

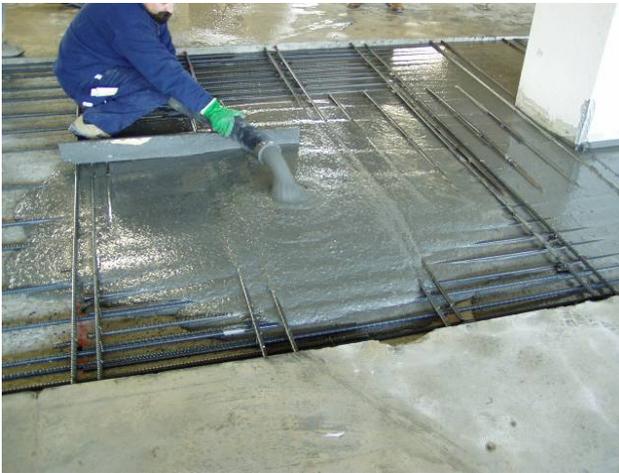
MasterEmaco S 475 PG

Pre-bagged restrained expansion in air curing, cementitious repair applied by grouting for thickness from 1 to 5 cm. For a thickness > 2 cm, contrast reinforcement is required.

DESCRIPTION AND FIELDS OF APPLICATION

MasterEmaco S 475 PG allows grouting to be carried out, for a thickness from 1 to 5 cm in a single layer on the soffit of horizontal surfaces of any concrete structure, whether civil, industrial or infrastructural for concrete repair for thickness from 1 to 5 cm. Thanks to its rheodynamic properties (high flowability and perfect self-compaction without vibration), MasterEmaco S 475 PG can be used for extremely reliable, fast repair work also on heavily reinforced structures with complex geometry or which have particularly "congested" sections.

When a thickness exceeding 20 mm is required, additional mesh must be applied. Therefore, it should be remembered that for practical reasons (to ensure a gap of 10 mm between the mesh and the substrate and a covering over the reinforcement of 2 cm) a thickness of at least 40 mm must be applied when there is reinforcement.



FEATURES

MasterEmaco S 475 PG meets the acceptance limits specified in the standard UNI EN 1504/3

 1305 BASF Construction Chemicals Italia spa Via Vicinale delle Corti, 21 Treviso 13 IT0016/01	
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:	Specificata 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:	≤ 0,5 Kg/m ² ·h ^{0,5}
Reazione al fuoco:	Classe A1
Sostanze pericolose:	Conforme 5.4

MasterEmaco S 475 PG is free from chlorides and reactive metal powders.

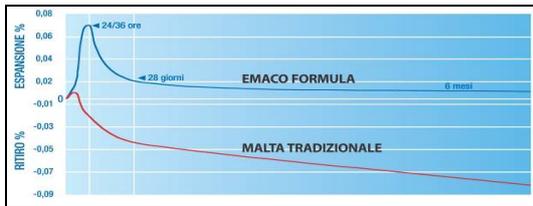
The peculiar features of the materials are:

- Restrained expansion even with air 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.

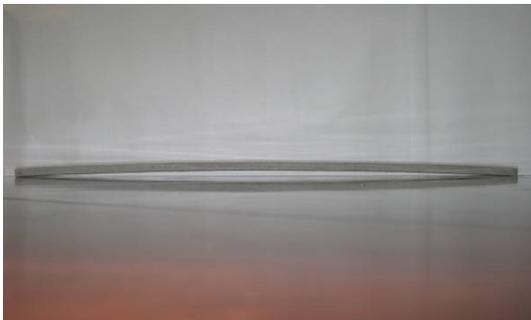
The mechanism is one of true chemical prestressing. The initial expansion of the mortar restrained by the surface roughness of the substrate (irregularity 0.5 cm) and by any electrowelded mesh, is used to compensate for the subsequent hygrometric shrinkage. This would otherwise cause the repair mortar 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 onto 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 which MasterEmaco S 475 PG produces a marked up-warping, proving its high capacity to provide hindered expansion; this behaviour is a guarantee for the monolithic nature of the repair work.



