MAPEI

IN COMPLIANCE WITH EUROPEAN STANDARD
EN 1504-2 (C)
PRINCIPLES
PI-MC-IR
SURFACE PROTECTION SYSTEMS FOR CONCRETE

CE
EN 1504-2

Mapelastic

Two-component, flexible cementitious mortar for the protection and waterproofing of concrete surfaces, balconies, terraces, bathrooms, showers and swimming pools

WHERE TO USE
Waterproofing and protection of concrete structures, renders and cementitious screeds.

Some application examples
- Waterproofing of concrete basins used for containing water.
- Waterproofing bathrooms, showers, balconies, terraces, swimming pools, etc. before laying ceramic tile finishes.
- Waterproofing of plasterboard, render or cementitious surfaces, lightweight cement blocks and marine-grade plywood.
- Flexible smoothing layer for light-sectioned concrete structures, including those subjected to minor deformation when under load (e.g. pre-cast panels).
- Protection of renders or concrete with cracks caused by shrinkage, against the infiltration of water and aggressive atmospheric elements.
- Protection, against the penetration of carbon dioxide, of concrete pillars and joists and road and railway viaducts repaired with products from the **Mapegrout** range, and structures with an insufficient layer of concrete covering on the reinforcement rods.
- Protection of concrete surfaces which may come into contact with seawater, de-icing salts, such as sodium or calcium chloride, and sulphates.

TECHNICAL CHARACTERISTICS
Mapelastic is a two-component mortar based on cementitious binders, fine-grained selected aggregates, special additives and synthetic polymers dispersed in water, blended according to a formula developed in MAPEI's own research laboratories.
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 mm in one single coat.
Thanks to the high content and quality of the synthetic resins, the cured layer of **Mapelastic** remains constantly flexible under all environmental conditions and, furthermore, is completely waterproof up to a pressure of 1.5 bar and resistant to the chemical attack of de-icing salts, sulphates, chlorides and carbon dioxide.
Mapelastic has excellent bonding properties to all concrete, masonry, ceramic and marble surfaces, as long as they are sound and sufficiently clean.
This property, together with its resistance to the deteriorating effect of UV rays, a characteristic of this product, ensures that structures protected and waterproofed with **Mapelastic** have a long service life, even if they are located in areas with particularly rigid climatic conditions, in coastal areas with a saline-rich atmosphere or in industrial areas where the air is particularly polluted.

Mapelastic meets the requirements defined by EN 1504-9 ("*Products and systems for the protection and repair of concrete structures - Definitions, requirements, quality control and evaluation of conformity - General principles for the use of products and systems*") and the minimum requirements claimed by EN 1504-2 coating (C) according to the PI, MC and IR principles ("*Protection systems for concrete surfaces*").

RECOMMENDATIONS
- Do not use **Mapelastic** for thick coatings (more than 2 mm per coat).
- Do not apply **Mapelastic** at temperatures below +8°C.
- Do not add cement, aggregates or water to **Mapelastic**.

Mapelastic

Waterproofing screeds with Mapelastic and Mapeband

Installing ceramic with Kerabond + Isolastic

Private terrace, Cereseto (Alessandria) - Italy

- Protect from rain and water spillage for the first 24 hours after application.
- When **Mapelastic** is used on large terraces or flat roofs that will not be covered with tiles, vapour vents must be appropriately positioned according to the level of humidity in the substrate (generally every 20-25 m^2).
  This operation is indispensable when **Mapelastic** is laid on substrates which are particularly absorbent, such as screeds which have been lightened with polystyrene or foamed clay.

