MAPEI

Fast Track Ready

Mapefix EP 385
Mapefix EP 585

Pure epoxy, resin-based chemical anchor for structural loads

CE ETA — OP7: non cracked concrete
M8 ÷ M30
Ø10 ÷ Ø32

CE ETA — C2: Seismic performance
M12 ÷ M16

CE ETA — C1: Seismic performance
M8 ÷ M30
Ø8 ÷ Ø32

CE ETA — European Technical Approval option 1 for cracked and non cracked concrete

CE ETA — European Technical Approval post installed rebar
Ø8 ÷ Ø40

CE ETA — European Technical Approval core drilled hole
M10 ÷ M24
Ø10 ÷ Ø25

Feuerwiderstandsklasse F 120

WHERE TO USE

Mapefix EP 385 and **Mapefix EP 585** are adhesives for chemically anchoring metal bars in holes made in building materials. It is a two-component, solvent-free product made from pure epoxy resin. Available in 385 ml and 585 ml cartridges. It has been specifically developed for chemically anchoring steel and zinc-plated steel threaded and deformed bar, which transmit structural loads, to solid substrates such as concrete, lightweight concrete, stone, wood and compact 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 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.

The epoxy formulate of **Mapefix EP 385** and **Mapefix EP 585** gives the resin extended workability time (see Table 1) which makes it particularly suitable for anchors in areas at high temperatures or where loads are not constant. **Mapefix EP 385** and **Mapefix EP 585** is recommended for all types of anchor with a horizontal, vertical, inclined or overhead axis and in tension or compressed zones, which are subjected to static, dynamic and seismic loads. **Mapefix EP 385** and **Mapefix EP 585** may also be used for immersed anchors which are permanently damp, in marine and industrial environments and in areas subjected to chemical aggression. The product may be applied at temperatures between +5°C and +40°C, including on damp or wet substrates and in holes immersed under water. **Mapefix EP 385** and **Mapefix EP 585** may be applied in both smooth and rough holes and in holes which have been cored or made with a hammer drill, and may be used for anchors with both small or large crowns.

Mapefix EP 385 and **Mapefix EP 585** are recommended for anchoring elements in place, such as:

- strengthening rods in construction joints;
- immersed anchors and anchors in damp environments;
- under water anchors;
- anchors in marine and industrial environments;
- overhead crane and tram rails;
- industrial motors;
- aerials and signs;
- pylons;
- safety barriers;
- highway guard-rails.

TECHNICAL CHARACTERISTICS

Mapefix EP 385 and **Mapefix EP 585** are two-component chemical anchoring products, packaged in a 385 ml or 585 ml bi-axial cartridge with 2 separate compartments containing component A (resin) and component B (catalyser) at the correct mixing ratio of 3:1 in volume (3 parts in volume of resin, 1 part in volume of catalyser). 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. The 385-585 ml cartridge may be used by inserting it into a special extrusion gun for bi-axial cartridges.

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 new one.

Mapefix EP 385 and **Mapefix EP 585** hardly shrink when they set which make ideal, therefore, for filling large gaps and for circular crowns.

Mapefix EP 385 and **Mapefix EP 585** are compatible with a large number of building materials, such as:

- concrete in tension and compressed zones;
- lightweight concrete;
- cellular concrete;
- elements made from calcium silicate;
- masonry, stone, rock and bricks;

Mapefix EP 385
Mapefix EP 585

- solid and perforated substrates;
- wood;
- stone.

Mapefix EP 385 and **Mapefix EP 585** are certified fire resistant according ETA 1 European standards, option 1 (anchors in concrete in tension or compression zones), ETA option REBAR (anchors in supplementary holes), ETA option CORE DRILL (anchors in core-drilled holes), ETA seismic performance (anchors in C1 and C2 seismic zones).

RECOMMENDATIONS

Do not apply on dusty or crumbling surfaces.
Do not use on surfaces with traces of oil, grease and form-release compound, adhesion may be compromised or reduced.
Do not apply if the air temperature or if the temperature of the substrate are lower than +5°C.
Do not apply loads until it has completely hardened T_{cure} (see Table 1).

