

Repairs to *façades*

Repairs to *façades*



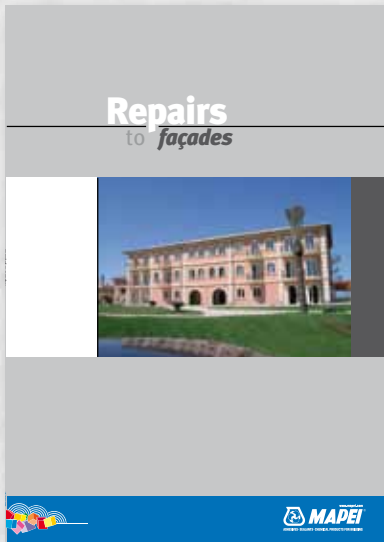
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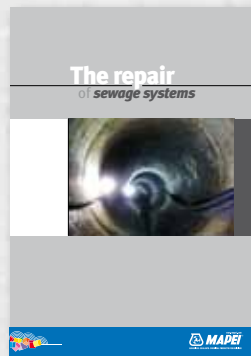
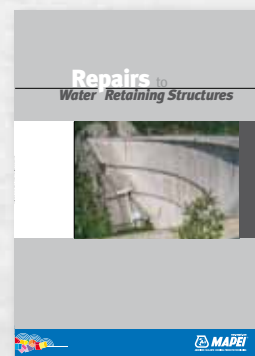
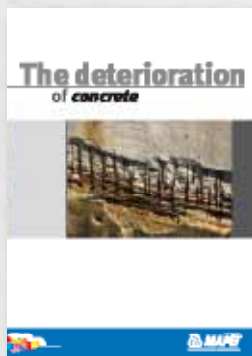
Mapei produces a series of technical manuals so that the subject of the deterioration of concrete may be analysed in depth, and to offer a professional approach to the problems regarding repair work.

The subject of this manual is:

Repairs to façades



The other manuals available in the series are:



The manuals are available upon request.

Repairs to *façades*

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Notes

► 1| Introduction

This section analyses the various techniques which may be employed to repair façades.

Repairs may be carried out on both masonry and concrete.

Each material suffers from different types of deterioration, which means that the methods and products used for repair work are also different.

Surfaces are treated so that they are suitable for application of the successive finishing layers, dependant on requirements: water-repellence, vapour permeability and final colour, to make the most of the aesthetic value of buildings.

Structures must be repaired correctly, and both concrete and masonry structures must be treated with the most appropriate materials.

The reinforced concrete framework of façades deteriorates due to: corrosion of the reinforcement by carbon dioxide present in the air, promoted by the poor quality of materials used; defects in the waterproofing layer; the presence of voids in the structure where water collects. A typical defect in buildings for civil use is alteration of the colour of the façade due to the washing action of rainwater. This may also lead to the formation of moss, dissolving of the binder, mechanical erosion or deposits of particles (released into the atmosphere by combustion processes). Below is a list of operations to carry out repair work:

- Preparation of the substrate;
- Protection of reinforcement rods;
- Repairing concrete using thixotropic mortars;
- Repairing concrete using a castable mortar;
- Repairing concrete using cementitious binders;
- Smoothing concrete and rendered surfaces;
- Protection and decoration of all the surfaces.

One of the most important operations to guarantee good repair work, apart from those listed above, is the elimination of defects in the waterproofing system. This subject is discussed in this manual, but a more in-depth analysis may be found in the dedicated technical manual *“Waterproofing systems for the installation of ceramic tiles and stone in external environments: terraces and balconies”*.

Each of these items includes different types of products, which are all suitable for achieving the requirements, and the choice of which one of these to use depends on the client, the thicknesses to be repaired, on-site organisation, etc.

► 2| Preparing the substrate

Remove any render if present, and the layer of deteriorated, carbonatated concrete around the reinforcement rods. The rods must be carefully cleaned to remove all traces of rust and other unwanted substances by sandblasting or hydro-sandblasting.

Cleaning of the surface under repair to eliminate dust and residuals of loose concrete and those which were not removed during the demolition phase, to leave a healthy, compact substrate.



photo 1
Mechanical removal of the front edge of a balcony.

► 3| Protecting reinforcement rods

► 3.1| Protecting reinforcement rods using MAPEFER

Description: *two-component, anti-corrosion cementitious mortar for protecting reinforcement rods.*

Apply MAPEFER on perfectly clean, rust-free reinforcement rods to bring the pH level back to more than 12, the minimum level required to guarantee passivation of the reinforcement rods. The mortar creates a protective, waterproof barrier and protection against aggressive agents present in the atmosphere. Apply MAPEFER by brush in two coats. The second coat may be applied 90-120 minutes after the first coat, and preferably within 24 hours. The total thickness

photo 2
Application of anti-corrosion mortar on reinforcement rods



of the two coats must be at least 1.5-2 mm. During this operation, it is inevitable that some of the concrete will also be coated with MAPEFER around the reinforcement rods. This will not create any kind of problem, since MAPEFER does not modify the adhesion of the repair mortar which, in normal environmental conditions, may be laid 4-5 hours after applying MAPEFER or even later, according to organisation of the site.

MAPEFER has the following performance characteristics:

table 1

Characteristics	Performance of product
Density (kg/m ³):	1900
pH of mix:	> 12.6
Brookfield Viscosity:	20000 mPa · s (N° 6 rotor - 10 rpm)
Pot life:	approx. 1 hour (at 20°C)
Bond strength to concrete (MPa):	> 2.5
Bond strength to sand-blasted steel (MPa):	> 2.5
Consumption:	120 g/m (approx. 2 mm of product applied on Ø 8 mm rebar)

► 3.2| Protecting reinforcement rods using MAPEFER 1K

Description: *single component, anti-corrosion cementitious mortar for protecting reinforcement rods.*

MAPEFER 1K creates a protective, waterproof barrier and protection against aggressive agents present in the atmosphere. After preparation, apply MAPEFER 1K by brush in two coats. We recommend completely covering the surface of the reinforcement with an even layer. The total thickness of the two coats must be at least 2 mm. During this operation, it is inevitable that some of the concrete will also be coated with MAPEFER 1K around the reinforcement rods. This will not create any kind of problem, since MAPEFER 1K does not modify the adhesion of the repair mortar which, in normal environmental conditions, may be laid 4-5 hours after applying MAPEFER 1K or even later, according to organisation of the site. The product meets the minimum requirements for EN 1504-7 regarding the protection against corrosion of reinforcement.

MAPEFER 1K has the following performance characteristics:

table 2

Characteristics	Test method	Minimum requirements according to EN 1504-7	Performance of product
Density of the mix (kg/m ³):	/	/	1800
pH:	/	/	> 12.5
Pot life of mix:	/	/	approx. 1 hour (at 20°C)
Waiting time before applying repair mortar:	/	/	6-24 hours (at +20°C)
Bond strength to substrate (MPa):	EN 1542	/	> 2.5 (after 28 days)
Slip-resistance of reinforcement rods: - load with reference to a movement of 0.1 mm:	EN 15184	load equal to at least 80% of load on reinforcement with no coating	meets specifications
Resistance to corrosion: - 10 condensation cycles in water; - 10 cycles in sulphur dioxide according to EN ISO 6988; - 5 days in saline mist according to EN 60068-2-11	EN 15183	after the series of cycles, the protected rods must be corrosion-free. Penetration of rust at the ends of the steel rods with no protection must be < 1 mm	meets specifications
Consumption (g/m):	/	/	100 (approx. 2 mm of product applied on a 8 mm improved-adherence rebar)

Mapei mortars for repairing concrete

		REPAIRS TO FAÇADES				
		Repairs to the corners of beams and columns	Repairs to the front edges of balconies	Repairs to ceilings	Repairs to gutters	Repairs to parapets
Normal-setting thixotropic mortars	Mapegrout Thixotropic	•	•	•	•	•
	Mapegrout T40	•	•	•	•	•
	Mapegrout T60	•	•	•	•	•
	Mapegrout BM	•	•	•	•	•
	Planitop 430	•	•	•	•	•
	Mapegrout LM2K	•	•	•	•	•
Rapid-setting thixotropic mortars	Mapegrout Rapid	•	•			
	Planitop Smooth & Repair	•	•	•	•	•
	Planitop 400	•	•			
Normal-setting castable mortars	Mapegrout Hi-Flow	•	•			
Cementitious binders	Stabilcem SCC	•	•			

► 4| **Repairing concrete using thixotropic mortars**

► 4.1| **Repairs to concrete using MAPEGROUT 430**

Description: *fine-grained, thixotropic, fibre-reinforced, mortar for repairing concrete.*

Particularly suitable for: *repairing the protective concrete layer on deteriorated concrete structures following oxidisation of the reinforcement rods. Repairing the corners of columns, beams and the front edges of balconies.*



photo 3

Application of Mapegrout 430

Rebuilding of demolished parts by applying PLANITOP 430 on substrates saturated with water, but with a dry surface.

MAPEGROUT 430 is particularly suitable for repairing the concrete layer on deteriorated concrete structures following oxidisation of the reinforcement rods. Thanks to its thixotropic consistency, it is easy to apply, even on vertical surfaces, at a thickness of from 5 to 35 mm without formwork.

To improve expansion in the open air during the first few days of the curing cycle, MAPEGROUT 430 may include 0.25%-0.5% of MAPECURE SRA special admix, which has the property of reducing plastic and hydraulic shrinkage and the formation of micro cracks.

If there is insufficient boundary support, filling layers of more than 20 mm must only be applied after inserting dolly rods and roughing the surface of the concrete. A layer of at least 20 mm thick must be applied over the rods.

If PLANITOP 430 is mixed with MAPECURE SRA, it must be applied using a machine with a pre-mixing unit. If applied mixed without MAPECURE SRA, it may be applied using a continuous-mixing type rendering machine.

The product meets the minimum requirements of EN 1504-3 Standards for R3-class structural mortar.

MAPEGROUT 430 has the following performance characteristics:

table 3

Characteristics	Test method	Minimum requirements according to EN 1504-3 for R3 class mortar	Performance of product
Density of the mix (kg/m ³):	/	/	2000
pH of mix:	/	/	> 12.5
Pot life of mix:	/	/	approx. 1 hour (at 20°C)
Mechanical characteristics using 18% of water:			
Compressive strength (MPa):	EN 12190	≥ 25 (after 28 days)	> 30 (after 28 days)
Flexural strength (MPa):	EN 196/1	/	> 6 (after 28 days)
Compressive modulus of elasticity (GPa):	EN 13412	≥ 15 (after 28 days)	23 (after 28 days)
Bond strength to substrate (MPa):	EN 1542	≥ 1.5 (after 28 days)	> 2 (after 28 days)
Resistance to accelerated carbonatation:	EN 13295	Depth of carbonatation ≤ reference concrete (MC 0.45 type, water/cement ratio = 0.45) according to UNI 1766	meets specifications
Capillary absorption (kg/m ² · h ^{0.5}):	EN 13057	≤ 0.5	< 0.4
Thermal compatibility to freeze-thaw cycles with deicing salts, measured as measured as bonding according to EN 1542 (MPa):	EN 13687/1	≥ 1.5 (after 50 cycles)	> 2
Reaction to fire:	Euroclasse	according to value declared by manufacturer	A1
Consumption (kg/m ²):	/	/	17 (per cm of thickness)

► 4.2| Repairs using MAPEGROUT T40

Description: *medium-strength (40 N/mm²), fibre-reinforced thixotropic mortar for repairing concrete.*

Particularly suitable for: *repairing deteriorated vertical and horizontal concrete structures. Repairing deteriorated areas in concrete, the corners of beams and pillars and the front edges of damaged balconies.*



photo 4

Repairs to the front edge
of a balcony using
Mapegrout T40

Rebuilding demolished parts by applying MAPEGROUT T40 on substrates saturated with water, but with a dry surface.

When this product is mixed with water, it forms a thixotropic mortar which is easy to apply on vertical surfaces, even in thick layers, without formwork.

