



Mapecif PE SF

**Chemical anchor
for heavy loads**



M8 ÷ M24



WHERE TO USE

Mapecif PE SF is an adhesive for chemical anchoring metal bars in holes made in building materials. It is a two-component, styrene-free product made from a mixture of polyester resins. It has been specifically developed for chemically anchoring steel and zinc-plated steel threaded and deformed bars, which transmit light loads, to solid and perforated substrates such as non-cracked concrete, heavyweight concrete, stone and mixed masonry.

It is also an ideal solution for anchoring close to edges or when there is a limited pitch between each anchor, due to no stress being generated as with conventional mechanical expansion fasteners.

Mapecif PE SF is recommended for anchoring lightweight elements in internal and external substrates with a horizontal, vertical, inclined or overhead axis, and is particularly recommended for anchors in perforated substrates. It may also be used for anchors in damp substrate, and in substrates at temperatures down to -5°C.

Mapecif PE SF is recommended for anchoring elements in place, such as:

- plant equipment;
- sanitary fittings;
- aerials;
- signs;
- window and door fittings.

TECHNICAL CHARACTERISTICS

Mapecif PE 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 with a clean, new one.

Mapecif PE SF does not contain styrene which makes it suitable for use in areas with poor ventilation and, because it has limited shrinkage, it is also suitable for anchors with small circular crests.

Mapecif PE SF is a chemical anchor made from a mixture of styrene-free resins, suitable for application on solid and perforated building materials, such as:

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

Mapecif PE SF is applied in holes made with a drill or hammer drill. We recommend using only a drill on perforated substrates.

Mapecif PE SF is certified according to ETA European Standards option 7 (anchors in concrete in tension zones). The **Mapecif PE 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 compound otherwise the bond may be compromised.

Do not apply if the temperature is lower than -5°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

Drill 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 containers 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 the extrusion gun. Discard the first three shots of resin, as 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}); 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 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 $+5^{\circ}\text{C}$ and $+25^{\circ}\text{C}$.

420 ml cartridges: 18 months in its original packaging at a temperature of between $+5^{\circ}\text{C}$ and $+25^{\circ}\text{C}$.

SAFETY INSTRUCTIONS FOR PREPARATION AND APPLICATION

Mapecif PE SF 420 component A and component B irritate the eyes. They may cause sensitisation if they come in contact with the skin to those predisposed.

Mapecif PE SF 420 component A is irritant for the skin. When applying the product it is recommended to use protective gloves and goggles and to take the usual precautions for handling chemicals. If the product comes in contact with the eyes or skin, wash immediately with plenty of water and seek medical attention.

Furthermore, **Mapecif PE SF 420** component A is dangerous 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 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

Consistency:	thixotropic paste
Colour:	light grey
Density (g/cm ³):	1.74

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

Application temperature range:	from -5°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/mm ²):	75
Flexural strength (N/mm ²):	30
Dynamic modulus of elasticity (N/mm ²):	4000
Resistance to UV rays:	good
Chemical resistance:	good
Resistance to water:	very good
In-service temperature range:	from -40°C to +80°C
Maximum permitted tensile loads:	see tables 2 and 3
Characteristic strength:	see tables 4 and 5
Maximum recommended loads:	see tables 6 and 8
Design suggestions:	see tables 7 and 9

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/hours
-5*	90'	6 h	12 h
0	45'	3 h	6 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 the product +15°C

Design parameters for anchors with threaded bar in concrete						
threaded bar	M8	M10	M12	M16	M20	M24
recommended distance from edge (mm)	80	90	110	125	170	210
minimum distance from edge (mm)	40	50	60	80	100	120
recommended pitch between anchors (mm)	160	180	220	250	340	420
minimum pitch between anchors (mm)	40	50	60	80	100	120
depth of threaded bar (mm)	80	90	110	125	170	210
depth of anchor hole (mm)	110	120	140	161	218	258
diameter of threaded bar (mm)	8	10	12	16	20	24
diameter of anchor hole (mm)	10	12	14	18	24	28
tightening torque (Nm)	10	20	40	60	120	150

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

Design parameters for anchors with threaded bar in masonry				
threaded bar	M6	M8	M10	M12
recommended distance from edge (mm)	250	250	250	250
recommended pitch between anchors (mm)	250	250	250	250
depth of threaded bar (mm)	60	80	90	110
depth of anchor hole (mm)	65	85	95	115
diameter of threaded bar (mm)	6	8	10	12
diameter of anchor hole (mm)	7	9	12	14
tightening torque (Nm)	3	8	8	8

Table 3: design parameters for anchors with threaded bar in solid or perforated masonry

Characteristic performance of threaded bar						
concrete: characteristic tensile strength according to EOTA ETag 001, annex C, method A						
threaded bar	M8	M10	M12	M16	M20	M24
<i>failure of steel</i>						
characteristic strength of 5.8 class steel (kN)	18	29	42	78	122	177
characteristic strength of 8.8 class steel (kN)	29	46	67	125	196	282
safety factor	1.5					
characteristic strength of A4 and HCR stainless steel (kN)	26	41	59	110	172	247
safety factor	1.87					
<i>failure of concrete cone</i>						
temperature 24°C/50°C (kN)	20	35	35	60	75	115
temperature 50°C/80°C (kN)	12	18	25	28	47	72
safety factor	1.5					
anchor depth (mm)	80	90	110	125	170	210
distance from edge (mm)	80	90	110	125	170	210
pitch (mm)	160	180	220	250	340	420

