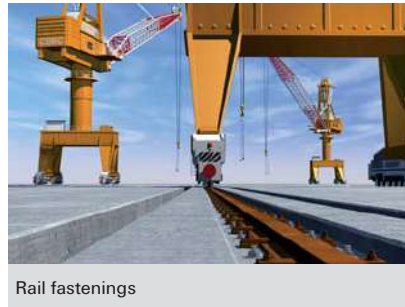


## The powerful injection mortar for rebar connections and cracked concrete

Chemical fixings 3



Rail fastenings



Rebar connections

### BUILDING MATERIALS

#### Approved for anchorings in:

- Concrete C20/25 to C50/60, cracked and non-cracked

#### Also suitable for:

- Natural stone with dense structure

### CERTIFICATES



### ADVANTAGES

- The optimised formulation of the epoxy resin mortar FIS EM Plus leads to improved load values in cracked and non-cracked concrete.
- The mortar can be used for rebar connections from diameter 8 to 40 mm.
- With the threaded rod FIS A, the loads to be applied can be designed variably by selecting the anchorage depth.
- Temporary and detachable fixing points are possible with the internal threaded anchor RG M I.
- For practical use on the building site, FIS EM Plus can be processed at low temperatures down to -5 °C.
- The mortar is approved for diamond-drilled and water-filled drill holes as well as seismic applications of performance categories C1, C2 and thus offers safety under extreme conditions.




### APPLICATIONS

- Post-installed rebar connections
- Jointers for concrete layers
- Rim beam anchorings
- Seismic applications
- Anchorings in diamond-drilled or in water-filled drill holes
- Heavy steel constructions
- Silo installations
- Tall shelving
- Sound barriers
- Temporary or removable fixings (with internal threaded anchor RG M I)

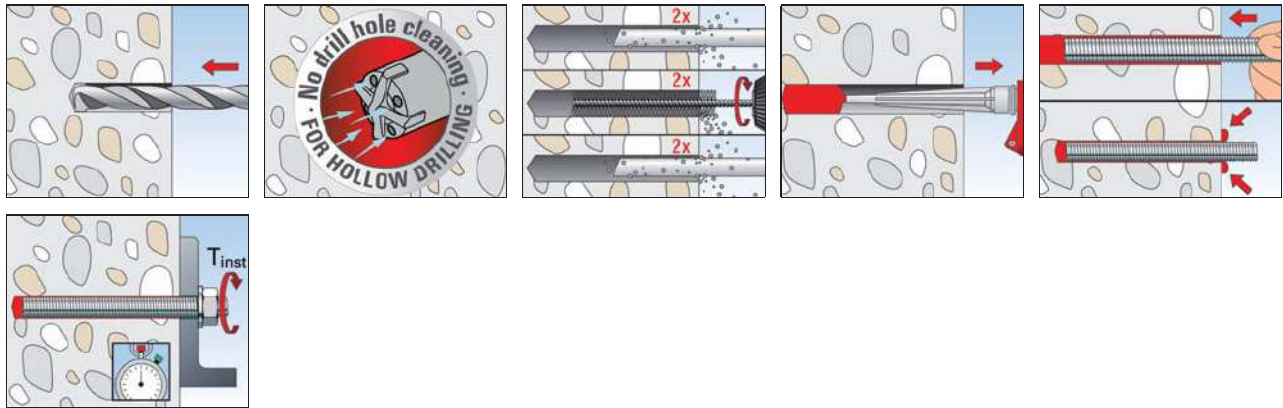
### FUNCTIONING

- The epoxy mortar FIS EM Plus combined with the FIS A threaded rod, is suitable for pre-positioned and push-through installation and with the internal threaded anchor RG M I for pre-positioned installation.
- Resin and hardener are stored in two separate chambers and are not mixed and activated until extrusion through the injection capsule in the static mixer.
- The mortar is injected bubble-free from the drill hole base.
- The mortar bonds the entire surface of the anchor with the drill hole wall and seals off the drill hole.
- The anchor is set manually by lightly rotating it until it reaches the drill hole base.
- During push-through installation, the annular gap between the threaded rod and attachment is filled with FIS EM Plus.

