



# fischer epoxy mortar FIS EM Plus

The powerful injection mortar for rebar connections and cracked concrete



MASONRY FIXINGS

# fischer FIS EM Plus

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



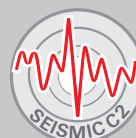
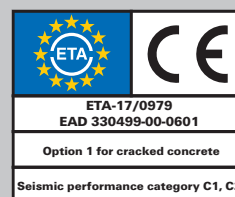
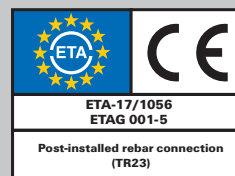
Optimized formulation for even  
more power in concrete.  
Assessment for seismic applications.



### Your advantages at a glance

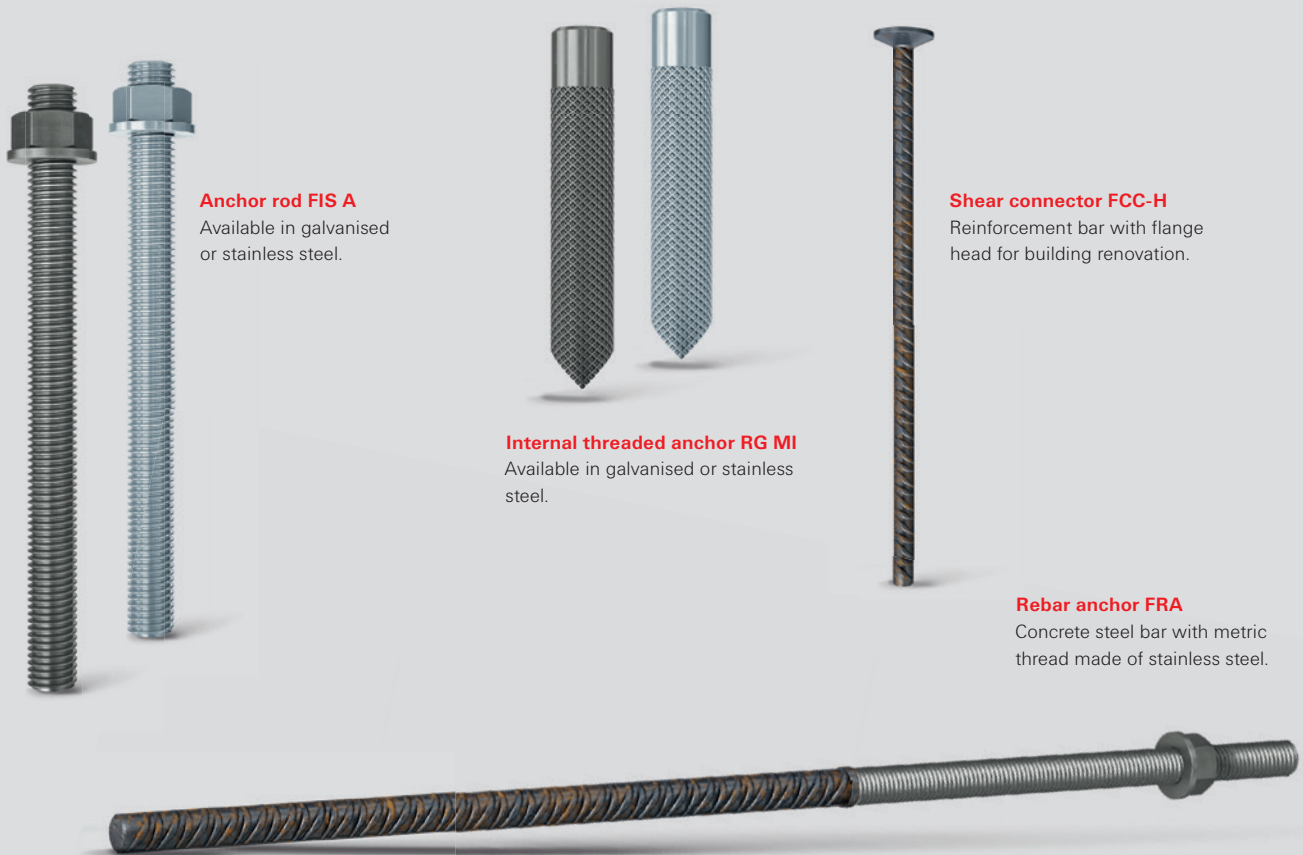
- The optimised formulation of the epoxy mortar FIS EM Plus leads to improved load values in cracked and non-cracked concrete.
- The mortar can be used for rebar connections from diameter 8 to 40 mm.
- With the threaded rod FIS A, the loads to be introduced can be designed variably by selecting the anchorage depth.
- Temporary and detachable fixing points are possible with the internal threaded anchor RG M I.
- FIS EM Plus is to be processed for use on site even at low temperatures down to 0 °C (outside of the evaluation even down to -5 °C).
- The mortar is approved for diamond-drilled and water-filled drill holes as well as seismic applications in performance categories C1, C2 and thus offers safety under extreme conditions.

