

# MasterEmaco T 1400 FR

**Fast setting and hardening, shrinkage compensated, metallic fibre reinforced, flowable structural repair mortar**

## DESCRIPTION

MasterEmaco T 1400 FR is a single component, fast setting and hardening pourable repair and bedding mortar that meets the requirements of the new European Norm EN 1504 part 3 class R4.

MasterEmaco T 1400 FR is a ready-to-use material that contains sulphate resistant Portland cement (HSR LA), hydraulic binders, well graded sands, metallic fibres, specially selected polymer fibres (PAN – polyacrylonitril) and special additives provide rapid strength build-up even at sub-zero temperatures, improved durability and unmatched, low drying shrinkage.

When mixed with water, MasterEmaco T 1400 FR forms a mortar with flowable consistency which can be easily applied by hand.

MasterEmaco T 1400 FR can be used in thicknesses from 10 mm up to 150 mm.

## FIELD OF APPLICATION


MasterEmaco T 1400 FR is used for:

- Bedding small to large size manhole frames, using formwork.
- Flowable large size horizontal repair.
- Repairing defective joints.
- Exposure to extreme traffic loads.
- Optimizing traffic management.
- Both internal and external use.
- Use in cold conditions or cold store rooms.
- Applications under the most difficult jobsite conditions.
- Where very short traffic disruption periods are required.

## FEATURES AND BENEFITS

- Ultra rapid strength build-up.
- MasterEmaco T 1400 FR can be opened to all traffic in just 2 hours.
- Excellent application properties
- Higher thickness possible with the addition of gravel
- Flowable consistency for ease of application.
- Can be used at sub-zero temperatures as low as -10°C.
- Ultra high ductility due to the presence of special metallic fibres.
- Resists high dynamic loads or impact.
- Very high early and final strengths.

- Excellent adhesion and excellent durability.
- Extra low shrinkage for durability.
- Minimized cracking tendency due to constrained shrinkage by PAN fibres.
- Excellent freeze-thaw resistance.
- Very good reinforcement protection due to very low water absorption and good carbonation resistance.
- Very good skid resistance, even in wet conditions.
- Very high resistance to hydrocarbons.

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|--|---|
| <br><b>0749</b>  |   |
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| <b>09</b><br><b>BE0023/01</b>  |   |
| <b>EN 1504-3</b><br><b>Fast setting, steel fibre reinforced</b><br><b>traffic repair mortar</b><br><br><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 %                                    |
| Adhesion   | ≥ 2,0 MPa                                   |
| Durability - Freeze/Thaw   | ≥ 2,0 MPa                                   |
| Carbonation resistance   | Pass  |
| Skid resistance  | Class I                                     |
| Capillary absorption   | ≤ 0,5 kg/m <sup>2</sup> x h <sup>-0.5</sup> |
| Fire resistance  | A1  |
| Dangerous substances   | Complies with 5.4; steel fibre              |

## APPLICATION METHOD

### (a) Surface Preparation

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.

Damaged or contaminated concrete should be removed to

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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 10 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.

Heavily damaged reinforcement, or when rebar sections have decreased below the safety level, need to be replaced for structural reasons. Ensure a 2 cm rebar cover when installing additional reinforcement.

Although MasterEmaco T 1400 FR can be applied at ambient temperatures as low as -10°C, the temperature of the substrate should be minimum > 0°C and maximum +30°C. Frozen substrates need to be defrosted just prior to the application of MasterEmaco T 1400 FR. Make sure that any metal parts, e.g. reinforcement and manhole frames are defrosted with a temperature above the freezing point. Try to keep the temperature uniform during application and hardening.

In case of fixing manhole frames, set the frames to the required level and install watertight formwork before the application of the material. Inflatable formwork can be used. 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.

First pour the clean tap water in the mixing container and afterwards, while mixing, add approx. 2/3 of the MasterEmaco T 1400 FR powder slowly and steadily into the water. Continue mixing for at least 1 minute. After 1 minute, add the rest of the powder and mix continuously until a homogeneous mortar is obtained.

Mix MasterEmaco T 1400 FR with a suitable paddle attached to a powerful, slow speed electric drill (max 400

rpm). The total mixing time is 3 to 4 minutes until a homogenous, plastic to fluid consistency is obtained. Only use clean uncontaminated water.

Mixing water needed: 2.7 to 3.2 litres per 25 kg bag are required for fluid consistency.

Note: It is strongly recommended to comply the mixing times before adjusting or not the consistency by adding extra water! Do not mix more material as can be applied within the pot life of approximately 20 to 30 minutes at 20°C. MasterEmaco T 1400 FR with any other material. Only the addition of maximum 30% of clean, well sized gravel is permitted for applications with a thickness over 100 mm.