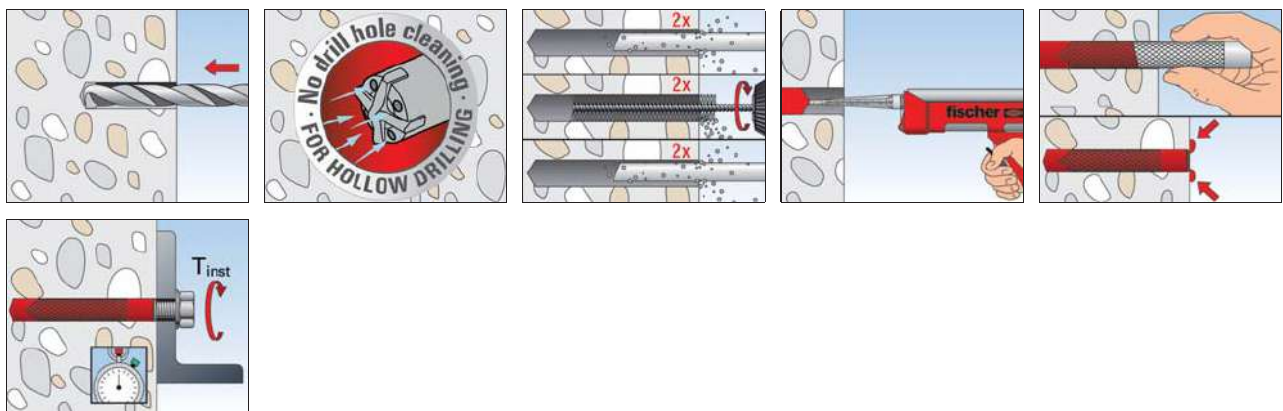
### SEE ALSO

	<b>ANCHORS + SLEEVES</b> Page 144		<b>DISPENSER</b> Page 195		<b>ACCESSORIES</b> Page 198
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## INSTALLATION IN CONCRETE WITH FIS EM PLUS AND FIS A / RG M



## INSTALLATION IN CONCRETE WITH FIS EM PLUS AND RG M I



## TECHNICAL DATA



Epoxy mortar  
**FIS EM Plus 390 S**



Epoxy mortar  
**FIS EM Plus 585 S**



Epoxy mortar  
**FIS EM Plus 1500 S**

Item	Art.-No.	Approval			Languages on the cartridge	Scale unit	Contents	Sales unit [pcs]
		DIBt	ETA	ICC				
<b>FIS EM Plus 390 S</b>	<b>544154</b>	●	■	▲	DE, EN, FR, NL, ES, PT	180	1 cartridge 390 ml, 2 x FIS MR Plus	6
<b>FIS EM Plus 390 S</b>	<b>544155</b>	●	■	▲	EN, ZH, EL, KO, HU, PL	180	1 cartridge 390 ml, 2 x FIS MR Plus	6
<b>FIS EM Plus 390 S</b>	<b>544176</b>	●	■	▲	CS, SK, RO, AR, FR, EN	180	1 cartridge 390 ml, 2 x FIS MR Plus	6
<b>FIS EM Plus 390 S</b>	<b>544159</b>	●	■	▲	LT, LV, ET, UK, RU, KK	180	1 cartridge 390 ml, 2 x FIS MR Plus	6
<b>FIS EM Plus 585 S</b>	<b>544166</b>	●	■	▲	DE, EN, FR, NL, ES, PT	270	1 cartridge 585 ml + 2 x FIS UMR	6
<b>FIS EM Plus 585 S</b>	<b>544165</b>	●	■	▲	EN, ZH, RU, KO, CS, PL	270	1 cartridge 585 ml + 2 x FIS UMR	6
<b>FIS EM Plus 585 S</b>	<b>544175</b>	●	■	▲	EN, ZH, RU, KO, CS, PL	270	1 cartridge 585 ml, 1 x FIS UMR, 1 x extension tube Ø 9x250 mm	6
<b>FIS EM Plus 1500 S</b>	<b>544167</b>	●	■	▲	DE, IT, FR, NL, CS, SK	700	1 cartridge 1500 ml, 2 x FIS UMR	4
<b>FIS EM Plus 1500 S</b>	<b>544173</b>	●	■	▲	EN, ES, PT, ZH, RU, PL	700	1 cartridge 1500 ml, 2 x FIS UMR	4

## TECHNICAL DATA



Static mixer **FIS MR Plus**



Static mixer **FIS UMR**

3  
Chemical fixings

Item	Art.-No.				Contents	Sales unit
						[pcs]
<b>FIS MR Plus</b>	<b>545853</b>				10 static mixer FIS MR Plus	10
<b>FIS UMR</b>	<b>520593</b>				10 static mixer FIS UMR for 585 ml and 1500 ml cartridges	10



