

MasterEmaco S 444 FR

R4 high-ductility pourable mortar with corrosion-resistant metal fibers. With contrasted expansion, high durability for repair of reinforced concrete. from 10 to 100 mm.

MATERIAL DESCRIPTION

MasterEmaco S 444 FR is a cementitious mortar / grout, pourable, with contrasted expansion in the air, with very high ductility, fiber-reinforced with rigid metal fibers, with polyacrylonitrile fibers, resistant to aggressive environmental agents.

It is applicable for thicknesses up to 10 cm.

In the absence of wet maturation, a condition not always achievable on site, to improve the air expansion of MasterEmaco S 444 FR, it is possible to add component B (MasterEmaco A 400). This additive allows to reduce the shrinkage in the plastic and hygrometric phase, improving the seasoning.



FIELDS OF APPLICATION

MasterEmaco S 444 FR allows you to reinforce, restore and thicken reinforced concrete elements by applying casting for thicknesses from 10 to 100 mm; avoids or reduces the use of additional armor, which must withstand dynamic stresses, impacts or particular hydraulic stresses, such as:

- floors;
- curbs;
- beams and pillars;
- motorway joints;

- extrados and headers of floor slabs;
- rigid paving in reinforced concrete;
- industrial, warehouse, car park flooring;
- hydraulic structures subject to cavitation or solid transport.

FEATURES AND BENEFITS

MasterEmaco S 444 FR also has the following features:

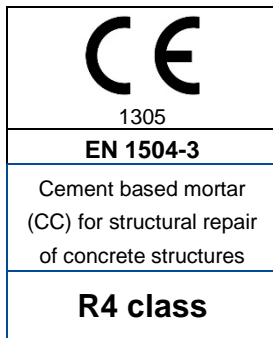
- highly ductile behavior: fundamental property to withstand repeated dynamic stresses and impacts. The ductility of a mortar is determined on the basis of the I20 toughness index (according to the ASTM C1018 standard);
- MasterEmaco S 444 FR is characterized by a toughness index that makes it at least 20 times more ductile than a non-fiber-reinforced MasterEmaco with rigid fibers;
- contrasted expansion in air (monolithicity with the support): the ability to provide a contrasted expansion with the mortar curing in the air in the most demanding exposure conditions (such as those of restoration with large surfaces exposed to air), allows MasterEmaco S 444 FR to obtain monolithicity with the support concrete; MasterEmaco S 444 FR, subjected to the bowing / bowing test, shows already after 24 hours a bowing (□) of the specimen which demonstrates, in a simple and immediate way, the effective ability of the product to guarantee contrasted expansion in air; materials that show on the other hand, a bending, ie lifting at the edges (□), would be inadequate for restoration interventions because characterized by shrinkage and therefore unable to guarantee monolithicity with the support;
- resistance to cracking in the plastic phase: to combat micro-cracking in the plastic phase, MasterEmaco S 444 FR is enriched with PAN polyacrylonitrile fibers;
- resistance to long-term cracking: this fundamental requirement for the durability of the restoration can be assessed through the O Ring test. MasterEmaco S 444 FR does not show any cracks even after long curing;
- resistance to aggressive environmental agents: MasterEmaco S 444 FR, thanks to the very particular chemistry and nature of its components, is absolutely impermeable to water, aggressive environmental agents such as chlorides and sulphates,

MasterEmaco S 444 FR

R4 high-ductility pourable mortar with corrosion-resistant metal fibers. With contrasted expansion, high durability for repair of reinforced concrete. from 10 to 100 mm.

resists freeze / thaw cycles (thermal compatibility) and is not subject to carbonation phenomena.

In compliance with the European Regulation (EU No 305/2011 and EU No. 574/2014) the product is provided with the CE marking according to UNI EN 1504-3 and the relative DoP (Declaration of Performance).



