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MasterEmaco S 488 TIX

Cementitious premixed repair mortar, restrained expansion, thixotropic, indicated to repair concrete structures, for thickness from 1 to 5 cm. For thickness from 3 to 5 cm wire mesh is required.

DESCRIPTION

MasterEmaco S 488 TIX is an expansive mortar that, for its specific performances, is ideal for concrete repair for thickness from 1 to 5 cm in a single layer on vertical walls or/and on the ceiling of horizontal surfaces of any concrete structure, whether civil, industrial or infrastructural.

MasterEmaco S 488 TIX is specifically designed to restore thickness from 1 to 2 cm. The restrained expansion of the mortar is guaranteed by the macro roughness of the substrate (surface irregularity 5mm).

When a thickness exceeding 2 cm is required, welded mesh must be applied. Therefore, it should be remembered that for practical reasons (to ensure a gap of 1 cm between the mesh and the substrate and a covering over the reinforcement of 2 cm) a thickness of at least 4 cm must be applied when there is reinforcement.

MasterEmaco S 488 TIX is free from chlorides and reactive metal powders.

FIELD OF APPLICATION

MasterEmaco S 488 TIX is specifically designed to assure a high durability to the restoration of damaged structures, guaranteeing:

- compatibility and excellent bond strength to the substrate;
- resistance to the aggressive action of environment;
- rapid and simple application.

CHARACTERISTICS

MasterEmaco S 488 TIX meets the acceptance limits specified in the standard UNI EN 1504-3.

CE

1305

BASF Construction Chemicals Italia spa
Via Vicinale delle Corti, 21 Treviso
13
IT0017/01

EN 1504-3

Malta 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·h^{0,5}
Reazione al fuoco:	Classe A1
Sostanze pericolose:	Conforme 5.4

The peculiar features of the materials are:

Restrained expansion without damp curing

The capacity to provide restrained expansion in an air-cured mortar (due to the addition of the component B added in the mix in a range of 1% by dry mortar weight), therefore closer to real site conditions, is a significant technological breakthrough offering considerable practical benefits to contractors and engineers. The mechanism is one of true chemical pre-stressing.

The initial expansion of the mortar, restrained by the surface roughness of the substrate (irregularity 0,5 cm) or by any welded mesh, is used to compensate for the subsequent hygrometric shrinkage, that would otherwise cause the repair mortar to become detached from the old concrete, thereby making the work futile.

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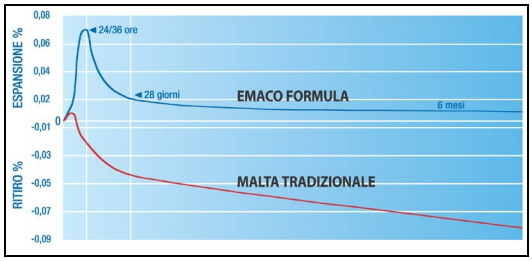

The capacity to provide restrained expansion with air curing has been measured by UNI 8147 (modified), curing the test pieces in air and not in water in order to simulate real application and working conditions.
A quick test has been perfected, called the down/up warping test, which is effective for simulating the dimensional behaviour of a repair mortar applied on a rough substrate.
If a mortar shows shrinkage, the test piece, already after 24 hours, will show a rising of the outside edges (∪) and therefore down-warping, while in the case of expansion there will be up-warping (∩).
The test is therefore quick and easy and may also be used on site to decide whether or not a repair mortar is acceptable.
In the down/up warping test MasterEmaco S 488 TIX with the addition of part B produces a marked up-warping, proving its high capacity to provide restrained expansion; this behaviour is a guarantee for the monolithic nature of the repair work.
MasterEmaco S 488 TIX without part B shows instead a planar (—) behaviour, that testify its capacity to compensate the hygrometric shrinkage but not to provide restrained expansion without damp curing.

Long-term resistance to cracking (O Ring test)
The O Ring test is an accelerated test used to highlight the tendency of a repair mortar to crack. The test consists of casting into a ring-shaped mould, the faces of which (inside and outside) provide the contrast.
After 24 hours just the outside support is removed, leaving the internal ring the task of containing the hygrometric shrinkage. This shrinkage causes tensile stress which, in most cases, lead to radial cracking of the mortar.
MasterEmaco S 488 TIX shows no signs of cracking even with long curing; this indicates high durability.

Resistance to crazing in the plastic phase
To minimise the effects of shrinkage in the plastic phase, possible in a very dry and ventilated environment, MasterEmaco S 488 TIX is modified with especially selected PAN polyacrylonitrile-based fibres, which allow the effective distribution of stress. This property, associated with to a correct float finish prevents cracks due to shrinkage in the plastic phase.

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PERFORMANCE:

The performances shown below are obtained with a consistency of 170-180 mm, UNI EN 13395/1, in absence of bleeding.

