

# MasterEmaco S 484 FR

**R4 ductile castable mortar with HPF fibers. With contrasted expansion and very high durability for restoring the reinforced concrete from 10 to 100 mm without contrast reinforcement.**

## MATERIAL DESCRIPTION

MasterEmaco S 484 FR is a cementitious mortar, pourable, with contrasted expansion in the air, resistant to aggressive environmental agents, reinforced with polymeric fibers, also sprayable and with very high tenacity. The special reinforcement fibers have these characteristics: length 12 mm, diameter 15 microns, tensile strength 1700 MPa, elasticity modulus 72000 MPa. In the absence of wet maturation, a condition not always achievable on site, to improve the air expansion of MasterEmaco S 484 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 484 FR has been designed to restore and / or reinforce any concrete structure.

It can be applied by casting on macroscopically roughened concrete (roughness of about 5 mm), in intervention thicknesses between 10 and 100 mm without applying electrowelded mesh. The main applications of MasterEmaco S 484 FR are:

- structural adaptation of floors subject to variations in loads, destinations of use and seismic adaptations;
- reinforcement of beams, pillars and curbs subject to variations in loads or intended use, seismic adjustments;
- restoration of rigid floors in reinforced concrete, industrial floors, warehouses, parking lots;
- reinforcement of hydraulic structures subject to cavitation or solid transport.

## FEATURES AND BENEFITS

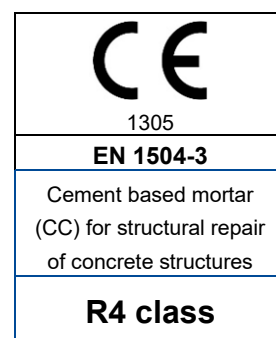
The peculiar characteristics of MasterEmaco S 484 FR are:

- ductile behavior, thanks to the use of special high-tenacity polymeric fibers which also allow the spray application of the product (characteristics that cannot be combined to date). It therefore guarantees high resistance to dynamic stresses, impacts or hydraulic stresses ;
- contrasted expansion in the air (monolithicity with the support): the ability to provide a contrasted expansion with the curing of the mortar in the air, i.e. in real construction site conditions, allows MasterEmaco S 484 FR to obtain monolithicity with the supporting

concrete; MasterEmaco S 484 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 the air; materials showing instead a bending, ie lifting at the edges, would be inadequate for restoration interventions because they are 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 484 FR in addition to the fibers necessary to counteract expansion, is also enriched with special inorganic fibers with very high dispersibility that emphasize the rheological characteristics of the mortar;
- resistance to long-term cracking: this fundamental requirement for the durability of the restoration can be assessed by means of the O Ring test. MasterEmaco S 484 FR does not show any cracks even after long curing;
- resistance to aggressive environmental agents: MasterEmaco S 484 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, 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).



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## CONSUMPTION

- 19.5 kg / m<sup>2</sup> per cm of thickness
- Possible Component B MasterEmaco A 400 (when used): minimum dosage 0.25% of the weight of the powder

## PACKAGING

- 25 kg bag
- Possible Component B MasterEmaco A 400: 5 kg tank

## STORAGE

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

Fiber Features	
Fibre shape	linear
Material	HPME
Length (mm) - according to EN 14889-2 (mm):	12
Diameter (mm) - according to EN 14889-2 (micron):	15
Tensile Strength (N/mm <sup>2</sup> ) - according to EN 14889-2	2800 MPa
Modulus of elasticity (GPa) - according to EN 14889-2	72 GPa
Elongation at break - according to EN 14889-2 (%)	3.5

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Technical Information			
1504-3 class		R4	
Typology		CC	
Granulometry		Max 2.5 mm	
Chloride content EN 1015-17		<0.05%	
Colour of mix		Grey	
Mixing ratio		3.50-4.00 l for bag (14-16%)	
Consistency of mix		Pourable	
Temperature of application		From 5°C to 35°C	
Packaging		25 kg bag.	
Consumption		19.5 kg/m <sup>2</sup> for 1 cm	
Workability time (at 20°C)		80 minutes	
Minimum thickness		10 mm	
Maximum thickness in single layer		100 mm	
Essential characteristic in accordance to 1504-3 with a dosage of water of 17.5%		Limits and class	Performance
Expansive characteristics with air curing	- UNI 8147 modified - Arching / Winding test		1 g > 0.04 % Arching $\cap$
Crack test (O Ring test)			No crack after 180 days
Adhesion to concrete	UNI EN 1542 on MC 0.40 substrate (with w/c ratio = 0.40) according to UNI EN 1766	$\geq 2,0$ MPa	$\geq 2,0$ MPa
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	$\geq 1,5$ MPa	$\geq 2,0$ MPa
Resistance to thunder shower cycles measured as adhesion	UNI EN 1542 after cycles UNI EN 13687/1 on MC 0.40 substrate	$\geq 1,5$ MPa	$\geq 2,0$ MPa
Resistance to thermal cycles without deicing salts measured as adhesion	UNI EN 1542 after cycles UNI EN 13687/1 on MC 0.40 substrate	$\geq 1,5$ MPa	$\geq 2,0$ MPa
Resistance to accelerated carbonation	UNI EN 13295	Carbonation depth $\leq$ that of reference concrete MC 0.45 (with w/c ratio = 0.45) according to UNI EN 1766	Specification obsolete
Water impermeability measured as capillary absorption coefficient	UNI EN 13057	$\leq 0,5$ kg·m <sup>-2</sup> ·h <sup>-0,5</sup>	$\leq 0,25$ kg·m <sup>-2</sup> ·h <sup>-0,5</sup>
Elastic modulus	UNI EN 13412	a 28 gg $\geq 20.000$ MPa	28000 MPa
Compression strength	UNI EN 12190	a 28 gg $\geq 45$ MPa	1 d > 25 MPa 7 dd > 55 MPa 28 dd > 65 MPa
Tensile strength in bending	UNI EN 196-1	-	1 d > 6 MPa 7 dd > 8 MPa 28 dd > 10 MPa
Impermeability to water measured as resistance to water penetration under direct pressure	UNI EN 12390/8	-	Average penetration depth < 5 mm
Pull-out resistance of steel bars	RILEM-CEB-FIP RC6-78	-	>25 MPa
Test method for metallic fibre concrete - Measuring the flexural tensile strength (limit of proportionality (LOP), residual) minimum requirements	EN 14651		$f_{cf,Lk}^f = 5,21$ MPa $f_{R,1k} = 5,52$ MPa $f_{R,2k} = 4,03$ MPa $f_{R,3k} = 2,90$ MPa $f_{R,4k} = 2,18$ MPa