### Approvals



# fischer FIS EM Plus

## Compatible anchors and connectors



**Anchor rod FIS A**  
Available in galvanised or stainless steel.

**Internal threaded anchor RG MI**  
Available in galvanised or stainless steel.

**Shear connector FCC-H**  
Reinforcement bar with flange head for building renovation.

**Rebar anchor FRA**  
Concrete steel bar with metric thread made of stainless steel.

### Your advantages at a glance

#### Anchor rod FIS A

- The anchor rod FIS A is approved for use with FIS EM Plus in sizes M8 – M30 made of galvanised or stainless steel A4.
- Variable anchorage depths allow for optimum adaptation to the respective application and load requirements.

#### Rebar anchor FRA

- The rebar anchor FRA is a concrete steel bar with metric connection thread made of stainless steel in sizes M12 – M24.
- The connection thread enables the transmission of very high tensile loads.
- The fischer FRA is approved for subsequently mortared overlap joints, connection reinforcements, and needlings.

#### Concrete-concrete shear connector FCC-H

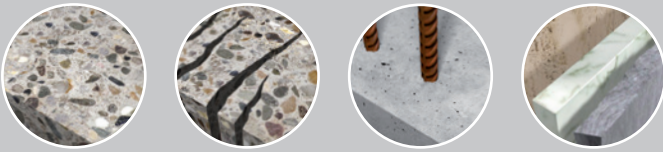
- The FCC-H is a reinforcement bar with flange head for connecting a concrete cover to the existing concrete structure.
- The concrete-concrete shear connector FCC-H is approved for building renovation, e. g. the renovation of bridges, the increase of load capacity of ceilings or to reinforce supports.

#### Internal threaded anchor RG MI

- The internal threaded anchor RG MI is available in sizes M8 – M20 made of galvanised or stainless steel A4.
- In combination with metric screws or threaded rods, RG MI can be used to create removable fixings.

# fischer FIS EM Plus Installation

## Building materials



### Approved for anchoring in:

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

### Also suitable for:

- Natural stone with dense structure

## Function

- The epoxy resin 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 anchor rod and attachment is filled with FIS EM Plus.



Threaded rod FIS A

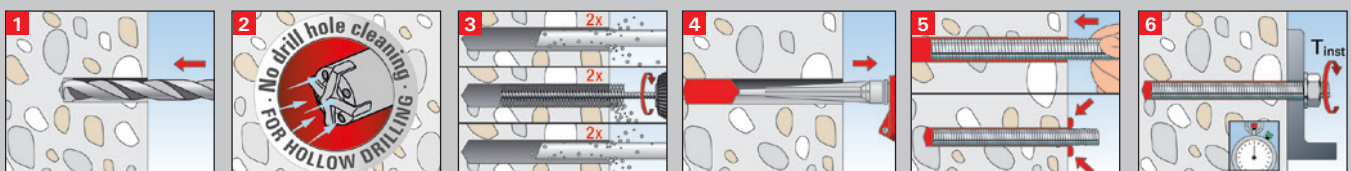
## Processing and curing times

Temperature at anchoring base [°C]	- 5 to -1 <sup>2)</sup>	0 to +4	+5 to +9	+ 10 to +19	+ 20 to + 29	+ 30 to +40
Maximum processing time [minutes]	180	150	120	30	14	7
Minimum curing time <sup>1)</sup> [hours]	200	90	40	18	10	5

