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MasterTop 514 QD

Fast drying polymer modified cementitious R4 repair mortar to be used as underneath before the application of Ucrete and MasterTop resins floors and for repairing of industrial concrete floors. For indoor and outdoor applications, thickness 3 - 40 mm, plastic, fluid or self-levelling consistency.

DEFINITION OF THE MATERIAL

MasterTop 514 QD is a fast drying multifunction high performance polymer modified cementitious mortar, for 3 up to 40 mm thickness. It can be applied at plastic, fluid or self-levelling consistency.
In case of thickness more than 20 mm, prepare a polymer modified concrete mixing MasterTop 514 QD with aggregates 5-10 o 8-15 mm according the thickness of concrete to cast, in the maximum ratio of 1/1.
MasterTop 514 QD mixed only with water gets the polymer modified cementitious base (PM 1K) while combined with specific water-epoxy binders evolves into a three-component modified epoxy (EM 3K) screed featured by the same characteristics of the base system with additional function of primer resistant to osmotic pressure.
MasterTop 514 QD is classified as:

- Cementitious screed EN 13813;
- Mortar for concrete repair, class R4 EN 1504/3;
- Protettive coating for concrete EN 1504/2.

MAIN FIELDS OF APPLICATION

MasterTop 514 QD has been specifically designed:

- for repairing concrete slabs before the application of MasterTop and Ucrete resin based systems;
- as self levelling underneath of the MasterTop 1300 Decorative and Comfort flooring system series;
- as patch repair wear coat in the logistics indoor areas in chemicals, pharmaceutical, food & beverage, manufacturing industries and commercial.

For extended surfaces for repair of industrial wear coat concrete floors, please consider to use the most appropriate pumpable products MasterTop 135 PG (5 to 15 mm) or MasterTop 450 PG (10 to 30 mm thickness.

MasterTop 514QD can be used for levelling the screeds before the application of resilient, ceramic tiles and wood floors.

Fields of application of MasterTop 514 QD Polymer Modified (PM 1k) and Epoxy Modified (EM 3k)

	MasterTop 514 QD	
	PM 1K	EM 3K
Repair of industrial concrete floors	☑	
Repair of concrete floors before the application of MasterTop and Ucrete	☑	
Levelling of ceramic floors before the application of MasterTop floors		☑
Repair of concrete with a function of barrier against the osmotic pressure before the application of MasterTop floors		☑

FEATURES

MasterTop 514 QD is featured by:

- fast drying: can be over-coated after only 24 hours by Ucrete systems and after 48 hours by MasterTop ones;

Residual humidity at 20°C (Carbide hygrometer) and recoating time

	Hours	Humidity	Recoating with	
MasterTop 514 QD (PM 1k)	24	< 6 %	Ucrete	☺
	48	< 4 %	MasterTop	☺
MasterTop 514 QD (EM 3k)	48	< 4 %	MasterTop	☺

- high compressive strength both 24 hours > 30 MPa and 28 days > 55 MPa;
- high compressive strength even at low temperature (-5°C and 0°C);
- high adhesion also to ceramic tiles floors;
- high impact and abrasion resistance;
- micro-fibres reinforced (almost 1 milion of fibres per liter of mortar) high aspect ratio (L/D > 600) and high tensile strength (> 700 MPa) every efficient to prevent crack during the plastic phase;
- high cracks resistance to hygrometric shrinkage.

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PERFORMANCE EN 1504/3 (Repair of concrete)

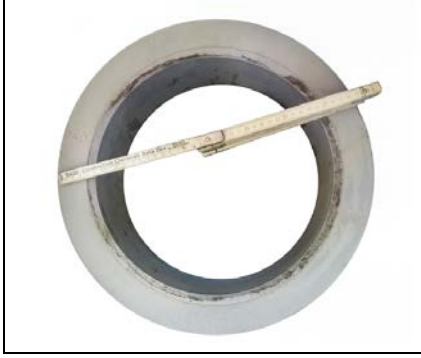
Test methods (water content 17.5 %)		Requirements for R4 mortars	MasterTop 514 QD (PM 1K)
Compressive strength, EN 12190	20°C	--- ≥ 45 MPa 28 days	> 30 MPa 24 hours > 55 MPa 28 days
	-5°C	----	> 5 MPa 24 hours > 10 MPa 48 hours
	0°C	----	> 10 MPa 24 hours > 20 MPa 48 hours
Elastic modulus, EN 13412		≥ 20 GPa	> 20 GPa
Adhesive bond EN 1542 substrate MC (0,40) EN 1766	Before thermal cycles	≥ 2 MPa	> 3 MPa
	Thermal compatibility after 50 cycles of freezing and thawing EN 13687/1	≥ 2 MPa	> 3 MPa
	Thermal compatibility after 30 cycles of Thunder shower EN 13687/2	≥ 2 MPa	> 3 MPa
	Thermal compatibility after 30 dry cycling cycles EN 13687/4	≥ 2 MPa	> 3 MPa
Capillary absorption, EN 13057		≤ 0.5 kg·m^{-2}·h$^{-0,5}$	< 0,05 kg·m^{-2}·h$^{-0,5}$
Carbonation resistance, EN 13295		d_k ≤ control concrete (MC(0,45))	d_k ≤ control concrete (MC(0,45))
Reaction to fire, EN 13501/1		-----	$A2_{fl}$ - S1
Skid resistance, EN 13036/4		Class I: wet indoor floors Unit ≥ 40; Class II: dry indoor floors Unit ≥ 40	Class I Class II