APPLICATION PROCEDURE

Design of the anchor

The size of the hole in the substrate, the depth of the anchor, the diameter of the metal bar and the recommended loads must be calculated by a qualified design engineer. The tables below illustrate a practical summary of some of our suggestions in compliance with EOTA guidelines (European Organization for Technical Assessment). MAPEI has a programme available (**Mapefix Software Design**) to help designers and technicians find the correct size for single and multiple anchors in any concrete element; contact the Technical Services Department.

Preparation of solid surfaces

Make holes in the substrate with a drill, a hammer drill, by coring or with a diamond-tipped cup-type drill, according to the type of material to be drilled and the depth of hole required.
Remove all traces of dust and loose material from inside the holes with compressed air. It is very important that holes are carefully cleaned in order for **Mapefix** to reach the maximum mechanical performance possible.
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.
If possible, remove any stagnant water from inside the holes, which will also help reduce the reaction time for the **Mapefix EP 385** and **Mapefix EP 585** epoxy resin.

Preparation of the metal bar

Clean and degrease the bar before anchoring it in the substrate. Remove all traces of rust and form-release compound.

Preparation of the resin for the chemical anchor

Unscrew the cap and screw the static mixer 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} and 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 13 and 14).

Cleaning

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

PACKAGING

Boxes of 12 pieces (385 ml and 585 ml cartridges) with 12 static mixers with extension tube.

COLOURS AVAILABLE

Grey.

STORAGE

24 months in its original packaging at a temperature of between +5°C and +25°C.

SAFETY INSTRUCTIONS FOR PREPARATION AND APPLICATION

Mapefix EP 385, **Mapefix EP 585** component A is irritant for the skin and the eyes; both component A and B may cause sensitization when in contact with the skin of predisposed subjects.
Mapefix EP 385, **Mapefix EP 585** component B is corrosive, it may cause burns and it is dangerous if swallowed. Furthermore, it may cause irreversible damage if used for lengthy periods. The product contains low weight molecular epoxy resins which may cause sensitization if cross-contamination with other epoxy compounds occurs.
During use, wear protective gloves and goggles and take the usual precautions for handling chemicals. If the product comes in contact with the eyes or skin, wash immediately with plenty of clean water and seek medical attention.
Furthermore, **Mapefix EP 385**, **Mapefix EP 585** component A and B are dangerous for aquatic life. Do not dispose of them 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 ONLY 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

LEGAL NOTICE

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/cm^3):	1.41
APPLICATION DATA (at +23°C and 50% R.H.)	
Application temperature range:	from +5°C to +40°C
Start setting time T_{gel}:	see table 1
Final hardening time T_{cure}:	see table 1
PERFORMANCE CHARACTERISTICS	
Compressive strength (EN 196-1) (N/mm^2):	120
Flexural strength (EN 196-1) (N/mm^2):	42
Modulus of elasticity (EN 196-1) (N/mm^2):	10,080
Resistance to UV rays:	good
Chemical resistance:	excellent
Resistance to water (EN 12390-8):	excellent
In-service temperature range:	from -40°C to +72°C
Electrical resistivity (IEC 93):	1.2x10^{12} Ω m
Thermal conductivity (IEC 60093):	0.47 W/m·k
Shore D hardness:	85
Design parameters:	see tables 2 and 7
Maximum recommended loads:	see tables 5, 6, 10 and 11
Fire resistance:	see table 12
Consumption:	see tables 13 and 14

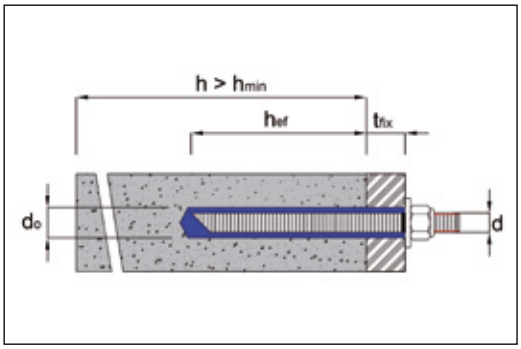
Reaction time of product			
Substrate temperature	**Start setting time T_{gel}**	**Final hardening time T_{cure}**	
		dry substrate	**damp/wet substrate**
°C	minutes/hours	days/hours	days/hours
+5	2 h	2 days	4 days
+10	90’	30 h	2 ½ days
+20	30’	10 h	20 h
+30	20’	6 h	12 h
+40	12’	4 h	8 h

