



# Mapefix VE SF

**Chemical styrene-free vinyl ester anchor for structural loads and construction bars in concrete**



OP1: non cracked concrete	OP1: cracked and non cracked concrete	European Technical Approval post installed rebar	C1: Seismic performance
M8 ÷ M30 Ø8 ÷ Ø32	M12 ÷ M30 Ø12 ÷ Ø32	Ø8 ÷ Ø25	M12 ÷ M30 Ø12 ÷ Ø32



## WHERE TO USE

**Mapefix VE SF** is an adhesive for chemically anchoring metal bars in holes made in building materials. It is a two-component, styrene-free product made from a mixture of synthetic resins. It is specifically formulated for anchoring zinc-plated threaded and deformed steel bars which transmit structural loads in solid and perforated substrates such as non-cracked concrete, lightweight concrete, stone, wood, bricks and mixed masonry.

Specific also for anchoring metal bars in tension and compression zones in cracked and non-cracked concrete, including in areas at risk of seismic activity. It is also an ideal solution for anchoring close to edges or when there is a limited space between each anchor, as no stress generated as with conventional mechanical expansion fasteners.

**Mapefix VE SF** is recommended for immersed anchors which are permanently damp, in marine and industrial environments subjected to chemical aggression, areas where the temperature is as low as -10°C when the product is applied and for anchors with a horizontal, vertical, inclined or overhead axis; it may also be used on substrates which are damp or wet at the moment of application where there are high static or dynamic stresses.

**Mapefix VE SF** is recommended for anchoring elements in place, such as:

- strengthening rods in construction joints;
- immersed anchors and anchors in damp environments;
- anchors in marine and industrial environments;
- overhead crane and tram rails;
- plant and sanitary equipment;
- aerials and signs;
- pylons;
- safety barriers.

## TECHNICAL CHARACTERISTICS

**Mapefix VE SF** is a two-component chemical anchoring product, packaged in 300 and 420 ml cartridges with two separate compartments containing component A (resin) and component B (catalyser), at the correct mixing ratio in volume. The two components are mixed together when they are extruded via the static mixer supplied with the cartridge. The mixer is screwed to the end of the cartridge, and no preliminary mixing of the two 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 by hardened resin with a clean, new one.

**Mapefix VE SF** does not contain styrene which makes it suitable for use in areas with poor ventilation and, due to its low shrinkage, it is also suitable for anchors with small circular crests.

**Mapefix VE SF** is a chemical anchor made from a mixture of styrene-free resins, suitable for application on a wide range of solid and perforated building materials, such as:

- non-cracked concrete;
- lightweight concrete;
- cellular concrete;
- masonry;
- bricks;
- stone;
- wood.

**Mapefix VE SF** is applied to holes made with a drill or hammer drill. We recommend using only a drill on perforated substrates.

**Mapefix VE SF** is certified according to the European Standards ETA option 1 (anchors in concrete in tension or compression zones), ETA rebar (supplementary reinforcement) and fire certification, ETA seismic performance C1 (in seismic zones).

The **Mapefix VE SF** 300 ml size cartridges may be

used with conventional silicone extrusion guns for 50 mm diameter cartridges, as long as they are robust enough. The 420 ml cartridges need to be used with a special extrusion gun for 65 mm diameter cartridges.

## RECOMMENDATIONS

Do not apply on dusty or crumbling surfaces. For use on damp or wet substrates, please contact the MAPEI Technical Services Department.

Do not use on surfaces with traces of oil, grease and stripping compounds otherwise it will impede or reduce adhesion.

Do not apply if the temperature is lower than -10°C.

If used on natural stone, check if it impregnates into the stone.

Do not apply loads until it has completely hardened  $T_{cure}$  (see table 1).

Do not use the product in holes made with a diamond-tipped bit (cored holes): use **Mapefix EP 385** or **Mapefix EP 585**.