Propriety	Acceptance limits	Performance
Expansive characteristics with air curing: - UNI 8147 modified - Down and up-warping test	----	1 g > 0,04 % Down-warping ∩
Cracking test (O Ring test)	----	No crack after 180 days
Adhesion to concrete, UNI EN 1542 on supports MC 0,40 (water/cement ratio = 0,40) according UNI EN 1766	≥ 2 MPa	> 2 MPa
Resistance to accelerated carbonation, UNI EN 13295	Depth of carbonation ≤ to the one of the reference concrete MC 0,45 type	Pass
Thermal compatibility (freeze and thaw cycles with deicing salt) measured as adhesion UNI EN 1542 after the cycles UNI EN 13687/1 on support type MC 0,40 (water/cement ratio = 0,40) according to UNI EN 1766	≥ 2 MPa after 50 cycles	> 2 MPa
Waterproof measured as capillary absorption factor, UNI EN 13057	≤ 0,5 $kg \cdot m^{-2} \cdot h^{-0,5}$	< 0,15 $kg \cdot m^{-2} \cdot h^{-0,5}$
Averange depth of penetration of water, UNI EN 12390/8	----	< 5 mm
Exspansion, UNI 8147	----	1 day > 0,04 %
Compressive strength, UNI EN 12190 *	at 28 days ≥ 45 MPa	1 day > 20 MPa 7 days > 50 MPa 28 days > 60 MPa
Flexural strength, UNI EN 196/1	----	1 day > 4 MPa 7 days > 6 MPa 28 days > 8 MPa
Pull out strength of steel bars, RILEM-CEB-FIP RC6-78	----	> 25 MPa
Elastic modulus, UNI EN 13412	at 28 days ≥ 20.000 MPa	28.000 (± 2.000) MPa

CONSUMPTION AND PACKAGING

18,4 kg/m^2 for cm of 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).

APPLICATIVE PROCEDURE

STORAGE

Keep the product in a sheltered and dry place.

REMOVAL OF DETERIORATED CONCRETE

The thickness to be removed will be decided by the designer on the basis of preliminary investigations aimed at identifying the state of the structure.

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

The surface of the base concrete should be roughened (surface irregularity of about 5 mm in depth). The above macro-roughness is indispensable for the mechanism of restrained expansion, which is essential for mortars with compensated shrinkage to work.

CLEANING THE REINFORCEMENT RODS

Loose or contaminated concrete covering the reinforcement rods should be removed. Any exposed reinforcement rods must be cleaned free of rust by mechanical brushing or sanding; whenever damaged or contaminated concrete has been removed by water-

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demolition, this generally also guarantees suitable cleaning of the reinforcement rods.

POSITIONING ADDITIONAL STRUCTURAL REINFORCEMENT

When it is necessary to add reinforcement for structural reasons, it should be laid before any welded mesh. A concrete thickness of 2 cm over the reinforcement must be guaranteed.

POSITIONING CONTRAST WIRE MESH

If the reinforcement found out after the removal of the deteriorated concrete and/or the additional reinforcement is not suitable (little distributed reinforcement and/or with a concrete thickness over the reinforcement > 3 cm) to guarantee an effective contrast to the expansive capacities of the concrete with MasterEmaco it is necessary to apply a welded mesh that contrast the expansion of the most outside side of the throw. For the correct anchorage of the welded mesh some steel mesh crops will be inserted in the holes with a diameter double of that of the rod and sealed with MasterEmaco. The density and the diameter of such riveting will be established case by case by the job site manager.

For a successful repair work, correct positioning of the wire mesh is very important:

- If the mesh is placed in contact with the support, the outermost part of MasterEmaco will not be contrasted or hindered and will therefore tend to crack and furthermore there would be low values of adherence with the interface.
- If, on the contrary, the mesh is positioned too far towards the extrados of the mortar layer, cracks will undoubtedly form around the links of the actual mesh.

CLEANING AND SATURATIONG THE CONCRETE

The base concrete should preferably be cleaned and saturated using water under pressure (80 ÷100 atm and warm water in winter). This is indispensable to avoid the concrete base from taking water from the mix. Imprecise saturation would lead to loss of adherence and cracking of the filler material.

Using water under pressure also ensures efficient cleaning of the surfaces, removing dust and small loose parts that may still be present after scarification of the concrete.

Cleaning and saturating of the surfaces are essential to obtain high values of adherence between base and filler material.

APPLICATION TEMPERATURE

MasterEmaco S 488 TIX may be applied when the ambient temperature is between +5 °C and +40°C.

When the temperature is 5 ÷ 10 °C mechanical strength is slower to develop; in any case it is advisable to keep the sacks of MasterEmaco in a heated environment, to use heated mixing water (30 ÷ 50 °C), to saturate the base with warm water and to apply the mortar mid-morning.

Do not apply at a temperature below + 5 °C, as should be the case for any concrete whenever no special measures are adopted.

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

PREPARING MIX

Mixing should be done in a forced action mortar mixer for about 5 minutes until a lump-free, smooth plastic mix is obtained. To mix small quantities, a slow speed drill with mixing paddle could be used; mixing by hand is not recommended. It is always necessary to mix the whole contents of each bag.

Each 25 kg bag of MasterEmaco S 488 TIX should be mixed with 3,8 ÷ 4,3 litres (15-17%) of 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. An additional benefit of the use of the B component is to prolonged the workability of the mortar for example in hot temperature. A lower dosage of part B is possible if applications at temperature lower than 10 °C.

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.

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APPLICATION

MasterEmaco S 488 TIX may be applied by hand or sprayed for a thickness ranging from 1 to 5 cm in a single layer.

FLOAT FINISH

The float finish should be done using a sponge float at a suitable time after application, according to environmental conditions. The time between application and the float finish is determined by the first stiffening of the mortar. This can be tested by resting a hand on the surface and the fingers instead of sinking in leave just a light mark on the mortar. A correct float finish is an important procedure to counter the formation of surface micro-cracks due to plastic shrinkage.

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.

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Supersedes all prior issues on this product.
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