CONSUMPTION

- 20 kg/m² for cm thickness
- Component B MasterEmaco A 400 (when used): minimum dosage 0,25% on the powder weight

PACKAGING

- 25 kg bag
- Component B MasterEmaco A 400: 5 kg can

STORAGE

Store the product in a dry and sheltered place at a temperature anywhere between 5 and +35°C.

FIBER

The special steel fibers contained in MasterEmaco S 444 FR have the following characteristics:

| Caratteristiche | |
|---|-------------|
| Fibre shape | Hooked ends |
| Material | Steel |
| Length (mm) - according to EN 14889-1 (mm): 30 | 30 mm |
| Diameter(mm)- according to EN 14889-1 (mm): 0,38 | 0,38 mm |
| Tensile Strength (N/mm ²) - according to EN 14889-1 | >3070 MPa |
| Modulus of elasticity (GPa) - according to EN 14889-1 | 210 GPa |
| Elongation at break - according to EN 14889-1 (%) | 0.8 |

MasterEmaco S 444 FR

R4 high-ductility pourable mortar with corrosion-resistant metal fibers. With contrasted expansion, high durability for repair of reinforced concrete. from 10 to 100 mm.

| Technical Information | | | |
|--|---|---|--|
| EN 1504-3 class | | R4 | |
| Typology | | CC | |
| Granulometry | | Max 2,5 mm | |
| Chloride content EN 1015-17 | | <0.05% | |
| Colour of mix | | Grey | |
| Consistency of mix | | Rheodynamic | |
| Mixing ratio | | 3.25-3.50 25 kg bag (13-14%) | |
| Temperature of application | | From 5° a 35°C | |
| Pot life | | 80 minutes | |
| Packaging | | 25 kg.bag | |
| Consumption | | 20 kg/m ² thickness 1 cm | |
| Minimum thickness | | 10 mm | |
| Maximum thickness | | 100 mm | |
| Essential characteristic in accordance to 1504-3 with a dosage of water of 16% Without MasterEmaco A 400 | | Limits and classes | Performances |
| Expansion characteristics with air curing: | UNI 8147 modified | | 1 day > 0,04 % |
| Expansion characteristics with air curing: | Down/up warping test | | Up-warping ∩ |
| Adhesion to concrete | UNI EN 1542 on MC 0.40 substrate (with w/c ratio = 0.40) according to UNI EN 1766 | ≥ 2,0 MPa | ≥ 2,0 MPa |
| Resistance to accelerated carbonation | UNI EN 13295 | Carbonation depth ≤ that of reference concrete MC 0.45 (with w/c ratio = 0.45) according to UNI EN 1766 | Specification obsolete |
| Resistance to freezing-thawing cycles with deicing salts measured as adhesion | UNI EN 1542 after cycles UNI EN 13687/1 on MC 0.40 substrate | ≥ 1,5 MPa | ≥ 2,0 MPa |
| Water impermeability measured as capillary absorption coefficient | UNI EN 13057 | ≤ 0,5 kg·m ⁻² ·h ^{-0,5} | ≤ 0,1 kg·m ⁻² ·h ^{-0,5} |
| Elastic modulus | UNI EN13412 | a 28 d ≥ 20000 MPa | 27.000 (± 2.000) MPa |
| Compressive strength, | UNI EN 12190 * | at 28 days ≥ 45 MPa | 1 g > 30 MPa 7 gg > 50 MPa 28 gg > 70 MPa |
| Test method for metallic fibre concrete - Measuring the flexural tensile strength (limit of proportionality (LOP), residual) | EN 14651 | | fR1k = 6,8 MPa fR2k = 8,5 MPa fR3k = 7,4 MPa fR4k = 6,4 MPa |
| Pull-out resistance of steel bars | RILEM-CEB-FIP RC6-78 | - | >25MPa |
| Impermeability to water measured as resistance to water penetration under direct pressure | UNI EN 12390/8 | - | Average penetration depth < 5 mm |
| Cracking test (Ring test) | | | No crack after 180 days |
| Abrasion resistance test by rotating disc | UNI EN 1338 | | CLASS 4 MARK I (maximum achievable value) |
| Toughness or impact strength characteristics, | ASTM C1018 | Load for first crack | > 20 KN |
| Toughness or impact strength characteristics, | ASTM C1018 | Toughness index | I ₂₀ > 20 |