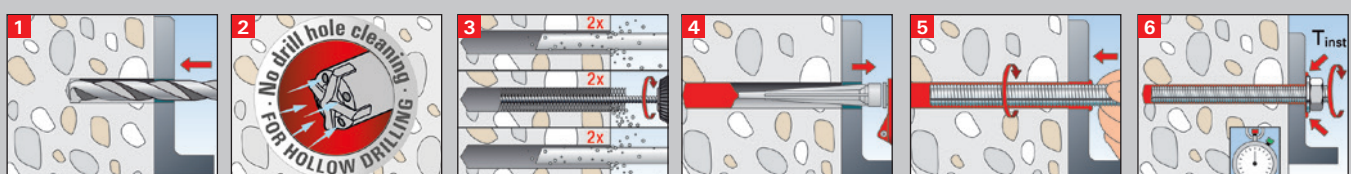
<sup>1)</sup> In damp concrete and water-filled drill holes, the curing time is to be doubled.

<sup>2)</sup> Not covered by ETA

## Pre-positioned installation

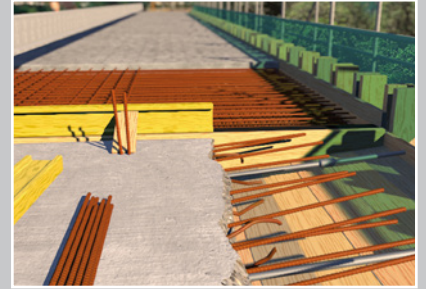
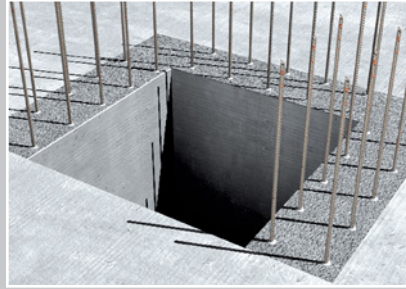
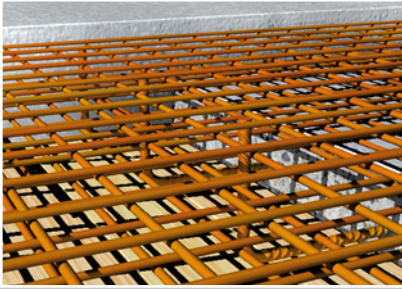


## Push-through installation

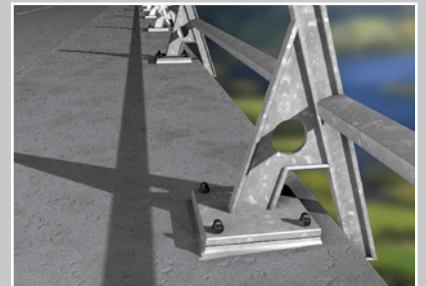


# fischer FIS EM Plus Applications

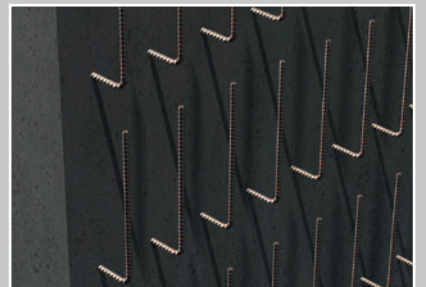
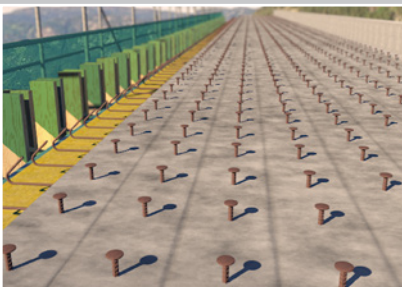
## Rebar connections