To improve expansion in the open air during the first few days of the curing cycle, MAPEGROUT T40 may include 0.25%-0.5% of MAPECURE SRA special admix, which has the property of reducing plastic and hydraulic shrinkage and the formation of micro cracks. If there is insufficient boundary support, filling layers of more than 20 mm must only be applied after inserting dolly rods and roughing the surface of the concrete. A layer of at least 20 mm thick must be applied over the rods. MAPEGROUT T40 may be applied by spray with a suitable worm-screw or piston-type spray rendering machine, such as a Turbosol or a Putzmeister. The product meets the minimum requirements of EN 1504-3 Standards for R3-class structural mortar.

MAPEGROUT T40 has the following performance characteristics:

table 4

Characteristics	Test method	Minimum requirements according to EN 1504-3 for R3 class mortar	Performance of product
Density of the mix (kg/m ³):	/	/	2200
pH of mix:	/	/	> 12.5
Pot life of mix:	/	/	approx. 1 hour (at 20°C)
Mechanical characteristics using 16% of water:			
Compressive strength (MPa):	EN 12190	≥ 25 (after 28 days)	> 40 (after 28 days)
Flexural strength (MPa):	EN 196/1	/	> 7 (after 28 days)
Compressive modulus of elasticity (GPa):	EN 13412	≥ 15 (after 28 days)	25 (after 28 days)
Bond strength to substrate (MPa):	EN 1542	≥ 1.5 (after 28 days)	> 2 (after 28 days)
Capillary absorption (kg/m ² · h ^{0.5}):	EN 13057	≤ 0.5	< 0.2
Thermal compatibility to freeze/thaw cycles with de-icing salts, measured as adhesion according to EN 1542 (MPa):	EN 13687/1	≥ 1.5 (after 50 cycles)	> 2
Reaction to fire:	Euroclass	according to value declared by manufacturer	A1
Consumption (kg/m ²):	/	/	18.5 (per cm of thickness)

► 4.3| Repairs using PLANITOP 400

Description: *quick-setting, controlled-shrinkage thixotropic mortar for cortical restoration, applied at various thicknesses of from 1mm up to 40mm in a single layer.*

Particularly suitable for: *repairing limited areas of concrete. Thanks to its fine grain structure, may be used directly as a finishing layer.*

Localised repairs of horizontal and vertical cortices using PLANITOP 400 quick-setting, controlled-shrinkage thixotropic mortar for repairing surfaces, applied at various thicknesses of from 1 mm up to 40 mm in a single layer. Apply on substrates saturated with water, but with a dry surface. When PLANITOP 400 is mixed with water, it forms a thixotropic mortar which is easy to work with, so that it may be applied on vertical surfaces at thicknesses of up to 4 cm. Apply the mix using a trowel or flat trowel. The maximum thickness to be applied for each layer is 4 cm.

The product meets the minimum requirements of EN 1504-3 Standards for R3-class structural mortar.



photo 5

Application
of Planitop 400

PLANITOP 400 has the following performance characteristics:

table 5

Characteristics	Test method	Minimum requirements according to EN 1504-3 for R3 class mortar	Performance of product
Density of the mix (kg/m ³):	/	/	2100
pH of mix:	/	/	> 12
Pot life of mix:	/	/	approx. 10 min. (at 20°C)
Mechanical characteristics using 15.5% of water:			
Compressive strength (MPa):	EN 12190	≥ 25 (after 28 days)	> 35 (after 28 days)
Flexural strength (MPa):	EN 196/1	/	> 7 (after 28 days)
Compressive modulus of elasticity (GPa):	EN 13412	≥ 15 (after 28 days)	24 (after 28 days)
Bond strength to substrate (MPa):	EN 1542	≥ 1.5 (after 28 days)	> 1.5 (after 28 days)
Reaction to fire:	Euroclass	according to value declared by manufacturer	A1
Consumption (kg/m ²):	/	/	18.5 (per cm of thickness)

► 4.4| Smoothing and levelling surfaces with PLANITOP SMOOTH & REPAIR

Description: *Quick-setting, fibre-reinforced, controlled-shrinkage thixotropic mortar for repairing and smoothing concrete, may be applied in various thicknesses of from 3 mm up to 40 mm in a single layer.*

Particularly suitable for: *quick repairs to deteriorated parts in concrete, the corners of beams, pillars, buffer walls, cornices and the front edges of balconies. Quickly smoothing over surface defects in cast concrete, such as gravel clusters, spacer holes, construction joints, etc. before painting the surface. Repairing and smoothing over concrete mouldings on civil buildings.*

photo 6
Application
Planitop Rasa & Ripara



PLANITOP SMOOTH & REPAIR is a one-component, thixotropic cementitious mortar, made from special hydraulic binders, selected fine-grained aggregates, polyacrylonitrile synthetic fibres, synthetic resins and special additives.

When PLANITOP SMOOTH & REPAIR is mixed with water, it forms a mortar with good workability which may be applied by trowel or spatula on vertical surfaces, for smoothing and repairing in thicknesses of from 3 to 40 mm in a single layer.

PLANITOP SMOOTH & REPAIR hardens without shrinking and, thanks to its content of synthetic fibres, is characterised by its excellent bond on concrete substrates. After hardening, PLANITOP SMOOTH & REPAIR has the following characteristics:

- Excellent bond strength to old concrete (≥ 1.5 MPa) if dampened with water before application, and to reinforcement rods, especially if treated beforehand with MAPEFER or MAPEFER 1K;
- High dimensional stability and, therefore, low risk of cracking during the plastic phase and when hardened;
- Low permeability to water.

The product complies with the minimum requirements of EN 1504-3 for structural R2-class mortars and EN 1504-2 coating (C) according to principles MC and IR.

PLANITOP SMOOTH & REPAIR has the following performance characteristics:

table 6

Characteristics	Performance of product
Density of mix (kg/m ³):	1730
Pot life of mix:	approximately 20 minutes (at 20°C)
Compressive strength (MPa):	≥ 18 (after 28 days)
Flexural strength (MPa):	≥ 4
Bond strength to substrate (MPa):	> 1.5 (after 28 days)
Minimum waiting time before passing a float:	approximately 30 mins.
Impermeability expressed as coefficient of permeability to free water (kg/m ² · h 0,5):	$W < 0.1$ Class III (low permeability)
Permeability to water vapour – equivalent air thickness Sd- (m):	$Sd < 5$ Class I (permeable to water vapour)
Consumption (kg/m ²):	approx. 1.4 (per mm of thickness)

► 4.5| Repairs using MAPEGROUT T60

Description: fibre-reinforced, sulphate-resistant thixotropic mortar for repairing concrete.

Particularly suitable for: repairing deteriorated, normal concrete structures and reinforced cement structures subject to attack by sulphur. Hydraulic structures, repairs to concrete around reinforcement rods and applications on ceilings, such as the inside face of floor slabs.

photo 7
Application
of Mapegrout T60



Repairing deteriorated, normal concrete structures and reinforced cement structures subject to attack by sulphur using MAPEGROUT T60. Apply on substrates saturated with water, but with a dry surface. When this product is mixed with water, it forms a thixotropic mortar which is easy to apply, on vertical surfaces, even in thick layers, without formwork. To improve expansion in the open air during the first few days of the curing cycle, MAPEGROUT T60 may include 0.25%-0.5% of MAPECURE SRA special admix, which has the property of reducing plastic and hydraulic shrinkage and the formation of micro cracks. If there is insufficient

MAPEGROUT T60 has the following performance characteristics:

table 7

Characteristics	Test method	Minimum requirements according to EN 1504-3 for R4 class mortar	Performance of product
Density of the mix (kg/m ³):	/	/	2200
pH of mix:	/	/	> 12.5
Pot life of mix:	/	/	approx. 1 hour (at 20°C)
Mechanical characteristics using 17% of water:			
Compressive strength (MPa):	EN 12190	≥ 45 (after 28 days)	> 60 (after 28 days)
Flexural strength (MPa):	EN 196/1	/	> 8 (after 28 days)
Compressive modulus of elasticity (GPa):	EN 13412	≥ 20 (after 28 days)	27 (after 28 days)
Bond strength to substrate (MPa):	EN 1542	≥ 2 (after 28 days)	> 2 (after 28 days)
Crack resistance:	"O-ring" test	/	no cracks after 180 days
Resistance to accelerated carbonatation:	EN 13295	depth of carbonatation ≤ reference concrete (MC 0.45 type water/cement ratio = 0.45) according to UNI 1766	meets specifications
Impermeability to water: - penetration depth - (mm):	EN 12390/8	/	< 5
Capillary absorption (kg/m ² · h ^{0.5}):	EN 13057	≤ 0.5	< 0.25
Slip-resistance of reinforcement rods: - bonding stress - (MPa):	EN 15184	/	≥ 25
Thermal compatibility to freeze-thaw cycles with deicing salts, measured as measured as bonding according to EN 1542 (MPa)	EN 13687/1	≥ 2 (after 50 cycles)	> 2
Reaction to fire:	Euroclass	according to value declared by manufacturer	A1
Consumption (kg/m ²):	/	/	18.5 (per cm of thickness)

boundary support, filling layers of more than 20 mm must only be applied after inserting dolly rods and roughing the surface of the concrete. A layer of at least 20 mm thick must be applied over the rods.

MAPEGROUT T60 may be applied by spray with a suitable worm-screw or piston-type spray rendering machine, such as a Turbosol or a Putzmeister.

The product meets the minimum requirements of EN 1504-3 Standards for R4-class structural mortars.

► 4.6| Repairs using MAPEGROUT BM

Description: *two-component cementitious mortar with a low modulus of elasticity for the restoration of concrete.*

Particularly suitable for: *repairing deteriorated parts in concrete, the corners of beams and pillars and the front edges of balconies, including when the surface is not particularly rough. Filling rigid joints, for example between footings and pillars.*

photo 8
Mapegrout BM
applied by spray



Repairing deteriorated cortices of concrete structures which are subject to small deformations under load, thermal cycles or which are exposed to particularly harsh climatic conditions using MAPEGROUT BM. Apply on substrates saturated with water, but with a dry surface. The maximum thickness to be applied for each layer is approximately 35 mm. For thicknesses of more than 30 mm, we recommend using electro-welded mesh embedded in the mortar. The product is applied by trowel or by spray without formwork, even on vertical surfaces or ceilings.

The product meets the minimum requirements of EN 1504-3 Standards for R4-class structural mortar.

MAPEGROUT BM has the following performance characteristics:

table 8

Characteristics	Test method	Minimum requirements according to EN 1504-3 for R4 class mortar	Performance of product
Density of the mix (kg/m ³):	/	/	2.100
pH of mix:	/	/	> 12.5
Pot life of mix:	/	/	approx. 1 hour (at 20°C)
Compressive strength (MPa):	EN 12190	≥ 45 (after 28 days)	> 47 (after 28 days)
Flexural strength (MPa):	EN 196/1	/	> 10 (after 28 days)
Compressive modulus of elasticity (GPa):	EN 13412	≥ 20 (after 28 days)	22 (after 28 days)
Bond strength to substrate (MPa):	EN 1542	≥ 2 (after 28 days)	> 2 (after 28 days)
Resistance to accelerated carbonatation:	EN 13295	Depth of carbonatation ≤ reference concrete (MC 0.45 type water/cement ratio = 0.45) according to UNI 1766	meets specifications
Impermeability to water: - penetration depth - (mm):	EN 12390/8	none	<10
Capillary absorption (kg/m ² · h ^{0.5}):	EN 13057	≤ 0.5	< 0.25
Thermal compatibility measured as bonding according to EN 1542 (MPa):	EN 13687/1	≥ 2 (after 50 cycles)	> 2
Reaction to fire:	Euroclass	According to value declared by manufacturer	A1
Consumption (kg/m ²):	/	/	21 (per cm of thickness)

► 4.7| Repairs using MAPEGROUT FAST SET

Description: fibre-reinforced, controlled-shrinkage rapid-setting and hardening mortar.