MasterEmaco S 444 FR

R4 high-ductility pourable mortar with corrosion-resistant metal fibers. With contrasted expansion, high durability for repair of reinforced concrete. from 10 to 100 mm.

APPLICATION SHEET

PREPARING THE SUBSTRATE

The removal of incoherent or contaminated concrete must take place by means of hydro demolition or mechanical chiselling performed with light breakers powered by compressed air for a thickness determined by the designer on the basis of preliminary investigations aimed at identifying the state of conservation of the structure, adopting all the necessary precautions to avoid damage to the structures.

The surface of the support concrete must be macroscopically rough (roughness of about 5 mm in depth) in order to obtain maximum adhesion between the support and the restoration material. Macro-roughness is essential for the contrasted expansion mechanism to be realized, which is the basis of the functioning of expansive conglomerates in the air

CLEANING REINFORCED BARS

Incoherent or contaminated concrete that surrounds the reinforcing rods will need to be removed. Any exposed reinforcing rods must be cleaned of rust by mechanical brushing or sandblasting / hydro-sandblasting; if the removal of degraded or contaminated concrete has been carried out with hydrodemolition, this generally also guarantees a suitable cleaning of the reinforcing bars

PLACING ADDITIONAL STRUCTURAL REINFORCEMENTS

When it is necessary, for structural reasons, it is possible to add reinforcements, these must be installed ensuring an adequate concrete cover in compliance with the regulations in force

POSITIONING OF ADDITIONAL STRUCTURAL NAILS

For particularly large surfaces, and / or in the presence of low-quality supporting concrete, mechanical connections (dowels, rivets, etc.) will be placed in holes with a diameter of at least double the diameter of the bar and sealed with MasterEmaco. The density and diameter of these connections will be established, from time to time, by the Designer and / or by the D.L.

CLEANING AND SATURATION OF CONCRETE

Cleaning and saturation of the substrate concrete should preferably be carried out with pressurised water (80 ÷ 100 atm and using hot water in winter). This operation is crucial in order to prevent the concrete substrate to steal water from the mix. Inaccurate saturation would lead to the loss of adherence and to the cracking of the added material. The use of pressurised water also guarantees effective cleaning of the surfaces in order to remove dust and small loose parts there may still be after the milling of the concrete. The cleaning and saturation of the surfaces are crucial operations for obtaining high adherence values between the substrate and the added material.

In case of low temperatures, before applying the product, make sure there is no superficial ice and eliminate it if there is any.

APPLICATION TEMPERATURE

MasterEmaco S 444 FR can be applied when the ambient temperature is between +5 ° C and + 35 ° C.

When the temperature is 5 ÷ 10 ° C the development of mechanical resistance occurs more slowly; it is recommended to store bags of MasterEmaco in a heated environment, to use heated mixing water (30 ÷ 50 ° C), to saturate the substrate with hot water, to apply the mortar in the middle of the day.

It is recommended not to apply at temperatures below + 5 ° C, as indeed should be the case for any cement conglomerate if no special precautions are taken.

When the temperature is 30 ÷ 40 ° C it is recommended to keep the bags of MasterEmaco in a cool place, to use low temperature mixing water, to apply the mortar in the cooler hours.

PREPARING THE MIXTURE

The mixing must be carried out in a cement mixer or in the mixer of the plaster sprayer and continue until a plastic, homogeneous and lump-free mixture is obtained; the duration of mixing depends on the effectiveness of the mixer used and must in any case be less than 6-7 minutes. A drill with whisk can be used to mix small quantities. Hand mixing is not recommended

MasterEmaco S 444 FR

R4 high-ductility pourable mortar with corrosion-resistant metal fibers. With contrasted expansion, high durability for repair of reinforced concrete. from 10 to 100 mm.