Table 1

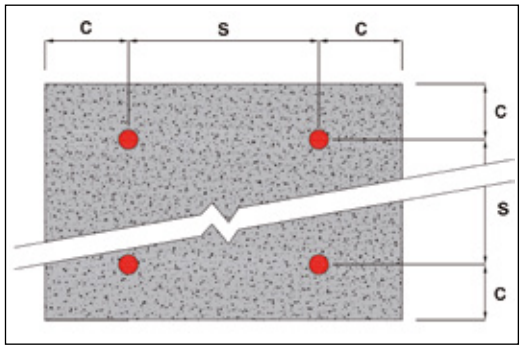
Installation parameters for threaded bar

Threaded bar				M8	M10	M12	M16	M20	M24	M27	M30	M33	M36	M39
Diameter of threaded bar	d		mm	8	10	12	16	20	24	27	30	33	36	39
Diameter of hole in concrete	d_0		mm	10	12	14	18	24	28	32	35	37	42	46
Minimum distance from edge	c_{min}		mm	40	50	60	80	100	120	135	150	165	180	195
Minimum pitch between bars	s_{min}		mm	40	50	60	80	100	120	135	150	165	180	195
Minimum and maximum anchoring depth of threaded bar	h_{ef}	$h_{ef,\,min}$	mm	60	60	70	80	90	96	108	120	320	350	380
		$h_{ef,max}$	mm	96	120	144	192	240	288	324	360	320	350	380
Minimum thickness of concrete element	h_{min}		mm	h_{ef} + 30 mm (≥ 100 mm)			h_{ef} + 2 d_0							
Required tightening torque	T_{inst}		Nm	10	20	40	80	120	160	180	200	350	500	700

Table 2 ***not ETA certified***



Drawing 3



Drawing 4

Recommended TENSILE and SHEAR loads (1) for a single anchor in concrete in a rough hole (2)

	Working temperature (3)				M8	M10	M12	M16	M20	M24	M27	M30	M33	M36	M39
Tensile load	24°C/40°C	Non-cracked	$N_{Rec,\,stat}$	kN	8.6	13.8	20	28	38.1	52.3	67.9	80.5	98.3	113	127
		Cracked	$N_{Rec,\,stat}$		6	8.4	12.3	16.2	21.8	29.6	39.7	49.4	62.1	74.1	87.1
		Seismic C1	$N_{Rec,\,seis}$		4.1	5.7	8.4	11	14.8	20.4	27.4	34.1	42.8	51.1	60.1
		Seismic C2	$V_{Rec,\,seis}$				3.9	5.5							
	43°C/60°C	Non-cracked	$N_{Rec,\,stat}$		7.6	10.7	14.8	21.2	29.1	40.4	54.1	67.3	79	94.2	111
		Cracked	$N_{Rec,\,stat}$		3.6	5	7.4	10	12.7	18.8	25.2	31.4	39.5	47.1	55.4
		Seismic C1	$N_{Rec,\,seis}$		2.4	3.4	5	6.8	8.6	13	17.4	21.7	27.3	32.5	38.2
		Seismic C2	$V_{Rec,\,seis}$				2.3	3.5							
	43°C/72°C	Non-cracked	$N_{Rec,\,stat}$		6.8	9.5	13.2	18.7	25.4	37.7	46.9	58.3	67.7	80.8	95
		Cracked	$N_{Rec,\,stat}$		3.2	4.5	6.6	8.7	10.9	16.2	21.6	26.9	33.9	40.4	47.5
		Seismic C1	$N_{Rec,\,seis}$		2.2	3.1	4.5	5.9	7.4	11.1	14.9	18.6	23.4	27.9	32.8
		Seismic C2	$V_{Rec,\,seis}$				2.1	3.0							
Shear load without bending moment		Non-cracked	$V_{Rec,\,stat}$	kN	5.1	8.6	12	22.3	34.9	50.3	65.7	80	88.6	102	117
		Cracked	$V_{Rec,\,stat}$		4.8	7.1	9.6	13.7	19.2	24.2	29.1	34.6	40.6	47	53.8
		Seismic C1	$V_{Rec,\,seis}$		1.8	3	4.2	6.9	9.6	12.1	14.5	17.3	20.3	23.5	26.9
		Seismic C2	$V_{Rec,\,seis}$				4.0	5.6							
Anchoring depth of reinforcing bar			h_{ef}	mm	80	90	110	125	170	210	250	280	320	350	380
Distance from edge			$c_{cr,N}$	mm	113	135	165	188	255	304	342	379	400	436	472
Pitch between bars			$s_{cr,N}$	mm	2 x $C_{cr,N}$										

