

MasterCrete HST 445

Class R4 cementitious mortar, pourable, expansive, reinforced with metal fibres, normal-setting, high-toughness grade, formulated for applications with thicknesses ranging from 1 to 10 cm.

Material description

MasterCrete HST 445 is a high-performance, single-component, pourable structural cementitious mortar (class R4 in accordance with EN 1504-3), composed of hydraulic binders, selected aggregates, synthetic polyacrylonitrile (PAN) fibres and a high content of metal reinforcement fibres, which provide high performance in terms of toughness. Its formulation is enhanced with special additives that give **MasterCrete HST 445** expansive properties under conditions of restricted expansion and air-curing.

MasterCrete HST 445 is suitable for the structural reinforcement and repair of deteriorated concrete structures, particularly those subject to dynamic loads, with application thicknesses ranging from 1 to 10 cm. Furthermore, the special formulation ensures high dimensional stability, minimising the risk of cracking due to hydraulic shrinkage and guaranteeing excellent adhesion to both the old concrete and the reinforcing bars, as well as high performance in terms of strength of the concrete mix.

Main uses

The fibre-reinforced structural flowable cementitious mortar **MasterCrete HST 445** is designed for structural repair work on concrete structures, for pouring into formwork or within areas confined by the existing substrate, ensuring maximum effectiveness and durability. It can be applied manually or pumped using a suitable machine, in thicknesses ranging from 1 to 10 cm and without reinforcement.

Some examples of application are:

- repair of concrete infrastructural structures: viaducts, bridges, tunnels, underpasses, dams, canals, pipelines, etc.;
- installation of pre-formed joints and road manhole covers, where high resistance to dynamic loads is required;

- restoration and repair of concrete elements and structures of any type and size, in residential, industrial or commercial buildings, where the concrete is deteriorated, defective or has come away;
- jacketing of reinforced concrete structures and reconstruction of the reinforced concrete and prestressed concrete structures, especially those subject to dynamic loads.

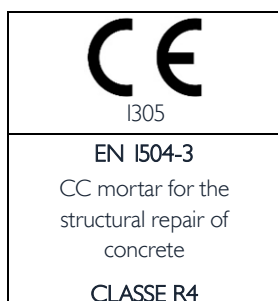
Features

- **Plastic shrinkage crack resistance:** **MasterCrete HST 445** is reinforced with polyacrylonitrile (PAN) synthetic fibres, which reduce the risk of surface micro-cracking during the plastic phase of the product.
- **Resistance to hydraulic shrinkage cracking:** thanks to its special formulation and the presence of metallic structural fibres, **MasterCrete HST 445** enables the creation of monolithic and durable repair works; the product's expansion properties, when applied to a suitably prepared substrate and allowed to cure correctly, enable the exploitation of the 'chemical pre-compression' effect generated by constrained expansion, thereby achieving excellent levels of interaction between the old and new materials and counteracting the stresses arising from constrained shrinkage.
- **High ductility:** dispersed reinforcement consisting of structural metal fibres gives **MasterCrete HST 445** significant post-cracking strength, making it the ideal product for projects involving structures subject to dynamic loads, impacts and abrasion.
- **Excellent adhesion** on properly prepared concrete substrates.
- **Excellent waterproofing properties**, in accordance with EN 12390 Part 8, against water and, consequently, against any potentially corrosive substances it may carry, such as chlorides and sulphates.

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In compliance with the European Regulations (EU No. 305/2011 and EU No. 574/2014), the product has the CE marking in accordance with UNI EN 1504-3 (class R4) and the relevant DoP (Declaration of Performance).



Consumption

Approximately 20.7 kg/m² per cm of thickness.

Packaging and storage

MasterCrete HST 445 is available in 25 kg bags. Keep the product in its original packaging in a dry, protected location at a temperature between +5°C and +35°C. Under the above conditions, the product has a shelf life of 12 months.

