



# Planitop HPC

**Two-component ultra high performance shrinkage-compensated free-flowing high ductility fibre-reinforced cementitious mortar with stiff steel fibres for restoring and repairing concrete**



## WHERE TO USE

Repairing and strengthening of concrete structures that require the use of a free-flowing, ultra-high performance and high ductility mortar without using reinforcing steel in order to limit the thickness applied.

### Some application examples

- Seismic upgrading of elements subjected to high stresses where high ductility is required.
- Structural strengthening by cladding reinforced cement pillars and beams.
- Repairing the lower spigots on pre-compressed viaduct beams.
- Reconstructing and levelling off the upper parts of pulvins and bearing elements of piles for motorway viaducts.
- Reinstating floor slabs after removing deteriorated areas by scarifying.

## TECHNICAL CHARACTERISTICS

**Planitop HPC** is a two-component fluid mortar suitable for casting into formwork without the risk of the mortar segregating. Areas up to 40 mm thick can be cast without using reinforcing steel; for thicker areas, it is possible to use suitable reinforcement steel.

**Planitop HPC** is a ready-mixed free-flowing mortar made from two components: component A (powder) and component B (**HPC Fibres**).

**Planitop HPC** component A (powder) is made from high-strength cement, selected aggregates and special additives according to a formulation developed in the MAPEI Research and Development laboratories and is supplied in 25 kg bags. Component A must be mixed

with 6.5% by weight of component B (**HPC Fibres**) stiff steel fibres.

To allow the product's expansive properties to develop fully and correctly, **Planitop HPC** must be cured in a damp environment. To allow expansion in the open air, **Planitop HPC** may also include 0.25% of **Mapecure SRA**, a special admixture which has the capacity to reduce plastic and hydraulic shrinkage.

**Mapecure SRA** carries out an extremely important role and guarantees better curing of the mortar. When mixed with **Planitop HPC** it may be considered a highly advanced technological system, in that the admixture has the capacity of reducing the water evaporation and encourages the development of the hydration process. **Mapecure SRA** acts as an internal curing agent and thanks to its interaction with some of the main components in the cement, reduces final shrinkage by 20% to 50% compared with the same product without the admix, which means there is also a lower risk of cracking.

The use of **Mapecure SRA** may reduce the mechanical properties by 5-6%.

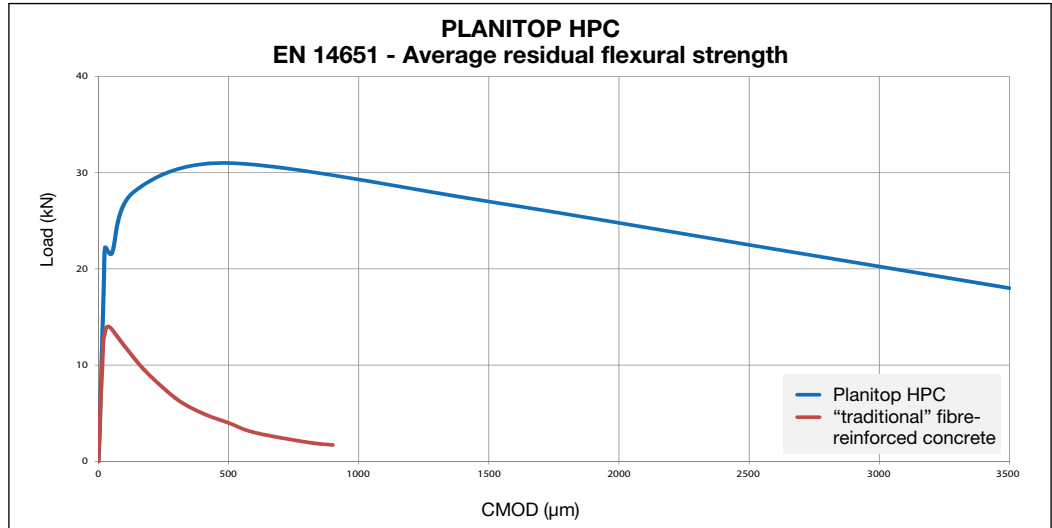
Once hardened, **Planitop HPC** has the following characteristics:

- very high flexural and compressive strength;
- high ductility;
- high resistance to cyclical loads;
- impermeable to water;
- excellent adhesion to old concrete, if dampened with water before application, and to reinforcement rods, especially if treated beforehand with **Mapefer** or **Mapefer 1K**;
- high resistance to wear due to abrasion or impact.

