repairs") for class R4 structural mortar.

If the surrounding weather conditions are such as to guarantee good curing, this product may also be used without adding **Mapecure SRA**.

RECOMMENDATIONS

- Do not apply **MapegROUT Easy Flow** on smooth surfaces. Roughen the surface well and add reinforcing for thicknesses greater than 3 cm.
- Do not use **MapegROUT Easy Flow** to repair by pouring into formworks (use **MapegROUT Hi-Flow**).
- Do not use **MapegROUT Easy Flow** for anchoring (use **Mapecfill** or **Mapecfill R**).
- Do not use **MapegROUT Easy Flow** at temperatures lower than +2°C or if the temperature could drop below 0°C immediately after its application.
- Do not add cement or admixtures to **MapegROUT Easy Flow**.
- Do not mix **MapegROUT Easy Flow** with other mortars from the **MapegROUT** range. Refer to MAPEI Technical Services Department.

APPLICATION PROCEDURE

TECHNICAL INFORMATION FOR APPLICATION

Composition of mix:	100 kg of MapegROUT Easy Flow 16.5-17.5 kg water 0.25 kg of Mapecure SRA (optional*)
Coat thickness:	10 to 100 mm. (See instructions in "Application of the mortar" section)
Application temperature range:	Surrounding temperature and substrate temperature from +5°C to +35°C
Pot life of mix:	approx. 1 h (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 until the substrate is sound, strong and rough. Any previous restoration work which is not soundly bonded should be removed.
- Once ready, the concrete surface that needs repair should be rough and with irregularities of maximum 5 mm.
- Clean the concrete and reinforcing rods until free of dust, rust, cement laitance, grease, oils and previously applied paints by sandblasting.
- Treat the reinforcing rods with **Mapecfer** or **Mapecfer 1K** following the application procedure described on the relevant Technical Data Sheets.
- Wait until **Mapecfer** or **Mapecfer 1K** has dried.
- Saturate the substrate with water.
- Wait for the excess water to evaporate before applying **MapegROUT Easy Flow**. If it is necessary to facilitate the elimination of free water, use compressed air.

Preparation of the mortar

- Pour into the mixer 90% of the amount of water required for the application:

APPLICATION METHOD	LITRES OF WATER PER 25 KG BAG
Trowel	approx. 4.1-4.3
Spray	approx. 4.2-4.4

- Start the concrete mixer and slowly add **MapegROUT Easy Flow** to the water in a continuous flow.
- If improved curing of the mortar in open air is required, add **Mapecure SRA** 0.25% by weight of the mortar (0.25 kg per 100 kg of **MapegROUT Easy Flow**).
- Mix for 1-2 minutes, then make sure the mix is well blended. Scrape any unblended powder from the bottom and the sides of the mixer. Add an additional amount of water until the mix has reached the desired consistency. Mix again for another 2-3 minutes.
- Depending on the amount needed, a mortar mixer or a drill fitted with a paddle may also be used. Mix at a low speed to avoid entraining air.

Instructions for the preparation of the mortar to create samples for Lab testing are contained in the TECHNICAL DATA table.

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

The expansion of **Mapegrout Easy Flow** is calculated to compensate the hydraulic shrinkage. In order to be effective, the substrate needs to be adequately reinforced with rebars and/or roughened.

Layers of **Mapegrout Easy Flow** in thicknesses of more than 3 cm, should be carried out only after reinforcing and roughening the concrete surface making sure the reinforcement is covered with concrete at least 2 cm thick. Lower thicknesses can be applied without reinforcing, provided that the substrate has been substantially roughened to restrain the expansion. The expansion phase is completed during the first days of curing.

Application of the mortar

Application is usually carried out by spraying using a piston or worm screw rendering machine, except continuous mixing machines.

Mapegrout Easy Flow can also be applied with a trowel without formwork even on vertical surfaces. The recommended maximum thickness is approximately 100 mm.