APPLICATION PROCEDURE

Preparation of the substrate

A) Protection and waterproofing of concrete structures and pre-cast units

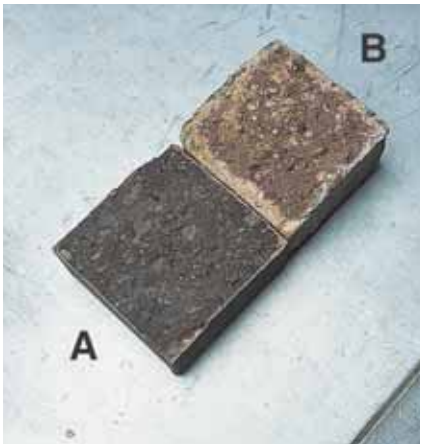

Fig. 2B - Penetration test of chloride ions (UNI 9944). Sample A covered with Mapelastic is not penetrated; sample B, left uncoated, shows an advanced penetration of many mm

(e.g. pillars and beams for road and railway viaducts, cooling towers, chimneys, underpasses, retaining walls, applications in coastal areas, basins, swimming pools, canals, faces of dams, columns, balcony fronts).
The surface to be treated must be sound and perfectly clean.
Remove all cement laitance, flaky parts and traces of powder, grease, oil and form release agents by sand-blasting, or wash down with high-pressure water jets.
If the structure to be waterproofed and protected with **Mapelastic** is in poor condition, remove the damaged parts by hand or mechanical abrasion or by using a hydro-demolition system or a hydro-scarifier.
The last two techniques, which use high-pressure water, are particularly recommended because the reinforcement rods are not damaged and the structures are not subject to vibration which could cause the onset of small cracks in adjacent concrete.
Once the rust has been completely removed by sandblasting, carry out the repair with a pre-blended mortar from the **Mapegrout** range or with **Planitop 400** (see appropriate technical data sheets).

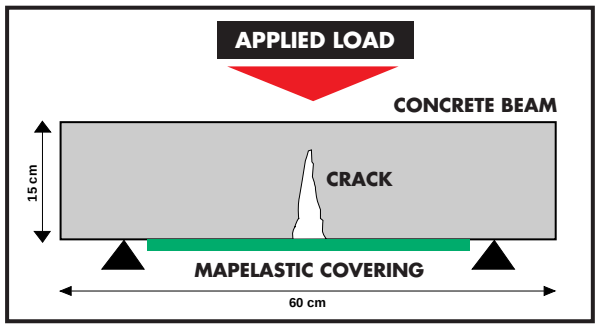

Fig. 1: Protection of a hairline crack with Mapelastic on the underside of a concrete beam subject to flexural stress

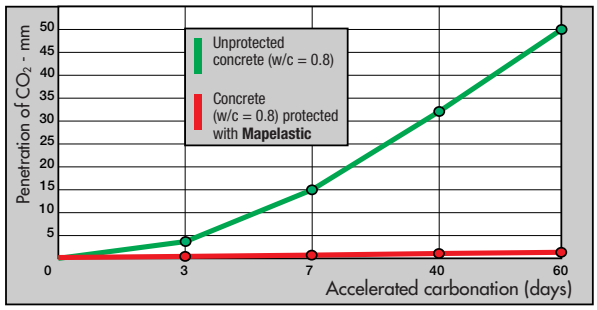

Fig. 2: Protection of Mapelastic against accelerated carbonation (30% of CO_2) on porous concrete

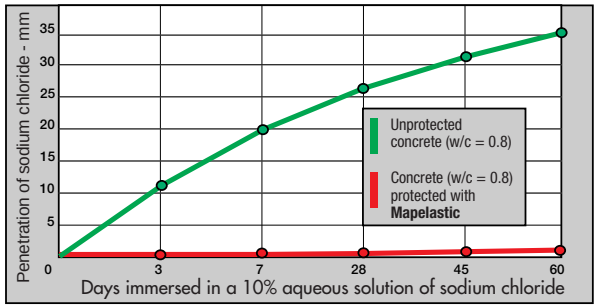

Fig. 3: Protection of Mapelastic against penetration of sodium chloride on porous concrete

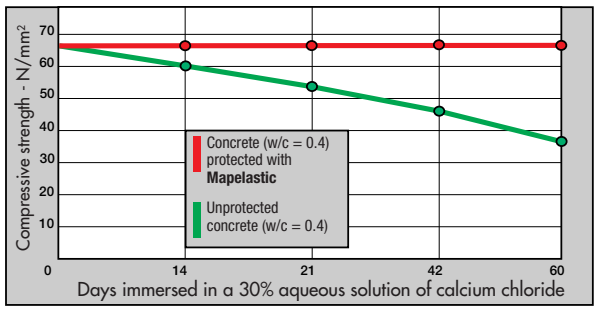

Fig. 4: Protection of mapelastic against the decrease in mechanical strength of concrete caused by calcium chloride based de-icing salts

Absorbent surfaces to be treated with **Mapelastic** must be dampened beforehand with water.