- 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 which MasterEmaco S 475 PG shows no signs of cracking even with long curing; this indicates high durability.



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- resistance to environmental agents: thanks to the very special chemical nature of its components, MasterEmaco S 475 PG is totally waterproof, impermeable to environmental agents such as chlorides and sulphates, resists freeze-thaw cycles (thermal compatibility) and is not subject to carbonation.

CONSUMPTION AND PACK

22 kg/m² 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 1% on the powder weight).

PERFORMANCE

The performances shown below are obtained following UNI EN 13395/1 with a consistency of 250-260 mm, in absence of bleeding

Property	Acceptance limits	Performance
Expansive characteristics with air curing: - UNI 8147 modified - Down and up-warping test	----	1 day > 0,04 % Down-warping ◊
Cracking test (O Ring test)	----	No cracks 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·m ⁻² ·h ^{-0,5}	< 0,08 kg·m ⁻² ·h ^{-0,5}
Average depth of penetration of water, UNI EN 12390/8	----	5 mm
Expansion, UNI 8147	----	1 day > 0,04 %
Compressive strength, UNI EN 12190 *	at 28 days ≥ 45 MPa	1 day > 25 MPa 7 days > 55 MPa 28 days > 70 MPa
Flexural strength, UNI EN 196/1	----	1day > 4 MPa 7 days > 6 MPa 28 days > 7 MPa
Adherence to steel, RILEM-CEB-FIP RC6-78	----	> 25 MPa
Modulus of elasticity, UNI EN 13412	at 28 days ≥ 20.000 MPa	28.000 (± 2.000) MPa

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APPLICATION SHEET

STORAGE

Keep the product in a sheltered, dry place.

REMOVAL OF DAMAGED 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 macroscopically rough (irregularity of about 5 mm in depth), in order to obtain maximum adherence between the base and the repair material. The above macro-roughness is indispensable for the mechanism of hindered expansion, which is essential for concrete 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-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 electrowelded mesh. A concrete thickness of 2 cm over the reinforcement must be guaranteed.



POSITIONING CONTRAST ELECTROWELDED MESH

For work up to 2 cm in thickness, hindrance to the initial expansion of MasterEmaco S 475 PG will be given by the surface roughness of the base.

For a repair thickness exceeding 2 cm, it will be necessary to lay electrowelded mesh, which hinders the expansion of the mortar MasterEmaco S 475 PG.

Since this mesh should be covered by at least 1.5-2 cm of mortar and should be at least 1 cm (using spacers) from the base, the minimum thickness of work in the presence of electrowelded mesh cannot be less than 4 cm.

For correct anchorage of the contrasting mesh, reinforcement steel crop ends will be inserted into holes with a diameter at least double that of the rod and then sealed with MasterEmaco.

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

For successful repair work, correct positioning of the electrowelded mesh is very important.

If the mesh is placed in contact with the base, the outermost part of MasterEmaco S 475 PG 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.

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CLEANING AND SATURATING 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 saturation of the surfaces are essential to obtain high values of adherence between base and filler material.

APPLICATION TEMPERATURE

MasterEmaco S 475 PG 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 S 475 PG 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 di MasterEmaco S 475 PG 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 THE MIX

Mixing should be done in a concrete mixer or in the plaster sprayer mixer for about 5 minutes until a lump-free, smooth plastic mix is obtained. To mix small quantities, a drill with beater could be used; mixing by hand is not recommended. It is always necessary to mix the whole contents of each sack.

Each 25 kg bag of MasterEmaco S 475 PG must be mixed with 3 ÷ 3,25 litres of water (12-13%). Expansion to compensate the shrinkage without wet curing is ensured by adding from 0,25 kg to 1% of B component for each bag. Smaller amounts of part B may be used when application is at temperatures below 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.

APPLICATION

MasterEmaco S 475 PG may be applied by grouting for a thickness ranging from 1 to 5 cm in a single layer; with fluid or superfluid consistency, without any problem of separation or compacting even in heavily reinforced structures and with complex geometry.

For work requiring a thickness of more than 5 cm, MasterEmaco S 465 MC should be used.





We create chemistry

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

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.

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.

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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