MAPEFIX POLYBOND

Polyester chemical anchor for concrete

OP7: non cracked concrete

WHERE TO USE

Mapefix PolyBond is an adhesive for chemically anchoring metal bars in holes drilled in concrete. It is a two-component polyester resin-based product specifically formulated for anchoring threaded bars made from steel, galvanized steel, stainless steel and steel with high resistance to corrosion that transmit loads into concrete and lightweight concrete substrates. It is also recommended for anchoring components in hollow brick substrates and uniform and mixed walls. Also, because no stress is generated as with conventional mechanical expansion fasteners, it is an ideal solution for anchoring components close to edges or when there is a limited pitch between each anchor.
Mapefix PolyBond is suitable for both internal and external anchors, for anchors on a horizontal, vertical or sloping axis and for anchoring components to overhead surfaces. It may be used to make anchors in dry and damp substrates at temperatures of 0°C to +35°C and may also be used at temperatures of up to +40°C, even though in such cases the workability of the resin is much lower.
Mapefix PolyBond is also available on request in versions suitable for cold climates (**Mapefix PolyBond Hot Clime**) and hot climates (**Mapefix PolyBond Hot Clime**).
Mapefix PolyBond is recommended for anchoring elements and features such as:
· plant equipment;
· sanitary fittings;
· antennas;
· signs;
· window and door fittings.

TECHNICAL CHARACTERISTICS

Mapefix PolyBond is a two-component chemical anchor supplied in 300 ml and 420 ml cartridges containing the 2 components A (resin) and B (catalyser) separate and in their correct proportions. The 2 components are mixed together when they are extruded through the static mixer supplied with the cartridge. The mixer is screwed to the end of the cartridge and no pre-mixing of the 2 components is required. If only part of the cartridge is used, the remaining product may be used, even after a number of days, by replacing the original static mixer clogged with hardened resin with a clean, new mixer.
Mapefix PolyBond is specific for use in building materials such as:
· non-cracked concrete;
· lightweight concrete;
· cellular concrete.

Mapefix PolyBond may also be used for hollow-core and compact substrates in other materials such as:
· masonry;
· brickwork;
· stone.

Mapefix PolyBond is applied in holes made with a drill or a hammer-drill. It is recommended to use only the drill feature on hollow-core substrates.
Mapefix PolyBond is certified according to European ETA Standards option 7 (anchors in concrete in compression zones). The **Mapefix PolyBond** 300 ml cartridges may be used with conventional sealant guns for 50 mm diameter cartridges, as long as they are robust enough. The 420 ml cartridges need to be used with a special sealant gun for 65 mm diameter

MAPEI

cartridges. Specific pro-grade guns are available in the **Mapei Gun** range with a manual, electric or pneumatic drive.

RECOMMENDATIONS

· In areas with poor or no ventilation, take suitable measures to ensure sufficient air circulation.
· Do not use on dusty or crumbling surfaces.
· Do not use on surfaces with traces of oil, grease or form-release compound; adhesion may be affected.
· Do not apply if the temperature is lower than 0°C; in such cases, use **Mapefix PE SF** or **Mapefix VE SF**.
· If used on natural stone, check beforehand to see if it impregnates into the substrate.
· Do not apply loads until it has completely hardened (T_{cure}).
· Do not apply the product in holes made with a diamond cutter (core-drilled holes); in such cases use **Mapefix EP**.
· Do not use for anchors in tension zones.

APPLICATION PROCEDURE

Anchor design

The size of the hole to be drilled in the substrate, the diameter and depth of the anchoring element and the maximum permitted loads must be calculated by a qualified design engineer. The **Mapefix Software Design** programme is available free of charge at www.mapei.com and is a very useful support tool when designing single and multiple anchors.
There are a series of tables based on our experience and in-house testing at the end of this Data Sheet containing various recommended loads for certified bars in a range of diameters set at three different anchoring depths; the values in these tables range from the minimum values to the maximum values according to ETA certification.