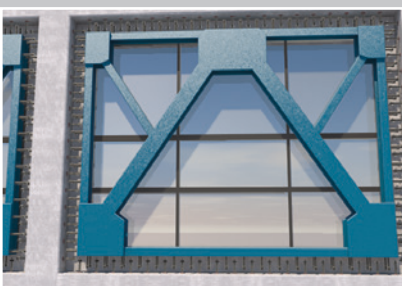
## Rail fixings, sound barriers and railings



## Shear connectors for concrete layers and needlings



## Seismic applications, diamond-drilled and water-filled drill holes



# fischer FIS EM Plus Assortment



FIS EM Plus 390 S



FIS EM Plus 585 S



FIS EM Plus 1500 S



FIS MR Plus



FIS UMR

## Epoxy mortar FIS EM Plus

Type	Art.-No.	Approval			Languages on the cartridge	Content	Sales unit [pcs]
		DIBt	ETA	ICC			
FIS EM Plus 390 S	544154	●	■	▲	DE, EN, FR, NL, ES, PT	1 cartridge 390 ml + 2 x mixing nozzles FIS MR Plus	6
FIS EM Plus 390 S	544155	●	■	▲	EN, ZH, EL, KO, CS, PL	1 cartridge 390 ml + 2 x mixing nozzles FIS MR Plus	6
FIS EM Plus 390 S	544176	●	■	▲	CS, SK, RO, AR, FR, EN	1 cartridge 390 ml + 2 x mixing nozzles FIS MR Plus	6
FIS EM Plus 390 S	544159	●	■	▲	LT, LV, ET, UK, RU, KK	1 cartridge 390 ml + 2 x mixing nozzles FIS MR Plus	6
FIS EM Plus 585 S	544166	●	■	▲	DE, EN, FR, NL, ES, PT	1 cartridge 585 ml + 2 x mixing nozzles FIS UMR	6
FIS EM Plus 585 S	544165	●	■	▲	EN, ZH, RU, KO, CS, PL	1 cartridge 585 ml + 2 x mixing nozzles FIS UMR	6
FIS EM Plus 585 S	544175	●	■	▲	EN, ZH, RU, KO, CS, PL	1 cartridge 585 ml + 1 x FIS UMR, 1 x extension tube Ø 9 x 250 mm	6
FIS EM Plus 1500 S	544167	●	■	–	DE, IT, FR, NL, CS, SK	1 cartridge 1500 ml + 2 x mixing nozzles FIS UMR	4
FIS EM Plus 1500 S	544173	●	■	–	EN, ES, PT, ZH, RU, PL	1 cartridge 1500 ml + 2 x mixing nozzles FIS UMR	4
FIS MR Plus	545853	–	–	–	–	10 mixing nozzles for FIS EM Plus 390 S	10
FIS UMR	520593	–	–	–	–	10 mixing nozzles for FIS EM Plus 585 S, FIS EM Plus 1500 S	10



FIS DM S



FIS AM



FIS DM S-L



FIS DCD S



FIS DP S-L



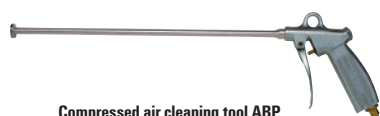
FIS AP



FIS DP S-XL

## Dispensers

Type	Art.-No.	Description	Sales unit [pcs]
FIS DM S	511118	Manual dispenser for FIS EM Plus 390 S	1
FIS AM	058000	Manual dispenser for FIS EM Plus 390 S	1
FIS DM S-L	510992	Manual dispenser for FIS EM Plus 585 S	1
FIS DCD S	543629	Battery dispenser with dosage function for FIS EM Plus 390 S	1
FIS DCD S Battery Pack	543946	Battery pack for dispenser FIS DCD S	1
FIS DP S-L	511125	Pneumatic dispenser for FIS EM Plus 585 S	1
FIS AP	058027	Pneumatic dispenser for FIS EM Plus 390 S	1
FIS DP S-XL	512401	Pneumatic dispenser for FIS EM Plus 1500 S	1



