

# Mapefill 130 WT

**High-flow cementitious mortar with high compressive strength and fatigue resistance for anchoring and grouting onshore wind turbines**



## WHERE TO USE

- Anchoring base plates for onshore wind turbines where high fatigue resistance is required.
- Anchoring tie-rods and nuts of wind turbines.

## Some application examples

- Filling gaps where a high modulus of elasticity and high compressive strength are required.
- Anchoring works under base plates.
- Anchoring works in adverse weather conditions and at temperatures down to +2°C.

## TECHNICAL CHARACTERISTICS

**Mapefill 130 WT** is a pre-blended powdered mortar composed of high-strength cement, graded aggregates and special admixtures with an expansive agent formulated by MAPEI Research & Development laboratories. When mixed with water, **Mapefill 130 WT** forms a highly fluid mortar with the capacity to flow into complex spaces. It is not necessary to vibrate the mortar and it does not segregate. It can be used for anchoring works 10 to 200 mm thick. Thanks to its special expansive agent, **Mapefill 130 WT** is characterized by a total absence of shrinkage in both its plastic phase and its hardened phase and develops very high early mechanical properties. If **Mapefill 130 WT** is prepared by only adding water, it must be cured under damp conditions. However, there is no guarantee that these conditions can be created

on site. Therefore, to guarantee that the expansive properties of **Mapefill 130 WT** develop when drying in the open air, especially in hot and windy days when water evaporation is accelerated, 0.25% of **Mapecure SRA**, a special shrinkage-reducing admixture, may be used to great advantage when added to the mix.

Thanks to this special technology, the development of hydration reactions is encouraged and capillary porosity is reduced, resulting in an increase in mechanical properties, impermeability and durability.

**Mapefill 130 WT** 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 minimum requirements of EN 1504-6 for anchoring works.

## RECOMMENDATIONS

- Do not use **Mapefill 130 WT** on concrete with smooth finish.
- Do not add cement or admixtures to **Mapefill 130 WT**.
- Do not add water once the mix has started to set.
- Do not use **Mapefill 130 WT** if the bag is damaged or if it has been opened previously.

## APPLICATION PROCEDURE Preparation of the substrate

### Anchoring works

- The area in and around the foundations to be filled with **Mapecure 130 WT** must have a very rough surface finish.
- Where possible, the holes for tie-rods and nuts must also have a rough surface finish to enable the mortar to adhere more firmly to the concrete base.
- Remove any loose material, cement laitance and dust created when carrying out previous operations.
- Saturate the foundation surface and the sides of the cavity to be filled with water. Before pouring, wait for the excess water to evaporate. To facilitate the elimination of unabsorbed water, use compressed air if necessary.

## Preparation of the mortar

### Anchoring works

- Pour into a concrete mixer a minimum of 2.1 litres of water per bag, then slowly add **Mapecure 130 WT**, mix for 4-5 minutes until a homogeneous mix is obtained.
- Add the remaining mixing water up to a maximum of 2.4 litres per bag and mix again for 1-2 minutes until a homogeneous and lump-free mix is obtained. **Mapecure 130 WT** remains workable for approximately 1 hour at +20°C.
- If improved open-air curing of the mortar is required, add **Mapecure SRA** to the freshly mixed product at a dosage of 0.25% by weight of the mortar (0.25 kg each 100 kg of **Mapecure 130 WT**).

## Application of the mortar

### Anchoring works

- When anchoring base plates for wind turbines, or anchoring under base plates in general, duly position formwork around the area and seal it to prevent mortar from leaking out during pouring. The formwork should not absorb water from **Mapecure 130 WT** and, to prevent this from happening, it is recommended to treat the formwork with a form-release compound (such as **Mapecure DMA 1000** for wooden formwork, **Mapecure 1500** or **Mapecure Eco 31** for any type of formwork). In order to carry out the anchoring works properly, make sure the formwork is duly placed so that there is a suitable head of mortar. Pour or pump **Mapecure 130 WT** into the areas previously prepared from one side only in a continuous flow to help expel the air. Pour **Mapecure 130 WT** into the formwork until it is completely full, making sure the mortar comes into full contact with the base plate of the wind turbine. It is not necessary to vibrate the mortar.

