

# MasterEmaco S 5450 PG

## Extra high-strength, shrinkage compensated, fibre reinforced, flowable structural repair mortar

### DESCRIPTION

MasterEmaco S 5450 PG is a single component, extra high strength, high modulus, and shrinkage compensated structural repair mortar that meets the requirements of the new European Norm EN 1504 part 3 class R4.

MasterEmaco S 5450 PG is a ready-to-use material that contains sulphate resistant Portland cement (HSR LA), hydraulic binders, well graded sands, specially selected polymer fibres (PAN – polyacrylonitril) and special additives to significantly reduce the risk and incidence of shrinkage cracking.

When mixed with water, MasterEmaco S 5450 PG forms a mortar with a fluid or flowable consistency which can be easily applied by hand or machine.

MasterEmaco S 5450 PG can be used in thicknesses from 20 mm up to 200 mm.

### FIELD OF APPLICATION


MasterEmaco S 5450 PG is used for the structural repair of concrete elements such as:

- Columns, cross beams and piers of all bridges
- In conjunction with electro-chemical cathodic protection systems
- Marine and other civil structures
- Water treatment and sewerage facilities
- Large area structural repairs using formwork and casting method
- Areas of congested reinforcement where hand or spray application is not possible

### FEATURES AND BENEFITS

- Formulated with nanotechnology to minimise shrinkage and crack tendency.
- No segregation or bleeding.
- Long open time.
- High flow for full compaction even in areas with congested steelwork.
- For hand or machine application.
- For concrete replacements up to 200 mm thick in one layer.
- Can be extended with clean, dry aggregate for thicknesses greater than 200 mm.

- Good strength development exceeding requirement of class R4 of EN 1504 part 3.
- Extra low shrinkage for durability.
- Only simple standard surface preparation required
- Excellent freeze/thaw resistance.
- High carbonation resistance.
- Sulphate resistant
- Very low permeability to water and chlorides.
- Low chromate (Cr [VI] < 2 ppm).
- Does not contain chlorides.

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<b>EN 1504-3</b> <b>Concrete repair product for structural repair</b> <b>CC mortar (based on hydraulic cement)</b>  <b>EN 1504-3 Principles 3.1 / 3.2 / 4.4 / 7.1 / 7.2</b>	
Compressive strength	class R4
Chloride ion content	≤ 0,05 %
Adhesive bond	≥ 2,0 MPa
Carbonation resistance	passes
Elastic modulus	≥ 25 GPa
Thermal compatibility	
- Freeze-Thaw	≥ 2,0 MPa
- Thunder Shower	≥ 2,0 MPa
- Dry cycling	≥ 2,0 MPa
Capillary Absorption	≤ 0,5 kg/m <sup>2</sup> x h <sup>-0,5</sup>
Reaction to fire	A1
Dangerous substances	complies with 5.4

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## APPLICATION METHOD

### (a) Surface Preparation

Hardness and durability of concrete are increasingly important parameters for the preparation of the support. This is particularly valid for repair and/or protection of concrete formulated according to the most recent concrete technology. It is therefore recommended to determine a diagnosis in advance, in order to adapt choices and the way how to prepare the support to these parameters. Consult your Master Builders Solutions representative for additional information.

Concrete must be fully cured, clean and sound to ensure good adhesion. All loose traces of concrete or mortar, dust, grease oil, etc. must be removed.

Concrete must have a minimum direct tensile strength of 1.5 N/mm<sup>2</sup>.

Damaged or contaminated concrete should be removed to obtain a keyed surface. Non-impact/vibrating cleaning methods, e.g. shot blasting, sandblasting or high water pressure blasting are recommended. Aggregate should be clearly visible on the surface of the concrete structure after surface preparation.

Cut the edges of the repair vertically to a minimum depth of 5 mm.

If reinforcing steel is visible, clean to a minimum grade of Sa 2 according to ISO 8501-1 / ISO 12944-4. Ensure back of rebar is also clean. Only in case of chloride contamination of the concrete should the reinforcement be protected by using MasterEmaco P 5000 AP (see technical data sheet).