Compressed air cleaning tool ABP



Centring wedge

## Compressed air cleaning tool, blow-out pump and centring device

Type	Art.-No.	Description	Sales unit [pcs]
Compressed air cleaning gun ABP	59456	–	1
Centring device	093076	–	10



FIS A zinc-plated steel



FIS A stainless steel

Anchor rod FIS A for installation with FIS EM Plus

Type	Art.-No.			Drill hole diameter $d_0$ [mm]	Min. anchorage depth $h_{ef, min}$ [mm]	Max. usable length $t_{fix}, h_{ef, min}$ [mm]	Min. fill quantity FIS EM Plus $h_{ef, min}$ [scale units]	Max. anchorage depth $h_{ef, max}$ [mm]	Max. usable length $t_{fix}, h_{ef, max}$ [mm]	Max. fill quantity FIS EM Plus $h_{ef, max}$ [scale units]	Sales unit [pcs]
	Zinc-plated steel grade 5.8	Zinc-plated steel grade 8.8	Stainless steel A4-70								
FIS A M 8 x 90	090274	519390	090440	10	60	19	2	78	1	3	10
FIS A M 8 x 110	090275	519391	090441	10	60	39	2	98	1	3	10
FIS A M 8 x 130	090276	519392	090442	10	60	59	2	118	1	4	10
FIS A M 8 x 175	090277	519393	090443	10	60	104	2	160	4	5	10
FIS A M 8 x 1000	509214	509222	509230	10	60	-	2	160	-	5	10
FIS A M 10 x 110	090278	-	090444	12	60	37	3	96	1	4	10
FIS A M 10 x 130	090279	-	090447	12	60	57	3	116	1	5	10
FIS A M 10 x 150	090281	517935	090448	12	60	77	3	136	1	5	10
FIS A M 10 x 170	044969	519395	044973	12	60	97	3	156	1	6	10
FIS A M 10 x 190	-	517936	519420	12	60	117	3	176	1	7	10
FIS A M 10 x 200	090282	519396	090449	12	60	127	3	186	1	7	10
FIS A M 10 x 1000*	509215	509223	509231	12	60	-	3	200	-	7	10
FIS A M 12 x 120	044971	519397	044974	14	70	34	3	103	1	5	10
FIS A M 12 x 140	090283	519398	090450	14	70	54	3	123	1	6	10
FIS A M 12 x 160	090284	517937	090451	14	70	74	3	143	1	7	10
FIS A M 12 x 180	090285	519399	090452	14	70	94	3	163	1	7	10
FIS A M 12 x 200	-	517938	519421	14	70	114	3	183	1	8	10
FIS A M 12 x 210	090286	-	090453	14	70	124	3	193	1	9	10
FIS A M 12 x 260	090287	-	090454	14	70	174	3	240	4	10	10
FIS A M 12 x 1000*	509216	509224	509232	14	70	-	3	240	-	10	10
FIS A M 16 x 130	044972	519400	044975	18	80	30	5	109	1	7	10
FIS A M 16 x 175	090288	519401	090455	18	80	75	5	154	1	10	10
FIS A M 16 x 200	090289	517939	090456	18	80	100	5	179	1	11	10
FIS A M 16 x 250	090290	517940	090457	18	80	150	5	229	1	14	10
FIS A M 16 x 300	090291	519402	090458	18	80	200	5	279	1	17	10
FIS A M 16 x 1000*	509217	509225	509233	18	80	-	5	320	-	19	10
FIS A M 20 x 245	090292	519404	090459	24	90	131	11	220	1	28	10
FIS A M 20 x 290	090293	519406	090460	24	90	176	11	265	1	32	10
FIS A M 20 x 1000*	-	519410	519427	24	90	-	11	400	-	48	10
FIS A M 24 x 290	090294	-	090468	28	96	165	15	260	1	39	5
FIS A M 24 x 380	090295	-	090462	28	96	255	15	350	1	52	5
FIS A M 30 x 340	090296	-	090463	35	120	185	28	304	1	67	5
FIS A M 30 x 430	090297	-	090464	35	120	275	28	394	1	88	5


\* excluding nuts and washers - FIS A highly corrosion-resistant steel 1.4529 on request. Additional sizes on request.