## APPLICATION PROCEDURE

### Design of the anchor

The size of the hole in the substrate, the depth of the anchor, the diameter of the anchoring element and the maximum permitted loads must be calculated by a qualified design engineer. The following tables contain practical design suggestions based on the company's experience and internal testing carried out in compliance with EOTA guidelines (European Organization for Technical Assessment). MAPEI has a special programme (Mapefix Software Design) available to help technicians and designers find the correct size for single and multiple anchors in any concrete element: consult the MAPEI Technical Services Department.

### Preparation of solid surfaces

Make holes in the substrate with a drill or a hammer drill, according to 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 holes with a suitable long-bristled bottlebrush.

Remove all traces of dust and loose material again from inside the holes with compressed air.

### Preparation of perforated surfaces

Make holes in the substrate with a drill.

Clean the surface inside the holes with a suitable long-bristled bottlebrush.

Place a mesh bush in the hole, with a diameter and length suitable for the size of the hole.

It is very important that holes are carefully cleaned in order for **Mapefix** to reach the maximum mechanical performance possible.

### Preparation of the metal bar

Clean and degrease the bar before anchoring it in the substrate. Eliminate every trace of form-release compounds.

### 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 sacks which protrude from the cartridge. This operation is not required with the 420 ml cartridge.

Screw the static mixer supplied with each pack to the end of the cartridge.

Insert the cartridge in the extrusion gun.

Discard the first three shots of resin, it may not be mixed correctly.

Starting from the bottom of the hole, extrude the product in the hole until it is full.

Insert the metal bar in the hole using a rotary movement to expel all the air until all excess resin comes out of the hole. The metal bar must be inserted in the hole within the start setting time ( $T_{gel}$ ) of the resin; only apply loads to the bar once the resin has completely hardened ( $T_{cure}$ ), as indicated in table 1.

## CONSUMPTION

According to the size of hole to be filled (see tables 11 and 12).

## CLEANING

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

## PACKAGING

Boxes of 12 pieces (300 or 420 ml cartridges) with 12 static mixers.

## COLOURS AVAILABLE

Light grey.

## STORAGE

300 ml cartridges: 12 months in its original packaging at a temperature of between +5°C and +25°C.

420 ml cartridges: 18 months in its original packaging at a temperature of between +5°C and +25°C.

## SAFETY INSTRUCTIONS FOR PREPARATION AND APPLICATION

**Mapefix VE SF** component A is irritant for the respiratory tract; both component A and component B can cause sensitization when in contact with the skin. Furthermore, **Mapefix VE SF** component B may irritate the eyes. We recommend, during the application, to use protective goggles and gloves and to 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. It is recommended to work in well-ventilated areas. If there is insufficient ventilation wear a face mask. 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)

**All relevant references  
for the product are available  
upon request and from  
[www.mapei.com](http://www.mapei.com)**

## TECHNICAL DATA (typical values)

### PRODUCT IDENTITY

Consistency:	thixotropic paste
Colour:	light grey
Density (g/cm <sup>3</sup> ):	1.77

### APPLICATION DATA (at +23°C and 50% R.H.)

Application temperature range:	from -10°C to +35°C
Start setting time T <sub>gel</sub> :	see table 1
Final hardening time T <sub>cure</sub> :	see table 1

### PERFORMANCE CHARACTERISTICS

Compressive strength (EN 196-1) (N/mm <sup>2</sup> ):	100
Flexural strength (EN 196-1) (N/mm <sup>2</sup> ):	15
Modulus of elasticity (EN 196-1) (N/mm <sup>2</sup> ):	14000
Resistance to UV rays:	good
Chemical resistance:	very good
Resistance to water (EN 12390-8):	excellent
In-service temperature range:	from -40°C to +80°C (provisionally up to +120°C)
Design parameters:	see tables 2 and 6
Recommended loads:	see tables 5 and 9
Fire resistance:	see table 10
Consumption:	see tables 11 and 12