Preparation and method of application

Preparing the substrates

- Remove all sections of deteriorated and/or contaminated concrete from the surface, as well as any concrete that is not fully bonded and is starting to come away, so as to achieve a solid and macroscopically rough substrate with surface irregularities of at least 5 mm. The aggregates must be visibly exposed. The edges of the repair area, for localised repairs, must be at right angles, allowing for a minimum mortar application thickness of 1 cm.
- Remove any rust from exposed reinforcing bars by brushing (either by hand or mechanically) or sandblasting.

- Treat the reinforcing bars with an anti-corrosion coating from the **MasterCrete range**. This procedure may also be extended to the new supplementary reinforcement.
- Install any additional reinforcement and the associated connections in accordance with the design specifications.
- Saturate the substrate with water until it is thoroughly saturated but free of surface water (s.s.a.); ensuring that surfaces are clean and saturated is essential to guarantee high levels of adhesion between the substrate and the applied material and to prevent the product from cracking.

Preparing the formwork

For applications involving the use of formwork, the latter must be made of sufficiently strong material and treated to be non-absorbent; e.g. in the case of wooden formwork, this can be achieved through saturation or by using release agents from the **MasterFinish RL line**. They must also be effectively secured and reinforced, and demonstrate adequate integrity to prevent the loss of material.

Preparation of mortar

Mix **MasterCrete HST 445** for approximately 4–5 minutes in a concrete mixer, together with a quantity of water equal to three-quarters of the total specified in the technical data sheet, gradually adding the remainder of the mixing water until a homogeneous mix is obtained (do not exceed the maximum water content specified in the technical data sheet).

If the quantity to be mixed is small – although it should never be less than the contents of a bag – mix it in a bucket using a low-speed whisk mixer.

In order to take full advantage of the expansive properties of **MasterCrete HST 445**, if it is anticipated that wet curing of the applied product will not be possible on site, the SRA additive **MasterCrete 400** must be used at a dosage of 0.4% or more by weight of the powder.

If the concrete is to exceed 10 cm in thickness, depending on the characteristics of the project, an aggregate with a suitable particle size distribution may be added to **MasterCrete HST 445**.

If you have any queries, please contact the Master Builders Solutions technical support team.

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Installation

The product can be applied manually or using suitable pumping systems (not continuous-cycle).

In the case of formwork, the concrete must be poured from one end to allow the mortar to properly fill the entire volume, thereby expelling air and preventing the formation of voids within the concrete.

In the case of complex geometric shapes or high reinforcement density, the flow and compaction of the concrete can be optimised using tools such as rods or chains, or by gently vibrating the concrete itself.

For horizontal applications and on large surfaces, the product can be levelled using a levelling straightedge.

Ageing and maturation

It is recommended to cure surfaces exposed to the air for the first 24 hours using a wet method or by spraying a curing and anti-evaporation agent from the **MasterKure** range. This solution is particularly recommended in environments characterised by low relative humidity and high ventilation.

Application temperatures

Application environment temperature needs to be between +5°C and +35°C.

Warnings

- Do not apply directly on plaster, crumbly, mixed or painted surfaces.
- Do not apply **MasterCrete HST 445** on smooth substrates; a mechanical roughening is necessary.
- Do not add additional water or fresh mortar to the mixture that has already begun to set.
- Do not add water beyond the dosage recommended in the technical data sheet.
- Do not use this product for application thicknesses of less than 1 cm.