# fischer FIS EM Plus

## Assortment



Nut and washer

Nut and washer for Anchor rod FIS A						
Type	Art.-No.		Width across nut  SW	Washer (outside-Ø x thickness) [mm]	Fits	Sales unit [pcs]
	Zinc-plated steel grade 8	Stainless steel A4-70				
Nut and washer M8	510509	510113	13	16 x 1.6	FIS A M8 x 1000	50
Nut and washer M10	510510	510514	17	20 x 2.0	FIS A M10 x 1000	50
Nut and washer M12	510511	510515	19	24 x 2.5	FIS A M12 x 1000	25
Nut and washer M16	510512	510516	24	30 x 3.0	FIS A M16 x 1000	20
Nut and washer M20	519737	519738	30	37 x 3.0	FIS A M20 x 1000	10



Rebar anchor FRA

Rebar anchor FRA for installation with FIS EM Plus								
Type	Art.-No.	Approval		Total length l [mm]	Max. fixing thickness t <sub>fix</sub> [mm]	Drill hole d <sub>0</sub> [Ø mm]	Fill quantity [Skalenteile]	Sales unit [pcs]
		DIBt	ETA					
FRA 12/900 M12-60*	505529	●	■	975	60	16	50	8
FRA 16/1100 M16-60*	505533	●	■	1180	60	20	81	8
FRA 20/1400 M20-60*	505534	●	■	1485	60	25	160	4

\* Concrete steel bar with threaded part made of friction-welded stainless steel A4.



Concrete-concrete shear connector FCC-H

Concrete-concrete shear connector FCC-H for installation with FIS EM Plus							
Type	Art.-No.	Approval DIBt	Nominal drill hole diameter [mm]	Bar diameter [mm]	Anchor length [mm]	Material	Sales unit [pcs]
FCC-H 12 x 230	520082	●	16	12	230	Reinforcement B 500 B	100
FCC-H 14 x 290 *	520083	●	18	14	290	Reinforcement B 500 B	50
FCC-H 16 x 360 *	520085	●	20	16	360	Reinforcement B 500 B	25

\*on request other sizes up to Ø 28 cm





RG M I zinc-plated steel



RG M I stainless steel

Internal threaded anchor RG MI for installation with FIS EM Plus

Type	Art.-No.		Connection thread	Drill hole diameter	Effective anchorage depth	Fill quantity	Min. bolt penetration	Max. bolt penetration	Sales unit
	Zinc-plated steel grade 5.8	Stainless steel A4-70							
RG 12 x 90 M8 I	050552	050565	M8	14	90	5	8	18	10
RG 16 x 90 M10 I	050553	050566	M10	18	90	7	10	23	10
RG 16 x 125 M12 I	050562	050567	M12	20	125	11	12	26	10
RG 22 x 160 M16 I	050563	050568	M16	24	160	17	16	35	5
RG 28 x 200 M20 I	050564	050569	M20	32	200	48	20	45	5



Cleaning brushes BS



SDS chuck

Cleaning brushes BS

Type	Art.-No.	Description	Fits	Drill hole diameter	Sales unit
				$d_0$	
				[Ø mm]	[pcs]
BS ø 10	078178	-	FIS A M 8 / RG M 5 I	10 mm	1
BS ø 12	078179	-	FIS A M 10 / RG M 6 I	12 mm	1
BS ø 14	078180	-	FIS A M 12 / RG M 8 I	14 mm	1
BS ø 18	078181	-	FIS A M 16 / RG M 10 I	16 / 18 mm	1
BS ø 20	052277	-	FIS A M 12 I	20 mm	1
BS ø 24	078182	-	FIS A M 20 / RG M 16 I	24 mm	1
BS ø 25	097806	-	FIS A M 20 / RG M I	27 mm	1
BS ø 28	078183	-	FIS A M 24/27	30 mm	1
BS ø 35	078184	-	FIS A M 30 / RG M 20 I	40 mm	1
SDS chuck	511961	with internal thread M8	-	-	1
Brush extension	508791	extension for deep drill holes	-	-	1