# Planitop HPC



CMOD controlled bending test in compliance with EN 14651 standards



Graph of residual flexural strength in compliance with EN 14651 standard

**Planitop HPC** complies with the principles defined in 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 use of products and systems”*), and the requirements of EN 1504-3 (*“structural and non-structural repair”*) for R4-class structural mortars and the minimum requirements EN 1504-6 (*“anchoring of reinforcing steel bar”*).

The product may also be used without adding **Mapecure SRA** when climatic conditions allow a favourable curing cycle to be carried out.

## RECOMMENDATIONS

- Do not use **Planitop HPC** on smooth concrete substrates.
- Do not use **Planitop HPC** for fixing elements accurately in place (use **Mapectill** or **Mapectill R**).
- Do not apply **Planitop HPC** by spray or with a trowel (use **Mapectout Thixotropic**).
- Do not add cement or additives to **Planitop HPC**.
- Do not add water once the mix has started to set.
- Do not use **Planitop HPC** if the bag is damaged or if it has been opened previously.

## APPLICATION PROCEDURE

### Preparation of the substrate

- Remove all deteriorated and loose concrete until there is a solid, strong and very rough substrate with roughness almost about 5 mm. Any areas previously repaired and which are not perfectly adhered must be removed.
- Remove all dust, rust, cement laitance, grease, oil and old paint from the concrete and reinforcement rods by sandblasting.
- Saturate the substrate with water.
- Before casting, wait until excess surface water has evaporated off. Use compressed air to accelerate this process if required.

### Preparation of the mortar

Pour **Planitop HPC** component A into a cement mixer and add 3-3.2 litres of water for each bag of product.

Mix for at least 6-8 minutes. When the product is well blended and fluid with no lumps, slowly add 1.625 kg of component B (**HPC Fibres**) and mix for a further 4-5 minutes to form an even mix. **Planitop HPC** remains workable for approximately 1 hour at +20°C.

## Application of the mortar

Pour **Planitop HPC** into the formwork in a continuous flow from one side only, and make sure all the air is expelled. The formwork must not absorb any of the water from **Planitop HPC**, so treat the formwork beforehand with a form release agent (such as **DMA 1000 Form Release Agent**). Make sure that all the elements to be reinforced are completely filled. To help the mortar flow into the more difficult areas, use wooden rods, round iron bars or vibrate lightly.

## PRECAUTIONS TO BE TAKEN DURING AND AFTER APPLICATION

- Only use bags of **Planitop HPC** which have been stored on their original, covered pallets.
- In hot weather, store the product in a cool area and use cold water to prepare the mix.
- In cold weather, store the product in an area protected from frost at a temperature of +20°C. Use lukewarm water to prepare the mortar.
- After stripping the formwork, we recommend curing **Planitop HPC** carefully to prevent the mixing water evaporating too quickly, especially in hot or windy weather, otherwise surface cracks may appear. **Planitop HPC** must be protected at all times by spraying the surface with a water mist while pouring operations are being carried out. Cover the surface with waterproof sheets and keep covered for at least 5 days.

## Cleaning

Wash the mortar from tools before it hardens using water. Once hardened, cleaning is much more difficult and it must be removed mechanically.

## TECHNICAL DATA (typical values)

### PRODUCT IDENTITY

Class according to EN 1504-3:	R4	
Type:	CC	
	<b>component A</b>	<b>component B</b>
Consistency:	powder	<b>Fibres HPC</b>
Colour:	grey	steel
Bulk density (kg/m <sup>3</sup> ):	1,400	-
Maximum size of aggregate (mm):	1	-
Dry solids content (%):	100	-
Ion chloride content - minimum requirement $\leq 0.05\%$ according to EN 1015-17 (%):	$\leq 0.05$	-

### APPLICATION DATA OF PRODUCT (at +20°C - 50% R.H.)

Colour of mix:	grey
Mixing ratio:	100 parts in weight of component A (powder) with 6.5 parts in weight of component B ( <b>HPC Fibres</b> ) (1.625 kg of fibres every 25 kg bag) and 12-13 parts in weight of water (3.0-3.2 litres of water every 25 kg bag)
Consistency of mix:	fluid
Density of mix (kg/m <sup>3</sup> ):	2,400
pH of mix:	> 12.5
Application temperature range:	from +5°C to +35°C
Pot life of mix:	approximately 1 hour (at +20°C)
Accessible to light traffic:	24 h (at +20°C)
Accessible to heavy traffic:	72 h (at +20°C)

