

REPARATUR MALTER FS4

Cement-polymer based mortar for structural repair of concrete, used for hand and mechanical application by spraying (Shotcrete)

Technical characteristics and usage are in compliance with:

EN 1504-3 Class R2; EN 1504-9 Method 3.1; 3.3; 7.1

FILED OF APPLICATION

Reparatur Malter FS4 is used for structural reparations of concrete and reinforced-concrete structures, increasing of protection layer of concrete covering steel reinforcement, reparation of damaged and segregated section on concrete (gravel pockets) etc.

Reparatur Malter FS4 is used for repair of vertical and ceiling surfaces, engineering and hydro-technical structures, concrete surfaces with irregular and rounded shape - tunnels, silos, tanks, bridges, etc.

In accordance with the European standard EN 1504-3, the product Reparatur Malter FS4 is classified as a mortar based on hydraulic cement and polymer additive (PCC), intended for repair of concrete in accordance with the following Principles / Methods for repair of concrete structures:

- Repair of concrete with hand applied mortar (Method 3.1 according to EN 1504-9)
- Repair of concrete with spraying concrete (Method 3.3 according to EN 1504-9)
- Restoring passivity of the reinforcement by increasing cover with additional mortar (Method 7.1 according to EN 1504-9)

Reparatur Malter FS4 can also be used as ready-mixed concrete intended for machine application with Shotcrete, using dry and wet procedure. For this purpose, additional aggregate with larger fraction (up to 8mm), and an additional amount of Admixture - Accelerator for setting concrete can be added in the Reparatur Malter FS4.

PROPERTIES

- High adhesion to concrete substrate;
- High early and final strength;
- Compensate shrinkage caused by cement setting;
- Reinforced with polypropylene fibers;
- Protects the structure from freezing;
- Protects the structure from ingress of water and aggressive substances;
- Resistant to atmospheric influences;
- Easy for preparation and application;
- Used for hand and machine application on vertical and curved surfaces, enables finishing with hand tools (trowel);
- Economical;
- Do not contain chlorides;

TECHNICAL FEATURES

PROPERTY	METHOD	DECLARED VALUES
Appearance	-	Grey powder
Water/material factor	-	0,14-0,16
Maximal size of aggregate	-	4 mm
Specific density	EN 12190	2200±100 kg/m ³
Setting time		
Start of setting		1÷3 h
End of setting	EN 13294	2÷4 h
Compressive strength		
after 7 days		>20 MPa
after 28 days	EN 12190	>30 MPa
Bending strength		
after 7 days		>3 MPa
after 28 days	EN 1015-11	>5 MPa
Adhesive bond	EN 1542	≥0,8 MPa
Capilarity absorption	EN 13057	< 0,5 kg · m ⁻² · h ^{-0,5}

DOSAGE AND PERFORMANCE:

SUBSTRATE PREPARATION

Substrate on which Reparatur malter FS4 is applied need to be clean, free of dust and grease, all labile section must be removed. Substrate also needs to be saturated with water. Surface temperature when material is applied must be between +5°C and 30°C. In case of reparation of steel reinforced structures, exposed reinforcement must be mechanically cleaned from corrosion (using steel brush or sand-blasting). It is recommended for the prepared steel surfaces to be protected using Reparatur Penetrat. In case of concrete substrate with low strength characteristics and high porosity, in order to achieve better adhesion as well as concrete surface stabilization, prior to application of Reparatur malter FS4 it is recommended to treat concrete substrate with pre-coating Vrska U.

APPLICATION

1. HAND APPLICATION

Reparatur malter FS4 is prepared by mixing with required quantity of water, 140 to 160 g of water per 1,0 kg material (one bag of material - 25kg is mixed with 3,5 to 4,0 kg water). Mixing is carried out with slow mixer until complete homogenization - minimum 3 minutes. Application is carried with metal trowel. Maximal thickness to be applied in one layer is 2,0 cm. When applying Reparatur Malter FS4 in several layers, each subsequent layer is applied after setting the previous one (in a period of several hours, depending on the temperature, consistency, wind and humidity).

2. MACHINE APPLICATION BY SPRAYING

Reparatur Malter FS4 can be applied by machine spraying using "wet" and "dry" method. Spraying should be cared out perpendicular to the substrate (concrete surface), at a speed that allows proper application at distance of 50-60 cm. This reduces the loss due to rebound from the surface and allows proper application and coverage of the reinforcement. If necessary, the freshly applied material can be further processed with hand tools (trowels), to achieve the required appearance and smoothness of the surface. When applying Reparatur Malter FS4 in several layers, each subsequent layer is applied after setting the previous one. The recommended thickness of the applied material in one layer is up to 2.0 cm.

3. USING REPARATUR MALTER FS4 AS READY-MIX CONCRETE (SHOTCRETE)

In cases when it is necessary to use ready-mix sprayed concrete for extensive repairs and other works (eg. stabilization of slopes), to perform the work it is recommended to use Reparatur Malter FS4 with the addition of coarser aggregate with granulation of 4-8 mm. The maximum amount of additional aggregate that can be added to Reparatur Malter FS4 is 20% (5.0 kg on a 25 kg bag).