PERFORMANCE MasterTop 514 QD (PM 1k) according to ACI and ASTM

Test methods	Performance	Classification according to ACI and ASTM
Tensile strength ASTM C 307	24 hours> 2,5 MPa 48 hours > 3 MPa 28 days > 5 MPa	> 2,8 MPa (ACI American Concrete Institute 546-B, Concrete Repair Guide)
Hygrometric shrinkage, EN 12617-4	< 0,05 %	ACI American Concrete Institute Guide for selecting and Specifying materials for Repair and Concrete Repair of Concrete Surfaces. Guideline n° 03733”

Shrinkage	Risk
0,025 – 0,05 %	**Low**
0,05 – 0,1 %	Moderate
> 0,1 %	High

Accelerated induction cracking test with restrained shrinkage, O Ring test ASTM C 1581 /C 1581M-09a	No cracks after 150 days	ASTM C 1581 /C 1581M-09a “Determining Age at cracking and Induced Tensile Stress Characteristics of Mortar and Concrete under Restrained Shrinkage”



Time for cracking	Potential risk of cracks
From 1 to a 7 days	High
From 7 to 14 days	High / Moderate
From 14 to 28 days	Moderate / Low
More than 28 days	**Low**

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PERFORMANCE EN 13813 (Screed and materials for screeds)

Test methods (water content 19 %)	MasterTop 514 QD (EM 3K)	MasterTop 514 QD (PM 1K)
Adhesive bond, EN 13892/8 on concrete substrate MC (0,40) EN 1766. Class (MPa): B0,5 …B2	Class B>2	Class B>2
Adhesive bond EN 13892/8 of MasterTop applied on MasterTop 514 QD (PM 1K) 48 hours curried laid on concrete substrate MC (0,40) EN 1766. Class (MPa): B0,5 …B2	-----	Classe B>2
Adhesive bond EN 13892/8 of MasterTop applied on MasterTop 514 QD (EM 3K) 48 hours curried laid on concrete substrate MC (0,40) EN 1766. Class (MPa): B0,5 …B2	Classe B>2	-----
Adhesive bond EN 13892/8 of Ucrete applied on MasterTop 514 QD (PM 1K) 24 hours curried laid on concrete substrate MC (0,40) EN 1766. Class (MPa): B0,5 …B2	-----	Classe B>2
Adhesive bond EN 13687/1 after 50 cycles of freezing and thawing EN 13687/1 of Ucrete systems applied on top of MasterTop 514 QD 24 hours curried and laid on MC (0,40) concrete EN 1766	-----	> 3 MPa
Compressive strength (MPa), EN 13892/2. Class: C5, C10, C80	C15 MPa 24 hours C40 MPa 28 days	C30 MPa 24 hours C45 MPa 28 days
Tensile strength by flexural (MPa), UNI EN ISO 178. Class F1 ... F50	Class F10	Class F10
Flexural modulus of elasticity (MPa), EN ISO 178. Class : E1 ... E20	Class E2	Class E10
Abrasion resistance, EN 13892/4 (BCA). Class: Class AR6 …. Class AR0,5	Class AR0.5	Class AR0.5
Permeability to water vapor, EN 12086. Sd. (Sd = μ·s, μ = coefficient of diffusion to vapor, s = thickness)	Sd < 1,2 m / cm	Sd < 0,6 m / cm
Coefficient of thermal variation, EN 1770	$1{,}49 \cdot 10^{-6}$ K^{-1}	$1{,}46 \cdot 10^{-6}$ K^{-1}
Impact resistance, EN ISO 6272. Class IR J (J in N·m)	IR20	IR20
Coefficient of capillary absorption, EN 1062/3	< 0,1 $kg \cdot m^{-2} \cdot h^{-0,5}$	< 0,1 $kg \cdot m^{-2} \cdot h^{-0,5}$
Resistance to negative pressure, UNI 8298/8	2,5 bar	2,5 bar