B) Waterproofing terraces, balconies and swimming pools

- CEMENTITIOUS SCREEDS:

– setting cracks or cracks caused by plastic or hygrometric shrinkage must be filled beforehand with **Eporip**;

– if thicknesses of up to 3 cm have to be levelled out (to create slopes, fill in dips, etc.) use **Planitop Fast 330**.

Mapelastic: two-component flexible cementitious membrane for waterproofing balconies, terraces, bathrooms and swimming-pools, and for protecting concrete in compliance with the requirements of EN 14891 and EN 1504-2 coating (C) principles PI, MC and IR.

TECHNICAL DATA (typical values)

PRODUCT IDENTITY		
	comp. A	**comp. B**
Consistency:	powder	liquid
Colour:	grey	white
Bulk density (g/cm³):	1.4	–
Density (g/cm³):	–	1.1
Dry solids content (%):	100	50
Storage:	12 months in its original packaging in a dry place	24 months
Hazard classification according to Directive 1999/45 CE:	irritant Before using refer to the "Safety instructions for preparation and application" paragraph and the information on the packaging and Safety Data Sheet	none
Customs class:	3824 50 90	

APPLICATION DATA OF PRODUCT (at +20°C - 50% R.H.)	
Colour of mix:	grey
Mixing ratio:	component A : component B = 3 : 1
Consistency of mix:	plastic, trowellable
Density of mix (kg/m³):	1,700
Density after application by spray (kg/m³):	2,200
Application temperature range:	from +5°C to +35°C
Pot life of mix:	1 hour

FINAL PERFORMANCE (thickness 2.0 mm)			
	Acceptable limit according to EN 1504-2 coating (C) (PI, MC and IR principles)	**Performance figures for Mapelastic**	
Bond strength to concrete according to EN 1542: – after 28 days at +20°C and 50% R.H. (N/mm²):	For flexible systems with no traffic: ≥ 0.8 with traffic: ≥ 1.5	1.0	
Thermal compatibility to freeze/thaw cycles with de-icing salts, measured as bond strength according to EN 1542 (N/mm²):		0.8	
Bond strength to concrete according to EN 1542: – after 7 days at +20°C and 50% R.H. + 21 days in water (N/mm²):	not applicable	0.6	
Flexibility according to DIN 53504 mod, expressed as elongation: – after 28 days at +20°C and 50% R.H. (%):	not applicable	30	
Static crack-bridging at -20°C according to EN 1062-7 expressed as maximum width of the crack (mm):	from class A1 (0.1 mm) to class A5 (2.5 mm)	class A3 (-20°C) (> 0.5 mm)	
Dynamic crack-bridging at -20°C according to EN 1062-7 of a film of Mapelastic reinforced with Mapetex Sel, expressed as resistance to cracking cycles:	from class B1 to class B4.2	class B3.1 (-20°C) No failure of the test piece after 1,000 crack cycles with movement of crack from 0.10 to 0.30 mm	
Permeability to water vapour according to EN ISO 7783-1: - equivalent thickness of air S_D (m):	class I: S_D < 5 m (permeable to vapour)	S_D	μ
		2.4	1,200
Impermeability to water, expressed as capillary absorption according to EN 1062-3 (kg/m²·h$^{0.5}$):	< 0.1	< 0.05	
Permeability to carbon dioxide (CO_2) according to EN 1062-6 - diffusion in an equivalent thickness of air S_{DCO} (m):	> 50	> 50	
Reaction to fire (Euroclass):	According to class declared by manufacturer	C, s1 - d0	
	Acceptable limit according to EN 14891	**Performance figures for Mapelastic**	
Impermeability to water under pressure according to EN 14891-A.7 (1.5 bar for 7 days of positive lift):	no penetration	no penetration	
Crack-bridging ability at +20°C according to EN 14891-A.8.2 (mm):	> 0.75	0.9	
Crack-bridging ability at -20°C according to EN 14891-A.8.3 (mm):	> 0.75	0.8	
Initial bond strength according to EN 14891-A.6.2 (N/mm²):	> 0.5	0.8	
Bond strength after immersion in water according to EN 14891-A.6.3 (N/mm²):	> 0.5	0.55	
Bond strength after application of heat source according to EN 14891-A.6.5 (N/mm²):	> 0.5	1.2	
Bond strength after freeze-thaw cycles according to EN 14891-A.6.6 (N/mm²):	> 0.5	0.6	
Bond strength after immersion in basic water according to EN 14891-A.6.9 (N/mm²):	> 0.5	0.6	