During the machine application of Reparatur Malter FS4, according to the needs of the project, admixture can be added - Accelerator for setting the concrete, in a dosage that will enable the achievement of the required time for start of the setting. In this way it is possible to apply Reparatur Malter FS4 in thicker layers (above 10cm) in one working procedure.

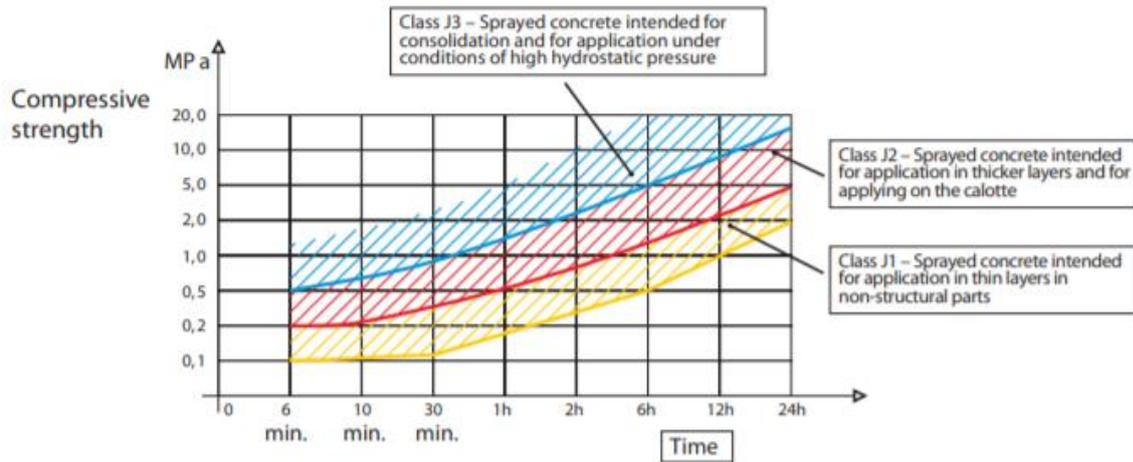
To regulate-accelerate the setting time of the product, we recommend using the following products from the production program of Ading:

- INGUNIT P – Alkali-free powdery admixture-Set accelerator. Used in the "Dry" method of application. Dosage: 0.1-0.3 kg per 25 kg (1 bag) Reparatur Malter FS4.

- INGUNIT T EKO - Liquid non-alkaline admixture-Set accelerator. Used in "Dry" and "Wet" application method. Dosage: 0.3-0.5 kg per 25 kg (1 bag) Reparatur Malter FS4.

3. RECOMMENDATIONS

* When applying the material Reparatur Malter FS4 as ready-mix Sprayed concrete (*Shotcrete*), its performance needs to be confirmed during application - *In situ*, using test methods for Sprayed concrete - European standard EN 14487 and EN 14488. Depending on the requirements and the applied type and dosage of the admixture - Set Accelerator, Reparatur Malter FS4 can be classified into one of the three classes of Sprayed concrete according to the development of early strength characteristics - J1, J2, J3.



Class of sprayed concrete according to the strength properties in the first 24h

* When applying Reparatur Malter FS4 in layers thicker than 5 cm, it is recommended to reinforce them and connect them to the substrate with steel anchors.

* When applying Reparatur Malter FS4 on a larger area, it is necessary for the surface to be divided into sections with working joints.

4. CURING OF THE FRESH REPARATUR MALTER FS4

First few hours following the application, material must be protected from high temperatures (above 30°C), exposure to direct sunlight and wind.

CONSUMPTION

For layer with thickness of 1.0 cm consumption is roughly 21-23 kg/m².

CLEANING

Tools and equipment are cleaned with water immediately after their use.

PACKAGING

Bags 25 kg

STORAGE

In original closed packing, in dry premises at temperature between 5 and 35 °C. Shelf life: 12 months.

CE MARKING

CE	
ADING AD Skopje, Novoselski pat (ul 1409) br.11 1060 Skopje, North Macedonia 20 GCBP001/1 EN 1504-3:2005	
REPARATUR MALTER FS4 Concrete repair product for non-structural repair – mortar based on hydraulic cement and polymer additive (PCC)	
Compressive strength	≥ 15 N/mm² (class R2)
Chloride ion content	≤ 0,05%
Adhesive bond	≥ 0,8 N/mm²
Restrained shrinkage/expansion	Bond strength after test ≥ 0,8 N/mm²
Thermal compatibility: Freeze-thaw cycling with de-icing salt immersion	Bond strength after 50 cycles ≥ 0,8 N/mm²
Capillary absorption	≤ 0,5 kg/m² · h^{0,5}
Reaction to fire	Class A1
Dangerous substances	No performance determined

Health hazards: Reparatur Malter FS4 does not contain toxic materials. Nevertheless, avoid contact of the product with skin and eyes and avoid swallowing. In case of contact with skin or eyes, rinse it immediately with clean running water. If swallowed, seek medical assistance. Additional information are provided in the Safety Data Sheet of the product.

Fire: Reparatur Malter FS4 is non-flammable.

Cleaning and disposal: Loose residues of Reparatur Malter FS4 should be cleaned with water. Old and used packaging should be disposed of in accordance with local rules and regulations for that type of waste. Additional information are provided in the Safety Data Sheet of the product.

CONCRETE REPAIR