Particularly suitable for: cortical restoration of deteriorated vertical and horizontal surfaces on concrete. Quick repairs to the corners of beams, pillars and the front edges of balconies. Sealing surface cracks in all types of concrete structures and cementitious render.

When MAPEGROUT FAST SET is mixed with water, it forms a thixotropic mortar which is easy to work with, so that it may be applied on vertical surfaces at thicknesses of up to 2-2.5 cm.

Apply on substrates saturated with water, but with a dry surface.

When several layers of MAPEGROUT FAST SET are required to fill in considerably thick areas,

photo 9
Application
of Mapegrout Rapido



wait approximately 15 minutes between the application of each layer. Apply the mix using a trowel or flat trowel.

The product meets the minimum requirements of EN 1504-3 Standards for R3-class structural mortar.

MAPEGROUT FAST SET has the following performance characteristics:

table 9

Characteristics	Test method	Minimum requirements according to EN 1504-3 for R3 class mortar	Performance of product
Density of the mix (kg/m ³):	/	/	2150
pH of mix:	/	/	> 12
Pot life of mix:	/	/	approx. 10 min. (at 20°C)
Mechanical characteristics using 15.5% of water:			
Compressive strength (MPa):	EN 12190	≥ 25 (after 28 days)	> 40 (after 28 days)
Flexural strength (MPa):	EN 196/1	/	> 8 (after 28 days)
Compressive modulus of elasticity (GPa):	EN 13412	≥ 15 (after 28 days)	24 (after 28 days)
Bond strength to substrate (MPa):	EN 1542	≥ 1.5 (after 28 days)	> 1.5 (after 28 days)
Reaction to fire:	Euroclass	according to value declared by manufacturer	A1
Consumption (kg/m ²):	/	/	18 (per cm of thickness)

► 4.8| Repairs using MAPEGROUT THIXOTROPIC

Description: *fibre-reinforced, controlled-shrinkage mortar for repairing concrete.*

Particularly suitable for: *cortical and structural repairs of deteriorated concrete structures. Repairing the corners of columns, beams and the front edges of balconies.*

When MAPEGROUT THIXOTROPIC is mixed with water, it forms a mortar which is easy to work with, so that it may be applied on vertical surfaces at high thicknesses without running, and without the use



photo 10
Application
of Mapegrout Thixotropic

of formwork. Apply on substrates saturated with water, but with a dry surface. To improve expansion in the open air during the first few days of the curing cycle, MAPEGROUT THIXOTROPIC may include 0.25%-0.5% of MAPECURE SRA special admix, which has the property of reducing plastic and hydraulic shrinkage and the formation of micro cracks. If there is insufficient boundary support, filling layers of MAPEGROUT THIXOTROPIC of more than 2 cm must only be applied after inserting dolly rods and roughing the surface of the concrete. A layer of at least 2 cm thick must be applied over the rods. MAPEGROUT THIXOTROPIC may be applied by spray with a suitable worm-screw or piston-type spray rendering machine, such as a Turbosol or a Putzmeister. The product meets the minimum requirements of EN 1504-3 Standards for R4-class structural mortar.

MAPEGROUT THIXOTROPIC has the following performance characteristics:

table 10

Characteristics	Test method	Minimum requirements according to EN 1504-3 for R4 class mortar	Performance of product
Density of the mix (kg/m ³):	/	/	2200
pH of mix:	/	/	> 12.5
Pot life of mix:	/	/	approx. 1 hour (at 20°C)
Mechanical characteristics using 16% of water:			
Compressive strength (MPa):	EN 12190	≥ 25 (after 28 days)	> 60 (after 28 days)
Flexural strength (MPa):	EN 196/1	/	> 8.5 (after 28 days)
Compressive modulus of elasticity (GPa):	EN 13412	≥ 15 (after 28 days)	26 (after 28 days)
Bond strength to substrate (MPa):	EN 1542	≥ 1.5 (after 28 days)	> 2 (after 28 days)
Capillary absorption (kg/m ² · h ^{0.5}):	EN 13057	≤ 0.5	< 0.2
Thermal compatibility to freeze/thaw cycles with de-icing salts, measured as adhesion according to EN 1542 (MPa):	EN 13687/1	≥ 1.5 (after 50 cycles)	> 2
Reaction to fire:	Euroclass	according to value declared by manufacturer	A1
Consumption (kg/m ²):	/	/	19 (per cm of thickness)

► 4.9| Repairs using MAPEGROUT LM2K

Description: *two-component, thixotropic, fibre-reinforced, cementitious mortar with a low modulus of elasticity and added organic corrosion inhibitor for repairing concrete, applied in a single layer at a thickness of from 3 to 20 mm.*

Particularly suitable for: *smoothing over surface defects in cast concrete, such as gravel clusters, spacer holes, construction joints, etc. Repairing deteriorated elements, such as beams, piles and pulvinoes.*

Mapegrout LM2K is a pre-blended thixotropic cementitious mortar with corrosion inhibitor made from two pre-dosed components to be mixed together.

Component A (powder) is made from cement, selected, mixed aggregates, synthetic fibres and special additives which reduce both plastic shrinkage and final hygrometric shrinkage. Component B (liquid) is a solution of synthetic resin in water.

After hardening, Mapegrout LM2K has the following properties:

- Low modulus of elasticity;
- Excellent bond strength to old concrete (< 2 MPa) if dampened with water before application, and to reinforcement rods, especially if treated beforehand with MAPEFER or MAPEFER 1K;
- High dimensional stability and, therefore, low risk of cracking during the plastic phase and when hardened;
- Resistance to aggressive agents in the atmosphere (e.g. CO₂).

The product meets the minimum requirements of EN 1504-3 for R3-class structural mortar.

photo 11
Application
Mapegrout LM2K



MAPEGROUT LM2K has the following performance characteristics:

table 11

Characteristics	Test method	Minimum requirements according to EN 1504-3 for R3 class mortar	Performance of product
Density of mix (kg/m ³):	/	/	2080
Pot life of mix:	/	/	approx. 1 hour (at 20°C)
Compressive strength (MPa):	EN 12190	≥ 25 (after 28 days)	≥ 38 (after 28 days)
Flexural strength (MPa):	EN 196/1	/	≥ 7 (after 28 days)
Compressive modulus of elasticity (GPa):	EN 13412	≥ 15 (after 28 days)	17 (after 28 days)
Bond strength to substrate (MPa):	EN 1542	≥ 1.5 (after 28 days)	≥ 2 (after 28 days)
Resistance to accelerated carbonatation:	EN 13295	Depth of carbonatation ≤ the reference concrete (MC 0.45 type water/cement ratio ≤ 0.45) according to UNI 1766	meets specifications
Thermal compatibility to freeze/thaw cycles with de-icing salts measured as bond strength EN 1542 (MPa):	EN 13687/1	≥ 1.5 (after 50 cycles)	≥ 2
Reaction to fire:	Euroclass	value declared by manufacturer	E
Consumption (kg/m ²):	/	/	approx. 21 (per cm of thickness)

► 4.10| Summary of the main characteristics of thixotropic repair mortars

table 12

	THIXOTROPIC MORTARS								
	Normal setting						Quick setting		
Characteristics	Mapegrout Thixotropic	Mapegrout T40	Mapegrout T60	Mapegrout BM	Mapegrout LM2K	Mapegrout 430	Mapegrout Fast set	Planitop 400	Planito Smooth & Repair
Standards class according to EN 1504-3	R4	R3	R4	R4	R3	R3	R3	R3	R2
Maximum size of aggregate	2,5 mm	2,5 mm	2,5 mm	2,5 mm	1,6 mm	1 mm	1 mm	0,5 mm	0,4 mm
Mixing ratio	15.5% - 16.5% of water	15.5% - 16.5% of water	16.5% - 17.5% of water	Comp. A : Comp.B 5.3 : 1	Comp. A : Comp.B 10 : 2.1	17.5% - 18.5% of water	15% - 16% of water	15% - 16% of water	19% - 21% of water
Density of mix	2200 kg/m ³	2200 kg/m ³	2200 kg/m ³	2100 kg/m ³	2080 kg/m ³	2000 kg/m ³	2150 kg/m ³	2100 kg/m ³	1730 kg/m ³
Application temperature range	from +5°C to +35°C	from +5°C to +35°C	from +5°C to +35°C	from +5°C to +35°C	from +5°C to +35°C	from +5°C to +35°C	from +5°C to +35°C	from +5°C to +35°C	from +5°C to +35°C
Pot life of mix	approx 1h (20°C)	approx 1h (20°C)	approx 1h (20°C)	approx 1h (20°C)	approx 1h (20°C)	approx 1h (20°C)	approx 10 min (20°C)	approx 10 min (20°C)	approx 20 min (20°C)
Compressive strength	> 60 MPa after 28 days	> 40 MPa after 28 days	> 60 MPa after 28 days	> 47 MPa after 28 days	≥ 38 MPa after 28 days	30 MPa after 28 days	> 40 MPa after 28 days	≥ 35 MPa after 28 days	18 MPa after 28 days
Flexural strength	> 8,5 MPa after 28 days	7 MPa after 28 days	> 8 MPa after 28 days	> 10 MPa after 28 days	> 7 MPa after 28 days	> 6 MPa after 28 days	> 8 MPa after 28 days	> 7 MPa after 28 days	> 4 MPa after 28 days
Compressive modulus of elasticity	26 GPa after 28 days	25 GPa after 28 days	27 GPa after 28 days	22 GPa after 28 days	17 GPa after 28 days	23 GPa after 28 days	24 GPa after 28 days	24 GPa after 28 days	13 GPa after 28 days
Bond strength on concrete according to EN 1766	> 2 MPa after 28 days	> 2 MPa after 28 days	> 2 MPa after 28 days	> 2 MPa after 28 days	> 2 MPa after 28 days	> 2 MPa after 28 days	> 2 MPa after 28 days	> 2 MPa after 28 days	> 2 MPa after 28 days
Thermal compatibility to freeze-thaw cycles with de-icing salts, measured as bond strength according to EN 1542	> 2 MPa	> 1,5 MPa	> 2 MPa	> 2 MPa	> 2 MPa	> 1.5 MPa	> 1.5 MPa	> 1.5 MPa	> 1.5 MPa
Maximum thickness applied by hand	30-35 mm	30-35 mm	40 mm	35 mm	20 mm	35 mm	20-25 mm	40 mm	40 mm
Consumption	19 kg/cm ² per cm of thickness	18.5 kg/cm ² per cm of thickness	18.5 kg/cm ² per cm of thickness	21 kg/cm ² per cm of thickness	21 kg/cm ² per cm of thickness	17 kg/cm ² per cm of thickness	18 kg/cm ² per cm of thickness	18.5 kg/cm ² per cm of thickness	14 kg/cm ² per cm of thickness

► 5| **Repairing concrete using a castable mortar**

► 5.1| **Repairs using MAPEGROUT HI-FLOW**

Description: *fibre-reinforced, controlled-shrinkage mortar for repairing concrete.*

Particularly suitable for: *repairs in thick layers to concrete structures. Structural reintegration of concrete beams and pillars by casting into formwork, floor slabs and floors.*



photo 12

Increasing a section using
Mapegrout Colabile

MAPEGROUT HI-FLOW is used to repair concrete structures where high thicknesses and special conformations of deterioration require the use of a castable mortar. Apply on substrates saturated with water, but with a dry surface. When mixed with water, MAPEGROUT HI-FLOW forms a highly-fluid mortar, suitable for application by casting into formwork with no risk of segregation, including when applied in thick layers. To improve expansion in the open air during the first few days of the curing cycle, MAPEGROUT HI-FLOW GF must include 0.25% of MAPECURE SRA special liquid admix, which has the property of reducing hydraulic shrinkage and the formation of micro cracks. Pour the mortar into the formwork in a continuous flow from one side only, in order to help all air to be expelled. The product meets the minimum requirements of EN 1504-3 Standards for R4-class structural mortar.