## FATIGUE RESISTANCE

Thanks to its special formulation developed in MAPEI Research & Development laboratories,

**Mapecure 130 WT** has excellent fatigue resistance and high resistance to dynamic loads. To determine the fatigue properties of **Mapecure 130 WT**, a test campaign was conducted at the Structural Engineering Faculty of the Federico II University of Naples. The product was tested according to the prescriptions in fib Model Code 2010. The results of the tests enabled the characteristic S-N curves of the material to be elaborated: an analytical curve (the black curve in Fig.1), which was found by applying the calculation model in fib Model Code 2010, and an experimental curve (the blue curve in Fig.1), which was calculated by means of compressive strength and fatigue tests performed in the lab by applying different loads to a series of samples of **Mapecure 130 WT**. fib Model Code 2010 supplies the equations to calculate the fatigue failure point of concrete elements in terms of maximum number of load cycles for a given range of constant stresses. In the graph in Fig. 1, the value for Log N is indicated on the X axis, where N represents the maximum number of load cycles for a given stress acting on the samples, while the Y axis indicates the maximum value of the stress acting on the samples, expressed as the ratio between the maximum compressive load applied during the test and the cylinder compressive strength characteristic of fatigue of the material, which takes into account the increasing susceptibility to fatigue of concrete as its compressive strength increases.

As can be seen in the graph, the results of the experimental tests tend to follow the trend of the theoretical curve quite closely and, what is more, increase the limits indicated by the more conservative analytical calculation model.

For further information, please contact MAPEI Technical Services to request a copy of the Test Report drafted by the University.

**Mapecure 130 WT** was also tested according to EN 1504-3 ("*Structural and non-structural repairs of concrete*") for R4-class structural mortars. Thanks to its high level of fatigue resistance, the product may also be used to carry out structural repairs on concrete elements subject to cyclical loads, to refurbish the base of wind turbines and to fill rigid joints between concrete elements.

## PROCEDURE FOR REPAIR WORKS

### Preparation of the substrate

- Remove all damaged and detached areas of concrete to form a sound, rough and strong substrate to at least 5 mm.
- Any areas previously restored which are not perfectly attached must also be removed.
- Remove rust from steel reinforcement through sandblasting.
- Hydro-blast the concrete to remove all traces of dust and cement laitance.
- Saturate the substrate with water.

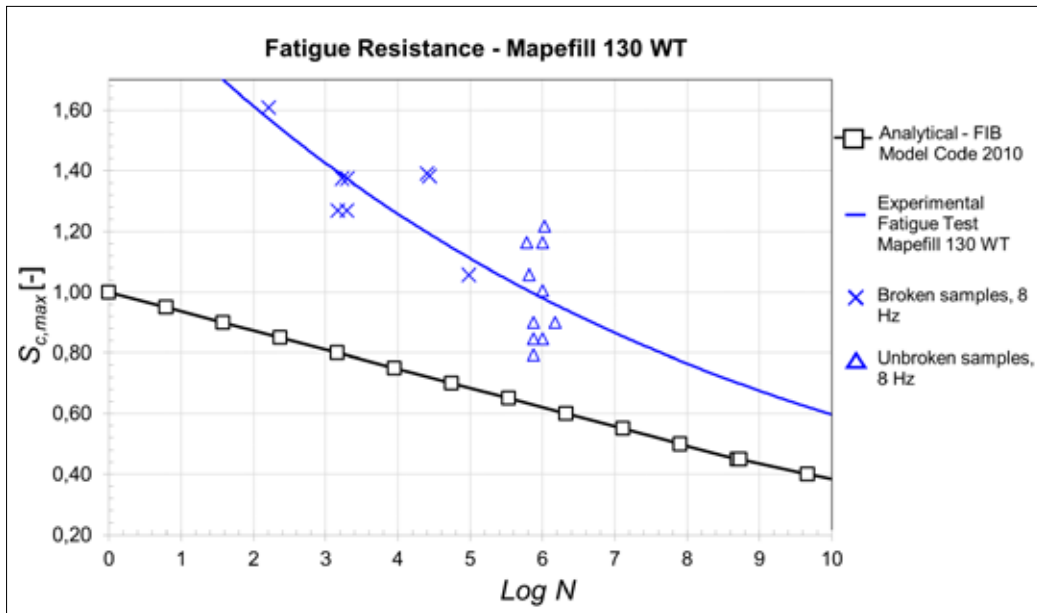


Fig.1

- Before applying the product, wait until any excess water has evaporated off, use compressed air to accelerate this process if necessary.

#### Application of the mortar

Treat the formwork with form-stripping oil, fasten it in place around the area to be filled and seal the formwork to prevent the mortar from leaking out. Pour **Mapefill 130 WT** in a continuous flow into the formwork; the mortar does not need to be vibrated.