Table 5 ***not ETA certified***

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

(2) rough holes made with hammer drill

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

Recommended TENSILE and SHEAR loads (1) for a single anchor in concrete in a core-drilled hole (4)

	Working temperature (3)				M8	M10	M12	M16	M20	M24	M27	M30	M33	M36	M39
Tensile load	24°C/40°C	Non-cracked	N_{Rec}	kN	8.6	13.8	16.5	24.9	40.3	56.5	75.7	89	111.9	131	148
	43°C/60°C	Non-cracked	N_{Rec}		6.7	9.4	10.7	15	25.4	34.6	46.3	52.4	65.8	78.5	92.4
	43°C/72°C	Non-cracked	N_{Rec}		6.2	8.1	9.9	13.7	21.2	31.4	42.1	47.1	59.2	70.7	83.1
Shear load without bending moment		Non-cracked	V_{Rec}	kN	5.1	8.6	12	22.3	34.4	45.1	55.4	63.7	75.3	87	95.7
Anchoring depth of reinforcing bar			h_{ef}	mm	80	90	110	125	170	210	250	280	320	350	380
Distance from edge			$c_{cr,N}$	mm	97	121	139	185	225	263	296	319	351	383	403
Pitch between bars			$s_{cr,N}$	mm	2 x $C_{cr,N}$										

Table 6 ***not ETA certified***

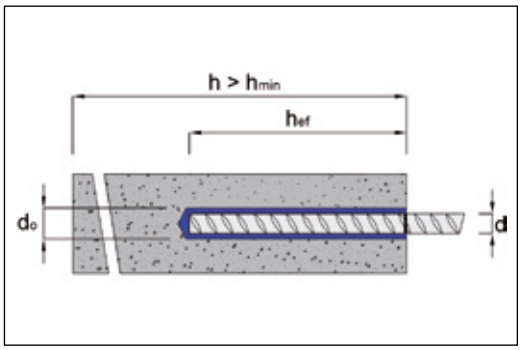
(1) recommended load valid if there are the following conditions:
- class 5.8 steel bar
- shear load without bending moment
- concrete minimum class C20/25
- $C \geq C_{cr,N}$
- $S \geq S_{cr,N}$
- $h \geq 2 \times h_{ef}$
- includes safety factors
- for other anchoring conditions use Mapefix Software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

(3) continuous working temperature/temporary maximum peak working temperature
(4) smooth holes made with diamond-tipped bit

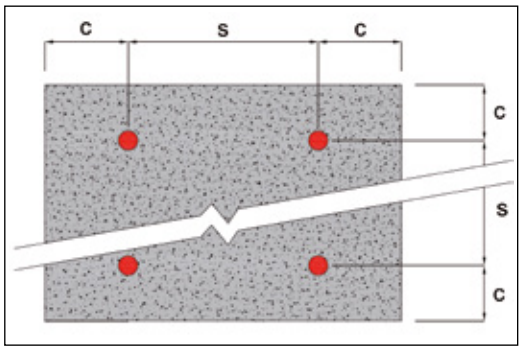
Installation parameters for reinforcing bars