MAPEGROUT HI-FLOW has the following performance characteristics:

table 13

Characteristics	Test method	Minimum requirements according to EN 1504-3 for R4 class mortar	Performance of product
Density of the mix (kg/m ³):	/	/	2350
pH of mix:	/	/	> 12.5
Pot life of mix:	/	/	approx. 1 hour (at 20°C)
Mechanical characteristics using 13% of water:			
Compressive strength (MPa):	EN 12190	≥ 45 (after 28 days)	> 75 (after 28 days)
Flexural strength (MPa):	EN 196/1	none	> 12 (after 28 days)
Compressive modulus of elasticity (GPa):	EN 13412	≥ 20 (after 28 days)	27 (after 28 days)
Bond strength to substrate (MPa):	EN 1542	≥ 2 (after 28 days)	> 2 (after 28 days)
Crack resistance:	"O Ring Test"	none	no cracks after 180 days
Resistance to accelerated carbonatation:	EN 13295	Depth of carbonatation ≤ reference concrete (MC 0.45 type water/cement ratio = 0.45) according to UNI 1766	meets specifications
Impermeability to water: - penetration depth - (mm):	EN 12390/8	/	< 5
Capillary absorption (kg/m ² · h ^{0.5}):	EN 13057	≤ 0.5	< 0.08
Slip-resistance of reinforcement rods: - bonding stress (MPa):	EN 15184	none	≥ 25
Thermal compatibility to freeze-thaw cycles with deicing salts, measured as measured as bonding according to EN 1542 (MPa):	EN 13687/1	≥ 2 (after 50 cycles)	> 2
Reaction to fire:	Euroclass	according to value declared by manufacturer	A1
Consumption (kg/m ²):	/	/	21 (per cm of thickness)

► 6| Repairing concrete using cementitious binders

► 6.1| Repairs using STABILCEM SCC

Description: cementitious binder for self-compacting, volumetrically-stable concrete, for repairing concrete structures.

Particularly suitable for: preparing self-compacting, compensated-shrinkage, high-strength concrete, applied by pumping or casting, without the need to vibrate the cast concrete.



photo 13

Super-fluid concrete prepared
using Stabilcem SCC

Increasing the section of piles using self-compacting, high-strength, pozzolanic-reaction, volumetrically-stable concrete without segregation.

Concrete applied using a concrete pump or by casting into formwork, without the need of vibrating the cast concrete.

STABILCEM SCC special binder must be used to prepare the concrete, a specially formulated product to guarantee no shrinkage during the first few weeks of the curing cycle, including in open air.

According to the type of aggregate available and performance characteristics required, the dosage rate of the binder is between 550 and 600 kg/m³.

The concrete is prepared on site or in a cement-mixing plant, and must include from 25 to 35 kg/m³ of calcium oxide based expanding agent, and 5 kg/m³ of MAPECURE SRA, which has the property of containing shrinkage by reducing the surface tension of the capillary pores in the cementitious paste, and DYNAMON SP3 super-plasticiser, according to the surrounding temperature, so that the formwork may be removed approximately 14 hours after casting.

The mix must contain inert materials with a good grain-size distribution with a maximum diameter of 15 mm, and a water/binder ratio of ≤ 0.35 .

Beton and concrete prepared using STABILCEM SCC has the following characteristics:

table 14

Characteristics	Performance of product
Density of the mix (kg/m ³):	2300
Slump flow (cm):	72
Compressive strength (EN 12390-3) (MPa): after 18 h at 10°C: after 18 h at 15°C: after 18 h at 20°C: after 1 day at 10°C: after 1 day at 15°C: after 1 day at 20°C: after 28 days at 10°C: after 28 days at 15°C: after 28 days at 20°C:	> 2 MPa > 10 MPa > 18 MPa > 8 MPa > 18 MPa > 24 MPa > 55 MPa > 55 MPa > 55 MPa
Bleeding:	none
Contrasted expansion (UNI 8148 mod.) (open-air curing at 20°C and 55% R.H.): after 24 hours: after 90 days:	300 µm/m < 100 µm/m
Impermeability according to EN 12390-8 penetration of water:	< 5 mm
Beton must be impermeable to water and conform to the exposition classes according to EN 206-1 Standards:	XC1-XC4, XS1-XS3, XD1-XD3, XF1-XF4, XA1-XA3
Dosage of binder: beton (kg/m ³): concrete (kg/m ³):	600 500-600

Mapei mortars for smoothing and levelling concrete and render

	Product	Nivoplan	Planitop 100	Planitop 200	Planitop 207	Planitop Smooth & Repair	Monofinish	Mapefinish	Planitop 520	Planitop 530	Planitop 540	Planitop 560	Planitop 580
Type	Normal setting	•		•	•		•	•	•	•	•	•	•
	Rapid setting		•			•							
Application	Concrete	•	•	•	•	•	•	•			•	•	
	Render	•	•	•	•		•		•	•	•	•	•
Where to use	Natural finish smoothing layer	•	•	•	•	•	•	•	•	•	•	•	•
	Smoothing out surface defects	•	•	•	•	•	•	•			•	•	•
	Localised repairs		•	•	•	•							
	Abrasion resistance							•					
	Protecting against aggressive agents						•	•					
	Suitable for laying ceramics	•		•	•						•		

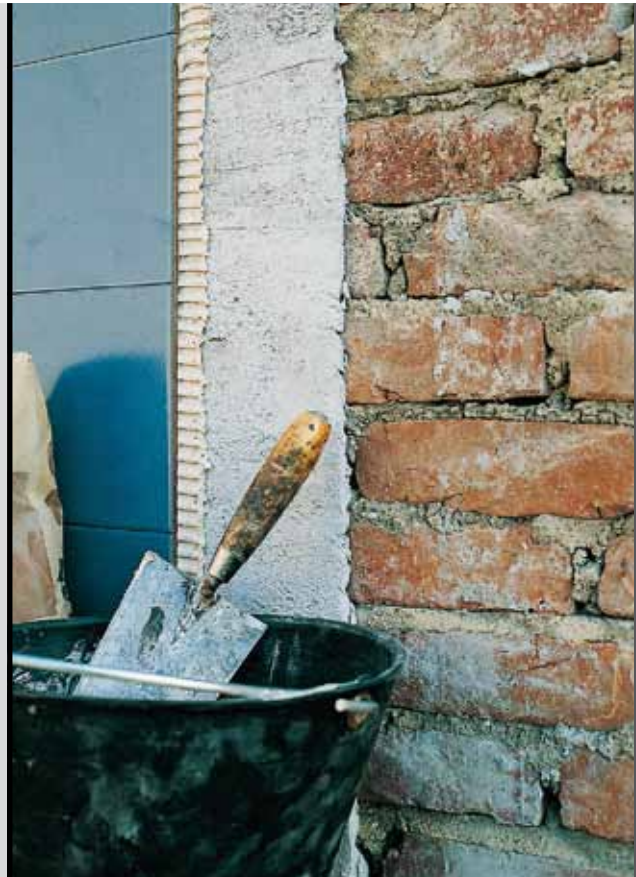
► 7| **Smoothing and levelling concrete and rendered surfaces**

► 7.1| **Smoothing and rendering surfaces using NIVOPLAN**

Description: *levelling mortar for indoor and outdoor walls and ceilings.*

Particularly suitable for: *rendering and levelling surfaces of internal and external walls and ceilings at a thickness of from 2 to 30 mm, to make them suitable for laying ceramic or for being painted over.*

photo 14
Application of render
using Nivoplan



When NIVOPLAN is mixed with water it forms a mix which is easy to apply on vertical surfaces by trowel or with a rendering machine. The bonding characteristics of NIVOPLAN may be improved by adding PLANICRETE when it is being mixed with water, at a rate of approximately 2 litres per sack (as a partial substitute for the mixing water). There is no problem if NIVOPLAN is applied on damp surfaces, the only consequence is a longer hardening time. On very absorbent substrates (brickwork, expanded cement, etc.) we recommend wetting the surface before applying NIVOPLAN, especially if a layer of less than 3 mm is applied. On gypsum or

similar substrates, the surface must be treated with PRIMER G before applying NIVOPLAN. NIVOPLAN may be applied by spray using a rendering machine or by trowel, or with a levelling board if applied in thick layers. Apply pressure when spreading the material to make sure that it bonds well to the substrate. Apply a layer approximately 1 cm thick. Under normal temperature and humidity conditions, it is resistant enough for laying tiles after 4-5 hours on substrates with normal absorption.

Wait at least two weeks before painting over the surface.

NIVOPLAN has the following performance characteristics:

table 15

Characteristics	Performance of product
Density of the mix (kg/m ³):	1830
pH of product:	approx. 12
Pot life of mix:	2-3 hours (at 23°C)
Thickness applied per layer (mm):	from 2 to 30
Resistance to alkalis:	excellent
Resistance to oil:	excellent (poor with vegetable oils)
Resistance to solvents:	excellent
Flexural strength (N/mm ²)	3.5
Compressive strength (N/mm ²)	6
Consumption (kg/m ²)	approx. 14 (per cm of thickness)

► 7.2| Smoothing surfaces using PLANITOP 100

Description: *quick-setting, fine, light-grey coloured mortar for repairing and smoothing concrete and render.*

Particularly suitable for: *repairing and finishing porous and fractured cementitious surfaces. Evening out surface defects, smoothing cement and lime-cement render and small repairs to concrete elements.*

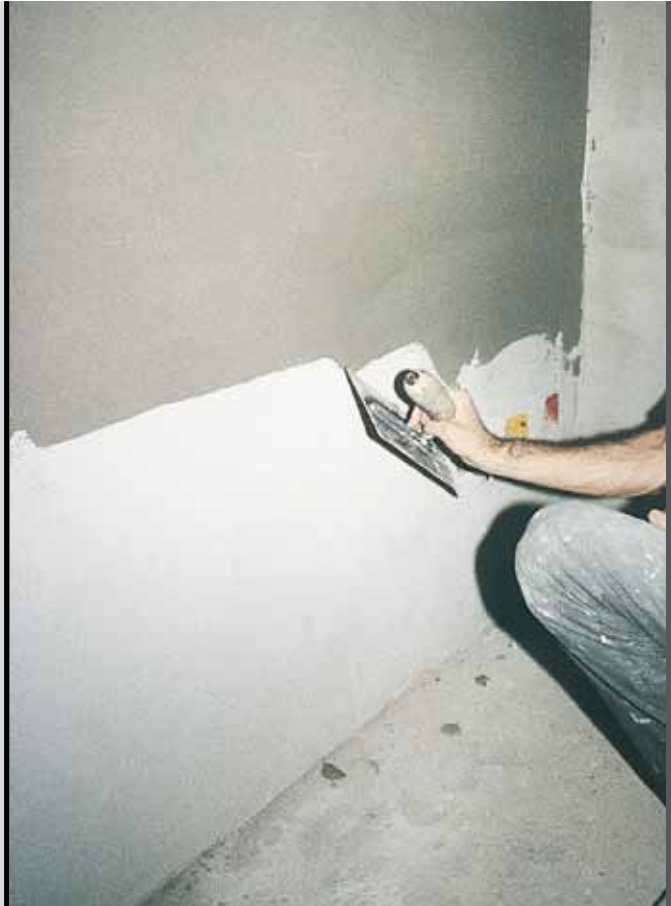
Repairing and finishing porous or fractured cementitious surfaces using PLANITOP 100.

Apply on substrates saturated with water, but with a dry surface.

When PLANITOP 100 is mixed with water, it forms a free-flowing mortar which may be easily applied, even on vertical surfaces, at a thickness of up to 5 mm in two layers. For layers thicker than 5 mm, we recommend adding 30% of inert material with a maximum grain size of 2 mm. Spread the mortar using a flat trowel.