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

In case of application thickness between 50 and 100 mm repair must be carried out in more coats (even consecutive ones) by placing rebars for at least 2 cm steel reinforcement. Apply approx. $\frac{3}{4}$ of the total thickness in one coat, covering the reinforcement completely and spreading the product so that a surface roughness between 5 and 10 mm is obtained (use a 10 mm notched trowel). The 2nd coat may be applied even after 24 hours over the previous layer after treating it with high pressure water to grant at least 5 mm roughness.

PRECAUTIONS TO BE TAKEN DURING AND AFTER THE APPLICATION

- To prepare the mix, only use **Mapegrout Easy Flow** bags stored in the original packaging.
- In warm weather, store the product in a cool place and use cold water to prepare the mortar.
- In cold weather, store the product protected from frost and use lukewarm water to prepare the mortar.
- To optimise the product's performances it is advisable to carefully cure **Mapegrout Easy Flow**, especially in hot or windy weather. Spray water on the surface during pouring and immediately cover it with a watertight sheet for at least 3 days. Alternatively to moist curing, surface anti-evaporation products can be used, to be selected depending to the following steps required by the project.

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

PACKAGING

25 kg bags. 1000 kg big-bags.

STORAGE

Mapegrout Easy Flow can be stored for 12 months in its original packaging.

The special packaging, made from 25 kg vacuum-packed polyethylene bags, improves protection of the product from rainfall.

Some characteristics of the product are particularly sensitive to storage methods. It is advisable to store the product in a dry and covered place 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

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
Chloride ion content: – minimum requirement $\leq 0.05\%$ - according to EN 1015-17:	$\leq 0.05\%$

TECHNICAL INFORMATION FOR THE PREPARATION OF THE PRODUCT

Composition of mix:	100 parts of Mapegrout Easy Flow with 17% of water
Preparation of the mix:	Mixing of the 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:	2,200 kg/m ³

FINAL PERFORMANCE

According to curing defined in test methods

Performance characteristic	Test method	Requirements according to EN 1504-3 R4	Performance of product
Compressive strength: - 1 day - 7 days - 28 days	EN 12190	- - ≥ 45 MPa	> 20 MPa > 50 MPa > 60 MPa
Flexural strength: - 1 day - 7 days - 28 days	EN 196-1	not required	> 4 MPa > 7 MPa > 8 MPa
Modulus of elasticity in compression:	EN 13412	≥ 20 GPa	27 GPa
Adhesion to concrete by pull-off:	EN 1542	≥ 2.0 MPa	> 2.0 MPa
Determination of slant shear strength: - 7 days - 28 days	EN 12615 mod.	not required	≥ 3.5 MPa ≥ 5.0 MPa
Contrasted expansion in air (24h):	UNI 8147 B method mod.	not required	> 400 $\mu\text{m/m}$ ⁽¹⁾
Curling/warping test:	/	not required	Convex behaviour ⁽¹⁾
Resistance to cracking:	"O Ring Test"	not required	no cracks after 180 days ⁽¹⁾
Resistance to accelerated carbonation:	EN 13295	carbonation depth \leq than reference concrete	Test passed
Water impermeability - 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 MPa
Thermal compatibility			
- freeze-thaw cycles using de-icing salts (50 cycles):	EN 13687-1	$\geq 2.0 \text{ MPa}$	> 2.0 MPa
- storm cycles (30 cycles):	EN 13687-2	$\geq 2.0 \text{ MPa}$	> 2.0 MPa
- dry thermal cycles (30 cycles):	EN 13687-4	$\geq 2.0 \text{ MPa}$	> 2.0 MPa
Resistance to freeze-thaw cycles in presence of salts - flaking:	EN 12390-9	not required	< than reference concrete (XF4) ⁽²⁾
Exposure classes:	/	not required	X0 XC1, XC2, XC3, XC4 XD1, XD2, XD3 XS1, XS2, XS3 XF1, XF2, XF3, XF4 ⁽²⁾
Reaction to fire:	EN 13501-1	Euroclass	XA1 A1

NOTES:

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

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

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

⁽³⁾ If 30% in weight of gravel is added to **Mapegrout Easy Flow**, the strength value is the same compared with mortar prepared as is (as long as the amount of mixing water used is the same).

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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