*Bond values according to EN 14891 measured using **Mapelastic** and a C2F-type cementitious adhesive according to EN 12004*

Application of Drain Vertical on Mapelastic

Laying Mapelastic on Mapenet 150

Laying Granirapid on a terrace waterproofed with Mapelastic

• EXISTING FLOORS:
– existing floors and coverings in ceramic, porcelain tiles, clinker or terracotta, etc. must be well bonded to the substrate and free of substances which could compromise the bonding, such as grease, oil, wax, paint, etc.

• RENDERS:
– cementitious renders must be sufficiently cured (7 days per cm of thickness in good weather conditions), well bonded to the substrate, resistant and free from all dust and paint;

• dampen absorbent surfaces to be treated beforehand with water.

Preparation of the mortar

Pour component B (liquid) into a suitable, clean container, then slowly add component A (powder) while stirring with a mechanical mixer.
Carefully mix **Mapelastic** for a few minutes, making sure that no powder remains stuck to the sides or the bottom of the container.
Keep stirring until a perfectly homogenous mix is obtained.
Use a low-speed mechanical mixer for this operation to avoid too much air being dragged into the mix.
Do not prepare the mix by hand.
Preparation of **Mapelastic** may also be carried out with a mortar mixer, which is usually supplied with mortar sprayers.
If this technique is used, make sure that the mix is homogenous and has no lumps before it is poured into the hopper of the pump.

Manual application of the mortar

Mapelastic must be applied within 60 minutes of it being mixed.
Smooth off the prepared surface by applying a thin layer of **Mapelastic** with a smooth trowel. Apply a second coat on top of this first layer while it is still fresh, to achieve a final thickness not less than 2 mm.
When used for waterproofing terraces, balconies, basins and swimming pools, it is recommended to insert a layer of **Mapenet 150** in the first layer of fresh **Mapelastic**, to act as reinforcement (see **Mapenet 150** technical data sheet).
The mesh must also be used in areas with either small cracks or in areas which are under particular stress.
After the mesh has been laid, finish off the surface with a flat trowel and apply a second layer of **Mapelastic** when the first one has set (after 4-5 hours).
To further improve both elongation at failure and crack-bridging of **Mapelastic**, we recommend inserting **Mapetex Sel** macro-holed non-woven polypropylene fabric (refer to the **Mapetex Sel** technical data sheet). The first layer of **Mapelastic** must be at least 1 mm thick. While it is still fresh, carefully lay the **Mapetex Sel** on the surface and press it in using a flat-bladed trowel to make sure that it is perfectly buttered. Then apply the second coat of **Mapelastic** to completely cover the fabric and smooth over the surface using a flat-bladed trowel.