The product meets the minimum requirements of EN 1504-2 regarding surface protection systems for concrete.

photo 15
Smoothing layer
using Planitop 100



PLANITOP 100 has the following performance characteristics:

table 16

Characteristics	Performance of product
Density of the mix (kg/m ³):	1,500 – 1,700
pH of product:	12.4
Pot life of mix:	20 – 30 minutes (at 20°C)
Setting time:	1 – 1.5 hours
Compressive strength (N/mm ²):	> 15 (after 28 days)
Flexural strength (N/mm ²):	> 5 (after 28 days)
Bond strength to substrate (Mpa):	≥ 2 (after 28 days)
Taber abrasion according to ASTM D 4060-84 Standards after 200 cycles with 500 g weight (H22 disk) expressed as loss in weight (g):	8
Consumption (kg/m ²):	approximately 1,3 (per mm of thickness if applied neat) approximately 1 (per cm of thickness if used with 30% of 2 mm diameter sand)

► 7.3| Smoothing surfaces using PLANITOP 200

Description: *single component, high-bonding cementitious mortar for smoothing uneven surfaces and finishing (with natural effect) of internal and external walls.*

Particularly suitable for: *evening and finishing concrete walls and cementitious and lime-cement render before painting. Smoothing walls before laying ceramic tiles. Smoothing all kinds of walls, including over old paintwork, as long as they are consistent, clean and well attached.*



photo 16

Reinforced smoothing layer
using Planitop 200

When PLANITOP 200 is mixed with water, it has a high bond strength and makes it very easy to spread with a smooth, metallic trowel, and helps with finishing operations using a metal float or sponge pad. May be applied at a maximum thickness of up to 3 mm for each layer. The maximum thickness must not be higher than 6 mm.

Spread the mortar using a smooth, metal trowel.

The product meets the minimum requirements of 1504-2 regarding surface protection systems for concrete.

PLANITOP 200 has the following performance characteristics:

table 17

Characteristics	Performance of product
Density of the mix (kg/m ³):	1,600
pH of product:	12-12.5
Pot life of mix:	approx. 1.5 hours (at 20°C)
Brookfield viscosity (mPa · s): - after 5 minutes: - after 60 minutes:	100-200 (rotor D – 5 revs) ≤ 400 (rotor E – 5 revs)
Setting time: - start: - finish:	> 3 h < 6 h
Compressive strength (MPa):	> 14 (after 28 days)
Flexural strength (MPa):	> 5 (after 28 days)
Dynamic modulus of elasticity (MPa):	7000-11000 (after 28 days)
Bond strength to substrate (MPa):	> 2 (after 28 days)
Abrasion according to ISO 5470 (after 100 revs) expressed as loss in weight (g):	< 5 (after 28 days)
Consumption (kg/m ²)	approx. 1.3 (per mm of thickness)

► 7.4| Smoothing and levelling surfaces with PLANITOP 207

Description: *one-component, high bond strength cementitious mortar for smoothing and levelling uneven surfaces and finishing off internal and external walls with a natural finish.*

Particularly suitable for: *evening and finishing concrete walls and cementitious and lime-cement render before painting. Smoothing and levelling plasterboard and mineral wood panels. Smoothing all kinds of walls, including over old paintwork, as long as they are consistent, clean and well attached.*

PLANITOP 207 is a one-component, normal-hardening cementitious mortar made from special high-strength binders, large-grained selected aggregates, special additives and synthetic polymers in powder form. When PLANITOP 207 is mixed with water, it develops a high bond strength and low slump which makes it easy to spread on with a smooth, metallic trowel, and helps with finishing operations using a metal float or sponge pad. May be applied at a maximum thickness of up to 3 mm for each layer. The total thickness applied must never be more than 6 mm, and MAPENET 150 reinforcement mesh must be laid between the first and second layers.

PLANITOP 207 complies with the requirements of EN 1504-2 coating (C) according to principles MC and IR for protecting concrete and is classified as GP category CS IV according to EN 998-1.



photo 17
Smoothing layer
using Planitop 207

PLANITOP 207 has the following performance characteristics:

table 18

Characteristics	Performance of product
Density of mix (kg/m ³):	1800
Pot life of mix:	approx. 1 hour (at 20°C)
Compressive strength (MPa):	> 25 (after 28 days)
Bond strength to substrate (MPa):	> 2 (after 28 days)
Minimum waiting time before laying ceramic coating:	4 days
Minimum waiting time before painting with coloured finishing products from the Silexcolor, Silancolor, Elastocolor, Quarzolite and Colorite ranges:	7 days
Impermeability expressed as coefficient of permeability to free water (kg/m ² · h 0,5):	W < 0.1 Class III (low permeability)
Permeability to water vapour – equivalent air thickness Sd- (m):	SD < 0.5 Class I (permeable to water vapour)
Consumption (kg/m ²):	approx. 1.5 (per mm of thickness)

► 7.5| Smoothing and levelling surfaces with PLANITOP SMOOTH & REPAIR

Description: Quick-setting, fibre-reinforced, controlled-shrinkage thixotropic mortar for repairing and smoothing concrete, may be applied in various thicknesses of from 3mm up to 40mm in a single layer.

Particularly suitable for: quick repairs to deteriorated parts in concrete, the corners of beams, pillars, buffer walls, cornices and the front edges of balconies. Quickly smoothing over surface defects in cast concrete, such as gravel clusters, spacer holes, construction joints, etc. before painting the surface. Repairing and smoothing over concrete mouldings on civil buildings.

PLANITOP SMOOTH & REPAIR is a one-component, thixotropic cementitious mortar, made from special hydraulic binders, selected fine-grained aggregates, polyacrylonitrile synthetic fibres, synthetic resins and special additives.

When PLANITOP SMOOTH & REPAIR is mixed with water, it forms a mortar with good workability which may be applied by trowel or spatula on vertical surfaces, for smoothing and repairing in thicknesses of from 3 to 40 mm in a single layer.

PLANITOP SMOOTH & REPAIR hardens without shrinking and, thanks to its content of synthetic fibres, is characterised by its excellent bond on concrete substrates. After hardening, PLANITOP SMOOTH & REPAIR has the following characteristics:

- Excellent bond strength to old concrete (≥ 1.5 MPa) if dampened with water before application, and to reinforcement rods, especially if treated beforehand with MAPEFER or MAPEFER 1K;
- High dimensional stability and, therefore, low risk of cracking during the plastic phase and when hardened;
- Low permeability to water.

The product complies with the minimum requirements of EN 1504-3 for structural R2-class mortars and EN 1504-2 coating (C) according to principles MC and IR.

photo 18
Smoothing layer
using Planitop Rasa & Ripara



PLANITOP SMOOTH & REPAIR has the following performance characteristics:

table 19

Characteristics	Performance of product
Density of mix (kg/m ³):	1730
Pot life of mix:	approximately 20 minutes (at 20°C)
Compressive strength (MPa):	≥ 18 (after 28 days)
Flexural strength (MPa):	≥ 4
Bond strength to substrate (MPa):	> 1.5 (after 28 days)
Minimum waiting time before passing a float:	approximately 30 mins.
Impermeability expressed as coefficient of permeability to free water (kg/m ² · h 0,5):	$W < 0.1$ Class III (low permeability)
Permeability to water vapour – equivalent air thickness Sd- (m):	$Sd < 5$ Class I (permeable to water vapour)
Consumption (kg/m ²):	approx. 1.4 (per mm of thickness)

► 7.6| Smoothing surfaces using MAPEFINISH

Description: *two-component cementitious mortar for finishing off concrete.*

Particularly suitable for: *evening out surface defects in cast concrete before being painted over. Smoothing and levelling off concrete repaired using mortar from the MAPEGROUT range.*



photo 19
Smoothing layer
using Mapefinish

When the two components are mixed together, a free-flowing mix is obtained which may be easily applied, even on vertical surfaces, at a thickness of up to 2-3 mm in one single layer. It has high bonding strength to all concrete surfaces and, once hardened, forms a tough, compact, layer which is impermeable to water and harmful gases present in the atmosphere and is resistant to freeze-thaw cycles. Spread the mortar on the surface at a thickness of up to a maximum of 2-3 mm using a metal trowel. The product meets the minimum requirements of EN 1504-3 Standards for R2-class non structural mortar and EN 1504-2 coating (C) standards according to the MC and IR principles.

MAPEFINISH has the following performance characteristics:

table 20

Characteristics	Performance of product
Density of the mix (kg/m ³):	1900
pH of product:	12.5
Pot life of mix:	1 hour (at 20°C)
Brookfield viscosity (mPa · s):	80000
Bond strength to substrate (MPa):	> 2.5 (after 28 days)
Taber abrasion according to ASTM D 4060-84 Standards - after 200 cycles with 500 g weight (H22 disk) expressed as loss in weight (g):	1.6 (after 28 days)
Consumption (kg/m ²):	2 (per mm of thickness)

► 7.7| Smoothing surfaces using MONOFINISH

Description: *single component, normal-setting cementitious mortar for smoothing concrete.*

Particularly suitable for: *protective and smoothing of concrete surfaces. Application on strong, concrete and rendered surfaces.*

photo 20
Smoothing layer using Monofinish



Protecting and smoothing surfaces using MONOFINISH. Application by trowel and finishing with a sponge float. Smoothing layers with MONOFINISH must also be applied on the surfaces which are not under repair, to form a uniform, homogenous substrate ready for successive dressing layers, paint or resin-based anti-corrosion treatment. The product meets the minimum requirements of EN 1504-3 Standards for R2-class non structural mortar and EN 1504-2 coating (C) standards according to the MC and IR principles.

MONOFINISH has the following performance characteristics:

table 21

Characteristics	Performance of product
Density of the mix (kg/m ³):	1650
pH of product:	12.5
Pot life of mix:	1 hour (at 20°C)
Brookfield viscosity (mPa · s):	300-600
Compressive strength (MPa):	> 20 (after 28 days)
Dynamic modulus of elasticity (MPa):	< 18000 (after 28 days)
Bond strength to substrate (MPa):	2.5 (after 28 days)
Taber abrasion according to ASTM D 4060-84 Standards - after 200 cycles with 500 g weight (H22 disk) expressed as loss in weight (g):	< 3 (after 28 days)
Consumption (kg/m ²):	1.4 (per mm of thickness)

► 7.8| Smoothing surfaces using PLANITOP 520

Description: *natural-finish, lime and cement-based smoothing layer for internal and external render, applied at a thickness of up to 3 mm using the “fresh on fresh” technique.*

Particularly suitable for: *natural finishes on pre-blended and fresh lime and cement-based render on internal and external walls and ceilings, before painting or applying coloured finishing products.*



photo 21

Smoothing layer using Planitop 520

PLANITOP 520 is a single component, pre-blended, normal-hardening smoothing product (available in light grey and white) made from aerated and hydraulic binders, limestone and quartz sand and special additives. The smoothing compound obtained by mixing PLANITOP 520 with water has high bonding strength and is characterised by its excellent free-flowing properties, which makes it easy to apply with a metal trowel, including on rough render, and where required, quick to finish off using a sponge pad. In good climatic conditions, the coloured finishing products from the SILEXCOLOR and SILANCOLOR ranges may be applied 3-4 weeks after applying PLANITOP 520.

PLANITOP 520 is classified as GP category CS II according to EN 998-1.

PLANITOP 520 has the following performance characteristics:

table 22

Characteristics	Performance of product
Density of the mix (kg/m ³):	1740
pH of product:	12 - 12.5
Pot life of mix:	approx. 2 hours
Maximum thickness of each layer:	3 mm
Recommended application temperature range:	from 5°C to 35°C
Waiting time between each layer:	30 minutes
Waiting time before finishing with float:	15 minutes
Compressive strength (N/mm ²) (28 days)	> 2
Flexural strength (N/mm ²)	> 1.5
Consumption (kg/m ²):	approx. 1.35 (per cm of thickness)

► 7.9| Smoothing surfaces using PLANITOP 530

Description: *natural-finish, lime and cement-based smoothing layer for fresh and cured internal and external render, applied at a thickness of up to 3 mm.*

Particularly suitable for: *natural finishes on pre-blended and fresh lime and cement-based render on walls and ceilings, before painting or applying coloured coatings.*

PLANITOP 530 is a single component, pre-blended, normal-hardening smoothing product (available in light grey and white) made from aerated and hydraulic binders, limestone and quartz sand and special powder additives. When PLANITOP 530 is mixed with water, it has high bonding strength and is characterised by its excellent free-flowing properties, which makes it easy to apply with a metal trowel, and where required, quick to finish off using a sponge pad. It may be applied at a maximum thickness of 3 mm per layer. Thicker layers, up to a maximum of 6 mm, must be applied in two layers. In good climatic conditions, coloured render or paint may be applied 3-4 weeks after applying PLANITOP 530.