Preparation of solid substrates

Make holes in the substrate with a drill or a hammer-drill, depending on the type of material to be drilled.
Remove all traces of dust and loose material from inside the holes with compressed air.
Clean the surface inside the hole with a suitable long-bristled bottle-brush.
Remove all traces of dust and loose material again from inside the holes with compressed air.

Preparation of hollow-core substrates

Make holes in the substrate with a drill.
Clean the surface inside the holes with a suitable long-bristled bottle-brush.
Insert a metal or plastic **Mapefix Mesh Sleeves** in the hole; the diameter and length of the sleeve must be appropriate for the diameter and depth of the hole.

Preparation of the metal bar

Clean and degrease the bar before anchoring it in the substrate.

Preparation of the resin for the chemical anchor

For the 300 ml cartridge, unscrew the upper cap and cut off the tips of the black and white bags which protrude from the cartridge. This operation is not required with the 420 ml cartridge.
Screw the static mixer to the end of the cartridge.
Insert the cartridge in a suitable sealant gun.
Discard the first 3 shots of resin; they may not be mixed correctly.
Starting from the bottom of the hole, extrude the product into the hole until it is sufficiently full.
Insert the metal bar in the hole using a rotary movement to expel all the air until the excess resin comes out of the hole.
The metal bar must be inserted in the hole within the start setting time (T_{gel}). Only apply loads to the bar once the resin has completely hardened (T_{cure}), as indicated in table 1.

CONSUMPTION

According to the volume of the hole to be filled: see tables 8, 9 and 10.

CLEANING

Use normal solvent-based paint thinners to clean all work tools and equipment.

PACKAGING

Boxes of 12 x 300 or 420 ml cartridges with 12 static mixers.

COLOUR

Light grey.

STORAGE

300 ml cartridges: 12 months in their original packaging at a temperature of +5°C to +25°C.
420 ml cartridges: 18 months in their original packaging at a temperature of +5°C to +25°C.

SAFETY INSTRUCTIONS FOR PREPARATION AND APPLICATION

Mapefix PolyBond part A is irritant for the skin and the respiratory system. Both part A and part B irritate the eyes. **Mapefix PolyBond** part B can also cause sensitization if it comes in contact with the skin of those subjects predisposed. During use wear protective gloves and goggles and take the usual precautions for the handling of chemicals. If the product comes in contact with the eyes or skin, was immediately with plenty of water and seek medical attention. Do not use in the presence of pregnant women. Always work in well ventilated areas, otherwise wear a mask with filters. **Mapefix PolyBond** part A is hazardous for aquatic life, do not dispose of the product in the environment. For further and complete information about the safe use of our product please refer to the latest version of our Safety Data Sheet.
PRODUCT FOR PROFESSIONAL USE.

TECHNICAL DATA (typical values)	
PRODUCT IDENTITY	
Consistency:	thixotropic paste
Colour:	light grey
Density (g/cm³):	1.74
APPLICATION DATA (at +23°C and 50% R.H.)	
Application temperature:	0°C to +40°C
Start setting time T_{gel}:	see Table 1
Final hardening time T_{cure}:	see Table 1
PERFORMANCE CHARACTERISTICS	
Compressive strength (N/mm²):	75
Flexural strength (N/mm²):	30
Dynamic modulus of elasticity (N/mm²):	4000
Resistance to UV rays:	good
Resistance to chemicals:	good
Resistance to water:	excellent
Service temperature:	-40°C to +50°C (temporary peak temperature +80°C)
Installation parameters:	see Table 2
Typical adhesion strength:	see Table 11
Recommended loads:	see Tables 5, 6 and 7

Design suggestions:	refer to ETA certification
Consumption:	see Tables 8, 9 and 10

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

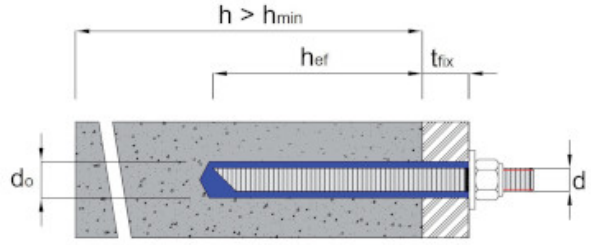
LEGAL NOTICE

Reaction time of product			
Substrate temperature	Start setting time T_{gel}	Final hardening time T_{cure}	
		dry substrate	damp substrate
(°C)	minutes	hours/minutes	hours/minutes
0	45	3 h	6 h
5	25	2 h	4 h
10	20	100	3¼ h
20	15	80	2¼ h
30	6	45	90
40	2	20	40