### Reaction time of product

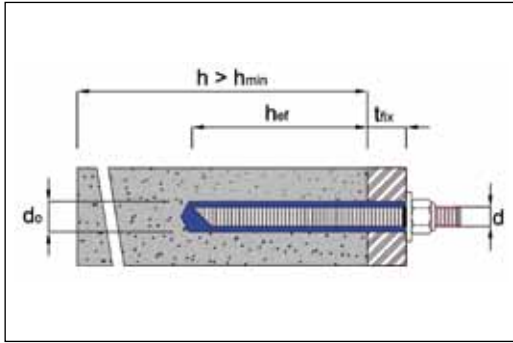
Substrate temperature (°C)	Start setting time T <sub>gel</sub>	final hardening time T <sub>cure</sub>	
		dry substrate	damp/wet substrate
-10*	90'	24 h	48 h
-5*	90'	14 h	28 h
0	45'	7 h	14 h
+5	25'	2 h	4 h
+10	15'	80'	3 h
+20	6'	45'	90'
+30	4'	25'	50'
+35	2'	20'	40'

Table 1: reaction time of resin

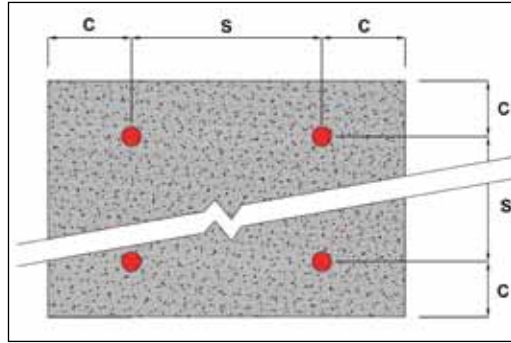
\* temperature of product at least +15°C

Installation parameters for threaded bar											
Threaded bar			M8	M10	M12	M16	M20	M24	M27	M30	
Diameter of threaded bar	d	mm	8	10	12	16	20	24	27	30	
Diameter of hole in concrete	d <sub>0</sub>	mm	10	12	14	18	24	28	32	35	
Minimum distance from edge	C <sub>min</sub>	mm	40	50	60	80	100	120	135	150	
Minimum pitch between bars	S <sub>min</sub>	mm	40	50	60	80	100	120	135	150	
Minimum and maximum anchoring depth of threaded bar	h <sub>ef</sub>	h <sub>ef,min</sub>	mm	60	60	70	80	90	96	108	120
		h <sub>ef,max</sub>	mm	160	200	240	320	400	480	540	600
Minimum thickness of concrete element	h <sub>min</sub>	mm	h <sub>ef</sub> + 30 mm (≥ 100 mm)				h <sub>ef</sub> + 2 d <sub>0</sub>				
Required tightening torque	T <sub>inst</sub>	Nm	10	20	40	80	120	160	180	200	

Table 2



Drawing 3



Drawing 4

Recommended TENSILE and SHEAR loads (*) for a single anchor in concrete in a rough hole												
	Working temperature (°)				M8	M10	M12	M16	M20	M24	M27	M30
		Tensile load	24°C/40°C		Non-cracked	N <sub>Rec, stat</sub>	kN	8.6	13.5	19.7	28.0	44.4
Cracked	N <sub>Rec, stat</sub>			4.3	6.2	9.1		13.7	23.3	34.6	54.7	63.4
Seismic	N <sub>Rec, seis</sub>			2.9	4.2	6.2		9.3	15.9	23.8	37.7	45.3
50°C/80°C	Non-cracked		N <sub>Rec, stat</sub>	7.2	10.1	14.8		22.4	38.1	53.4	63.1	65.6
	Cracked		N <sub>Rec, stat</sub>	2.9	4.5	6.6		10.0	17.0	25.1	37.9	45.4
	Seismic		N <sub>Rec, seis</sub>	2.0	3.1	4.5		6.8	11.5	17.3	26.1	31.4
72°C/120°C	Non-cracked		N <sub>Rec, stat</sub>	5.3	7.3	10.7		16.2	27.6	40.8	46.3	50.5
	Cracked		N <sub>Rec, stat</sub>	2.4	3.4	4.9		7.5	12.7	18.8	29.5	35.3
	Seismic		N <sub>Rec, seis</sub>	1.6	2.3	3.4		5.1	8.6	13.0	20.3	24.4
Shear load without bending moment		Non-cracked	V <sub>Rec, stat</sub>	kN	5.1	8.6	12.0	22.3	34.9	50.3	59.3	65.5
		Cracked	V <sub>Rec, stat</sub>		3.8	5.6	7.5	12.3	18.0	23.7	31.9	37.8
		Seismic	V <sub>Rec, seis</sub>		1.8	2.8	3.8	6.1	9.0	11.9	16.0	18.9
Anchoring depth of reinforcing bar		h <sub>ef</sub>	mm	80	90	110	125	170	210	250	270	
Distance from edge		C <sub>cr,N</sub>	mm	92	126	152	188	253	291	312	329	
Pitch between bars		S <sub>cr,N</sub>	mm	2 x C <sub>cr,N</sub>								