PLANITOP 530 is classified as GP category CS IV according to EN 998-1.



photo 22

Smoothing layer using Planitop 530

PLANITOP 530 has the following performance characteristics:

Characteristics	Performance of product
Density of mix (kg/m ³):	1600
pH of product:	≥ 12
Maximum thickness of each layer:	3 mm
Application temperature range:	from 5°C to 35°C
Pot life:	approx. 2 hours
Waiting time before finishing with float:	15 minutes
Waiting time between first and second coat:	30 minutes
Compressive strength (N/mm ²) (28 days):	> 6
Flexural strength (N/mm ²)	> 3
Bond strength to concrete (N/mm ²) (28 days)	> 0.5
Consumption (kg/m ²):	approx. 1.25 (per cm of thickness)

table 23

► 7.10| Smoothing surfaces using PLANITOP 540

Description: *natural finish smoothing compound for “cured” internal and external concrete and render, applied at a thickness of up to 3 mm.*

Particularly suitable for: *natural finishes on pre-blended and fresh lime and cement-based cured render, or on slightly rough concrete walls before painting.*

PLANITOP 540 is a natural finish smoothing compound for cured concrete surfaces and render, made from cementitious binders, selected aggregates with a good grain distribution, special additives and synthetic polymers in powder form. When mixed with water, PLANITOP 540 forms a smoothing compound which is extremely easy to apply using a smooth metal trowel and finished off using a sponge float and, once hardened, has high bonding properties. It may be applied at a maximum thickness of 3 mm per layer. Thicker layers, up to a maximum of 6 mm, must be applied in two layers. Products from the SILEXCOLOR, SILANCOLOR and ELASTOCOLOR ranges may be used to obtain an excellent finish.

PLANITOP 540 is classified as GP category CS II according to EN 998-1.

photo 23
Smoothing layer using
Planitop 540



PLANITOP 540 has the following performance characteristics:

table 24

Characteristics	Performance of product
Density of mix (kg/m ³):	approx. 1680
pH of product:	≥ 12
Pot life of mix:	approx. 2 hours
Maximum thickness of each layer:	3 mm
Application temperature range:	from 5°C to 35°C
Setting time:	>3, < 6 hours
Waiting time before painting:	7 days
Compressive strength (N/mm ²) (28 days):	> 14
Flexural strength (N/mm ²)	> 5
Bond strength to concrete (N/mm ²) (28 days):	> 1
Dynamic modulus of elasticity (N/mm ²)	7,000 – 11,000
Consumption (kg/m ²):	approx. 1.4 (per cm of thickness)

► 7.11 | Smoothing surfaces using PLANITOP 560

Description: lime and cement-based white levelling compound for the smooth finishing of internal and external fresh and cured cementitious render and concrete surfaces, applied at a thickness from 0 mm to 3 mm.



photo 24

Smoothing layer using
Planitop 560

Particularly suitable for: *smoothing fresh or cured (within 24 hours of application) lime-mortar or pre-blended render on internal and external walls and ceilings, before painting or applying coloured finishing materials.*

PLANITOP 560 is a single component, pre-blended, normal-hardening, white smoothing product made from aerated and hydraulic binders, selected, white guaranteed Carrara limestone sand, special additives and synthetic polymers in powder form. When PLANITOP 560 is mixed with water, it has high bonding properties and is very fluid, which makes it very easy to spread with a smooth, metallic trowel, and which helps with the finishing operations. It may be applied at a thickness of between 0 mm and 3 mm for each single coat. In good climatic conditions, finishing products from the SILEXCOLOR, SILANCOLOR and ELASTOCOLOR ranges may be applied after 7 days on cured substrates and after 3-4 weeks on fresh substrates.

PLANITOP 530 is classified as GP category CS IV according to EN 998-1.

PLANITOP 560 has the following performance characteristics:

table 25

Characteristics	Performance of product
Density of mix (kg/m ³):	1600
pH of product:	12 - 12.5
Pot life of mix:	approx. 2 hours
Maximum thickness of each layer:	3 mm
Recommended application temperature range:	from 5°C to 35°C
Waiting time before finishing with float:	15 minutes
Waiting time between first and second coat:	30 minutes
Compressive strength (N/mm ²) (28 days):	> 6
Flexural strength (N/mm ²)	>3
Bond strength to concrete (N/mm ²) (28 days):	> 1
Consumption (kg/m ²):	approx. 1.1 (per cm of thickness)

► 7.12| Smoothing surfaces using PLANITOP 580

Description: *white lime and gypsum-based smoothing compound for finishing dry, cured internal gypsum, anhydrite or lime/cement-based renders.*

Particularly suitable for: *finishing and smoothing traditional and pre-blended render, if sufficiently dry and cured. Smoothing gypsum surfaces, breeze blocks or clay and gypsum blocks. Grout for old rendered walls with small imperfections.*

PLANITOP 580 is a white, single component, pre-blended, normal-setting smoothing compound made from hydrated lime, gypsum, ultra-fine marble powder, rheologic additives and synthetic polymers in powder form. When the product is mixed with water, its special



photo 25

Smoothing layer using
Planitop 580

composition and considerable fineness form a compound with high bonding characteristics which flows smoothly when spread on with a smooth, metal trowel. PLANITOP 580 may be applied at a thickness of up to 3 mm for each coat on well-cured renders.

PLANITOP 580 has the following performance characteristics:

table 26

Characteristics	Performance of product
Density of mix (kg/m ³):	1260
pH of product:	> 12
Pot life of mix:	approx. 50 minutes
Maximum thickness of each layer:	3 mm
Recommended application temperature range:	from 5°C to 35°C
Waiting time before sanding:	from 3 to 7 days
Waiting time before painting:	28 days
Waiting time between first and second coat:	90 minutes
Compressive strength (N/mm ²) (28 days):	> 2
Flexural strength (N/mm ²)	> 1.4
Bond strength to concrete (N/mm ²) (28 days):	> 0.5
Consumption (kg/m ²):	approx. 0.80 (per cm of thickness)

► 7.13 | Summary of the main characteristics of mortars for smoothing and levelling concrete

table 27

Characteristics	MORTAR FOR SMOOTHING AND LEVELLING CONCRETE						
	Planitop 100	Planitop 200	Planitop 207	Planitop Smooth & Repair	Monofinish	Mapectifinish	Planitop 540
Certification principles according to EN 1504-2	MC and IR	MC and IR	MC and IR	MC and IR	MC and IR	MC and IR	MC and IR
Maximum size of aggregate	0,2 mm	0,5 mm	0,7 mm	0,4 mm	0,4 mm	0,4 mm	0,4 mm
Mixing ratio	26% - 27% of water	20% - 23% of water	17% - 19% of water	19% - 21% of water	18% - 19% of water	Comp. A : Comp.B 4 : 1	24% - 26% of water
Density of mix	1650 kg/m ³	1600 kg/m ³	1800 kg/m ³	1730 kg/m ³	1700 kg/m ³	1900 kg/m ³	1600 kg/m ³
Application temperature range	from +5°C to +35°C	from +5°C to +35°C	from +5°C to +35°C	from +5°C to +35°C	from +5°C to +35°C	from +5°C to +35°C	from +5°C to +35°C
Pot life of mix	20' - 30'	approx. 1 h e 30'	approx 1 h	approx 20'	approx 1 h	approx 1 h	approx 2 h
Compressive strength	> 15 MPa after 28 days	> 20 MPa after 28 days	> 25 MPa after 28 days	≥ 18 MPa after 28 days	> 25 MPa after 28 days	> 35 MPa after 28 days	15 MPa after 28 days
Flexural strength	> 4 MPa after 28 days	> 5 MPa after 28 days	/	> 4 MPa after 28 days	> 6.5 MPa after 28 days	> 10 MPa after 28 days	/
Bond strength on concrete according to EN 1766	> 2 MPa after 28 days	> 2 MPa after 28 days	> 2 MPa after 28 days	≥ 1,5 MPa a 28 gg	> 2 MPa after 28 days	> 2 MPa after 28 days	≥ 1 MPa after 28 days
Thermal compatibility to freeze-thaw cycles with de-icing salts, measured as bond strength according to EN 1542	> 2 MPa	≥ 1 MPa	/	≥ 1.5 MPa	≥ 2 MPa	≥ 2 MPa	/
Thickness applied	from 1 to 3 mm	from 1 to 3 mm	from 1 to 3 mm	from 3 to 40 mm	from 1 to 3 mm	from 1 to 3 mm	from 1 to 3 mm
Consumption	1.3 kg/m ² per mm of thickness	1.3 kg/m ² per mm of thickness	1.5 kg/m ² per mm of thickness	1.4 kg/m ² per mm of thickness	1.4 kg/m ² per mm of thickness	2 kg/m ² per mm of thickness	1.2 kg/m ² per mm of thickness

table 28

MORTAR FOR SMOOTHING AND LEVELLING RENDER					
Characteristics	Planitop 520	Planitop 530	Planitop 540	Planitop 560	Planitop 580
Classification according to EN 998-1	GP-CS II	GP-CS IV	GP-CS IV	GP-CS IV	/
Maximum size of aggregate	0,4 mm	0,4 mm	0,4 mm	< 0,1 mm	< 0,1 mm
Mixing ratio	29% - 33% of water	24% - 27% of water	24% - 26% of water	39% - 43% of water	approx 60% of water
Density of mix	1750 kg/m ³	1600 kg/m ³	1600 kg/m ³	1670 kg/m ³	1260 kg/m ³
Application temperature range	from +5°C to +35°C	from +5°C to +35°C	from +5°C to +35°C	from +5°C to +35°C	from +5°C to +35°C
Pot life of mix	approx 2 h	approx 2 h	approx 2 h	approx 2 h	approx 50'
Compressive strength	Category CS II (from 1.5 to 5 Mpa after 28 days)	Category CS IV (≥ 6 Mpa after 28 days)	Category CS IV (≥ 6 Mpa after 28 days)	Category CS IV (≥ 6 Mpa after 28 days)	> 2 MPa
Bond strength to substrate (render)	≥ 0.3 MPa	≥ 0.3 MPa	≥ 0.5 MPa (brickwork)	≥ 0.4 MPa (brickwork)	≥ 0.4 MPa
Coefficient of permeability to water vapour (μ)	≤ 15	≤ 18	≤ 25	≤ 20	/
Thickness applied	from 1 to 3 mm	from 1 to 3 mm	from 1 to 3 mm	from 0 to 3 mm	from 1 to 3 mm
Consumption	1.35 kg/m ² per mm of thickness	1.25 kg/m ² per mm of thickness	1.2 kg/m ² per mm of thickness	1.1 kg/m ² per mm of thickness	0.8 kg/m ² per mm of thickness

► 8| **Structural strengthening using cementitious mortars**

► 8.1| **Strengthening with PLANITOP HDM**

Description: *two-component, high-ductility, pozzolan-reaction cementitious mortar used for “reinforced” structural reinforcement of masonry substrates in combination with MAPEGRID G 220 and for smoothing and levelling surfaces in concrete, stone, brickwork and tuff.*

Particularly suitable for: *strengthening and evening out masonry facing walls, vaulted ceilings and general masonry work. High-ductility smoothing and levelling layer on concrete repaired using mortar from the MAPEGROUT range of products or PLANITOP 400.*

PLANITOP HDM is a two-component, high-strength cement-based mortar with fine-grained selected aggregates, special additives and synthetic polymers in water dispersion. When the two components are mixed together, they form a mix which is easy to spread, and which may be applied manually on vertical surfaces at a thickness of up to 6 mm per layer. Thanks to its high content of synthetic resins, PLANITOP HDM has high bonding strength and, once hardened, forms a tough, compact, layer which is impermeable to water and aggressive gases present in the atmosphere, but remains highly permeable to vapour.

