

MasterEmaco S 465 MC

Air-cured cementitious grout with restrained expansion and high durability for repairing reinforced concrete structures with thickness from 60 to 100 mm.

DEFINITION

MasterEmaco S 465 MC is an air-cured rheoplastic (fluid) or rheodynamic (superfluid, self-compacting without vibration) cementitious grout with restrained expansion that contains flexible inorganic fibres and is resistant to environmental agents.

In the absence of wet curing, a condition not always achievable on site, MasterEmaco S 465 MC must be mixed with its component B (MasterEmaco A 400) to enhance expansion during air curing. This admixture reduces plastic and hygrometric shrinkage improving the curing.



MAIN FIELDS OF APPLICATION

MasterEmaco S 465 MC has been designed to repair or thicken any concrete structure.

It is applied by casting also into formwork on macroscopically roughened concrete (surface irregularity of approx. 5 mm) for a repair thickness between 6 and 10 cm inclusive.

For work with thickness exceeding 10 cm, washed impurity-free aggregate, having a minimum diameter of more than 10 mm and a maximum diameter in relation to the thickness of the cast, must be added to the mix in the

ratio of 35% of the total weight of the dry mix.

By properly dosing the mixing water, the product can be used both to repair structures that have a slight transverse or longitudinal slope and for works where maximum fluidity is required, until obtaining a self-compacting mortar.

FEATURES

The features peculiar to MasterEmaco S 465 MC are:

- restrained expansion with air curing (monolithicity with the substrate): the ability to provide restrained expansion with air curing of the grout, in other words in real worksite conditions, means that MasterEmaco S 465 MC becomes one with the substrate concrete;
- a test specimen of MasterEmaco S 465 MC subjected to the down/up warping test only 24 hours after application shows up-warping (∩), which very simply and immediately proves the effective capacity of the product to guarantee restrained expansion in air;
- materials that instead show down-warping, that is, a lifting at the edges (∪), would be unsuitable for repair work because they shrink and are therefore unable to guarantee monolithicity with the substrate;
- rheoplastic (fluid) or rheodynamic consistency (depending on the amount of mixing water): MasterEmaco S 465 MC has been designed to flow even in structures that are heavily reinforced or have a complex shape. Its particular rheology allows it to compact by itself without requiring vibration;
- long-term resistance to cracking: this basic requirement for the duration of the repair work may be assessed through the O Ring test. MasterEmaco S 465 MC shows no signs of cracks after even long curing;
- resistance to crazing in the plastic phase: to counter micro-cracking in the plastic phase MasterEmaco S 465 MC is enriched with special inorganic fibres with very high dispersibility, which enhance the rheological characteristics of the grout;

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STORAGE

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

- **resistance to environmental agents:** thanks to the very special chemical nature of its components, MasterEmaco S 465 MC is totally waterproof, impermeable to environmental agents such as chlorides and sulphates, resists freeze-thaw cycles (thermal compatibility) and is not subject to carbonation.

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 934-2 and the relative DoP (Declaration of Performance).