**FIS EM Plus 390 S HWK big**



**FIS EM Plus 390 S in bucket**

Item	Art.-No.	Approval			Languages on the cartridge	Contents	Sales unit
		DIBt	ETA	ICC			
<b>FIS EM Plus 390 S HWK big</b>	<b>544156</b>	●	■	▲	EN, ZH, EL, KO, HU, PL	20 cartridges 390 ml, 20 x FIS MR Plus	1
<b>FIS EM Plus 390 S in bucket</b>	<b>544172</b>	●	■	▲	DE, EN, FR, NL, ES, PT	20 cartridges 390 ml, 20 x FIS MR Plus	1

## GELLING AND CURING TIME

Temperature at anchoring base	Gelling time	Curing time
- 5 °C to - 1 °C	180 min.	200 hrs.
0 °C to + 4 °C	150 min.	90 hrs.
+ 5 °C to + 9 °C	120 min.	40 hrs.
+ 10 °C to + 19 °C	30 min.	18 hrs.
+ 20 °C to + 29 °C	14 min.	10 hrs.
+ 30 °C to + 40 °C	7 min.	5 hrs.

The above times apply from the moment of contact between resin and hardener in the static mixer.

For installation, the cartridge temperature must be at least +5 °C. For longer installation times, i.e. when interruptions occur in work, the mixer should be replaced.

## LOADS

Injection system FIS EM Plus: Injection resin FIS EM Plus with Threaded rod FIS A<sup>2)</sup>

zinc plated steel 5.8 / zinc plated steel 8.8 / stainless steel A4-70 / high corrosion resistant steel C-70

Permissible loads of a single anchor in cracked normal concrete (concrete tension zone) of strength class C20/25 (~B25) <sup>1) 3) 4) 8)</sup>										Minimum spacings while reducing the load					
Type	Material fixing element	Min. member thickness	Effective anchorage depth	Maximum torque moment	Permissible tensile load	Permissible shear load	Required edge distance (with one edge) for		Required spacing for	Min. spacing	Min. edge distance				
							Max. tension load c	Max. shear load c				Max. Load s <sub>cr</sub>	s <sub>min</sub> <sup>6)</sup>	c <sub>min</sub> <sup>6)</sup>	
		h <sub>min</sub> [mm]	h <sub>ef</sub> [mm]	T <sub>max</sub> [Nm]	N <sub>perm</sub> <sup>5)</sup> [kN]	V <sub>perm</sub> <sup>5)</sup> [kN]									
FIS A M 8	5.8	100	60	10	5,4	5,1	90	105	180	40	40				
		110	80		7,2							120	95	240	
		190	160		9,0							65	80	480	
	8.8	100	60		5,4	120	8,6	90	185			180			
		110	80		7,2								170	240	
		190	160		13,8								115	480	
	A4-70	100	60		5,4	120	6,0	90	125			180			
		110	80		7,2								115	240	
		190	160		9,9								75	90	480
	C-70	100	60		5,4	120	7,4	90	160			180			
		110	80		7,2								145	240	
		190	160		12,4								105	105	480
FIS A M 10	5.8	100	60	20	6,7	8,6	90	185	180	45	45				
		120	90		10,1							135	155	270	
		230	200		13,8							70	110	600	
	8.8	100	60		6,7	135	13,1	90	295			180			
		120	90		10,1								250	270	
		230	200		22,4								150	150	600
	A4-70	100	60		6,7	135	9,2	90	195			180			
		120	90		10,1								165	270	
		230	200		15,7								115	600	
	C-70	100	60		6,7	135	11,4	90	250			180			
		120	90		10,1								215	270	
		230	200		19,5								125	135	600
FIS A M 12	5.8	100	70	40	10,0	12,0	105	255	210	55	45				
		140	110		17,8							165	195	330	
		270	240		20,5							60	135	720	
	8.8	100	70		10,0	145	19,4	105	435			210			
		140	110		17,8								340	330	
		270	240		32,4								200	720	
	A4-70	100	70		10,0	145	13,7	105	295			210			
		140	110		17,8								230	330	
		270	240		22,5								75	150	720
	C-70	100	70		10,0	145	17,1	105	380			210			
		140	110		17,8								295	330	
		270	240		28,1								115	175	720
FIS A M 16	5.8	120	80	60	12,3	22,3	120	445	240	65	50				
		170	125		24,0							190	350	375	
		360	320		37,6							95	195	960	
	8.8	120	80		12,3	120	24,5	120	495			240			
		170	125		24,0								190	600	375
		360	320		60,0								225	320	960
	A4-70	120	80		12,3	120	24,5	120	495			240			
		170	125		24,0								190	400	375
		360	320		42,0								215	960	
	C-70	120	80		12,3	120	24,5	120	495			240			
		170	125		24,0								190	515	375
		360	320		52,4								175	270	960