### (c) Application

Concrete substrates and any metal parts coming in contact MasterEmaco T 1400 FR need to be defrosted.

The prepared substrate should be pre-soaked, preferably for 24 hours, but at least 2 hours before applying MasterEmaco T 1400 FR. The surface must be mat-damp, but without standing water.

For optimum curing of the product the temperatures during application of MasterEmaco T 1400 FR are between -10°C and +30°C.

Set manhole frames or road / bridge joint to the required level and install watertight formwork when necessary before the application of the material.

MasterEmaco T 1400 FR is cast in situ with flowable consistency inside the formwork and underneath the manhole frame or in the gap between the road surface and the bridge / road joint.

For basic repair applications, pour MasterEmaco T 1400 FR with flowable consistency directly onto the pre-dampened substrate up to the required thickness.

MasterEmaco T 1400 FR is basically self-curing. Wet curing is not advised.

When working at sub-zero temperatures, cover MasterEmaco T 1400 FR with insulation materials or dry cloths until sufficiently hardened, preferably 24 hours or until MasterEmaco T 1400 FR is to be opened for traffic.

Do not apply MasterEmaco T 1400 FR if the temperature is expected to drop below -10°C during application or within 24 hours.

### COVERAGE

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Approximately 82 bags are required to produce 1m<sup>3</sup> of fresh mortar. 25 kg bag will yield approximately 12.2 litres of mortar.

### 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

20 minutes in 20 °C ambient and substrate temperature.

### PACKAGING

MasterEmaco T 1400 FR 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 T 1400 FR at temperatures below -10°C nor above +30°C.
- Do not add cement, sand or other substances that could affect the properties of MasterEmaco T 1400 FR.
- 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.

- When applying EMACO FAST FLUID at cold or sub-zero temperatures, we advise to use warm mixing water in order not to delay the hardening of the mortar too much.
- For applications over 100 mm, 7.5 kg of clean gravel (4-8 mm or 8-16 mm depending on the thickness) may be added to 25 kg of MasterEmaco T 1400 FR powder.
- Do not wet cure the material. Prevent from rain.

