MAPEI

Mapefix VE SF

Chemical anchor for heavy loads

European Technical Approval post installed rebar

European Technical Approval option 7 for non cracked concrete

Feuerwiderstandsklasse F 120

WHERE TO USE

Mapefix VE SF is an adhesive for chemically anchoring metal bar in holes made in building materials. It is a 2-component, styrene-free product made from a mixture of synthetic resins. It has been specifically developed for chemically anchoring steel and zinc-plated steel deformed bar, which transmits medium and heavy loads, to solid and perforated substrates such as non-cracked concrete, lightweight concrete, stone, wood, bricks and mixed masonry.
It is also an ideal solution for anchoring close to edges or when there is a limited pitch between each anchor, in that there is 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.
Mapefix VE 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 2-component chemical anchoring product, packaged in 300 and 380 ml cartridges with 2 separate compartments containing component A (resin) and component B (catalyser), at the correct mixing ratio in volume. The 2 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 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 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, because it hardly shrinks, 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 in 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 7 (anchors in concrete in tension zones), ETA rebar (supplementary reinforcement) and fire certification.

Mapefix VE SF

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 380 ml cartridges need to be used with a special extrusion gun for 70 mm diameter cartridges.

RECOMMENDATIONS

Do not apply on dusty or crumbly surfaces.
For use on damp or wet substrates, please contact the Mapei Technical Assistance Department.
Do not use on surfaces with traces of oil, grease and stripping compound otherwise the bond may be compromised.
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}.
Do not use the product in holes made with a diamond-tipped bit (cored holes).
Do not use for anchors in tension zones.

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 tables below illustrate a practical summary of some of our suggestions, based on experience and testing carried out within the company.

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.

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 sacks which protrude from the cartridge.
This operation is not required with the 380 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}), as indicated in table 1.
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.

CLEANING

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

PACKAGING

Boxes of 12 (300 or 380 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.
380 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 is irritant. If it comes into contact with the skin, it may cause sensitisation in those subjects allergic to such products. It may also irritate the respiratory system. We recommend wearing protective clothing and goggles when handling and using the product. If the product comes into contact with the eyes or skin, wash immediately with plenty of clean water and seek medical attention. Only use in well ventilated areas.
For further and complete information about the safe use of our product please refer to our latest version of the 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

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

TECHNICAL DATA (typical values)	
PRODUCT IDENTITY	
Appearance:	thixotropic paste
Colour:	light grey
Density (g/cm³):	1.65
APPLICATION DATA (at +23°C and 50% R.H.)	
Application temperature range:	from -10°C to +35°C
Start setting time T_{gel}:	see table 1
Final hardening time T_{cure}:	see table 1
PERFORMANCE CHARACTERISTICS	
Compressive strength (N/mm²):	80
Flexural strength (N/mm²):	17
Dynamic modulus of elasticity (N/mm²):	4000
Resistance to UV rays:	good
Chemical resistance:	very good
Resistance to water:	excellent
In-service temperature range:	from -40°C to +120°C
Design parameters:	see tables 2 and 3
Maximum permitted tensile and shear loads:	see tables 4, 5, 6 and 7
Recommended loads:	see tables 8 and 9
Design suggestions:	see tables 10 and 11
Fire resistance:	see table 12

Reaction time of product			
Substrate temperature (°C)	**Start setting time T_{gel}**	**final hardening time T_{cure}**	
		dry substrate	**damp 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*

Design parameters for anchors with threaded bar in concrete								
threaded bar	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**	**M30**
recommended distance from edge (mm)	92	126	152	188	253	291	312	329
minimum distance from edge (mm)	40	50	60	80	100	120	135	150
recommended pitch between anchors (mm)	184	252	304	376	506	582	624	658
minimum pitch between anchors (mm)	40	50	60	80	100	120	135	150
depth of threaded bar (mm)	80	90	110	125	170	210	250	280
depth of anchor hole (mm)	110	120	140	161	218	266	314	350
diameter of threaded bar (mm)	8	10	12	16	20	24	27	30
diameter of anchor hole (mm)	10	12	14	18	24	28	32	35
tightening torque (Nm)	10	20	40	60	120	150	200	250