In the waterproofing sector, more than in any other sector, it is essential that particular attention is paid to details, which alone are capable of making a difference. This is why **Mapeband TPE**, **Mapeband** and other special accessory articles are indispensable and a determining factor.
Mapeband TPE is used to seal structural joints and joints subject to high dynamic stress, **Mapeband** is used to waterproof check joints, fillet joints between horizontal and vertical elements and special kits from the **Drain** range are used to seal drain holes. It is absolutely imperative that special care is in these critical areas after evening out and cleaning the substrate and before applying the cementitious waterproofing mortar.
After applying **Mapelastic**, wait 5 days for curing before laying ceramic tiles.
In favourable climatic conditions and with good temperatures this period may be reduced to 24 hours on damp substrates.

Laying ceramic tiles on Mapelastic

• BALCONIES AND SWIMMING POOLS:
– lay the tiles with MAPEI cementitious adhesives and leave wide joints. In swimming pools, use **Granirapid** (class C2F, S1), **Elastorapid** (class C2FTE, S2) or **Keracrete + Keracrete Powder** (class C2T). If mosaics are laid, **Adesilex P10** + **Isolastic** mixed with 50% water may also be used (class C2TE, S1).

– grout the joints between the tiles with a suitable cementitious grout (for example **Keracolor FF**, **Keracolor GG** mixed with **Fugolastic**, **Ultracolor Plus** - class CG2) or epoxy resin (for example **Kerapoxy** - class RG);

– seal expansion joints with a suitable flexible sealant from the MAPEI range (such as **Mapeflex PU21**, **Mapeflex PU20**, **Mapeflex PU50 SL**, **Mapeflex PU45**, **Mapeflex PU40** or **Mapesil AC**, according to requirements).

Application of the mortar by spraying

After preparing the surface (see paragraph on “Preparation of the substrate”), apply **Mapelastic** with a spray gun with a lance fitting suitable for use with smoothing mortars, at a minimum thickness not less than 2 mm per layer.
If a thicker layer is required, **Mapelastic** must be applied in several coats.
Successive coats must only be applied when the previous one is dry (after 4-5 hours).
In areas with small cracks or which are highly stressed, insertion of **Mapenet 150** in the first layer of fresh **Mapelastic** is recommended.
Immediately after laying the mesh, **Mapelastic** must be smoothed off with a flat trowel.

Waterproofing a swimming pool with Mapelastic

Laying ceramic tiles on Mapelastic in a swimming pool

Swimming pool waterproofed with Mapelastic: Scarioni Leisure Centre - Milan - Italy

If the mesh needs to be covered better, a further layer of **Mapelastic** may be applied with a spray gun.
To further improve both elongation at failure and crack-bridging of **Mapelastic**, we recommend inserting **Mapetex Sel** non-woven macro-holed polypropylene fabric (refer to the **Mapetex Sel** technical data sheet).
The first layer of **Mapelastic** must be at least 1 mm thick. While it is still fresh, carefully lay the **Mapetex Sel** on the surface, and press it in using a flat-bladed trowel to make sure that it is perfectly buttered. Then apply the second coat of **Mapelastic** to completely cover the fabric, and smooth over the surface using a flat-bladed trowel.
In the areas around expansion joints and joints between horizontal and vertical surfaces, either **Mapeband**, alkali-resistant rubber tape with felt, or **Mapeband TPE**, tape made from thermo-plastic polymers and synthetic elastomers, must be used.
If **Mapelastic** is used for protecting stacks and joists on bridges, railway underpasses and façades on buildings etc., the product may be painted using products from the **Elastocolor** range, which are acrylic resin-based water dispersions and are available in a wide range of colours which may be obtained using the **ColorMap®** automatic colouring system.
If **Mapelastic** is used, on the other hand, for protecting surfaces in constant contact with water and the final coating is not in ceramic such as in swimming pools, or on horizontal concrete surfaces not for pedestrian use such as flat roofs, the product may be painted over with **Elastocolor Waterproof** flexible acrylic resin-based paint in water dispersion (refer to the technical data sheet for **Elastocolor Waterproof**).
Elastocolor Waterproof is available in a wide range of colours obtained using the **ColorMap®** automatic colouring system and must be applied at least 20 days after applying **Mapelastic**.