### FINAL PERFORMANCE (12% mixing water) - Mix the product according to the instructions in the "Preparation of the mortar" section

Performance characteristic	Test method	Requirements according to EN 1504-3 for R4 class mortar	Requirements according to EN 1504-6	Performance of product
Compressive strength (MPa):	EN 12190	$\geq 45$ (after 28 days)	> 80% of value as declared by manufacturer (after 28 days)	40 (after 1 day) 130 (after 28 days)
Tensile strength (MPa):	BS 6319	none	none	8.5 (after 28 days)
Compressive modulus of elasticity (GPa):	EN 13412	$\geq 20$ (after 28 days)	none	37 (after 28 days)
Shear strength (MPa):	EN 12615	none	none	16 (after 28 days)
Adhesion on concrete (substrate in MC 0.40 - water/cement ratio = 0.40) according to EN 1766 (MPa):	EN 1542	$\geq 2$ (after 28 days)	none	$\geq 2$ (after 28 days)
Shore hardness:	ISO 868	none	none	D > 75
Endogenous shrinkage (%):	-	none	none	< 0.05
Impeded shrinkage (after 7 days curing in water and 21 days at 21°C - 50% R.H.) ( $\mu\text{m}/\text{m}$ ):	-	none	none	200
Resistance to accelerated carbonation:	EN 13295	Carbonation depth $\leq$ reference concrete (type MC 0.45 water/cement ratio = 0.45) according to UNI 1766	none	test passed
Impermeability to water - penetration depth (mm):	EN 12390-8	none	none	< 2
Thermal compatibility measured as adhesion according to EN 1542 (MPa): - freeze-thaw cycles with de-icing salts:	EN 13687/1	$\geq 2$ (after 50 cycles)	none	$\geq 2$
Resistance to freeze-thaw cycles in the presence of salts - flaking ( $\text{g}/\text{m}^2$ )	EN 12390-9	none	none	< 100 (after 56 cycles)
Pull-out strength of steel reinforcing bars - movement under a load of 75 kN (mm):	EN 1881	none	< 0.6	< 0.6
Reaction to fire:	EN 13501-1	Euroclass		A1, A1 <sub>fl</sub>
Application of fracture energy (N/m):	EN 14651 mod.	none	none	6,600
Average residual flexural strength (MPa): CMOD 1 = 500 $\mu\text{m}$ CMOD 2 = 1,500 $\mu\text{m}$ CMOD 3 = 2,500 $\mu\text{m}$ CMOD 4 = 3,500 $\mu\text{m}$	EN 14651	not required		$f_{R1}$ 9.9 $f_{R2}$ 8.2 $f_{R3}$ 7.2 $f_{R4}$ 5.8

\* Since the mortar is fibre-reinforced, the flexural test must exceed the crack limit of the cementitious matrix.

# Planitop HPC



## CONSUMPTION

Approximately 20 kg/m<sup>2</sup> per cm of thickness.

## PACKAGING

Planitop HPC is supplied in 25 kg bags (component A) and boxes containing 6.5 kg of stiff metal fibres component B (HPC Fibres).

## STORAGE

12 months in a dry, covered area in its original packaging.

The product complies with the conditions of Annex XVII to Regulation (EC) N° 1907/2006 (REACH), item 47.

## SAFETY INSTRUCTIONS FOR PREPARATION AND APPLICATION

Planitop HPC contains cement that when in contact with sweat or other body fluids causes irritant alkaline reaction and allergic reactions to those predisposed.

It can cause damage to eyes.

During use, wear protective gloves and goggles and take the usual precautions for handling chemicals. In case of contact with eyes or skin wash immediately with plenty of water and seek medical attention.

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

PRODUCT FOR PROFESSIONAL USE.

## WARNING

*Although the technical details and recommendations contained in this product*

*data sheet correspond to the best of our knowledge and experience, all the above information must, in every case, be taken as merely indicative and subject to confirmation after long-term practical application; for this reason, anyone who intends to use the product must ensure beforehand that it is suitable for the envisaged application. In every case, the user alone is fully responsible for any consequences deriving from the use of the product.*

**Please refer to the current version of the Technical Data Sheet, available from our website [www.mapei.com](http://www.mapei.com)**

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