The product meets the minimum requirements of EN 1504-2 regarding protection systems for concrete surface and EN 1504-3 Standards for R2-class non-structural mortar.

photo 26
Reinforced smoothing layer
using Planitop HDM



PLANITOP HDM has the following performance characteristics:

table 29

Characteristics	Performance of product
Density of mix (kg/m ³):	1800
Pot life of mix:	approx. 60 minutes
Application temperature range:	from 5°C to 35°C
Setting time from start to finish:	4-9 hours
Compressive strength (N/mm ²) (28 days):	≥ 30
Flexural strength (N/mm ²)	≥ 9
Compressive modulus of elasticity (N/mm ²)	11000
Bond strength to concrete (N/mm ²) (28 days):	≥ 2.5
Bond strength to masonry substrates (N/mm ²) (28 gg):	≥ 2
Consumption (kg/m ²):	approx. 1.80 (per cm of thickness)

► 8.2| Strengthening with PLANITOP HDM MAXI

Description: *two-component, high-ductility, fibre-reinforced mortar made with a pozzolanic-reaction binder base, applied at a maximum thickness of 25 mm for levelling off stone, brick and tuff substrates before laying MAPEGRID G 220.*



photo 27
Application of
Planitop HDM Maxi

Particularly suitable for: *strengthening masonry facing walls, vaulted ceilings and general masonry work. Evening out stone, brick and tuff elements before applying “reinforced” structural strengthening using MAPEGRID G 220, for stresses induced by seismic activity.*

PLANITOP HDM MAXI is a two-component, high-strength cement-based mortar with glass fibres, fine-grained selected aggregates, special additives and synthetic polymers in water dispersion. When the two components are mixed together, they form a mix which is easy to spread, and which may be applied manually on horizontal and vertical surfaces at a thickness of up to 25 mm per layer.

Thanks to its high content of synthetic resins, PLANITOP HDM MAXI has high bonding strength and, once hardened, forms a tough, compact, layer which is impermeable to water and aggressive gases present in the atmosphere, but highly permeable to vapour.

The product meets the minimum requirements of EN 1504-3 Standards for R4-class structural mortars.

PLANITOP HDM MAXI has the following performance characteristics:

table 30

Characteristics	Performance of product
Density of mix (kg/m ³):	1850
Pot life of mix:	approx. 60 minutes
Application temperature range:	from 5°C to 35°C
Compressive strength (N/mm ²) (28 days):	≥ 25
Flexural strength (N/mm ²)	≥ 7
Compressive modulus of elasticity (N/mm ²)	8000
Bond strength to masonry substrates (N/mm ²) (28 gg):	≥ 2
Consumption (kg/m ²):	approx. 1.85 (per cm of thickness)

► 9| Protecting and decorating all types of surfaces

► 9.1| Finishing products from the ELASTOCOLOR range

9.1.1| MALECH

Description: *micronised acrylic resin-based base layer in water dispersion.*

Particularly suitable for: *base preparation of surfaces before applying the final colouring coat, to regulate absorption of the substrate and improve bonding. May also be used in the permanent AQUAFLEX SYSTEM capping cycle of asbestos cement. This product is also odourless, which makes it particularly suitable in closed or poorly ventilated environments.*

Once MALECH has been applied, it penetrates deeper down into the substrate than conventional water-based products, and thanks to its special formulation, guarantees consolidation of dust on the surface to be treated. MALECH's high penetration depth also slows down the formation of efflorescence.

Apply the product using traditional techniques; brush, roller or spray.

9.1.2| ELASTOCOLOR PRIMER

Description: *solvent-based, high-penetration reconsolidating primer for crumbly and dusty substrates, and curing agent for repair mortar.*

Particularly suitable for: *consolidating surface dust by impregnating absorbent surfaces. Suitable for promoting bonding before applying finishing products from the ELASTOCOLOR range of products.*

Fixing treatment for crumbly and dusty surfaces, such as cementitious render and concrete surfaces, using ELASTOCOLOR PRIMER. Thanks to its special properties, the product penetrates easily into absorbent substrates and guarantees excellent insulation and good bonding for successive coats of paint.

9.1.3| Protecting and decorating surfaces using ELASTOCOLOR PAINT

Description: *flexible acrylic resin-based paint in water dispersion for protecting and decorating concrete.*

Particularly suitable for: *application on cracked façades or concrete with deformation problems. Protects concrete structures against the phenomenon of carbonatation.*

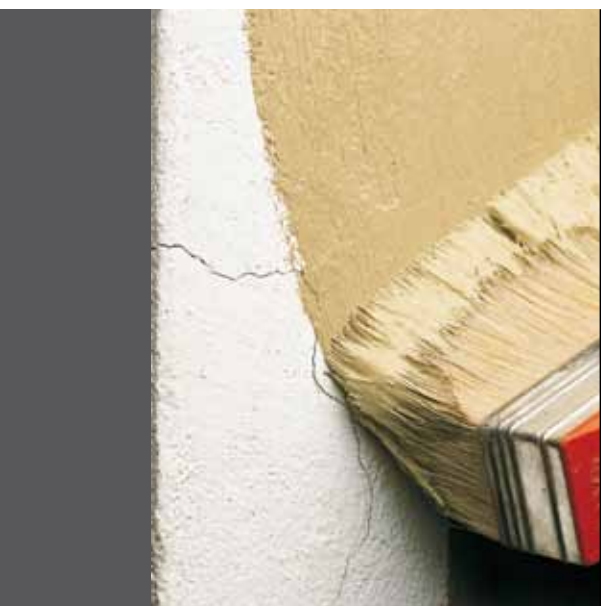


photo 28
Application of
Elastocolor Pittura

Painting surfaces by applying ELASTOCOLOR PAINT. Dilute ELASTOCOLOR PAINT with 10-15% of water and mix using a low-speed drill until it is completely blended. Once mixed as above, the product may be applied using traditional application techniques: by brush, roller or spray.

For effective, complete covering of the surface, apply at least two coats. Under normal humidity and temperature conditions, wait 24 hours between each coat.

ELASTOCOLOR PAINT is available in a wide range of colours, created using the COLORMAP® colouring system.

The product meets the minimum requirements of EN 1504-2 regarding surface protection systems for concrete.

ELASTOCOLOR PAINT has the following performance characteristics:

table 31

Characteristics	Performance of product
Density of mix (kg/m ³):	approx. 1.400
Brookfield viscosity (mPa · s):	16.000 (rotor 6 – 20 revs)
Dry solids content (%):	approx. 65
Waiting time between each coat:	24 hours
Resistance to abrasion when damp (DIN 53778):	> 10.000 cycles
Vapour diffusion resistance coefficient (DIN 52615) (μ):	545
Resistance to passage of vapour of a 0.2 mm-thick layer in equivalent metres of air Sd (DIN 52615) (m):	0.109
Capillary action water absorption coefficient W (DIN 52617) (kg/m ² · h ^{0.5}):	0.100
Sd · W = 0.109 · 0.100 (kg/m · h ^{0.5}): The value of Sd · W must be less than 0.1 and respect Kienzle's theory (DIN 18550):	0.011
CO ₂ diffusion resistance factor (BASF test method) (μs):	1,320,594
Resistance to the passage of CO ₂ RG (BASF test method) (m):	462.21
Elongation at failure (%): - after 14 days at 23°C: - after 7 days at 23°C + 7 days at 60°C: - after 7 days at 23°C + 7 days in water: - after 7 days at 23°C + 7 days at -10°C: - after 7 days at 23°C + 7 days at 60°C + 7 days at -10°C: - after 7 days at 23°C + 7 days at 60°C in water + 7 days at -10°C: - after 7 days at 23°C + 7 days at 60°C + 7 days in water + 7 days at -10°C + 7 days at 23°C:	392 220 662 434 567 512 192
Crack-bridging ability at start cracking point for a 0.3 mm thick dry film (prEN 1062-7 mod.) (mm):	approx. 1.8
Resistance to accelerated aging (colour RAL 7032) after 1,000 hours exposure to a Weather-Ometer (ASTM G26/A):	Δ E < 2.5
Consumption (kg/m ²):	0.2 – 0.4 (per coat)

► 9.2| Finishing products from the SILEXCOLOR range

9.2.1| SILEXCOLOR PRIMER

Description: *modified potassium silicate-based primer in water solution used for preparing substrates before applying products from the SILEXCOLOR range.*

SILEXCOLOR PRIMER penetrates deep down into absorbent substrates without forming a surface film, and without altering its water vapour diffusion capacity. It also acts as a bonding promoter for products from the SILEXCOLOR range of products, and helps the silicatisation process. This product helps to consolidate surface dust of the surfaces to be treated. SILEXCOLOR PRIMER is odourless and does not contain solvents, which makes it suitable for applications in closed or poorly ventilated areas. Apply one coat of the product using conventional techniques, by brush or roller.

9.2.2| Protecting and decorating surfaces using SILEXCOLOR PAINT

Description: *silicate-based, transpirant, protective and decorative paint for internal and external cementitious and lime render.*

Particularly suitable for: *painting porous vertical surfaces which require protection against atmospheric agents and high transpiration. Decorating cementitious and lime-based render and dehumidifying products.*

SILEXCOLOR PAINT must always be applied on substrates treated beforehand with SILEXCOLOR PRIMER. The two products used in combination form a complete painting



photo 29

Finishing coat using
Silexcolor Pittura

cycle for internal and external vertical surfaces. Available in a wide range of colours, created using the COLORMAP® automatic colouring system. SILEXCOLOR PAINT is applied using traditional techniques with a brush, a roller or by spray on a coat of dry SILEXCOLOR PRIMER. For effective, complete covering of the surface, apply at least two coats. Under normal humidity and temperature conditions, wait 24 hours between each coat.

SILEXCOLOR PAINT has the following performance characteristics:

table 32

Characteristics	Performance of product
Density of mix (g/cm ³):	approx. 1.46
Dry solids content (%):	approx. 55
Dilution rate:	20% of SILEXCOLOR PRIMER
Waiting time between each coat:	12 hours
Application temperature range:	from 8°C to 35°C
Vapour diffusion resistance coefficient (DIN 52615) (μ):	214
Resistance to passage of vapour of a 0.1 mm-thick layer in equivalent metres of air Sd (DIN 52615) (m):	0.02
Capillary action water absorption coefficient (W) (DIN 52617):	0,120 kg/m ² ·h ^{0.5} $Sd \cdot W = 0,02 \times 0,120 = 0,002 \text{ kg/m} \cdot \text{h}^{0.5}$ The value of Sd·W is less than 0.1, therefore Silexcolor Paint respects Kuenzle's Theory (DIN 18550)
Consumption (kg/m ²):	0.35-0.45 (for two coats)

9.2.3| Protecting and decorating surfaces using SILEXCOLOR TONACHINO

Description: *silicate-based, protective, decorative, transpirant mineral coating product in paste form for external and internal applications, applied by trowel.*

Particularly suitable for: *good protection of render without altering its transpiration, and gives the surface an attractive finish. Decorating lime and cement-based render and dehumidifying products.*

SILEXCOLOR TONACHINO must always be applied on substrates treated beforehand with SILEXCOLOR PRIMER. This product is very good for covering irregularities in the substrate, and forms a single body with the substrate without modifying its transpiration properties. Available in a wide range of colours, created using the COLORMAP® automatic colouring system. SILEXCOLOR TONACHINO is supplied ready for use. If the product becomes too thick, add 3%-5% of SILEXCOLOR PRIMER and mix using a low-speed drill with a mixing attachment to avoid entrapment of air, until a homogenous blend is obtained. Apply the product using a flat metal trowel or a stainless steel or plastic float.



photo 30

Application of
Silexcolor Tonachino

SILEXCOLOR TONACHINO has the following performance characteristics:

table 33

Characteristics	Performance of product
Density of mix (g/cm ³):	approx. 1.7
Viscosity (mPa · s):	38,000-40,000
Dry solids content (%):	approx. 80
Ready for painting over:	after 12-24 hours
Vapour diffusion resistance coefficient (DIN 52615) (μ):	39
Resistance to passage of vapour of a 1.5 mm-thick layer in equivalent metres of air Sd (DIN 52615) (m):	0.059
Capillary action water absorption coefficient (W) (DIN 52617):	0,09 kg/m ² ·h ^{0.5} Sd·W = 0,009 x 0,059 = 0,005 kg/m·h ^{0.5} The value of Sd·W less than 0.1, therefore Silexcolor Tonachino respects Kuenzle's Theory (DIN 18550)
Consumption (kg/m ²):	from 2 to 2.5

► 9.3| Finishing products from the SILANCOLOR range

9.3.1| SILANCOLOR PRIMER

Description: *silicon resin-based insulating primer in water dispersion.*

When SILANCOLOR PRIMER is used in combination with SILANCOLOR PAINT coloured finishes, it forms a painting system for internal/external applications which guarantees protection of masonry substrates against attack by aggressive chemical products, U.V. rays and general humidity. Transpiration of the substrate remains unchanged, and the product forms a highly water-repellent finish. SILANCOLOR PRIMER helps to consolidate surface dust of the surfaces to be treated. SILANCOLOR PRIMER is odourless and does not contain solvents, which makes it suitable for applications in closed or poorly ventilated environments. Apply the product using traditional techniques; brush, roller or spray.