Table 2: design parameters for anchors with threaded bar in concrete

Design parameters for anchors with deformed bar in concrete								
deformed bar	**Ø8**	**Ø10**	**Ø12**	**Ø16**	**Ø20**	**Ø25**	**Ø28**	**Ø32**
recommended distance from edge (mm)	85	115	139	185	231	274	289	309
minimum distance from edge (mm)	40	50	60	80	100	125	140	160
recommended pitch between anchors (mm)	170	230	278	370	462	548	578	618
minimum pitch between anchors (mm)	40	50	60	80	100	125	140	160
depth of deformed bar (mm)	80	90	110	125	170	210	250	280
depth of anchor hole (mm)	110	120	140	165	218	274	320	360
diameter of deformed bar (mm)	8	10	12	16	20	25	28	32
diameter of anchor hole (mm)	12	14	16	20	24	32	35	40

Table 3: design parameters for anchors with deformed bar in concrete

Characteristic performance of threaded bar								
maximum permitted tensile loads according to EOTA Technical Report 029, method A								
threaded bar	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**	**M30**
failure of steel								
characteristic strength of 5.8 class steel (kN)	18	29	42	78	122	176	230	280
characteristic strength of 8.8 class steel (kN)	29	46	67	125	196	282	368	449
safety factor	1.5							
characteristic strength of A4 and HCR stainless steel (kN)	26	41	59	110	172	247	230	281
safety factor	1.87						2.86	
failure of concrete cone								
temperature 24°C/40°C (kN)	20.1	33.9	49.7	75.4	128	174	212	237
temperature 50°C/80°C (kN)	15.1	25.4	37.3	56.5	96.1	135	159	171
temperature 72°C/120°C (kN)	10.4	17.6	25.8	39.1	66.4	90.3	110	123
safety factor	1.8							
anchor depth (mm)	80	90	110	125	170	210	250	270
distance from edge (mm)	92	126	152	188	253	291	312	329
pitch (mm)	184	252	304	376	506	582	624	658

Table 4: maximum permitted loads with threaded bar in non-cracked concrete

maximum permitted shear loads according to EOTA Technical Report 29, method A								
threaded bar	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**	**M30**
failure of steel with no bending moment								
bending moment of 5.8 class steel (kN)	9	15	21	39	61	88	115	140
bending moment of 8.8 class steel (kN)	15	23	34	63	98	141	184	224
safety factor	1,25							
bending moment of A4 and HCR stainless steel (kN)	13	20	30	55	86	124	115	140
safety factor	1,56						2,38	
failure of steel with bending moment								
bending moment of 5.8 class steel (kN)	19	37	65	166	324	560	833	1123
bending moment of 8.8 class steel (kN)	30	60	105	266	519	896	1333	1797
safety factor	1,25							
bending moment of A4 and HCR stainless steel (kN)	26	52	92	232	454	784	832	1125
safety factor	1,56						2,38	
failure of concrete cone								
anchor length (mm)	80	90	110	125	170	210	250	270
diameter of hole (mm):	10	12	14	18	24	28	32	35
safety factor	1,8							

Table 5: maximum permitted loads with threaded bar in non-cracked concrete

Characteristic performance with deformed bar								
maximum permitted tensile loads according to EOTA Technical Report 029, method A								
deformed bar	**Ø8**	**Ø10**	**Ø12**	**Ø16**	**Ø20**	**Ø25**	**Ø28**	**Ø32**
failure of steel								
characteristic strength according to DIN 488-2:1986 (kN)	26	41	59	110	172	247	230	281
safety factor	1.87						2.86	
failure of concrete in compressed zone								
temperature 24°C/40°C (kN)	15.1	25.4	37.3	56.5	96.1	135	159	171
temperature 50°C/80°C (kN)	12.8	21.6	31.7	48	81.7	115	135	145
temperature 72°C/120°C (kN)	8.9	14.7	21.5	32.6	55.4	77	91.2	102
safety factor	1.8							
anchor depth (mm)	80	90	110	125	170	210	250	270
distance from edge (mm)	85	115	139	185	231	274	289	309
pitch (mm)	170	230	278	370	462	548	578	618

Table 6: maximum permitted loads with deformed bar in non-cracked concrete

maximum permitted shear loads according to EOTA Technical Report 029, method A								
deformed bar	**Ø8**	**Ø10**	**Ø12**	**Ø16**	**Ø20**	**Ø25**	**Ø28**	**Ø32**
failure of steel with no bending moment								
characteristic strength of BSt 500 S class steel (kN)	14	22	31	55	86	135	169	221
safety factor	1,5							
failure of steel with bending moment								
characteristic strength of BSt 500 S class steel (Nm)	33	65	112	265	518	1012	1422	2123
safety factor	1,5							
failure of concrete cone								
anchor length (mm)	80	90	110	125	170	210	250	280
diameter of hole (mm):	10	12	14	18	24	28	32	35
safety factor	1,5							