Table 5

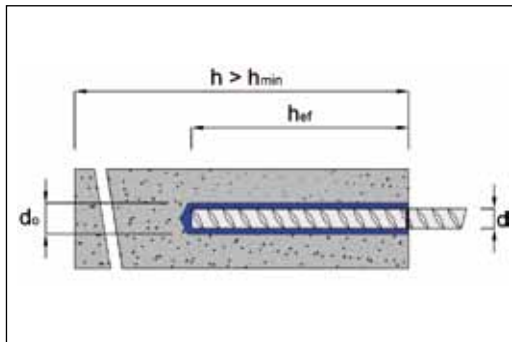
(\*) recommended load valid if there are the following conditions

- concrete minimum class C20/25
- shear load without bending moment
- class 5.8 steel bar
- C ≥ C<sub>cr,N</sub>
- S ≥ S<sub>cr,N</sub>
- h ≥ 2 x h<sub>ef</sub>
- includes safety factors
- for other anchoring conditions use Mapefix Software Design, developed in compliance with current European standards

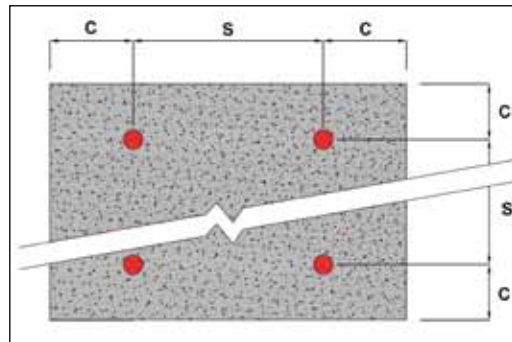
(°) continuous working temperature/temporary maximum peak working temperature

Installation parameters for reinforcing bars												
Reinforcing bar			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32	
Diameter of reinforcing bar	d	mm	8	10	12	14	16	20	25	28	32	
Diameter of hole in concrete	d <sub>0</sub>	mm	12	14	16	18	20	24	32	35	40	
Minimum distance from edge	c <sub>min</sub>	mm	40	50	60	70	80	100	125	140	160	
Minimum pitch between bars	s <sub>min</sub>	mm	40	50	60	70	80	100	125	140	160	
Minimum and maximum anchoring depth of threaded bar	h <sub>ef</sub>	h <sub>ef, min</sub>	mm	60	60	70	75	80	90	100	112	128
		h <sub>ef, max</sub>	mm	160	200	240	280	320	400	480	540	640
Minimum thickness of concrete element	h <sub>min</sub>	mm	h <sub>ef</sub> + 30 mm (≥ 100 mm)			h <sub>ef</sub> + 2 d <sub>0</sub>						