9.3.2| Protecting and decorating surfaces using SILANCOLOR PAINT

Description: *silicon resin-based, high-transpiration, high water-repellence paint in water dispersion, for external applications.*

Particularly suitable for: *painting surfaces where an attractive finish and extremely high water repellence and excellent transpiration are required. Decorating all types of cementitious and lime-based render and dehumidifying products.*

SILANCOLOR PAINT is a silicon resin-based paint which combines the advantages of conventional mineral paints (SILEXCOLOR PAINT) and synthetic paints. In fact, thanks to its special formulation, substrates have good permeability to water vapour and are highly water-repellent. Unlike conventional synthetic paint, it forms a porous layer rather than a film which is impermeable to water vapour, and the special silicon resins contained in the product form an excellent barrier against the penetration of water, so that render always remains dry. SILANCOLOR PAINT bonds perfectly to all types of conventional and dehumidifying renders and to old, well-bonded paintwork. Its water-repellence properties protects substrates against chemical attack, attracts very little dirt, is highly resistant to cleaning operations and is very hard-wearing. SILANCOLOR PAINT is highly resistant to alkalis, washing cycles, UV rays and ageing, and maintains its characteristics for a very long period of time. Apart from its protective properties, SILANCOLOR PAINT leaves an attractive finish and gives a smooth, opaque surface which is velvety to the touch. SILANCOLOR PAINT is available in a wide range of colours, created using the COLORMAP® automatic colouring system. SILANCOLOR PAINT is also suitable for internal use on gypsum or old paintwork if well-bonded and sound, after treatment with SILANCOLOR PRIMER. Dilute the paint with 15%-25% of water, making sure that it is well blended. Apply using traditional techniques; brush, roller, spray or airless spray system.

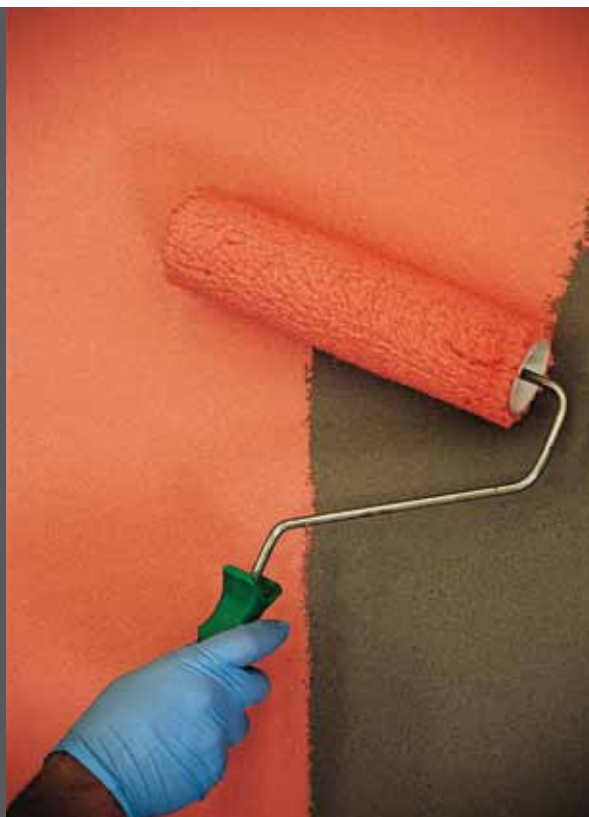


photo 31

Application of
Silancolor Pittura

SILANCOLOR PAINT has the following performance characteristics:

table 34

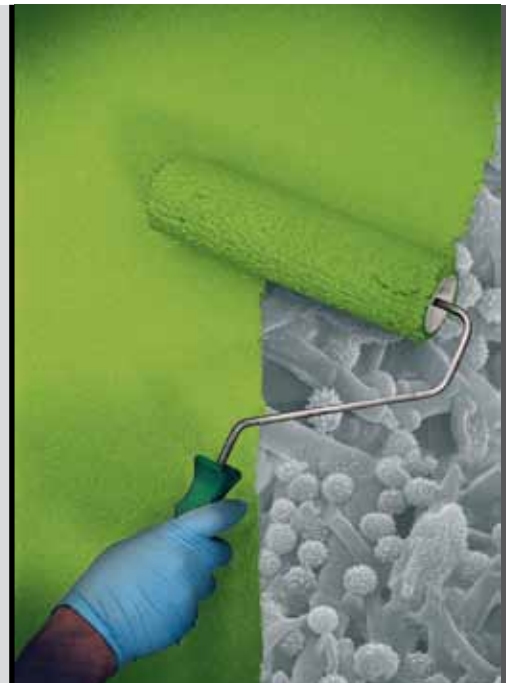
Characteristics	Performance of product
Density of the mix (kg/cm ³):	approx. 1.55
Dry solids content (%):	approx. 65
Damp abrasion after 4 days:	> 10,000 cycles
Damp abrasion after 200 hours exposure to a Weather-Ometer:	> 10,000 cycles
Damp abrasion after 400 hours exposure to a Weather-Ometer:	> 10,000 cycles
Vapour diffusion resistance coefficient μ (DIN 52615):	600
Resistance to passage of vapour of a 0.1 mm-thick layer in equivalent metres of air S_d (DIN 52615) (m):	0.06
Capillary action water absorption coefficient (W) (DIN 52617):	0,06 kg/m ² ·h ^{0.5} $S_d \cdot W = 0.06 \times 0.06 = 0,0036 \text{ kg/m} \cdot \text{h}^{0.5}$ The value of $S_d \cdot W$ is less than 0.1, therefore Silancolor Paint respects Kuenzle's Theory (DIN 18550)
Consumption (kg/m ²):	0.2 to 0.3 (for two coats)

9.3.3| Protecting and decorating surfaces using SILANCOLOR PAINT PLUS

Description: *high-efficiency (protective) silicon resin-based, high-transpiration, high water-repellence, anti-mildew and anti-mould paint in water dispersion for internal and external applications.*

Particularly suitable for: *painting walls which are particularly prone to the destructive action of mildew, mould and fungus. Painting north-facing façades and internal environments with mould (e.g. bathrooms and kitchens).*

photo 32
Application of
Silancolor Pittura Plus



SILANCOLOR PAINT PLUS may be used for painting walls which have already been damaged by the aforementioned micro-organisms, after removing them and washing the surface. This product possesses all the advantages of the family of silicon resin-based products, extremely high water-repellence and good permeability to vapour. SILANCOLOR PAINT PLUS used in combination with SILANCOLOR PRIMER PLUS and, where necessary, with SILANCOLOR CLEANER PLUS, forms a complete, efficient protective system, and forms a long-lasting means of defence for the surface. It is also highly resistant to alkalis, washing cycles, UV rays and ageing, and maintains its characteristics for a very long period of time. Apart from its protective properties, it leaves an attractive finish and gives a smooth, opaque surface which is velvety to the touch. It is available in a wide range of colours, obtained using the COLORMAP® automatic colouring system.

Dilute SILANCOLOR PAINT PLUS with 15%-20% of water, making sure that it is well blended. Apply using traditional techniques; brush, roller, spray or airless spray system.

SILANCOLOR PAINT PLUS has the following performance characteristics:

table 35

Characteristics	Performance of product
Density of the mix (kg/cm ³):	approx. 1.55
Dry solids content (%):	approx. 65
Damp abrasion:	> 10,000 cycles
Vapour diffusion resistance coefficient μ (DIN 52615):	339
Resistance to passage of vapour of a 0.2 mm-thick layer in equivalent metres of air S_d (DIN 52615) (m):	0.07
Capillary action water absorption coefficient (W) (DIN 52617):	0.09 kg/m ² ·h ^{0.5} $S_d \cdot W = 0.07 \times 0.09 = 0.006 \text{ kg/m} \cdot \text{h}^{0.5}$ The value of $S_d \cdot W$ is less than 0.1, therefore Silexcolor Paint Plus respects Kuenzle's Theory (DIN 18550)
Consumption (kg/m ²):	0.2 to 0.3 (for two coats)

9.3.4| Protecting and decorating surfaces using SILANCOLOR TONACHINO

Description: *silicon resin-based, high-transpirant, water-repellent paste coating in water dispersion for external use, applied by trowel.*

Particularly suitable for: *coating surfaces where an attractive finish and excellent water repellence and good transpiration are required. Decorating cementitious and lime-based render, dehumidifying products and old paintwork.*

SILANCOLOR TONACHINO is a silicon resin-based coating which combines the advantages of mineral dressing materials (high transpiration, such as with SILEXCOLOR TONACHINO) with those of synthetic dressing materials (even colour, good bond to old paintwork which is in good condition, and availability in a wide range of colours). Thanks to its special formulation, substrates have good permeability to water vapour and are highly water-repellent. Unlike conventional synthetic finishing products, it forms a porous layer rather than a film which is impermeable to water vapour, and the special silicon resins contained in the product form an excellent barrier against the penetration of water, so that render always remains dry.

Its water-repellence properties protects substrates against chemical attack, attracts very little dirt, is highly resistant to UV rays and aging, characteristics of the product which remain stable for a very long time. Apart from its protective characteristics, SILANCOLOR TONACHINO gives the substrate an attractive rustic finish. It is available in the 34 different colours in the MAPEI colour chart, and is also available in a wide range of colours obtained using the COLORMAP® automatic colouring system. SILANCOLOR TONACHINO is also suitable for internal use on gypsum or old painted surfaces if well-bonded and sound.

photo 33
Application of
Silancolor Tonachino



Before applying SILANCOLOR TONACHINO, always apply a normalising coat of SILANCOLOR PRIMER. In the case of old, well-bonded painted surfaces, assess whether SILANCOLOR PRIMER is really required according to its absorbency. The product is supplied ready for use. Mix the product well before use, and apply using a stainless steel or plastic float.

SILANCOLOR TONACHINO has the following performance characteristics:

table 36

Characteristics	Performance of product
Density of the mix (g/cm ³):	approx. 1.69
Viscosity (mPa · s):	65,000-70,000
Dry solids content (%):	approx. 80
Ready for painting over:	12-24 hours
Vapour diffusion resistance coefficient μ (DIN 52615):	178
Resistance to passage of vapour of a 0.2 mm-thick layer in equivalent metres of air S_d (DIN 52615) (m):	0.267
Capillary action water absorption coefficient (W) (DIN 52617):	0.12 kg/m ² ·h ^{0.5} $S_d \cdot W = 0.267 \times 0.12 = 0.032 \text{ kg/m} \cdot \text{h}^{0.5}$ The value of $S_d \cdot W$ is less than 0.1, therefore Silancolor Tonachino respects Kuenzle's Theory (DIN 18550)
Consumption (kg/m ²):	from 2 to 2.5

Notes: _____

[illegible]