## LOADS

Injection system FIS EM Plus: Injection resin FIS EM Plus with Threaded rod FIS A<sup>2)</sup>

zinc plated steel 5.8 / zinc plated steel 8.8 / stainless steel A4-70 / high corrosion resistant steel C-70

Permissible loads of a single anchor in cracked normal concrete (concrete tension zone) of strength class C20/25 (~B25) <sup>1) 3) 4) 8)</sup>										Minimum spacings while reducing the load		
Type	Material fixing element	Min. member thickness	Effective anchorage depth	Maximum torque moment	Permissible tensile load	Permissible shear load	Required edge distance (with one edge) for		Required spacing for	Min. spacing	Min. edge distance	
							Max. tension load c	Max. shear load c				Max. Load s <sub>cr</sub>
		h <sub>min</sub> [mm]	h <sub>ef</sub> [mm]	T <sub>max</sub> [Nm]	N <sub>perm</sub> <sup>5)</sup> [kN]	V <sub>perm</sub> <sup>5)</sup> [kN]						
FIS A M 20	5.8	140	90	120	14,6	29,3	135	530	270	85	55	
		220	170		38,0	34,9	255	455	510			
		450	400		58,6		115	260	1200			
	8.8	140	90		14,6	29,3	135	530	270			
		220	170		38,0	56,0	255	780	510			
		450	400		93,3		340	435	1200			
	A4-70	140	90		14,6	29,3	135	530	270			
		220	170		38,0	39,4	255	520	510			
		450	400		65,7		145	285	1200			
	C-70	140	90		14,6	29,3	135	530	270			
		220	170		38,0	49,1	255	675	510			
		450	400		81,9		265	370	1200			
FIS A M 24	5.8	160	96	150	16,1	32,2	145	545	290	105	60	
		270	210		52,2	50,9	315	590	630			
		540	480		84,3		160	330	1440			
	8.8	160	96		16,1	32,2	145	545	290			
		270	210		52,2	80,6	315	1005	630			
		540	480		134,3		475	570	1440			
	A4-70	160	96		16,1	32,2	145	545	290			
		270	210		52,2	56,8	315	670	630			
		540	480		94,3		230	360	1440			
	C-70	160	96		16,1	32,2	145	545	290			
		270	210		52,2	70,9	315	870	630			
		540	480		117,6		380	480	1440			
FIS A M 27	5.8	170	108	200	19,2	38,5	165	610	325	120	75	
		310	250		67,8	65,7	375	695	750			
		600	540		109,5		240	390	1620			
	8.8	170	108		19,2	38,5	165	610	325			
		310	250		67,8	105,1	375	1200	750			
		600	540		175,2		615	700	1620			
	A4-70	170	108		19,2	38,5	165	610	325			
		310	250		67,8	73,7	375	795	750			
		600	540		123,0		325	445	1620			
	C-70	170	108		19,2	38,5	165	610	325			
		310	250		67,8	92,0	375	1030	750			
		600	540		153,3		500	595	1620			
FIS A M 30	5.8	190	120	300	22,5	45,1	180	665	360	140	80	
		350	280		80,3	80,6	420	795	840			
		670	600		133,8		300	440	1800			
	8.8	190	120		22,5	45,1	180	665	360			
		350	280		80,3	128,6	420	1375	840			
		670	600		213,8		725	805	1800			
	A4-70	190	120		22,5	45,1	180	665	360			
		350	280		80,3	90,2	420	910	840			
		670	600		150,1		395	510	1800			
	C-70	190	120		22,5	45,1	180	665	360			
		350	280		80,3	112,6	420	1180	840			
		670	600		187,1		595	680	1800			

For the design the complete assessment ETA-17/0979 has to be considered. <sup>7)</sup>

<sup>1)</sup> The partial safety factors for material resistance as regulated in the ETA-17/0979 as well as a partial safety factor for load actions of  $\gamma_L = 1,4$  are considered. As a single anchor counts e.g. an anchor with a spacing  $s \geq 3 \cdot h_{ef}$  and an edge distance  $c \geq 1,5 \cdot h_{ef}$ . Accurate data see ETA-17/0979.

<sup>2)</sup> Also valid for threaded rod RG M in the same property class.

<sup>3)</sup> For higher concrete strength classes up to C50/60 higher permissible loads may be possible.

<sup>4)</sup> Drill method hammer drilling resp. hollow drilling. For further allowable drill methods and application conditions see ETA-17/0979.