Reinforcing bar				Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32	Ø36	Ø40
Diameter of rebar	d		mm	8	10	12	14	16	20	25	28	32	36	40
Diameter of hole in concrete	d_0		mm	12	14	16	18	20	24	32	35	40	46	50
Minimum distance from edge	c_{min}		mm	40	50	60	70	80	100	125	140	160	180	200
Minimum pitch between bars	s_{min}		mm	40	50	60	70	80	100	125	140	160	180	200
Minimum and maximum anchoring depth of reinforcing bar	h_{ef}	$h_{ef,min}$	mm	60	60	70	75	80	90	100	112	128	340	360
		$h_{ef,max}$	mm	96	120	144	168	192	240	300	336	384	340	360
Minimum thickness of concrete element	h_{min}		mm	h_{ef} + 30 mm (≥ 100 mm)			h_{ef} + 2 d_0							

Table 7 ***not ETA certified***



Drawing 8



Drawing 9

Recommended TENSILE and SHEAR loads (1) for a single anchor in concrete in a rough hole (2)

	Working temperature (3)				Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32	Ø36	Ø40
Tensile load	24°C/40°C	Non-cracked	$N_{Rec, stat}$	kN	11.2	15.7	21.4	24.7	28	38.1	52.3	67.9	80.5	108	117
		Cracked	$N_{Rec, stat}$		6	8.4	12.3	14	13.9	21.8	30.9	41.1	52.7	71.9	83.6
		Seismic C1	$N_{Rec, seis}$		4.1	5.7	8.4	9.6	9.4	15	21.3	28.4	36.3	49.6	58.4
	43°C/60°C	Non-cracked	$N_{Rec, stat}$		6.8	9.5	13.2	16.1	18.7	25.4	39.3	48.6	62.2	85	100
		Cracked	$N_{Rec, stat}$		3.6	5	7.4	8	8.5	12.7	19.6	26.2	33.5	45.8	53.9
		Seismic C1	$N_{Rec, seis}$		2.4	3.4	5	5.5	5.8	8.8	13.5	18.1	23.1	31.6	37.2
	43°C/72°C	Non-cracked	$N_{Rec, stat}$		6	8.4	12.3	14	17.5	23.6	33.7	44.9	57.4	78.5	92.3
		Cracked	$N_{Rec, stat}$		3.2	4.5	6.6	7	7.5	10.9	16.8	22.4	28.7	39.2	46.2
		Seismic C1	$N_{Rec, seis}$		2.2	3.1	4.5	4.8	5.1	7.5	11.6	15.5	19.8	27.1	31.9
Shear load without bending moment		Non-cracked	$V_{Rec, stat}$	kN	6.7	10.5	14.8	20	26.2	41	56.6	67	84	102	120
		Cracked	$V_{Rec, stat}$		4.8	7.1	9.4	11.6	13.7	19.1	25.7	30.5	38.3	46.6	55.2
		Seismic C1	$V_{Rec, seis}$		2.3	3.5	4.7	5.8	6.9	9.5	12.8	15.3	19.2	23.3	27.6
Anchoring depth of reinforcing bar			h_{ef}	mm	80	90	110	115	125	170	210	250	280	340	360
Distance from edge			$c_{cr,N}$	mm	109	135	158	173	188	253	303	339	388	436	484
Pitch between bars			$s_{cr,N}$	mm	2 x $C_{cr,N}$										

Table 10 ***not ETA certified***

(1) recommended load valid if there are the following conditions:
- shear load without bending moment
- concrete minimum class C20/25
- $C \geq C_{cr,N}$
- $S \geq S_{cr,N}$
- $h \geq 2 \times h_{ef}$
- includes safety factors
- for other anchoring conditions use **Mapefix Software Design**, developed in compliance with current European standards

(2) rough holes made with hammer drill
(3) continuous working temperature/temporary maximum peak working temperature