# fischer FIS EM Plus

## 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
		$h_{min}$ [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 $s_{er}$ [mm]		
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	8,6	90	185	180		
		110	80		7,2		120	170	240		
		190	160		13,8		115	480			
	A4-70	100	60		5,4	6,0	90	125	180		
		110	80		7,2		120	115	240		
		190	160		9,9		75	90	480		
	C-70	100	60		5,4	7,4	90	160	180		
		110	80		7,2		120	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	13,1	90	295	180		
		120	90		10,1		135	250	270		
		230	200		22,4		150	150	600		
	A4-70	100	60		6,7	9,2	90	195	180		
		120	90		10,1		135	165	270		
		230	200		15,7		90	115	600		
	C-70	100	60		6,7	11,4	90	250	180		
		120	90		10,1		135	215	270		
		230	200		19,5		125	135	600		

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 anchor 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).

<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  $w_k \sim 0,3\text{mm}$ .

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
		$h_{min}$ [mm]	$h_{ef}$ [mm]				Max. tension load $c$ [mm]	Max. shear load $c$ [mm]			
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	19,4	105	435	210		
		140	110		17,8		165	340	330		
		270	240		32,4		145	200	720		
	A4-70	100	70		10,0	13,7	105	295	210		
		140	110		17,8		165	230	330		
		270	240		22,5		75	150	720		
	C-70	100	70		10,0	17,1	105	380	210		
		140	110		17,8		165	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	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	24,5	120	495	240		
		170	125		24,0		190	400	375		
		360	320		42,0		25,2	215	960		
	C-70	120	80		12,3	24,5	120	495	240		
		170	125		24,0		190	515	375		
		360	320		52,4		31,4	175	270		

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 anchor rod R6 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).

<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  $w_k \sim 0,3\text{mm}$ .

# fischer FIS EM Plus

## 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
		$h_{min}$ [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 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		

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 anchor 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).

<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  $w_k \sim 0,3\text{mm}$ .

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
		$h_{min}$ [mm]	$h_{ef}$ [mm]				Max. tension load $c$ [mm]	Max. shear load $c$ [mm]			
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 anchor rod R6 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).

<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  $w_k \sim 0,3\text{mm}$ .

# fischer FIS EM Plus

## Loads

Injection systems FIS EM Plus, FIS RC, FIS SB, FIS V and FIS VS LOW SPEED with reinforcing steel B500B<sup>5)</sup>  
in accordance with rebar theory

Design resistances and permissible loads <sup>1) 6)</sup> of single, post-installed rebars in cracked or non-cracked normal concrete of the strength class C20/25 <sup>2)</sup>				
Reinforcing steel B500B  $f_{yk} / f_{tk} =$ 500 / 540 N/mm <sup>2</sup>	Basic value for the anchorage length for FIS EM Plus  $l_{b,reqd}$ <sup>4)</sup> [mm]	Maximum anchorage depth  $l_{v,max}$ [mm]	Maximum design resistance for axial tensile load  $N_{Rd,s}$ <sup>3)</sup> [kN]	Maximum permissible tensile load  $N_{perm,s}$ <sup>3)</sup> [kN]
Ø 8 mm	378	1800 (3000) <sup>8)</sup>	21,9	15,6
Ø 10 mm	473	1800 (3000) <sup>8)</sup>	34,1	24,4
Ø 12 mm	567	1800 (3000) <sup>8)</sup>	49,2	35,1
Ø 14 mm	662	1800 (3000) <sup>8)</sup>	66,9	47,8
Ø 16 mm	756	1800 (3000) <sup>8)</sup>	87,4	62,4
Ø 20 mm	945	1800 (3000) <sup>8)</sup>	136,6	97,6
Ø 22 mm <sup>7)</sup>	1040	2000	165,3	118,1
Ø 24 mm <sup>7)</sup>	1134	2000	196,7	140,5
Ø 25 mm	1181	2000 (3000) <sup>8)</sup>	213,4	152,4
Ø 26 mm <sup>7)</sup>	1229	2000	230,8	164,9
Ø 28 mm	1323	2000 (3000) <sup>8)</sup>	267,7	191,2
Ø 30 mm <sup>7)</sup>	1418	2000	307,3	219,5
Ø 32 mm <sup>9)</sup>	1512	2000 (3000) <sup>8)</sup>	349,7	249,8
Ø 34 mm <sup>7)</sup>	1607	2000	394,7	282,0
Ø 36 mm <sup>7)</sup>	1701	2000	442,6	316,1
Ø 40 mm <sup>7)</sup>	1890	2000	546,4	390,3