## LOADS

### Injection system FIS EM Plus: Injection resin FIS EM Plus with Threaded rod FIS A<sup>2)</sup>

zinc plated steel 5.8 / zinc plated steel 8.8 / stainless steel A4-70 / high corrosion resistant steel C-70

Permissible loads of a single anchor in cracked normal concrete (concrete tension zone) of strength class C20/25 (~B25) <sup>1) 3) 4) 8)</sup>										Minimum spacings while reducing the load	
Type	Material fixing element	Min. member thickness	Effective anchorage depth	Maximum torque moment	Permissible tensile load	Permissible shear load	Required edge distance (with one edge) for		Required spacing for	Min. spacing	Min. edge distance
							Max. tension load c	Max. shear load c			
		h <sub>min</sub> [mm]	h <sub>ef</sub> [mm]	T <sub>max</sub> [Nm]	N <sub>perm</sub> <sup>5)</sup> [kN]	V <sub>perm</sub> <sup>5)</sup> [kN]	[mm]	[mm]	[mm]	[mm]	[mm]

<sup>5)</sup> For combinations of tensile loads and shear loads or for shear loads with lever arm (bending moments) as well as reduced edge distances or spacings (anchor groups) we recommend to use our anchor design software C-FIX.

<sup>6)</sup> Minimum possible axial spacings resp. edge distance while reducing the permissible load.

<sup>7)</sup> The given loads refer to the European Technical Assessment ETA-17/0979, issue date 06/04/2018. Design of the loads according to FprEN 1992-4:2017 and TR 055 (for static resp. quasi-static loads).

<sup>8)</sup> A reinforcement in the concrete to prevent splitting is required. The width of the cracks has to be limited under consideration of the splitting forces at w<sub>k</sub> ~0.3mm.

## LOADS

### Injection system FIS EM Plus: Injection resin FIS EM Plus with Threaded rod FIS A<sup>2)</sup>

zinc plated steel 5.8 / zinc plated steel 8.8 / stainless steel A4-70 / high corrosion resistant steel C-70

Permissible loads of a single anchor in non-cracked normal concrete (concrete compression zone) of strength class C20/25 (~B25) <sup>1) 3) 4)</sup>										Minimum spacings while reducing the load	
Type	Material fixing element	Min. member thickness	Effective anchorage depth	Maximum torque moment	Permissible tensile load	Permissible shear load	Required edge distance (with one edge) for		Required spacing for	Min. spacing	Min. edge distance
							Max. tension load c	Max. shear load c			
		h <sub>min</sub> [mm]	h <sub>ef</sub> [mm]	T <sub>max</sub> [Nm]	N <sub>perm</sub> <sup>5)</sup> [kN]	V <sub>perm</sub> <sup>5)</sup> [kN]	[mm]	[mm]	[mm]	[mm]	[mm]
FIS A M 8	5.8	100	60	10	9,0	5,1	75	70	180	40	40
		110	80				55		240		
		190	160				40		480		
	8.8	100	60		11,2	8,6	100	130	180		
		110	80		13,8		130	115	240		
		190	160		40		90	480			
	A4-70	100	60		9,9	6,0	85	85	180		
		110	80				70	75	240		
		190	160				40	70	480		
	C-70	100	60		11,2	7,4	100	110	180		
		110	80		12,4		110	100	240		
		190	160		40		80	480			
FIS A M 10	5.8	100	60	20	11,2	8,6	100	125	180	45	45
		120	90		13,8		110	105	270		
		230	200		45		85	600			
	8.8	100	60		11,2	13,1	100	200	180		
		120	90		20,5		200	170	270		
		230	200		45		115	600			
	A4-70	100	60		11,2	9,2	100	135	180		
		120	90		15,7		140	110	270		
		230	200		45		90	600			
	C-70	100	60		11,2	11,4	100	170	180		
		120	90		19,5		190	145	270		
		230	200		45		105	600			
FIS A M 12	5.8	100	70	40	14,1	12,0	145	175	210	55	45
		140	110		20,5		165	130	330		
		270	240		45		100	720			
	8.8	100	70		14,1	19,4	145	295	210		
		140	110		27,7		250	230	330		
		270	240		32,4		45	150	720		
	A4-70	100	70		14,1	13,7	145	200	210		
		140	110		22,5		190	155	330		
		270	240		45		115	720			
	C-70	100	70		14,1	17,1	145	260	210		
		140	110		27,7		250	200	330		
		270	240		28,1		45	135	720		