Recommended TENSILE and SHEAR loads (1) for a single anchor in concrete in a core-drilled hole (4)															
	Working temperature (3)				Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32	Ø36	Ø40
Tensile load	24°C/40°C	Non-cracked	N_{Rec}	kN	11.2	15.7	21.4	24.7	28	38.1	52.3	67.9	80.5	108	117
	43°C/60°C	Non-cracked	N_{Rec}	kN	6.8	9.5	13.2	16.1	18.7	25.4	39.3	48.6	62.2	85	100
	43°C/72°C	Non-cracked	N_{Rec}	kN	6	8.4	12.3	14	17.5	23.6	33.7	44.9	57.4	78.5	92.3
Shear load without bending moment		Non-cracked	V_{Rec}	kN	6.7	10.5	14.8	20	26.2	41	60.1	68	85	102	116
Anchoring depth of reinforcing bar			h_{ef}	mm	80	90	110	115	125	170	210	250	280	340	360
Distance from edge			$c_{cr,N}$	mm	97	121	139	162	185	225	274	298	298	383	413
Pitch between bars			$s_{cr,N}$	mm	2 x $C_{cr,N}$										

Table 11

not ETA certified

(1) recommended load valid if there are the following conditions:
- shear load without bending moment
- concrete minimum class C20/25
- $C \geq C_{cr,N}$
- $S \geq S_{cr,N}$
- $h \geq 2 \times h_{ef}$
- includes safety factors
- for other anchoring conditions use **Mapefix Software Design**, developed in compliance with current European standards

(3) continuous working temperature/temporary maximum peak working temperature
(4) smooth holes made with diamond-tipped bit

Fire resistance				
	Exposure to fire in minutes			
	30'	60'	90'	120'
Threaded bar	Residual strength in kN			
M8	≤ 0.90	≤ 0.50	≤ 0.30	≤ 0.20
M10	≤ 3.20	≤ 1.80	≤ 1.10	≤ 0.75
M12	≤ 4.20	≤ 2.30	≤ 1.40	≤ 0.90
M16	≤ 8.25	≤ 5.30	≤ 3.80	≤ 3.00
M20	≤ 17.25	≤ 10.20	≤ 6.70	≤ 5.00
M24	≤ 24.85	≤ 14.75	≤ 9.70	≤ 7.20
M30	≤ 39.50	≤ 23.40	≤ 15.40	≤ 11.35

Table 12

Consumption of Mapefix EP 385 and Mapefix EP 585												
Threaded bar			M8	M10	M12	M16	M20	M24	M27	M30	M33	M36	M39
Diameter of threaded bar	d	mm	8	10	12	16	20	24	27	30	33	36	39
Diameter of hole in concrete	d_0	mm	10	12	14	18	24	28	32	35	37	42	46
Anchoring depth	h_{ef}	mm	80	90	110	125	170	210	250	280	320	350	380
Theoretical consumption per hole		ml	2.7	3.7	5.4	8.0	28.2	41.1	69.5	85.7	84.4	154.3	213.0
Number of holes per 385 ml cartridge		n°	142	103	71	48	14	9	6	4	5	2	2
Number of holes per 585 ml cartridge		n°	216	157	109	73	21	14	8	7	7	4	3

Table 13

Consumption of Mapefix EP 385 and Mapefix EP 585												
Reinforcing bar			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32	Ø36	Ø40
Diameter of rebar	d	mm	8	10	12	14	16	20	25	28	32	36	40
Diameter of hole in concrete	d_0	mm	12	14	16	18	20	24	32	35	40	46	50
Anchoring depth	h_{ef}	mm	80	90	110	115	125	170	210	250	280	340	360
Theoretical consumption per hole		ml	6.0	8.1	11.6	13.9	17.0	28.2	78.9	103.9	151.9	262.6	305.2
Number of holes per 385 ml cartridge		n°	64	47	33	28	23	14	5	4	3	1	1
Number of holes per 585 ml cartridge		n°	97	72	50	42	35	21	7	6	4	2	2

Table 14

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BUILDING THE FUTURE