PERFORMACNE EN 1504/2 (Protection of concrete)

Test methods (water content 17,5 %)		MasterTop 514 QD (PM 1K)
Compressive strength, EN 12190		> 55 MPa
Permeability to water vapor Sd, EN ISO 7783/1 (Sd = μ·s, μ = coeff. diffusion to water vapor, s = thickness). Class I: Sd < 5 m (Permeable), Class II: Sd ≥ 5 e ≤ 50 m, Class III: Sd > 50 (Not Permeable)		Class I (Sd < 0,6 m / cm)
Adhesive bond EN 1542 substrate MC (0,40) EN 1766	Before thermal cycles	> 3 MPa
	Thermal compatibility after 50 cycles of freezing and thawing EN 13687/1	> 3 MPa
	Thermal compatibility after 30 cycles of Thunder shower EN 13687/2	> 3 MPa
Capillary absorption, EN 1062/3		< 0,1 $kg \cdot m^{-2} \cdot h^{-0,5}$
Abrasion resistance, EN ISO 5470/1 (1000 g wheel H22/1000 cycles)		Loss < 950 mg
Impact resistance, EN ISO 6272. Class I : 4 N·m, Class II: 10 N·m, Class III: 20 N·m		Class III
Class I: wet indoor surfaces: unit ≥ 40; Classe II: dry indoor surfaces: unit ≥ 40		Classe I Classe II
Reaction to fire, EN 13501/1		$A2_{fl}$ - S1

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PERFORMANCE ACCORDING EN 206/1

Typical Mix Design	
MasterTop 514 QD	1100 kg/m^3
Aggregate clean and washed 8-12 mm	1100 kg/m^3
Water	158 l/m^3 (16%)
Slump no segregation nor bleeding, EN 12350/2	23 cm
Air content	< 3%
Density, EN 12350/6	2420 kg/m^3
Shrinkage, UNI 11307	< 0,02 %
Compressive strength, UNI EN 12390/3	24 hours > 45 MPa 48 hours > 55 MPa 28 days > 70 MPa
Elastic modulus, EN 12390/13	35.000 MPa
Residual humidity at 20°C (Carbide hygrometer)	24 hours < 4 %

PACKAGING

MasterTop 514 QD: 25 kg bag.
MasterSeal P 385 component A: 4,25 kg pail.
MasterSeal P 385 component B: 4,25 kg pail.

System	Component	Kg
MasterTop 514 QD (PM 1K)	MasterTop 514 QD	25

System	Components	Kg
MasterTop 514 QD (EM 3k)	MasterTop 514 QD	3 x 25
	MasterSeal P 385 comp.A	4,25
	MasterSeal P 385 comp.B	4,25
	3 MasterTop 514 QD + 1 MasterSeal P 385 Comp.A + 1 MasterSeal P 385 Comp.B	83,5

CONSUMPTION

	Kg/m^2 per mm
MasterTop 514 QD (PM 1K)	1,8
MasterTop 514 QD (EM 3k)	1,4

Thickness more than 20 mm, MasterTop 514 QD can be used as polymer modified concrete mixing it with aggregates 5-10 o 8-15 mm (according to thickness of concrete to cast), in the maximum ratio of 1/1.

Concrete	Kg/m^2 per cm
MasterTop 514 QD (PM 1K)	11
Aggregates 5-10 mm or 8-15 mm	11

STORAGE

Must be stored in a shady, dry spot 10 - 35°C temperature conditions.

APPLICATION PROCEDURE

SUBSTRATE QUALITY

Substrates to be resurfaced must be clean and sound.

SUBSTRATE PREPARATION

Remove all traces of previous coatings, laitance, oil, curing compounds, organic growth or any other contaminants which may adversely affect the bond[1].

Preferred methods of preparation

Include high pressure water-jetting, wet abrasive blasting or grit blasting and vacuum shot-blasting.
Not recommended are chemical cleaning methods such as acid etching, aggressive percussive methods such as scabbling. This may damage the substrate.