## LOADS

Injection system FIS EM Plus: Injection resin FIS EM Plus with Threaded rod FIS A<sup>2)</sup>

zinc plated steel 5.8 / zinc plated steel 8.8 / stainless steel A4-70 / high corrosion resistant steel C-70

Permissible loads of a single anchor in non-cracked normal concrete (concrete compression zone) of strength class C20/25 (~B25) <sup>1) 3) 4)</sup>										Minimum spacings while reducing the load		
Type	Material fixing element	Min. member thickness	Effective anchorage depth	Maximum torque moment	Permissible tensile load	Permissible shear load	Required edge distance (with one edge) for		Required spacing for	Min. spacing	Min. edge distance	
		$h_{min}$ [mm]	$h_{ef}$ [mm]	$T_{max}$ [Nm]	$N_{perm}^{5)}$ [kN]	$V_{perm}^{5)}$ [kN]	Max. tension load $c$ [mm]	Max. shear load $c$ [mm]	Max. Load $s_{cr}$ [mm]	$s_{min}^{6)}$ [mm]	$c_{min}^{6)}$ [mm]	
FIS A M 16	5.8	120	80	60	17,2	22,3	160	305	240	65	50	
		170	125		33,6		285	235	375			
		360	320		37,6		50	150	960			
	8.8	120	80		17,2	34,4	160	495	240			
		170	125		33,6	36,0	285	405	375			
		360	320		60,0	36,0	120	220	960			
	A4-70	120	80		17,2	25,2	160	350	240			
		170	125		33,6		285	270	375			
		360	320		42,0		50	165	960			
	C-70	120	80		17,2	31,4	160	445	240			
		170	125		33,6		285	350	375			
		360	320		52,4		50	195	960			
FIS A M 20	5.8	140	90	120	20,5	34,9	170	435	270	85	55	
		220	170		53,3		385	300	510			
		450	400		58,6		55	195	1200			
	8.8	140	90		20,5	41,1	170	525	270			
		220	170		53,3	56,0	385	510	510			
		450	400		93,3	56,0	230	290	1200			
	A4-70	140	90		20,5	39,4	170	500	270			
		220	170		53,3		385	350	510			
		450	400		65,7		55	215	1200			
	C-70	140	90		20,5	41,1	170	525	270			
		220	170		53,3	49,1	385	455	510			
		450	400		81,9	49,1	135	260	1200			
FIS A M 24	5.8	160	96	150	22,6	45,2	170	540	290	105	60	
		270	210		73,2		50,9	475	390			630
		540	480		84,3		50,9	60	250			1440
	8.8	160	96		22,6	45,2	170	540	290			
		270	210		73,2	80,6	475	675	630			
		540	480		134,3	80,6	360	365	1440			
	A4-70	160	96		22,6	45,2	170	540	290			
		270	210		73,2	56,8	475	445	630			
		540	480		94,3	56,8	60	270	1440			
	C-70	160	96		22,6	45,2	170	540	290			
		270	210		73,2	70,9	475	580	630			
		540	480		117,6	70,9	235	325	1440			
FIS A M 27	5.8	170	108	200	27,0	54,0	195	605	325	120	75	
		310	250		95,1		65,7	565	460			750
		600	540		109,5		65,7	75	295			1620
	8.8	170	108		27,0	54,0	195	605	325			
		310	250		95,1	105,1	565	805	750			
		600	540		175,2	105,1	505	450	1620			
	A4-70	170	108		27,0	54,0	195	605	325			
		310	250		95,1	73,7	565	530	750			
		600	540		123,0	73,7	140	320	1620			
	C-70	170	108		27,0	54,0	195	605	325			
		310	250		95,1	92,0	565	690	750			
		600	540		153,3	92,0	355	385	1620			

## LOADS

### Injection system FIS EM Plus: Injection resin FIS EM Plus with Threaded rod FIS A<sup>2)</sup>

zinc plated steel 5.8 / zinc plated steel 8.8 / stainless steel A4-70 / high corrosion resistant steel C-70