Table 6



Drawing 7



Drawing 8

Recommended TENSILE and SHEAR loads (*) for a single anchor in concrete in a rough hole												
	Working temperature (°C)			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
Tensile load	24°C/40°C	Non-cracked	N <sub>Rec, stat</sub>	9.6	13.5	19.7	24.1	28.0	44.4	61.0	79.2	88.9
		Cracked	N <sub>Rec, stat</sub>	4.3	6.2	9.1	11.0	13.7	23.3	36.0	56.5	63.4
		Seismic	N <sub>Rec, seis</sub>	2.9	4.2	6.2	7.5	9.3	16.1	24.8	39.1	48.3
	50°C/80°C	Non-cracked	N <sub>Rec, stat</sub>	7.2	10.1	14.8	18.1	22.4	38.1	52.4	61.1	64.6
		Cracked	N <sub>Rec, stat</sub>	2.9	4.5	6.6	8.0	10.0	17.0	26.2	39.3	48.5
		Seismic	N <sub>Rec, seis</sub>	2.0	3.1	4.5	5.5	6.8	11.7	18.1	27.1	33.4
	72°C/120°C	Non-cracked	N <sub>Rec, stat</sub>	5.3	7.3	10.7	13.0	16.2	27.6	39.3	43.6	48.5
		Cracked	N <sub>Rec, stat</sub>	2.4	3.4	4.9	6.0	7.5	12.7	19.6	30.5	37.7
		Seismic	N <sub>Rec, seis</sub>	1.6	2.3	3.4	4.1	5.1	8.8	13.5	21.1	26.0
Shear load without bending moment		Non-cracked	V <sub>Rec, stat</sub>	6.7	10.5	14.8	20.0	26.2	41.0	56.6	62.5	69.3
		Cracked	V <sub>Rec, stat</sub>	3.8	5.6	7.5	9.9	12.3	18.0	25.7	33.6	41.4
		Seismic	V <sub>Rec, seis</sub>	1.9	2.8	3.8	5.0	6.1	9.0	12.8	16.8	20.7
Anchoring depth of reinforcing bar	h <sub>ef</sub>	mm	80	90	110	115	125	170	210	250	270	
Distance from edge	c <sub>cr,N</sub>	mm	92	126	152	173	188	253	303	323	341	
Pitch between bars	s <sub>cr,N</sub>	mm	2 x c <sub>cr,N</sub>									

Table 9

(\*) recommended load valid if there are the following conditions

- concrete minimum class C20/25
- shear load without bending moment
- class 5.8 steel bar
- $C \geq C_{cr,N}$
- $S \geq S_{cr,N}$
- $h \geq 2 \times h_{ef}$
- includes safety factors
- for other anchoring conditions use Mapefix Software Design, developed in compliance with current European standards

(°) continuous working temperature/temporary maximum peak working temperature



Fire resistance				
exposure to fire in minutes				
	30'	60'	90'	120'
Threaded bar	Residual strength equal to or less than (kn)			
M8	≤ 1.65	≤ 1.12	≤ 0.59	≤ 0.33
M10	≤ 2.60	≤ 1.77	≤ 0.94	≤ 0.52
M12	≤ 3.35	≤ 2.59	≤ 1.82	≤ 1.44
M16	≤ 6.25	≤ 4.82	≤ 3.40	≤ 2.69
M20	≤ 9.75	≤ 7.52	≤ 5.30	≤ 4.19
M24	≤ 14.04	≤ 10.84	≤ 7.64	≤ 6.04
M30	≤ 18.26	≤ 14.10	≤ 9.94	≤ 7.86

Table 10

Consumption of Mapefix VE SF										
Threaded bar			M8	M10	M12	M16	M20	M24	M27	M30
Diameter of threaded bar	d	mm	8	10	12	16	20	24	27	30
Diameter of hole in concrete	d <sub>0</sub>	mm	10	12	14	18	24	28	32	35
Anchoring depth	h <sub>ef</sub>	mm	80	90	110	125	170	210	250	280
Theoretical consumption per hole		ml	3	4	5	8	28	41	69	86
Number of holes with 300 ml cartridge		n°	111	80	56	37	11	7	4	3
Number of holes with 420 ml cartridge		n°	155	113	78	52	15	10	6	5

Table 11

Consumption of Mapefix VE SF											
Reinforcing bar			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
Diameter of threaded bar	d	mm	8	10	12	14	16	20	25	28	32
Diameter of hole in concrete	d <sub>0</sub>	mm	12	14	16	18	20	24	32	35	40
Anchoring depth	h <sub>ef</sub>	mm	80	90	110	115	125	170	210	250	280
Theoretical consumption per hole		ml	6	8	12	14	17	28	79	104	152
Number of holes with 300 ml cartridge		n°	50	37	26	22	18	11	4	3	2
Number of holes with 420 ml cartridge		n°	70	52	36	30	25	15	5	4	3

Table 12