Table 7: maximum permitted loads with deformed bar in non-cracked concrete

Recommended loads with threaded bar								
threaded bar (5.8 class steel)	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**	**M30**
maximum recommended loads (kN): temperature 24°C/40°C	8.6	13.5	19.7	28	44.4	61	79.2	93.9
maximum recommended loads (kN): temperature 50°C/80°C	7.2	10.1	14.8	22.4	38.1	53.4	63.1	68.1
maximum recommended loads (kN): temperature 72°C/120°C	5.0	7.0	10.2	15.5	26.4	35.8	43.6	48.9
temperature 50°C/80°C without bending moment	5.1	8.6	12	22.3	34.9	51.3	59.3	66.1
anchor depth (mm)	80	90	110	125	170	210	250	280
distance from edge (mm)	92	126	152	188	253	291	312	329
pitch (mm)	184	252	304	376	506	582	624	658

Table 8: recommended loads with threaded bar in non-cracked concrete

Recommended loads with deformed bar								
deformed bar (BSt 500 class steel)	**Ø8**	**Ø10**	**Ø12**	**Ø16**	**Ø20**	**Ø25**	**Ø28**	**Ø32**
maximum recommended loads (kN): temperature 24°C/40°C	8.1	11.2	16.5	24.9	42.4	58.9	69.8	78.2
maximum recommended loads (kN): temperature 50°C/80°C	5.7	8.4	12.3	18.7	31.8	45.8	52.4	55.9
maximum recommended loads (kN): temperature 72°C/120°C	4.2	5.8	8.5	12.9	22.0	30.5	36.2	40.5
temperature 50°C/80°C without bending moment	6.7	10.5	14.8	23.0	35.5	47.8	54.2	61.8
anchor depth (mm)	80	90	110	125	170	210	250	280
distance from edge (mm)	85	115	139	185	231	274	289	309
pitch (mm)	170	230	278	370	462	548	578	618

Table 9: recommended loads with deformed bar in non-cracked concrete

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Design suggestions for anchoring threaded bar								
threaded bar (5.8 class steel)	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**	**M30**
distance from edge (mm)	92	126	152	188	253	291	312	329
pitch between anchors (mm)	184	252	304	376	506	582	624	658
diameter of anchor hole (mm)	10	12	14	18	24	28	32	35
depth of anchor hole (mm)	110	120	140	161	218	266	314	350
diameter of threaded bar (mm)	8	10	12	16	20	24	27	30
depth of threaded bar (mm)	80	90	110	125	170	210	250	280
tightening torque (Nm)	10	20	40	60	120	150	200	250
maximum recommended loads (kN) temperature 24°C/40°C	8.6	13.5	19.7	28.0	44.4	61.0	79.2	93.9
maximum recommended loads (kN) temperature 50°C/80°C	7.2	10.1	14.8	22.4	38.1	53.4	63.1	68.1
maximum recommended loads (kN) temperature 72°C/120°C	5.0	7.0	10.2	15.5	26.4	35.8	43.6	48.9
maximum recommended shear loads (kN) without bending moment	5.1	8.6	12.0	22.3	34.9	51.3	59.3	66.1

Table 10: design suggestions for anchoring deformed bar

Design suggestions for anchoring deformed bar								
deformed bar (BSt class steel)	**Ø8**	**Ø10**	**Ø12**	**Ø16**	**Ø20**	**Ø25**	**Ø28**	**Ø32**
distance from edge (mm)	85	115	139	185	231	274	289	309
pitch between anchors (mm)	170	230	278	370	462	548	578	618
diameter of anchor hole (mm)	12	14	16	20	24	32	35	40
depth of anchor hole (mm)	110	120	140	165	218	274	320	360
depth of deformed bar (mm)	80	90	110	125	170	210	250	280
maximum recommended loads (kN) temperature 24°C/40°C	8.1	11.2	16.5	24.9	42.4	58.9	69.8	78.2
maximum recommended loads (kN) temperature 50°C/80°C	5.7	8.4	12.3	18.7	31.8	45.8	52.4	55.9
maximum recommended loads (kN) temperature 72°C/120°C	4.2	5.8	8.5	12.9	22.0	30.5	36.2	40.5
maximum recommended shear loads (kN) without bending moment	6.7	10.5	14.8	24.2	35.5	47.8	54.2	61.8

Table 11: design suggestions for anchoring deformed bar

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 12: resistance of anchor to fire

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