Precautions to be taken during and after application

- No special precautions need to be taken when the temperature is around +20°C.
- During hot weather, it is advisable to keep the product out of direct sunlight (powder and liquid).
- After application, and in particularly dry, hot or windy weather, it is recommended to protect the surface from rapid evaporation by covering it with sheets.

TECHNICAL PERFORMANCE DATA

The technical data table contains the identification and application data for the product. Figures 1, 2, 3 and 4 illustrate some of **Mapelastic**'s characteristics.
Figure 1 shows the load diagram for evaluating the product's crack-bridging capacity. The sample to which **Mapelastic** was applied, on the underside of the beam, is subjected to increasing loads in the middle. The crack-bridging capacity of **Mapelastic** is determined by measuring the maximum width of the crack in the concrete at the moment **Mapelastic** fractures.
The degree of protection offered by **Mapelastic** to the concrete substrate is not limited to a simple "covering" of subsequent cracks provoked by heavy loads, shrinkage, temperature variations etc. **Mapelastic** itself is also very resistant to chemical attack, as illustrated by the results of the following tests, and offers good protection for the concrete against carbonation and, therefore, subsequent corrosion of the reinforcing rods.

Figure 2 is a graph which compares accelerated carbonation (in an atmosphere of air enriched with 30% of CO_2), and shows how **Mapelastic** is completely impermeable to this aggressive substance (Fig. 5). The **Mapelastic** membrane also protects the concrete from the action of sodium chloride (for example seawater).

Figure 3 shows how **Mapelastic** completely blocks infiltration of salt into the concrete which is, in itself, very porous and may be easily penetrated. **Mapelastic** also provides an impenetrable barrier against calcium chloride ($CaCl_2$) based de-icing salts, which have a destructive action on even the highest quality concrete.

Figure 4 shows the reduction in mechanical resistance (initially 65 N/mm²) of concrete permanently immersed in a solution of 30% $CaCl_2$. In this case, too, **Mapelastic** offers efficient protection of the concrete, and prevents the salt from carrying out its aggressive and destructive action on the concrete.

Cleaning

Due to the high bonding strength of **Mapelastic**, even on metals, it is recommended to wash work tools with water before the mortar sets. Once it has set, cleaning may only be carried out by mechanical means.

CONSUMPTION

Manual application:
approx. 1.7 kg/m² per mm of thickness.

Spray gun application:
approx. 2.2 kg/m² per mm of thickness.

PACKAGING

Units of 32 kg:
component A: 24 kg bags:
component B: 8 kg drums.
Upon request, component B may also be supplied in 1000 kg tanks.
Units of 16 kg:
2 6 kg bags and 1 4 kg drum.

STORAGE

Mapelastic component A may be stored for up to 12 months in its original packaging. Manufactured in compliance with the regulations of the 2003/53/EC Directive.

Mapelastic component B may be stored up to 24 months.
Keep **Mapelastic** in a dry place and at a temperature of at least +5°C.

SAFETY INSTRUCTIONS FOR PREPARATION AND APPLICATION

Mapelastic component A contains cement which, in contact with perspiration or other body fluids, produces an irritating alkaline reaction and allergic reactions to those predisposed. Wear protective gloves and goggles.

Example of Mapelastic applied on a viaduct by spraying

Example of Mapelastic applied on a dam by spraying

Mapelastic

For further and complete information about a safety use of our product please refer to our latest version of the Material Safety Data Sheet.

PRODUCT FOR PROFESSIONAL USE.

WARNING
While the indications and guidelines contained in this data sheet correspond to the company's knowledge and wide experience, they must be considered, under all circumstances, merely as an indication and subject to confirmation only after long-term, practical applications. Therefore, anybody who undertakes to use this product, must ensure beforehand that it is suitable for the intended application and, in all cases, the user is to be held responsible for any consequences deriving from its use.

Please refer to the current version of the Technical Data Sheet, available from our web site www.mapei.com

All relevant references for the product are available upon request and from www.mapei.com

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