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## APPLICATION SHEET

### PREPARING THE SUBSTRATE

The thickness to be removed must be determined by the designer on the basis of preliminary investigations aimed at identifying the state of conservation of the structure.

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. The macro-roughness is essential for the contrasted expansion mechanism to be realized, which is the basis of the operation 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; 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, to add new reinforcements, you must guarantee at least a 2 cm cover. To ensure a correct anchorage of the contrast mesh, use reinforcement steel sections inserted in holes with a diameter at least twice that of the bar and sealed with MasterFlow 960. The density and the diameter of said nailing will be established on a case-by-case basis by the Site Manager.

### FORMWORK

MasterEmaco S 484 FR can also be poured into formwork. The formwork must be made of material with an adequate strength and enough resistance to water to

avoid subtracting water from the mixture, firmly anchored, contrasted and sealed to withstand the pressure exerted by the mortar and prevent losses of material.

The wooden formwork must be saturated before the casting stage.

### CLEANING AND SATURATION OF CONCRETE

Cleaning and saturation of the substrate concrete must 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 mixture. Inaccurate saturation leads 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 inconsistent parts that may be present 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.

### APPLICATION TEMPERATURE

MasterEmaco S 484 FR can be applied when the ambient temperature is between +5°C and +35°C. When the temperature is 5 ÷ 10°C, the mechanical strengths develop more slowly. It is recommended to store the bags of EMACO in a heated environment, use heated mixing water (30 ÷ 50°C), saturate the substrate with hot water and apply the mortar during the warmer hours of the day.

Do not apply at temperatures below + 5°C, as which also applies to any cement mix if you do not take special precautions.

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

### PREPARING THE MIXTURE

It must be mixed in a concrete mixer until a plastic, smooth mixture which is free of lumps is obtained. When mixing small amounts, you can also use a power drill; hand mixing, on the other hand, is not recommended. It is always necessary to mix the entire content of each bag.

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Each 25 kg bag of MasterEmaco S 484 FR must be mixed for its entire content with 3,5 ÷ 4 litres of water (14,5-16%). The use of component B (MasterEmaco A 400, admixture that reduces plastic and hygrometric shrinkage improving the curing) with a minimum dosage equal to 0,25%, is recommended in case of repairs of extended surfaces exposed to air and in case of incorrect curing. Furthermore, it allows a longer workability in hot periods. If an application in more layers is required (wet on hardened), the component B MasterEmaco A 400 must be used only in the final layer and not in the lower ones. Any addition of aggregate must be previously checked on site using testing dough to check the performance.

## APPLICATION

At the time of application, the substrate must be saturated with a dry surface and any free water there may be must be removed.

MasterEmaco S 484 FR must be poured also between formwork items with a fluid consistency. For casts performed between formwork items, the mortar must be poured constantly and only on one side to let out the air. Always ensure perfect compression of the material, also with slight vibration if necessary.

The mechanized applications can take place with not continuous-cycle worm or piston pump, by specialized manufactures (such as Turbosol, Putzmaister, Bunker, Imer, etc). For further details consult our Technical Support.

## FLOATING

Proper floating is essential to effectively counter the formation of micro-cracks resulting from plastic shrinkage. Floating must be applied with a sponge float after sufficient time has elapsed following the application, depending on the weather.

The time interval between the application and the float finish depends on the first hardening phase of the mortar, which is determined by placing your hand on the surface and your fingers do not sink but leave a light mark on the mortar.

## 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](http://www.master-builders-solutions.com/it-it) or contact [infomac@mbcc-group.com](mailto:infomac@mbcc-group.com).

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



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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**

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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.