 1305
EN 1504-3 CC mortar for Structural and non-structural repair. EN 1504-3 methods 3.1/3.2/4.4/7.1/7.2.
R4 Class

CONSUMPTION

- 22 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

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TYPICAL PERFORMANCE

Technical Information			
Consistency		Powder and fibres	
Colour of mix		Grey	
Mixing ratio		Rheoplastic consistency: 2,00 litres of water per 25 kg bag (8%) Rheodynamic consistency: 2,40 litres of water per 25 kg of bag (9,5%)	
Consistency of mix		Fluid or superfluid	
Temperature of application		From +5°C to +35°C	
Pot life of mix		80 min	
Essential characteristic in accordance to EN 1504-3 and 15046 with a dosage of water of 15% without MasterEmaco A 400		Acceptance limits	Performance
Expansion characteristics with air curing	UNI 8148 modified	1 g > 0,04 %	1 g > 0,04 %
Expansion characteristics with air curing	Down/up warping test	Up-warping ∩	Up-warping ∩
Cracking test (O Ring test)		No crack after 180 days	No crack after 180 days
Adhesion to the concrete	UNI EN 1542 on substrate MC 0.40 (having 0.40 w/c ratio) in accordance with UNI EN 1766.	> 2 MPa	> 2 MPa
Resistance to accelerated carbonation	Depth of carbonation ≤ that of the reference concrete type MC 0.45 (having 0.45 w/c ratio in accordance with UNI EN 1766)	Specification passed	Specification passed
Thermal compatibility (freeze-thaw cycling with de-icing salts)	Measured as adhesion UNI EN 1542 after cycles UNI EN 13687/1 on substrate MC 0.40 (having w/c ratio = 0.40) according to UNI EN 1766	> 2 MPa	> 2 MPa
Permeability to water	Measured as liquid-water transmission rate, UNI EN 13057	< 0,1 kg·m ⁻² ·h ^{-0.5}	< 0,1 kg·m ⁻² ·h ^{-0.5}
Permeability to water	Measured as depth of penetration of water under direct pressure, UNI EN 12390/8		average depth of penetration < 5 mm
Restrained expansion	UNI 8148	1 day > 0,04 %	1 day > 0,04 %
Compressive strength	UNI EN 12390/3-	1 day > 25 MPa 7 days > 55 MPa 28 days > 70 MPa	1 day > 25 MPa 7 days > 50 MPa 28 days > 65 MPa
Compressive strength	UNI EN 12390/3		1 day > 25 MPa 7 days > 50 MPa 28 days > 65 MPa
Flexural strength	UNI EN 12390/5	1 day > 4 MPa 7 days > 6 MPa 28 days > 7 MPa	1 day > 4 MPa 7 days > 6 MPa 28 days > 7 MPa
Flexural strength	UNI EN 196/1	-	1 g > 7 MPa 7 gg > 9 MPa 28 gg > 10 MPa
Resistance to extraction of steel rods	RILEM-CEB-FIP RC6-78	> 25 MPa	> 25 MPa
Modulus of elasticity	UNI 6556	30.000 (± 2.000) MPa	30.000 (± 2.000) MPa

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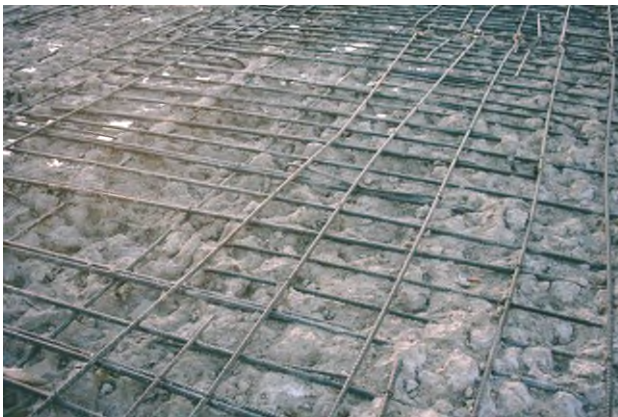
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APPLICATION SHEET

REMOVAL OF THE DETERIORATED CONCRETE

The engineer decides the thickness to be removed on the basis of the preliminary surveys aimed at identifying the state of preservation of the structure.

Loose or contaminated concrete must be removed preferably by hydro-demolition or, alternatively, by mechanical chipping using lightweight compressed-air operated concrete breakers and taking all the necessary precautions to avoid damaging the structures.



The surface of the concrete substrate must be macroscopically rough (surface irregularity approx. 5 mm deep) to obtain maximum bond between the substrate and the repair material. The macro-roughness is indispensable for the restrained expansion mechanism, which is essential for the success of shrinkage compensated cementitious mixes.