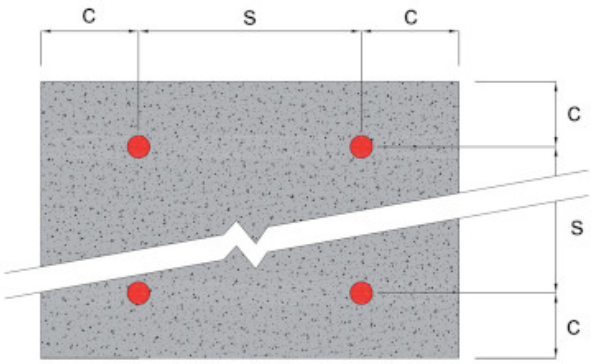
*Table 1 * temperature of cartridge ≥ 15°C*

Installation parameters for threaded bars									
Threaded bar				M8	M10	M12	M16	M20	M24
Diameter of bar	d		mm	8	10	12	16	20	24
Diameter of hole	d_o			10	12	14	18	24	28
Minimum distance from edge	c_{min}			40	50	60	80	100	120
Minimum pitch between bars	s_{min}			40	50	60	80	100	120
Anchoring depth	h_{ef}	min		60	60	70	80	90	96
		max		160	200	240	320	400	480
Minimum thickness of concrete	h_{min}			h_{ef} + 30 mm (≥ 100 mm)			h_{ef} + 2 d_o		
Thickness of anchored element	T_{fix}	min		0					
		max		1500					
Diameter of hole for anchored element	d_f			9	12	14	18	22	26
Maximum tightening torque	T_{fix}		Nm	10	20	40	80	120	160

Table 2



Drawing 3



Drawing 4

Recommended loads[1] for single anchor in concrete										
minimum anchoring depth										
					M8	M10	M12	M16	M20	M24
	service temperature[2]				min h_{ef}	min h_{ef}	min h_{ef}	min h_{ef}	min h_{ef}	min h_{ef}
anchoring depth			h_{ef}	mm	60	60	70	80	90	96
tensile load	24°C/40°C	non-cracked concrete	$N_{Rec,stat}$	kN	6.8	8.1	10.7	13.6	16.7	18.4
	50°C/80°C	non-cracked concrete	$N_{Rec,stat}$		5.7	7.2	9.4	12.0	15.7	18.4
shear load without bending moment	24°C/40°C	non-cracked concrete	$V_{Rec,stat}$		6.3	7.3	9.4	12.0	14.8	16.7
	50°C/80°C	non-cracked concrete	$V_{Rec,stat}$		6.3	7.3	9.4	12.0	14.8	16.7
distance from edge			$C_{cr,N}$	mm	90	90	105	120	135	144
pitch between bars			$S_{cr,N}$	mm	2 x $C_{cr,N}$					

Table 5

Recommended loads[1] for single anchor in concrete										
intermediate anchoring depth										
					M8	M10	M12	M16	M20	M24
	service temperature[2]				h_{ef}	h_{ef}	h_{ef}	h_{ef}	h_{ef}	h_{ef}
anchoring depth			h_{ef}	mm	80	90	110	125	170	210
tensile load	24°C/40°C	non-cracked concrete	$N_{Rec,stat}$	kN	8.6	12.1	16.8	21.2	33.9	50.3
	50°C/80°C	non-cracked concrete	$N_{Rec,stat}$		7.7	10.8	14.8	18.7	29.7	44.0
shear load without bending moment	24°C/40°C	non-cracked concrete	$V_{Rec,stat}$		6.3	9.7	14.3	23.4	38.4	54.1
	50°C/80°C	non-cracked concrete	$V_{Rec,stat}$		6.3	9.7	14.3	23.4	38.4	54.1
distance from edge			$C_{cr,N}$	mm	120	135	165	188	255	315
pitch between bars			$S_{cr,N}$	mm	2 x $C_{cr,N}$					