Holes and cavities

Holes or cavities should be filled with MasterTop 514 QD repair mortar (stiff to pasty consistency prior to the application of MasterTop 514 QD[2] applied as screed.

Static cracks

Small shrinkage cracks in the substrate may be ignored but cracks of 1 mm width or more should be repaired prior to the application of MasterTop 514 QD.

Moving cracks or joints

Moving cracks or joints should be treated as such, i.e. any existing moving crack or joint in the substrate must be carried through the MasterTop 514 QD. Wherever a repair must connect to an existing level, the concrete must be cut to a minimum depth of 5 mm. Feather edging is not permissible[3].

[1] A minimum concrete class according EN 206/1 is required.
[2] Finish repair surfaces roughly to improve adhesion.
[3] Wherever a repair is to join a non-concrete floor (tiles, resin based flooring or wood), a movement joint should be created to be filled later with an elastic sealant.

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Ceramic tiles substrate

Remove the glassy top layer of the tiles using vacuum shot-blasting. On top of ceramic tiles always use MasteTop 514 QD Epoxy modified (EM 3K).

TEMPERATURE

Apply MasterTop 514 QD when the ambient temperature is above + 5°C. When the temperature is between 5 and 20° C the development of mechanical strength and timing of the relevant drying proceed slower than the performance indicated in the Technical Data Sheet. Under these conditions, it is recommended to keep the bags of MasterTop 514 QD in a conditioned room and use heated mixing water (30 to 50°C).

APPLICATION PROCEDURE FOR MasterTop 514 QD (PM 1K) Polymer Modified

Saturation

The prepared concrete substrate should be saturated with clean water. This operation, which should be performed carefully, has the effect of displacing air from the substrate which otherwise would cause pinholes to occur in the MasterTop 514 QD. Before proceeding to the next phase, free standing water or excess water should be removed.

Pore sealing with MasterSeal 600

In case of very absorbent concrete, an additional pore sealing step could be necessary using MasterSeal 600 applied by roller in the range of 0,1 - 0,2 litres/m^2. After pore sealing, MasterTop 514 QD must be poured fresh on fresh.

Mixing

The quantity may vary slightly depending upon the ambient conditions. Mix continuously for a few minutes to a lump-free consistency using a mortar mixer or for larger projects, a mobile mixer. Allow the mix to stand undisturbed to stabilize for 2 minutes and remix. When necessary add liquid or powder, to obtain the correct consistency.[4]

Water addition

Consistency	Water amount
Plastic	12 % or 3 liters per bag
Fluid	15,5 % or 3,9 liters per bag
Self levelling	19 % or 4,75 liters per bag

Mixing and pouring using dry mix mortar pump is also possible. Pay attention to not exceed the maximum liquid demand.

Pouring MasterTop 514 QD (PM 1K) Polymer Modified

Pour or pump MasterTop 514 QD and spread it with a using a space rake or notched trowel (or trowel teeth V) to the required thickness.

Data for the application	
Density	2,1 kg/liter
Workability time at 20°C	20 minutes: loss 30% 30 minutes: loss 40%
Setting time at 20°C	Initial: 70 minutes End: 90 minutes

Finishing

This should be done using a porcupine roller. Immediately after the MasterTop 514 QD has been applied, it should be thoroughly rolled back-and-forth (crosswise) using a spiked roller. This has the effect of releasing entrapped air and ensures a smooth, level surface. It is usual for the rolling phase to be one mix unit behind the application by space rake so that the new mix is rolled evenly into the old.
This ensures that the two mixes marry-in evenly.
A skid resistant finish can be achieved by broadcasting dry silica sand into the fresh MasterTop 514 QD, just prior to the moment the material starts to skin on the surface. After curing, excess sand can be removed.

CLEANING

Tools can be easily cleaned using tap water.

REMARKS FOR OUTDOOR APPLICATIONS

During hot, dry and windy conditions (above 25°C and below 55% relative humidity) as soon as the surface of the MasterTop 514 QD has set dry, clean silica sand could be broadcast or polythene sheeting should be used over the entire surface. This will protect it from rapid uncontrolled drying. The sand can be removed by broom after a minimum of 24 hours.
When temperatures are low (5 – 15°C) and humidity high (above 90%) the setting and curing times of MasterTop 514 QD will be extended. Under these conditions a longer curing period will be needed before opening to traffic.

[4] Do not exceed the maximum liquid demand.