Technical data

Product identification data	
Packaging	25 kg bags
Powder colour	Grey
Maximum size of the aggregate	2.5 mm
Type of fibres	Steel, hooked
Fibre diameter	380 µm
Fibre length	30 mm
Mixing ratio	2.75 - 3.25 litres of water per bag (11.0-13.0%)
Consumption	approximately 20.7 kg/m ² per cm of thickness
Fresh density	approximately 2315 kg/m ³
Mixture consistency	Fluid

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Workability time (+20°C)	60 minutes
Application environment temperature	+5°C to +35°C
Class (EN 1504-3)	R4
Type	CC cementitious mortar
Chloride ion content (EN 1015-17) – minimum requirement $\leq 0.05\%$	< 0.05%
Applicable layer thickness (minimum/maximum)	1 cm / 10 cm

Performance

(The performance data shown below was obtained in accordance with UNI EN 1504-3 with a water content of 12.0%)

Feature	Test method	Regulatory requirement	Product performance
Compression strength	UNI EN 12190	≥ 45 MPa at 28 days	1 days > 35 MPa 7 days > 80 MPa 28 days > 90 MPa
Flexural strength	UNI EN 196-1	none	1 days > 10 MPa 7 days > 15 MPa 28 days > 20 MPa
Elastic modulus	UNI EN 13412	$\geq 20,000$ MPa at 28 days	$30,000 \pm 2,000$ MPa
Adhesion to concrete	UNI EN 1542 (MC 0.40 substrate – UNI EN 1766)	≥ 2.0 MPa	> 2.0 MPa
Resistance to freeze-thaw cycles with de-icing salts	UNI EN 1542 after the UNI EN 13687/1 cycles on an MC 0.40-type substrate.	≥ 2.0 MPa	≥ 2.0 MPa
Resistance to accelerated carbonation	UNI EN 13295	Carbonation depth $\leq$ compared to that of the reference concrete type MC 0.45 (with a/c ratio = 0.45) according to UNI EN 1766	Specification superseded
Capillary absorption coefficient	UNI EN 13057	$\leq 0.5 \text{ kg} \cdot \text{m}^{-2} \cdot \text{h}^{-0.5}$	$\leq 0.1 \text{ kg} \cdot \text{m}^{-2} \cdot \text{h}^{-0.5}$
Reaction to fire (Euroclass)	EN 13501-1	-	A1

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Additional performance

(The performance data shown below was obtained with a water content of 12.0%)

Feature	Test method	Regulatory requirement	Product performance
24-hour controlled expansion – Water curing	UNI 8147 – Method A	none	≥ 0.04%
24-hour controlled expansion – Air curing	UNI 8147 – modified method B	none	≥ 0.04%
Resistance to positive hydraulic pressure	UNI EN 12390-8	Test pressure: 5 bar	5 bar - Average penetration < 20 mm 5 bar - Maximum penetration < 50 mm
Arching/warping test	-	Aching to demonstrate expansive behaviour	Arching
Bleeding	UNI 8998	No bleeding	Specification superseded
Resistance to pull-out of steel bars	RILEM CEM FIP RC6-78	-	> 20 MPa
Abrasion resistance	UNI EN 1338	Class 4, marking I: ≤ 20 mm	Class 4, marking I

Safety instructions

For guidance on the correct and safe use, transport, storage and disposal of the product, please see the latest Safety Data Sheet (SDS).

Scan QR code to visit the product page and download the latest version of this technical sheet and any additional documentation.



Other services

For additional technical information, brochures, references, technical reports and technical assistance please visit www.master-builders-solutions.com/it-it or alternatively contact infomac@masterbuilders.com.

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Disclaimer

Since 16/12/1992, Master Builders Solutions Italia Spa has been operating under a Certified Quality System compliant with the UNI EN ISO 9001 Standard. Furthermore, the Environmental Management System is certified according to the UNI EN ISO 14001 Standard and the Safety Management System is certified according to the UNI ISO 45001 Standard.

For further information, please consult the local Technician of Master Builders Solutions. The technical advice on how to use our products, either written or verbally given, are based on the current state of our scientific and practical expertise, and does not imply the assumption of any guarantee and/or responsibility for the final results of works executed using our products.

Therefore, the customer is not exempted from the exclusive task and responsibility of verifying the suitability of our products for the intended use and purposes.

This version supersedes all the previous ones.

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