Each 25 kg bag of MasterEmaco S 444 FR must be mixed for its entire content with 3.25-3.50 (13-14%) liters of water.

The use of component B (MasterEmaco A 400, an additive that allows to reduce the shrinkage in the plastic and hygrometric phase, improving the curing), with a minimum dosage of 0.25%, is especially indicated in the case of restorations with large surfaces exposed to air and in the absence of correct maturation. It also allows greater maintenance of workability in summer climates. In the case of multi-layer applications, fresh on hardened, MasterEmaco A 400 must be added only in the final layer and not in the lower layers.

Any additions of aggregate must be checked in advance on site with test mixes to test their performance

APPLICATION

MasterEmaco S 444 FR must be applied on macroscopically roughened, coherent, clean and water saturated surfaces.

At the time of application, the support must be saturated with a dry surface and all free water that may be present must be removed. MasterEmaco S 444 FR must be applied by casting with a fluid or superfluid consistency. For applications with reduced thickness and / or in the presence of reinforcement, the utmost attention must be paid to the mixing and application phase, possibly consulting our Technical Service.

It is always necessary to ensure perfect compaction of the material, possibly providing even slight vibration.

In the case of flooring, the non-slip finish (in cases, for example, of road toll booths, industrial floors, etc.) can be achieved by passing after casting, with a steel bristle broom.

Mechanized application can take place with non-continuous cycle screw or piston pumps from specialized manufacturers (such as Turbosol, PFT, Putzmaister, Bunker, Imer, etc.). For further details consult our Technical Service.

HARDENING

It is always advisable to carry out a correct wet maturation of the surfaces exposed to the air. In the case of particularly adverse conditions characterized by low relative humidity and high ventilation, both in hot and cold

climates, in the absence of humid ripening, we recommend using the products of the MasterKure line.

PROTECTION

To lengthen the useful life of the structure, enhancing durability even in areas which require no maintenance, it is always recommended to apply a protective system of the MasterProtect line on the entire structure. This acts as a barrier to the entrance of aggressive environmental agents, also improving the aesthetic appearance of the structure.

SAFETY INSTRUCTION

For information on the correct and safe use, transport, storage and disposal of the product, consult the most recent Safety Data Sheet.

OTHER SERVICES

For price analysis, specifications, supplementary brochures, references, reports and technical assistance, visit the website www.master-builders-solutions.com/it-it or contact infomac@mbcc-group.com.

Scan the QR code to visit the product page and download the latest version of this datasheet.



MasterEmaco S 444 FR

R4 high-ductility pourable mortar with corrosion-resistant metal fibers. With contrasted expansion, high durability for repair of reinforced concrete. from 10 to 100 mm.

Since 16/12/1992, Master Builders Solutions Italia Spa has been operating under a Certified Quality System compliant with the UNI EN ISO 9001 Standard. Furthermore, the Environmental Management System is certified according to the UNI EN ISO 14001 Standard and the Safety Management System is certified according to the UNI ISO 45001 Standard.

Master Builders Solutions Italia Spa

Via Vicinale delle Corti, 21 – 31100 Treviso – Italia

T +39 0422 429200 F +39 0422 421802

www.master-builders-solutions.com/it-it

e-mail: infomac@mbcc-group.com

For further information, please consult the local Technician of Master Builders Solutions. The technical advice on how to use our products, either written or verbally given, are based on the current state of our scientific and practical expertise, and does not imply the assumption of any guarantee and/or responsibility for the final results of works executed using our products.

Therefore, the customer is not exempted from the exclusive task and responsibility of verifying the suitability of our products for the intended use and purposes.

This version supersedes all the previous ones.