BASF
We create chemistry

MasterEmaco S 465 MC

Ready-mixed air-cured cementitious grout with restrained expansion for repairing reinforced concrete structures with thickness from 6 to 10 cm by casting.

DEFINITION OF THE MATERIAL

MasterEmaco S 465 MC is a ready-mixed, air-cured rheodynamic (superfluid, self-compacting without vibration) cementitious grout with restrained expansion that contains flexible inorganic fibres and is resistant to environmental agents. To ensure restrained expansion in air MasterEmaco S 465 MC must be mixed with its part B.

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.

FEATURES

MasterEmaco S 465 MC meets the acceptance limits specified in the standard UNI EN1504/3

CE

1305

BASF Construction Chemicals Italia spa
Via Vicinale delle Corti, 21 Treviso
13
IT0015/01

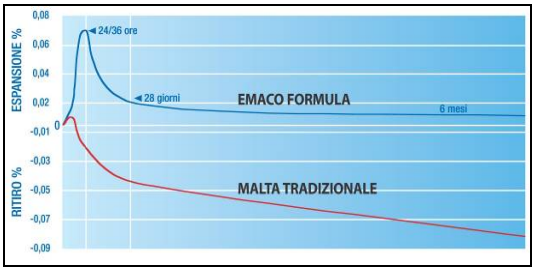
EN 1504-3

Betoncino CC per ripristini di strutture in calcestruzzo a base di cemento idraulico. EN 1504-3 metodi 3.1/3.2/3.3/4.4/7.1/7.2

Resistenza a compressione:	Classe R4
Contenuto di cloruri:	< 0,05%
Adesione al supporto:	> 2,0 MPa
Ritiro:	> 2,0 MPa (adesione dopo la prova)
Resistenza alla carbonatazione:	Specifica superata
Modulo elastico:	> 20 GPa
Compatibilità termica:	
Gelo-disgelo	> 2,0 MPa (adesione dopo i cicli)
Temporali	> 2,0 MPa (adesione dopo i cicli)
Cicli a secco	> 2,0 MPa (adesione dopo i cicli)
Assorbimento capillare:	$\leq$ 0,5 $Kg/m^2 \cdot h^{0,5}$
Reazione al fuoco:	Classe A1
Sostanze pericolose:	Conforme 5.4

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.



MASTER® BUILDERS SOLUTIONS

We create chemistry

MasterEmaco S 465 MC

Ready-mixed air-cured cementitious grout with restrained expansion for repairing reinforced concrete structures with thickness from 6 to 10 cm by casting.

- 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;
- rheodinamicity: 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 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;

- 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.

COVERAGE AND PACKAGING

22 kg/m^2 for cm thickness.

Packaging:

- 25 kg bag;
- Component B: MasterEmaco A 400 - 5 kg can (the dosage of B component is variable from 0,25% to l'1% on the powder weight).

MASTER® BUILDERS SOLUTIONS

We create chemistry

MasterEmaco S 465 MC

Ready-mixed air-cured cementitious grout with restrained expansion for repairing reinforced concrete structures with thickness from 6 to 10 cm by casting.

PERFORMANCE

The performances shown below are obtained with following UNI EN 13395/1 with a consistency of S5, in absence of bleeding.

Property	Acceptance limits	Performance
Expansion characteristics with air curing: - UNI 8148 modified - Down/up warping test	----	1 g > 0,04 % Up-warping ∩
Cracking test (O Ring test)	----	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, UNI EN 13295	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
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 after 50 cycles	> 2 MPa
Permeability to water measured as liquid-water transmission rate, UNI EN 13057	≤ 0,5 $kg \cdot m^{-2} \cdot h^{-0,5}$	< 0,1 $kg \cdot m^{-2} \cdot h^{-0,5}$
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 %
Compressive strength, UNI EN 12390/3	at 28 days ≥ 45 MPa	1 day > 25 MPa 7 days > 55 MPa 28 days > 70 MPa
Flexural strength, UNI EN 12390/5	----	1 day > 4 MPa 7 days > 6 MPa 28 days > 7 MPa
Resistance to extraction of steel rods, RILEM-CEB-FIP RC6-78	----	> 25 MPa
Modulus of elasticity, UNI 6556	at 28 days ≥ 20.000 MPa	30.000 (± 2.000) MPa

MASTER® BUILDERS SOLUTIONS

We create chemistry

MasterEmaco S 465 MC

Ready-mixed air-cured cementitious grout with restrained expansion for repairing reinforced concrete structures with thickness from 6 to 10 cm by casting.

APPLICATION SHEET

STORAGE

Store the product in a sheltered, dry place at a temperature anywhere between 5 and 40°C.

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 sand-blasting. 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 THE 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.

MASTER® BUILDERS SOLUTIONS

We create chemistry

MasterEmaco S 465 MC

Ready-mixed air-cured cementitious grout with restrained expansion for repairing reinforced concrete structures with thickness from 6 to 10 cm by casting.

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

APPLICATION TEMPERATURE

MasterEmaco S 465 MC may be applied at an ambient temperature anywhere between +5°C and +40°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.

PREPARING THE MIX

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 with 2.1 ÷ 2.22 litres (8.3 ÷ 9%) water. Expansion to compensate the shrinkage without wet curing is ensured by adding from 0,25 kg to 1% of B component for each bag.
If an application in more layers is required, the B component must not be used in the lower layers but only in the last one as previously indicated.
Using part B also gives longer workability times in summer.
Whenever the temperature is between 5 and 10° C, less than 0.5% of part B may be used to avoid excessive slowing down of the product setting times.
For applications of more than 10 cm thickness the mix must be extended with washed, impurity-free aggregate, having a minimum diameter of more than 10 mm and maximum diameter according to the thickness of the cast, in the quantity of 35% of the total weight of the dry mix.

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.

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.
For more details contact our technical service.

MASTER® BUILDERS SOLUTIONS

We create chemistry

MasterEmaco S 465 MC

Ready-mixed air-cured cementitious grout with restrained expansion for repairing reinforced concrete structures with thickness from 6 to 10 cm by casting.

From 16/12/1992 BASF Construction Chemicals Italia Spa operates under the Quality System in compliance with European Standard UNI-EN ISO 9001. The environmental management system of BASF Construction Chemicals Italia Spa is certified accordingly to UNI EN ISO 14001 and the System of Safety Management is certified accordingly to OHSAS 18001. Environment sustainability: Partner Green Building Council since 2009.

BASF Construction Chemicals Italia Spa
Via Vicinale delle Corti, 21 – 31100 Treviso – Italy
T +39 0422 429200 F +39 0422 421802
http:// www.master-builders-solutions.basf.it
e-mail: infomac@basf.com

For further information, please consult your local BASF Construction Chemicals Italia Spa representative.
The technical advice on how to use our products, either written or verbally given, are based on the present state of our best scientific and practical knowledge, and no guarantee and/or implicit or explicit responsibility are assumed on final results of works executed by the use of our products.
The owner, his representative, or the contractor is responsible for checking the suitability of our products as to the intended use and aims.

Supersedes all prior issues on this product.
May 2019

MASTER® BUILDERS SOLUTIONS