CLEANING THE REINFORCEMENT RODS

The loose or contaminated concrete around the reinforcement rods must be removed. Any exposed reinforcement rods must have the rust removed by mechanical brushing or sandblasting. If the damaged or contaminated concrete has been removed by hydro demolition, this usually guarantees suitable cleaning also of the reinforcement rods.

PLACING ADDITIONAL STRUCTURAL REINFORCEMENT

Should it be necessary for structural reasons to add reinforcement rods, they must be laid in situ prior to any weld mesh so that 2 cm thick concrete cover is guaranteed.

POSITIONING THE RESTRAINING WELD MESH

Whenever the reinforcement is exposed after removal of the damaged concrete or the additional reinforcement is unsuitable (reinforcement poorly distributed or with concrete cover > 3 cm), it is necessary to apply a weld mesh 5x5 cm and diameter 5 mm to counter the expansion of the grout in the outermost areas of the pour. For correct anchorage of the restraining mesh, use steel crop ends from the reinforcement rods inserted in holes with a diameter at least twice that of the rod and sealed with MasterEmaco.

The density and diameter of this riveting will be established case by case by the Management of Works.

FORMWORK

The forms must be made of adequately strong material, be sufficiently watertight to avoid absorbing or wicking water out of the grout and must be anchored, bucked and sealed to withstand the pressure of the grout and avoid loss of material.

Wood formwork must be saturated prior to casting.

CLEANING AND SATURATION OF CONCRETE

The concrete substrate must be cleaned and saturated preferably using water under pressure (80÷100 atm and warm water in winter). This is indispensable to prevent the concrete substrate taking water from the mix. Incomplete saturation would cause loss of adherence and cracking of the added material.

The use of water under pressure also ensures effective cleaning of the surfaces by removing dust and small loose particles that may still be present after the concrete has been scarified.

Cleaning and saturation of the surfaces are essential to obtain high values of adherence between the substrate and the applied material.

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APPLICATION TEMPERATURE

MasterEmaco S 465 MC may be applied at an ambient temperature anywhere between +5°C and +35°C.

Whenever the temperature is 5 ÷ 10°C the mechanical strength will develop more slowly; it is advisable to keep the bags of MasterEmaco S 465 MC in a heated environment, to use warm mixing water (30 ÷ 50°C), to saturate the substrate with warm water and to apply the grout in the central hours of the day.

Whenever the temperature at the time of application is between 30 ÷ 40°C it is advisable to keep the bags of MasterEmaco S 465 MC in a cool place, to use cold mixing water and to apply the grout during the coolest hours of the day.

PRAPARATION OF THE MIXTURE

Use a concrete mixer or the spraying machine mixer to mix until a lump-free, even plastic mix is obtained. Small quantities may be mixed with a drill with whisk attachment. Mixing by hand is not recommended. The whole contents of each bag must always be mixed at one time.

Each 25 kg bag of MasterEmaco S 465 MC must be mixed for its entire content with:

- to obtain a rheoplastic consistency (fluid), mix 25 kg bag with about 2,00 litres of water (8%) and with a minimum component B quantity of 0,25%;
- to obtain a rheodynamic consistency (superfluid, self-compacting), mix 25 kg bag with about 2,40 liters of water (9,5%) and with a minimum component B quantity of 0,25%.

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

MasterEmaco S 465 MC must be applied onto macroscopically roughened but cohesive surfaces that have been cleaned and saturated with water.

At the time of application, the substrate must be saturated but with a dry surface; in other words, any free water must be removed.

MasterEmaco S 465 MC is cast in situ continuously with superfluid consistency, placing it inside formwork from one side only to allow air to escape.

Its particular rheology means it can compact without requiring vibration and can flow even in structures that are heavily reinforced or have a complex shape.

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.

CURING

To obtain the best results with MasterEmaco products on site, correct curing is necessary.

PROTECTION

To increase the overall durability of the repair work, it is advisable to apply protection over the whole structure.

The MasterEmaco protection system is accomplished with the application of MasterProtect products.

SAFETY INFORMATION

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



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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.

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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.