Table 4: characteristic strength with threaded bar

Characteristic performance of threaded bar						
concrete: characteristic shear strength according to EOTA ETag 001, annex C, method A						
threaded bar	M8	M10	M12	M16	M20	M24
<i>failure of steel with no bending moment</i>						
bending moment of 5.8 class steel (kN)	9	15	21	39	61	88
bending moment of 8.8 class steel (kN)	15	23	34	63	98	141
safety factor	1.25					
bending moment of A4 and HCR stainless steel (kN)	13	20	30	55	86	124
safety factor	1.56					
<i>failure of steel with bending moment</i>						
bending moment of 5.8 class steel (kN)	19	37	65	166	324	560
bending moment of 8.8 class steel (kN)	30	60	105	266	519	896
safety factor	1.25					
bending moment of A4 and HCR stainless steel (kN)	26	52	92	232	454	784
safety factor	1.56					
<i>failure of concrete cone</i>						
anchor length (mm)	80	90	110	125	170	210
diameter of hole (mm)	10	12	14	18	24	28
safety factor	1.50					

Table 5: characteristic strength with threaded bar

Recommended loads with threaded bar in concrete						
threaded bar	M8	M10	M12	M16	M20	M24
maximum recommended load (kN) temperature 24°C/40°C	8.6	13.8	16.7	24.0	35.7	52.2
maximum recommended load (kN) temperature 50°C/80°C	5.7	8.6	11.9	13.3	22.4	34.3
maximum recommended shear load (kN) without bending moment	5.1	8.6	12	22.3	34.9	50.3
anchor depth (mm)	80	90	110	125	170	210
distance from edge (mm)	120	135	165	190	235	315
pitch (mm)	240	270	330	380	470	630

Table 6: recommended loads with threaded bar in concrete

Design suggestions for anchoring threaded bar in concrete						
threaded bar	M8	M10	M12	M16	M20	M24
distance from edge (mm)	80	90	110	125	170	210
pitch between anchors (mm)	160	180	220	250	340	420
diameter of anchor hole (mm)	10	12	14	18	24	28
depth of anchor hole (mm)	110	120	140	161	218	258
diameter of threaded bar (mm)	8	10	12	16	20	24
depth of threaded bar (mm)	80	90	110	125	170	210
tightening torque (Nm)	10	20	40	60	120	150
maximum recommended load (kN) temperature 24°C/40°C	8.6	13.8	16.7	24.0	35.7	52.2
maximum recommended load (kN) temperature 50°C/80°C	5.7	8.6	11.9	13.3	22.4	34.3
maximum recommended shear load (kN) without bending moment	5.1	8.6	12.0	22.3	34.9	50.3

Table 7: design suggestions for threaded bar

Recommended loads with threaded bar in masonry				
threaded bar	M6	M8	M10	M12
maximum recommended load on perforated bricks (kN)	0.3	0.3	0.3	0.3
maximum recommended load on perforated calcium silicate blocks (kN)	0.3	0.3	0.3	0.3
maximum recommended load on solid calcium silicate blocks (kN)	0.5	1.7	1.7	1.7
maximum recommended load on solid bricks (kN)	0.5	1.7	1.7	1.7
maximum recommended load on perforated lightweight concrete blocks (kN)	0.3	0.3	0.3	0.3
maximum recommended load on solid concrete blocks (kN)	0.5	0.6	0.6	0.6

Table 8: permitted loads with threaded bar in masonry



Design suggestions for anchoring threaded bar in masonry				
threaded bar	M6	M8	M10	M12
recommended distance from edge (mm)	250	250	250	250
recommended pitch between anchors (mm)	250	250	250	250
depth of threaded bar (mm)	60	80	90	110
depth of anchor hole (mm)	65	85	95	115
diameter of threaded bar (mm)	6	8	10	12
diameter of anchor hole (mm)	7	9	12	14
tightening torque (Nm)	3	8	8	8
maximum recommended load on perforated bricks (kN)	0.3	0.3	0.3	0.3
maximum recommended load on perforated calcium silicate blocks (kN)	0.3	0.3	0.3	0.3
maximum recommended load on solid calcium silicate blocks (kN)	0.5	1.7	1.7	1.7
maximum recommended load on solid bricks (kN)	0.5	1.7	1.7	1.7
maximum recommended load on perforated lightweight concrete blocks (kN)	0.3	0.3	0.3	0.3
maximum recommended load on solid concrete blocks (kN)	0.5	0.6	0.6	0.6

Table 9: design suggestions for threaded bar in masonry

Consumption of Mapefix PE SF in concrete						
bar	M8	M10	M12	M16	M20	M24
diameter of the bar (mm)	8	10	12	16	20	24
diameter of the hole (mm)	10	12	16	20	24	28
depth anchoring (mm)	110	120	140	161	218	258
volume of the hole (cm ³)	8.6	13.6	21.5	40.9	98.6	158.8
volume of the bar (cm ³)	5.5	9.4	15.8	32.4	68.5	116.7
shrinkage (cm ³)	20%	20%	20%	20%	20%	20%
theoretical consumption per hole (cm ³)	3.7	5.0	6.9	10.3	36.1	50.6
number of holes with 300 ml cartridge	80	60	44	29	8	6
number of holes with 420 ml cartridge	113	84	61	41	12	8

Table 10: consumption of Mapefix PE SF

Consumption of Mapefix PE SF in masonry				
bar	M6	M8	M10	M12
diameter of the bar (mm)	6	8	10	12
diameter of the hole (mm)	7	9	12	14
depth anchoring (mm)	65	85	95	115
volume of the hole (cm ³)	2.5	5.4	10.7	17.7
volume of the bar (cm ³)	1.8	4.3	7.5	13.0
shrinkage (cm ³)	30%	30%	30%	30%
theoretical consumption per hole (cm ³)	0.9	1.5	4.3	6.1
number of holes with 300 ml cartridge	348	203	70	49
number of holes with 420 ml cartridge	487	285	98	69

Table 11: consumption of Mapefix PE SF