For planning and design the complete European Technical Assessments ETA-17/1056 (FIS EM Plus), ETA-13/0651 (FIS SB) or resp. ETA-08/0266 (FIS V and FIS VS LOW SPEED) have to be considered. For determination of the installation parameters (minimum concrete cover, distances, etc.) as well as required transverse reinforcement see EN 1992-1-1 and general installation rules of the assessments.

<sup>1)</sup> The partial safety factors for resistance taken from the European standard EN 1992-1-1 as well as a partial safety factor for action of  $\gamma_f = 1,4$  are considered.

<sup>2)</sup> The ETAs for FIS EM Plus, FIS SB, FIS V and FIS VS LOW SPEED permit post-installed rebar connections in concrete C12/15 up to C50/60. The above mentioned basic value for anchorage length changes depending on the relevant concrete strength class.

<sup>3)</sup> For utilisation of the full steel capacity.

<sup>4)</sup> Basic value of the anchorage length in accordance with EN 1992-1-1, section 8.4.3 for concrete strength class C20/25 and good bond conditions.

<sup>5)</sup> Reinforcing steel with characteristic yield strength  $f_{yk} = 400 - 600$  N/mm<sup>2</sup> in accordance with EN 1992-1-1 Annex C, Table C.1 and C.2N is approved. The above mentioned basic value for the anchorage length as well as maximum steel resistance (see foot not 3) will change accordingly.

<sup>6)</sup> With FIS EM Plus, FIS SB, FIS V or FIS VS LOW SPEED post-installed rebars are approved in dry or wet concrete with temperatures up to +50 °C (resp. short term up to +80 °C) and drill hole cleaning in accordance with ETA.

<sup>7)</sup> Only FIS EM Plus.

<sup>8)</sup> Values in brackets apply for FIS SB.

<sup>9)</sup> Only FIS EM Plus or FIS SB.



# fischer FIXPERIENCE

## The design and information software suite



- The modular design program includes engineering software and application modules.
- The software is based on international design standards (ETAG 001, EC1, EC2, EC3 and EC5), including the national application documents. All common force and measurement units are available.
- Incorrect input will be recognized and the software gives tips to get a correct result. This ensures a safe and reliable design every time.
- The graphical display can easily be rotated through 360°, panned, tilted or zoomed as required.
- The 3D display gives a detailed and realistic image.
- The "live update" feature helps to keep the program up to date ensuring you are always working with the latest version.
- Free download and updates at [www.fischer.de/fixperience-en](http://www.fischer.de/fixperience-en)

## Our service to you



We are available to you at any time as a reliable partner to offer technical support and advice:

- Our products range from chemical resin systems to steel anchors through to nylon anchors.
- Competence and innovation through own research, development and production.
- Global presence and active sales service in over 100 countries.
- Qualified technical consulting for economical and compliant fastening solutions. Also on-site at the construction site if requested.
- Training sessions, some with accreditation, at your premises or at the fischer academy.
- Design and construction software for demanding applications.

## This is what fischer stands for



FIXING SYSTEMS



AUTOMOTIVE SYSTEMS



FISCHERTECHNIK



CONSULTING



MASONRY FIXINGS

See the extensive main catalogue or visit our website at [www.fischer-international.com](http://www.fischer-international.com) for information about the complete fischer range