**NOTE:** *Mapefill 130 WT may be used as is or adding 6 to 10 mm Gravel, according to the thickness to be applied. For particular application conditions, it is recommended to contact MAPEI Technical Services.*

#### FINISHING CONCRETE SURFACES OR THE MORTAR

If finishing is required, it is possible to use specific coatings such as **Mapelastic Guard** two-component, light grey, elastic cementitious mortar for waterproofing structures subjected to dynamic stresses, and/or **Elastocolor Paint** protective, crack-resistant, acrylic resin-based elastomeric finish in water dispersion. Both products meet the minimum requirements of EN 1504-2 standards ("Surface protection systems for concrete").

#### PRECAUTIONS TO BE TAKEN DURING AND AFTER APPLICATION

- To prepare the mortar, use only **Mapefill 130 WT** bags that have been stored on their original 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 and use lukewarm water to prepare the mortar.

- After pouring, **Mapefill 130 WT** must be cured very carefully. Surfaces exposed to the open air must be protected to avoid the water evaporating off too quickly, otherwise surface cracks due to plastic shrinkage may form, particularly in hot and/or windy weather.
- Spray water on surfaces exposed to the open air during the first 24 hours of curing or apply a suitable anti-evaporation product on the surface.

#### Cleaning

Remove mortar from tools with water before it hardens. Once hardened, cleaning is much more difficult and must be carried out only mechanically.

#### CONSUMPTION

Approx. 2.2 kg/dm<sup>3</sup> per cm of thickness

#### PACKAGING

25 kg bags.

#### STORAGE

**Mapefill 130 WT** may be stored for maximum 12 months in its original packaging. The special 25 kg vacuum-packed polyethylene bags may be stored outside for the entire duration of the site. Rain has no effect on its characteristics.

#### SAFETY INSTRUCTIONS FOR PREPARATION AND APPLICATION

Instructions for the safe use of our products can be found on the latest version of the Safety Data Sheet, available from our website [www.mapei.com](http://www.mapei.com).

PRODUCT FOR PROFESSIONAL USE.

#### WARNING

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

## TECHNICAL DATA (typical values)

### PRODUCT IDENTITY

Class according to EN 1504-3:	R4
Type:	CC
Consistency:	powder
Colour:	grey
Maximum size of aggregate (mm):	2.5
Ion chloride content: – minimum requirements $\leq 0,05\%$ - according to EN 1015-17 (%):	$\leq 0.05$

### APPLICATION DATA

Colour of mix:	grey
Mixing ratio:	100 parts of <b>Mapefill 130 WT</b> with 8.5-9.5 parts of water (2.1-2.4 litres of water every 25 kg bag)
Consistency of mix:	fluid
Density of mix (kg/m <sup>3</sup> ):	2400
Application temperature range:	from +5°C to +35°C
Pot life of mix:	approx. 1 h

### FINAL PERFORMANCE (9% mixing water; mixed in compliance with EN 196-1 standards)

Performance characteristic	Test method	Requirements according to EN 1504-3 for R4 class mortam	Requirements according to EN 1504-6	Product performance
Compressive strength - 60 mm x 120 mm cylindrical sleeve according to EN 12390-3 mod (MPa):	EN 12390-3	not required	not required	> 130 (after 28 days)
Compressive modulus of elasticity (GPa):	EN 13412	$\geq 20$ (after 28 days)	not required	42 (after 28 days)
Adhesion to concrete (MC 0.40 substrate type - water/cement ratio = 0.40) according to EN 1766 (MPa):	EN 1542	$\geq 2$ (after 28 days)	not required	> 3.0 (after 28 days)
Capillary absorption (kg/m <sup>2</sup> ·h <sup>0.5</sup> ):	EN 13057	$\leq 0.5$	not required	0.01
Resistance to accelerated carbonation:	EN 13295	depth of carbonation $\leq$ reference concrete (type MC 0.45, water/cement ratio = 0.45) according to UNI 1766	not required	meets specifications
Thermal compatibility measured as bonding according to EN 1542 (MPa): – freeze-thaw cycling with de-icing salt immersions:	EN 13287-1	$\geq 2$ (after 50 cycles)	not required	> 2.0
Slip-resistance of rebar – movement with a load of 75 kN – (mm):	EN 1881	not required	$\leq 0.6$	0.3
Non-contrasted shrinkage (mm/m):	EN 12617-4	not required	not required	< 0.6 (after 90 days)
Exposure class:	/	not required	not required	X0 XC1, XC2, XC3, XC4 XD1, XD2, XD3 XS1, XS2, XS3 XF1, XF2, XF3, XF4 (**) XA1
Reaction to fire:	EN 13501-1	Euroclass	Euroclass	A1

(\*\*) **Mapefill 130 WT** was tested according to EN 12390-9 standards compared with reference concrete with composition in compliance with class XF4 according to EN 206-1

*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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**Mapefill  
130 WT**



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