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APPLICATION PROCEDURE FOR MasterTop 514 QD (EM 3K) Epoxy Modified

Saturation

The prepared concrete substrate should be saturated with clean water. This operation, which should be performed carefully, has the effect of displacing air from the substrate which otherwise would cause pinholes to occur in the MasterTop 514 QD (EM 3K). Before proceeding to the next phase, free standing water or excess water should be removed.

Pore sealing with MasterSeal P 385

In case of very absorbent concrete or where water saturation cannot be done for any reason, pore sealing can be performed using MasterSeal P 385 (component A mixed with component B) applied by roller directly on dry substrate in the range of 0,2 kg/m^2 with a dilution of water in the range of 30% maximum.
After pore sealing, MasterTop 514 QD (EM 3K) must be poured fresh on fresh.
Then lay down MasterTop 514 QD (EM 3K) after about 30-45 minutes at 20° C.

Pouring MasterTop 514 QD (EM 3K) Epoxy Modified

Mixing

Pour MasterSeal P 385 component B (hardener) into the MasterSeal P 385 component A (base) and mix thoroughly until complete homogenization.

Composition of the kit (3K EM)	
MasterTop 514 QD	3 bags 25 kg each
MasterSeal P 385 comp. A	4,25 kg Pail
MasterSeal P 385 comp. B	4,25 kg Pail

Mixing ratio	
MasterTop 514 QD	18
MasterSeal P 385 comp. A	1
MasterSeal P 385 comp. B	1

The quantity may vary slightly depending upon the ambient conditions. Mix continuously for a few minutes to a lump-free consistency using a mortar mixer or for larger projects, a mobile mixer. Allow the mix to stand undisturbed to stabilize for 2 minutes and remix. When necessary add liquid or powder, to obtain the correct consistency.[5] Then add MasterSeal P 385 (A+B) previously mixed into the already mixed MasterTop 514 QD and mix for 2 minutes more in order to get the right homogeneous mix.

Water addition

	Consistency	% on MasterTop 514 QD
Water	Fluid	17 (4,25 liters per bag)
	Self levelling	19 (4,75 liters per bag)

After the pore sealer has been applied (waiting from 30 up to 45 minutes in order to be still tacky), pour MasterTop 514 QD (EM 3K) and spread it with a using a space rake or notched trowel (or trowel teeth V) to the required thickness.

Data for the application	
Density	1,7 kg/liters
Workability time at 20°C	20 minutes: loss 30% 30 minutes: loss 40%
Setting time at 20°C	Initial: 80 minutes End: 100 minutes

Finishing

This should be done using a porcupine roller (steel teeth). Immediately after the MasterTop 514 QD (EM 3K) has been applied, it should be thoroughly rolled back-and-forth (crosswise) using a spiked roller. This has the effect of releasing entrapped air and ensures a smooth, level surface. It is usual for the rolling phase to be one mix unit behind the application by space rake so that the new mix is rolled evenly into the old.
This ensures that the two mixes marry-in evenly.

CLEANING

Tools can be easily cleaned using tap water.

CLEAN UP AND SPILLAGES

Not hardened material may simply be removed with water.

READY TO TRAFFIC

System	Time
MasterTop 514 QD (PM 1K)	4 hours, ready for pedestrian traffic 24 hours: full service
MasterTop 514 QD (EM 3K)	18 hours, ready for pedestrian traffic

[5] Do not exceed the maximum liquid demand.

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RECOATING TIME

Follow the guidelines of the table below.

Residual humidity and recoating time at 20°C (Carbide hygrometer)

System	Hours	Humidity	Recoating with	
MasterTop 514 QD (PM 1k)	24	< 6 %	Ucrete	☺
			MasterTop	☹
MasterTop 514 QD (EM 3k)	48	< 4 %	MasterTop	☺

MOVEMENT AND CRACK CONTROL JOINTS

MasterTop 514 QD, in this respect, must be considered as concrete. Therefore, movement and crack control joints must be designed, performed and sealed using PU sealant MasterSeal NP 474. Joint cutting must be done by 24 hours after the application of MasterTop 514 QD.

MasterTop 514 QD SUBSTRATE PREPARATION BEFORE THE APPLICATION OF MasterTop AND Ucrete

Shot-blasting is the preferred method to properly prepare the surface of MasterTop 514 QD before the application of MasterTop and Ucrete systems.

DECLARATION OF PERFORMANCE AND CE MARKING

According to the European Regulation EU No 305/2011 and EU No. 574/2014, the material has it own EN 13813, EN 1594/3 and EN 1504/2 CE labelling and related DoPs (Declaration of Performance).

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.
June 2017

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