The formwork shall be sound and watertight. Use a light application of MasterFinish chemical release agent to the inner face of the formwork. Fill the formwork with water to test for tightness and pre-soak substrate. Provision must be made for draining of pre-soaking water and air venting during placement. The concrete substrate shall be water saturated, without free standing water, at the moment of application.

### (b) Mixing

It is strongly recommended that only full bags are mixed. Damaged or opened bags should not be used.

Mix MasterEmaco S 5450 PG with a suitable paddle attached to a powerful, slow speed electric drill or in a forced action pan mixer for 3 minutes until fluid or flowable consistency is achieved without any lump in the mortar. Only use clean tap water.

Mixing water needed: 3.5 to 4.0 litres per 25 kg bag are required for fluid consistency.

A flowable consistency can be achieved by mixing 3.1. to 3.5 litres per 25kg bag.

Note: Add water if necessary but never exceed the maximum water demand!

For applications exceeding 200 mm, the mix must be extended with clean aggregate with a suitable grading (e.g. 4 – 8 or 8 – 16mm) up to maximum 30 to 35% of the total weight of the dry mix.

### (c) Application

The prepared substrate should be pre-soaked, preferably for 24 hours, but at least 2 hours before applying MasterEmaco S 5450 PG. The surface must be mat-damp, but without standing water.

For optimum curing of the product the temperatures during application of MasterEmaco S 5450 PG are between +5°C and +30°C.

The material can be placed or pumped behind the formwork, or poured into the patch repair area.

MasterEmaco S 5450 PG is cast in situ continuously with a fluid consistency, placing it inside the formwork from one side only to allow air to escape. It is self-compacting without requiring vibration even in structures that are heavily reinforced or have a complex shape.

Leave the formwork in place for as long as possible and/or ensure proper curing, using e.g. MasterKure curing compounds.

MasterEmaco S 5450 PG can be also placed in a pourable consistency in horizontal patch repair areas brushing the first poured material into the surface roughness of the substrate. Pour further material up to the required thickness wet in wet.

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## COVERAGE

### (a) Fluid consistency

Approximately 76 bags are required to produce 1 m<sup>3</sup> of fresh mortar. 25 kg bag will yield approximately 13 litres of mortar, when mixed with 3.8 litres water/bag.

### (b) Flowable consistency

Approximately 80 bags are required to produce 1 m<sup>3</sup> of fresh mortar. 25 kg bag will yield approximately 12.5 litres of mortar, when mixed with 3.2 litres/bag..

## FINISHING AND CLEANING

Tools and mixer must be cleaned immediately after use with water. Cured material can only be removed mechanically.

## CURING

Full cure is reached in 28 days after the application at a constant temperature of 23 °C.

## WORKING TIME

60 minutes in 20 °C ambient and substrate temperature.

## PACKAGING

MasterEmaco S 5450 PG is available in 25 kg paper bags.

## STORAGE

Store at ambient temperatures, out of direct sunlight, in cool, dry warehouse conditions and clear of the ground on pallets protected from rainfall prior to application.

## SHELF LIFE

12 months if stored at above mentioned storage conditions.

## WATCH POINTS

- Do not apply MasterEmaco S 5450 PG at temperatures below +5°C nor above +30°C.
- Do not add cement, sand or other substances that could affect the properties of MasterEmaco S 5450 PG.
- Do not use vibrator for placing the mortar.

- Never add water or fresh mortar to a mortar mix which has already begun to set.
- Keep the mixing water ratio between the recommended limits.

## HANDLING AND TRANSPORT

Usual preventive measures for the handling of chemical products should be observed when using this product, for example do not eat, smoke or drink while working and wash hands when taking a break or when the job is completed. Specific safety information referring the handling and transport of this product can be found in the Material Safety Data Sheet. For full information on Health and Safety matters regarding this product the relevant Health and Safety Data Sheet should be consulted.

Disposal of product and its container should be carried out according to the local legislation in force. Responsibility for this lies with the final owner of the product.