### 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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| Product Data   |                   |   |                                      |                   |                   |    |   |   |    |    |    |    |    |    |    |    |    |     |    |    |                   |
|--|-------------------|---|--------------------------------------|-------------------|-------------------|----|---|---|----|----|----|----|----|----|----|----|----|-----|----|----|-------------------|
| Property   | Standard          | Data  | Unit                                 |                   |                   |    |   |   |    |    |    |    |    |    |    |    |    |     |    |    |                   |
| Chemical Base  | -                 | Cement  | -                                    |                   |                   |    |   |   |    |    |    |    |    |    |    |    |    |     |    |    |                   |
| Colour   | -                 | Grey  | -                                    |                   |                   |    |   |   |    |    |    |    |    |    |    |    |    |     |    |    |                   |
| Grain Size maximum   | -                 | 3.15  | mm                                   |                   |                   |    |   |   |    |    |    |    |    |    |    |    |    |     |    |    |                   |
| Chloride Ion Content   | EN 1015-17        | ≤ 0.05  | %                                    |                   |                   |    |   |   |    |    |    |    |    |    |    |    |    |     |    |    |                   |
| Layer Thickness minimum<br>maximum   | -                 | 10<br>150   | mm                                   |                   |                   |    |   |   |    |    |    |    |    |    |    |    |    |     |    |    |                   |
| Fresh Mortar Density   | -                 | Approx. 2.25  | g/cm <sup>3</sup>                    |                   |                   |    |   |   |    |    |    |    |    |    |    |    |    |     |    |    |                   |
| Mixing Water for 25 kg Bag   | -                 | ca. 2.7 – 3.2   | l                                    |                   |                   |    |   |   |    |    |    |    |    |    |    |    |    |     |    |    |                   |
| Working Time <sup>1</sup>  | -                 | 20  | Minute                               |                   |                   |    |   |   |    |    |    |    |    |    |    |    |    |     |    |    |                   |
| Open to Traffic (at 20°C) light traffic<br>heavy traffic                   | -                 | 60<br>120   | Minute                               |                   |                   |    |   |   |    |    |    |    |    |    |    |    |    |     |    |    |                   |
| Application Temperature (ambient and substrate)                            | -                 | -10 - +30   | Celcius                              |                   |                   |    |   |   |    |    |    |    |    |    |    |    |    |     |    |    |                   |
| Modulus of Elasticity  | EN 13412          | 40,000  | N/mm <sup>2</sup>                    |                   |                   |    |   |   |    |    |    |    |    |    |    |    |    |     |    |    |                   |
| Compressive Strength<br>2 hours<br>4 hours<br>1 day<br>7 days<br>28 days   | EN 12190          | <table border="1"> <thead> <tr> <th>+20°C<sup>2</sup></th> <th>+5°C<sup>3</sup></th> <th>-5°C<sup>4</sup></th> </tr> </thead> <tbody> <tr> <td>47</td> <td>2</td> <td>9</td> </tr> <tr> <td>59</td> <td>24</td> <td>25</td> </tr> <tr> <td>75</td> <td>64</td> <td>62</td> </tr> <tr> <td>92</td> <td>84</td> <td>83</td> </tr> <tr> <td>104</td> <td>97</td> <td>91</td> </tr> </tbody> </table> | +20°C <sup>2</sup>                   | +5°C <sup>3</sup> | -5°C <sup>4</sup> | 47 | 2 | 9 | 59 | 24 | 25 | 75 | 64 | 62 | 92 | 84 | 83 | 104 | 97 | 91 | N/mm <sup>2</sup> |
| +20°C <sup>2</sup>   | +5°C <sup>3</sup> | -5°C <sup>4</sup>   |                                      |                   |                   |    |   |   |    |    |    |    |    |    |    |    |    |     |    |    |                   |
| 47   | 2                 | 9   |                                      |                   |                   |    |   |   |    |    |    |    |    |    |    |    |    |     |    |    |                   |
| 59   | 24                | 25  |                                      |                   |                   |    |   |   |    |    |    |    |    |    |    |    |    |     |    |    |                   |
| 75   | 64                | 62  |                                      |                   |                   |    |   |   |    |    |    |    |    |    |    |    |    |     |    |    |                   |
| 92   | 84                | 83  |                                      |                   |                   |    |   |   |    |    |    |    |    |    |    |    |    |     |    |    |                   |
| 104  | 97                | 91  |                                      |                   |                   |    |   |   |    |    |    |    |    |    |    |    |    |     |    |    |                   |
| Flexural Strength<br>1 day<br>7 days<br>28 days                            | EN 196-1          | ≥ 15<br>≥ 20<br>≥ 25  | N/mm <sup>2</sup>                    |                   |                   |    |   |   |    |    |    |    |    |    |    |    |    |     |    |    |                   |
| Tensile Strength<br>2 hours  |                   | ≥ 5.0   | N/mm <sup>2</sup>                    |                   |                   |    |   |   |    |    |    |    |    |    |    |    |    |     |    |    |                   |
| Adhesion to Concrete<br>28 days  | EN 1542           | ≥ 3.0   | N/mm <sup>2</sup>                    |                   |                   |    |   |   |    |    |    |    |    |    |    |    |    |     |    |    |                   |
| Adhesion to Concrete<br>after Freeze-Thaw (50 cycles with salt)<br>28 days | EN 13687-1        | ≥ 3.0   | N/mm <sup>2</sup>                    |                   |                   |    |   |   |    |    |    |    |    |    |    |    |    |     |    |    |                   |
| Carbonation resistance<br>28 days  | EN 13295          | d <sub>k</sub> ≤ Ref. Concrete  | mm                                   |                   |                   |    |   |   |    |    |    |    |    |    |    |    |    |     |    |    |                   |
| Skid Resistance<br>28 days   | EN 13036-4        | Class I – tested wet  |                                      |                   |                   |    |   |   |    |    |    |    |    |    |    |    |    |     |    |    |                   |
| Capillary Absorption<br>28 days  | EN 13057          | ≤ 0.1   | kg.m <sup>2</sup> .h <sup>-0.5</sup> |                   |                   |    |   |   |    |    |    |    |    |    |    |    |    |     |    |    |                   |
| Cracking Tendency (I)  | Coutinho Ring     | No Cracking   | Up to 180 days                       |                   |                   |    |   |   |    |    |    |    |    |    |    |    |    |     |    |    |                   |

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| Product Data                     |         |                       |         |                   |
|----------------------------------|---------|-----------------------|---------|-------------------|
| Property                         |         | Standard              | Data    | Unit              |
| Drying Shrinkage                 | 28 days | EN 12617-4            | ≤ 0.300 | mm/m              |
| Pull out strength of steel rebar | 28 days | Rilem-CEB-FIP RC6-78) | ≥ 30    | N/mm <sup>2</sup> |

**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.

<sup>2</sup> Curing; water and powder temperature: 20°C

<sup>3</sup> Curing; water and powder temperature +5°C

<sup>4</sup> Curing -5°C; water and powder temperature +20°C

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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.

Products are sold subject to the Company's standard conditions of sale and all customers, users and specifiers, should ensure that they examine the Company's latest Product Literature.