Permissible loads of a single anchor in non-cracked normal concrete (concrete compression zone) of strength class C20/25 (~B25) <sup>1)3)4)</sup>										Minimum spacings while reducing the load	
Type	Material fixing element	Min. member thickness	Effective anchorage depth	Maximum torque moment	Permissible tensile load	Permissible shear load	Required edge distance (with one edge) for		Required spacing for	Min. spacing	Min. edge distance
							Max. tension load c	Max. shear load c			
		h <sub>min</sub> [mm]	h <sub>ef</sub> [mm]	T <sub>max</sub> [Nm]	N <sub>perm</sub> <sup>5)</sup> [kN]	V <sub>perm</sub> <sup>5)</sup> [kN]					
FIS A M 30	5.8	190	120	300	31,6	63,2	210	660	360	140	80
		350	280		112,7	80,6	635	525	840		
		670	600		133,8		80	330	1800		
	8.8	190	120		31,6	63,2	210	660	360		
		350	280		112,7	128,6	635	920	840		
		670	600		213,8		610	515	1800		
	A4-70	190	120		31,6	63,2	210	660	360		
		350	280		112,7	90,2	635	605	840		
		670	600		150,1		195	365	1800		
	C-70	190	120		31,6	63,2	210	660	360		
		350	280		112,7	112,6	635	785	840		
		670	600		187,1		445	435	1800		

For the design the complete assessment ETA-17/0979 has to be considered. <sup>7)</sup>

<sup>1)</sup> The partial safety factors for material resistance as regulated in the ETA-17/0979 as well as a partial safety factor for load actions of  $\gamma_L = 1,4$  are considered. As a single anchor counts e.g. an anchor with a spacing  $s \geq 3 \cdot h_{ef}$  and an edge distance  $c \geq 1,5 \cdot h_{ef}$ . Accurate data see ETA-17/0979.

<sup>2)</sup> Also valid for threaded rod RG M in the same property class.

<sup>3)</sup> For higher concrete strength classes up to C50/60 higher permissible loads may be possible.

<sup>4)</sup> Drill method hammer drilling resp. hollow drilling. For further allowable drill methods and application conditions see ETA-17/0979.

<sup>5)</sup> For combinations of tensile loads and shear loads or for shear loads with lever arm (bending moments) as well as reduced edge distances or spacings (anchor groups) we recommend to use our anchor design software C-FIX.

<sup>6)</sup> Minimum possible axial spacings resp. edge distance while reducing the permissible load.

<sup>7)</sup> The given loads refer to the European Technical Assessment ETA-17/0979, issue date 06/04/2018. Design of the loads according to FprEN 1992-4:2017 and TR 055 (for static resp. quasi-static loads).

## LOADS

### Injection system FIS EM Plus: Injection resin FIS EM Plus with Internal threaded anchor RG M I

zinc plated steel / stainless steel A4

Permissible loads of a single anchor in cracked normal concrete (concrete tension zone) of strength class C20/25 (~B25) <sup>1)2)3)7)</sup>										Minimum spacings while reducing the load			
Type	Screw steel property/surface	Min. member thickness	Effective anchorage depth	Maximum torque moment	Permissible tensile load	Permissible shear load	Required edge distance (with one edge) for		Required spacing for	Min. spacing	Min. edge distance		
							Max. tension load c	Max. shear load c				Max. Load s <sub>cr</sub>	s <sub>min</sub> <sup>5)</sup>
		h <sub>min</sub> [mm]	h <sub>ef</sub> [mm]	T <sub>max</sub> [Nm]	N <sub>perm</sub> <sup>4)</sup> [kN]	V <sub>perm</sub> <sup>4)</sup> [kN]							
RG M8 I	5.8	120	90	10	9,0	5,3	100	85	270	55	55		
	8.8				11,3	8,3	135	145					
	A4-70				9,9	5,9	115	95					
RG M10 I	5.8	130	90	20	12,9	9,3	135	135	270	65	65		
	8.8							13,3				135	235
	A4-70							9,3				155	155
RG M12 I	5.8	170	125	40	20,2	13,5	190	165	375	75	75		
	8.8							19,3				285	
	A4-70							13,5				185	
RG M16 I	5.8	210	160	80	34,7	25,1	240	275	480	95	95		
	8.8							30,9				405	
	A4-70							25,1				315	
RG M20 I	5.8	270	200	120	48,5	39,4	300	380	600	125	125		
	8.8							42,9				480	
	A4-70							39,4				430	



## LOADS

**Injection system FIS EM Plus: Injection resin FIS EM Plus with Internal threaded anchor RG M I**  
zinc plated steel / stainless steel A4

Permissible loads of a single anchor in cracked normal concrete (concrete tension zone) of strength class C20/25 (~ B25) <sup>1) 2) 3) 7)</sup>										Minimum spacings while reducing the load	
Type	Screw steel property/surface	Min. member thickness $h_{min}$ [mm]	Effective anchorage depth $h_{ef}$ [mm]	Maximum torque moment $T_{max}$ [Nm]	Permissible tensile load $N_{perm}^{4)}$ [kN]	Permissible shear load $V_{perm}^{4)}$ [kN]	Required edge distance (with one edge) for		Required spacing for Max. Load $s_{cr}$ [mm]	Min. spacing $s_{min}^{5)}$ [mm]	Min. edge distance $c_{min}^{5)}$ [mm]
							Max. tension load $c$ [mm]	Max. shear load $c$ [mm]			