## CONTACT DETAILS

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Property	Standard	Data	Unit
Chemical Base	-	Cement	-
Colour	-	Grey	-
Grain Size maximum	-	1.5	mm
Chloride Ion Content	EN 1015-17	≤ 0.01	%
Layer Thickness minimum maximum	-	20 200	mm
Fresh Mortar Density	-	Approx. 2.2	g/cm <sup>3</sup>
Mixing Water for 25 kg Bag flowable fluid	-	ca. 3.1 – 3.5 ca. 3.5 – 4.0	l
Working Time	-	60 <sup>1</sup>	Minute
Application Temperature (ambient and substrate)	-	+5 - +30	Celcius
Compressive Strength 1 day 7 days 28 days	EN 12190	≥ 15 ≥ 40 ≥ 55	N/mm <sup>2</sup>
Elasticity Modulus 28 days	EN13412	≥ 23,000	N/mm <sup>2</sup>
Adhesion to Concrete 28 days	EN 1542	≥ 2.7	N/mm <sup>2</sup>
Adhesion to Concrete after Freeze-Thaw (50 cycles with salt) 28 days	EN 13687-1	≥ 3.1	N/mm <sup>2</sup>
Adhesion to Concrete after Thunder-Shower (50 cycles) 28 days	EN 13687-2	≥ 3.0	N/mm <sup>2</sup>
Adhesion to Concrete after Dry Cycling (50 cycles) 28 days	EN 13687-4	≥ 3.0	N/mm <sup>2</sup>
Carbonation resistance 28 days	EN 13295	d <sub>k</sub> ≤ Ref. Concrete	mm
Capillary Absorption 28 days	EN 13057	≤ 0.5	kg.m <sup>-2</sup> .h <sup>-0.5</sup>
Cracking Tendency (I)	Coutinho Ring	No Cracking	Up to 180 days
Cracking Tendency (II)	DIN type V-channel	No Cracking	Up to 180 days
Electrical Resistivity (DOT spec 5,000-15,000 Ω cm)	Wenner 4 pin method	7,500	Ω cm
Water Quality	BS 6920	Complies	-

**Note:** <sup>1</sup> Hardening times are measured at 21°C ± 2°C and 60% ± 10% relative humidity. Higher temperatures will reduce these times and lower temperatures will extend them. Technical data shown are statistical results and do not correspond to guaranteed minima. Tolerances are those described in appropriate performance standards.

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### Health and Safety

\*For full information on Health and Safety matters regarding this product the relevant Health and Safety Data Sheet should be consulted.

The following general comments apply to all products.

As with all chemical products, care should be taken during use and storage to avoid contact with eyes, mouth, skin and foodstuffs, (which may also be tainted with vapour until the product is fully cured and dried). Treat splashes to eyes and skin immediately. If accidentally ingested, seek medical attention. Keep away from children and animals. Reseal containers after use.

### Solvent Based Products

Use in well ventilated areas; avoid inhaling. Suitable respiratory equipment may be needed, eg when spraying. Can cause skin, eye irritation. Wear protective eye shields and gloves during use. Do not smoke or allow sparks or naked lights when stored or in use.

### Resin Products

Can cause irritation, dermatitis or allergic reaction. Use protective equipment particularly for skin and eyes. Use only in well ventilated areas.

### Spillage

Chemical products can cause damage; clean spillage immediately.

### DISCLAIMER

"BASF plc, Construction Chemicals" (the Company) endeavours to ensure that advice and information given in Product Data Sheets, Method Statements and Material Safety Data Sheets (all known as Product Literature) is accurate and correct. However, the Company has no control over the selection of its products for particular applications. It is important that any prospective customer, user or specifier, satisfies him/her-self that the product is suitable for the specific application. In this process, due regard should be taken of the nature and composition of the background/base and the ambient conditions both at the time of laying/applying/installing the material and when the completed work is to be brought into use.

Accordingly, no liability will be accepted by the Company for the selection, by others, of a product, which is inappropriate to a particular application.

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