Table 6

Recommended loads[1] for single anchor in concrete										
maximum anchoring depth										
					M8	M10	M12	M16	M20	M24

	service temperature(2)				max h_{ef}	max h_{ef}	max h_{ef}	max h_{ef}	max h_{ef}	max h_{ef}
anchoring depth			h_{ef}	mm	160	200	240	320	400	480
tensile load	24°C/40°C	non-cracked concrete	$N_{Rec,stat}$	kN	8.6	13.8	20.0	37.6	58.6	84.3
	50°C/80°C	non-cracked concrete	$N_{Rec,stat}$		8.6	13.8	20.0	37.6	58.6	84.3
shear load without bending moment	24°C/40°C	non-cracked concrete	$V_{Rec,stat}$		6.3	9.7	14.3	26.9	42.3	60.6
	50°C/80°C	non-cracked concrete	$V_{Rec,stat}$		6.3	9.7	14.3	26.9	42.3	60.6
distance from edge			$C_{cr,N}$	mm	240	300	360	480	600	720
pitch between bars			$S_{cr,N}$	mm	2 x $C_{cr,N}$					

Table 7

Design according to EN 1992-4:2017 (Eurocode 2)
(1) recommended loads valid under the following design conditions:
· $_{sus} \leq 0.60$
· $_{sus} = 1.0$
· class 5.8 minimum threaded steel bar
· shear load without bending moment
· class 20/25 minimum concrete
· $C \geq C_{cr,N}$
· $S \geq S_{cr,N}$
· $h \geq 2 \times h_{ef}$
· safety factors included
· gap = 1,0 (no play between anchored element and metal bar)
· rough hole made with a hammer-drill
· for other design conditions use **Mapefix Software Design**, developed in compliance with current European standards
(2) constant service temperature/temporary peak temperature

Consumption of Mapefix PolyBond in concrete						
minimum anchoring depth						
bar	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**
diameter of bar (mm)	8	10	12	16	20	24
diameter of hole (mm)	10	12	16	20	24	28
anchoring depth (mm)	60	60	70	80	90	96
n° of anchors (300 ml cartridge)	***161***	***132***	***44***	***30***	***22***	***17***
n° of anchors (420 ml cartridge)	***225***	***184***	***62***	***42***	***31***	***24***

Table 8

Consumption of Mapefix PolyBond in concrete						
intermediate anchoring depth						
bar	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**
diameter of bar (mm)	8	10	12	16	20	24
diameter of hole (mm)	10	12	16	20	24	28
anchoring depth (mm)	80	90	110	125	170	210
n° of anchors (300 ml cartridge)	***121***	***88***	***28***	***19***	***12***	***8***
n° of anchors (420 ml cartridge)	***169***	***123***	***39***	***27***	***16***	***11***

Table 9

Consumption of Mapefix PolyBond in concrete						
maximum anchoring depth						
bar	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**
diameter of bar (mm)	8	10	12	16	20	24

diameter of hole (mm)	10	12	16	20	24	28
anchoring depth (mm)	160	200	240	320	400	480
n° of anchors (300 ml cartridge)	***60***	***39***	***13***	***8***	***5***	***3***
n° of anchors (420 ml cartridge)	***84***	***55***	***18***	***11***	***6***	***5***

Table 10

Typical adhesion strength								
typical adhesion strength[1] in class 20/25 non-cracked concrete								
				M8	**M10**	**M12**	**M16**	**M20**	**M24**
service temperature	24°C/40°C	Mpa	$t^{Rk,ucr}$	9.5	9.0	8.5	8.5	8.0	8.0
	50°C/80°C			8.0	8.0	7.5	7.5	7.0	7.0
safety factor for concrete	C25/30	Y_c		1.06					
	C30/37			1.12					
	C35/45			1.19					
	C40/50			1.23					
	C45/55			1.27					
	C50/60			1.30					

[1] typical values for designing single and multiple anchors in concrete according to EOTA TR 029 guidelines
Table 11