For the design the complete assessment ETA-17/0979 has to be considered. <sup>6)</sup>  
<sup>1)</sup> The partial safety factors for material resistance as regulated in the ETA-17/0979 as well as a partial safety factor for load actions of  $\gamma_L = 1,4$  are considered. As a single anchor counts e.g. an anchor with a spacing  $s \geq 3 \cdot h_{ef}$  and an edge distance  $c \geq 1,5 \cdot h_{ef}$ . Accurate data see ETA-17/0979.  
<sup>2)</sup> For higher concrete strength classes up to C50/60 higher permissible loads may be possible.  
<sup>3)</sup> Drill method hammer drilling resp. hollow drilling. For further allowable drill methods and application conditions see ETA-17/0979.  
<sup>4)</sup> For combinations of tensile loads and shear loads or for shear loads with lever arm (bending moments) as well as reduced edge distances or spacings (anchor groups) we recommend to use our anchor design software C-FIX.  
<sup>5)</sup> Minimum possible axial spacings resp. edge distance while reducing the permissible load.  
<sup>6)</sup> The given loads refer to the European Technical Assessment ETA-17/0979, issue date 06/04/2018. Design of the loads according to FprEN 1992-4:2017 and TR 055 (for static resp. quasi-static loads).  
<sup>7)</sup> A reinforcement in the concrete to prevent splitting is required. The width of the cracks has to be limited under consideration of the splitting forces at  $w_k \sim 0,3$  mm.

## LOADS

**Injection system FIS EM Plus: Injection resin FIS EM Plus with Internal threaded anchor RG M I**  
zinc plated steel / stainless steel A4

Permissible loads of a single anchor in non-cracked normal concrete (concrete compression zone) of strength class C20/25 (~ B25) <sup>1) 2) 3)</sup>										Minimum spacings while reducing the load	
Type	Screw steel property/surface	Min. member thickness $h_{min}$ [mm]	Effective anchorage depth $h_{ef}$ [mm]	Maximum torque moment $T_{max}$ [Nm]	Permissible tensile load $N_{perm}^{4)}$ [kN]	Permissible shear load $V_{perm}^{4)}$ [kN]	Required edge distance (with one edge) for		Required spacing for Max. Load $s_{cr}$ [mm]	Min. spacing $s_{min}^{5)}$ [mm]	Min. edge distance $c_{min}^{5)}$ [mm]
							Max. tension load $c$ [mm]	Max. shear load $c$ [mm]			
RG M8 I	5.8	120	90	10	9,0	5,3	55	65	270	55	55
	8.8										
	A4-70										
RG M10 I	5.8	130	90	20	13,8	8,3	105	90	270	65	65
	8.8										
	A4-70										
RG M12 I	5.8	170	125	40	20,5	12,1	130	110	375	75	75
	8.8										
	A4-70										
RG M16 I	5.8	210	160	80	37,6	22,4	255	180	480	95	95
	8.8										
	A4-70										
RG M20 I	5.8	270	200	120	58,6	35,4	365	245	600	125	125
	8.8										
	A4-70										

For the design the complete assessment ETA-17/0979 has to be considered. <sup>6)</sup>  
<sup>1)</sup> The partial safety factors for material resistance as regulated in the ETA-17/0979 as well as a partial safety factor for load actions of  $\gamma_L = 1,4$  are considered. As a single anchor counts e.g. an anchor with a spacing  $s \geq 3 \cdot h_{ef}$  and an edge distance  $c \geq 1,5 \cdot h_{ef}$ . Accurate data see ETA-17/0979.  
<sup>2)</sup> For higher concrete strength classes up to C50/60 higher permissible loads may be possible.  
<sup>3)</sup> Drill method hammer drilling resp. hollow drilling. For further allowable drill methods and application conditions see ETA-17/0979.  
<sup>4)</sup> For combinations of tensile loads and shear loads or for shear loads with lever arm (bending moments) as well as reduced edge distances or spacings (anchor groups) we recommend to use our anchor design software C-FIX.  
<sup>5)</sup> Minimum possible axial spacings resp. edge distance while reducing the permissible load.  
<sup>6)</sup> The given loads refer to the European Technical Assessment ETA-17/0979, issue date 06/04/2018. Design of the loads according to FprEN 1992-4:2017 and TR 055 (for static resp. quasi-static loads).