

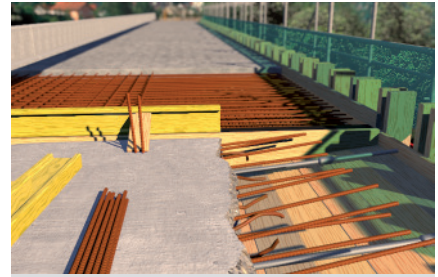
The powerful injection mortar for rebar connections and cracked concrete

Chemical fixings

3



Rail fastenings



Rebar connections

BUILDING MATERIALS

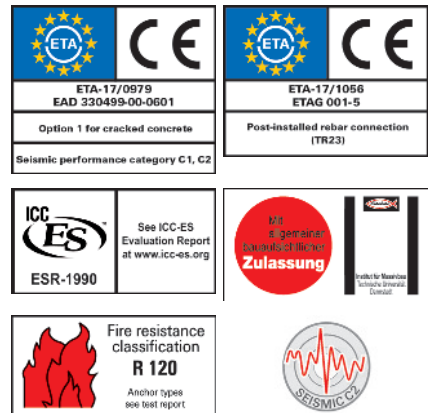
Approved for anchorings in:

- 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 0 °C (outside of the assessment even 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.

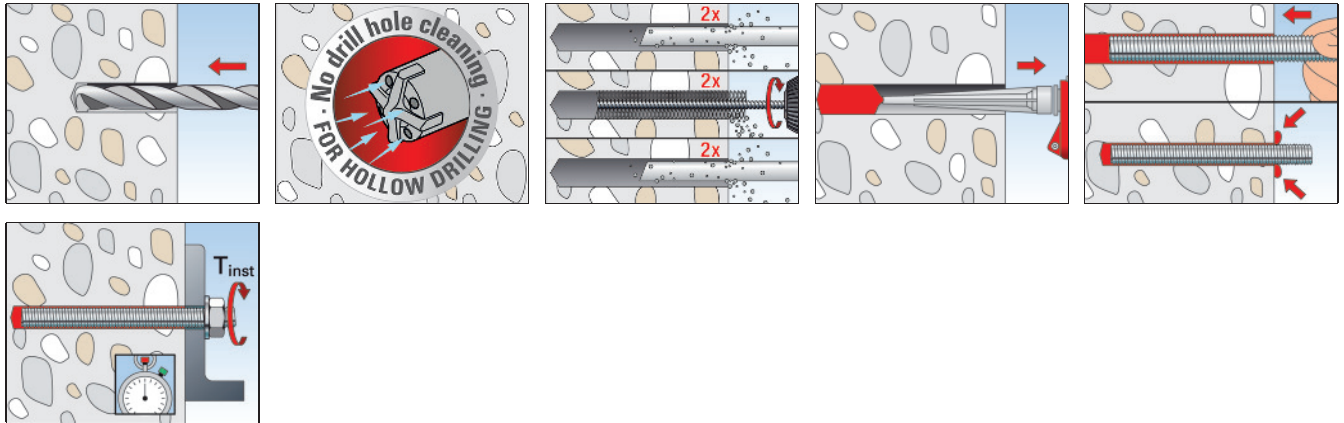
APPLICATIONS

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

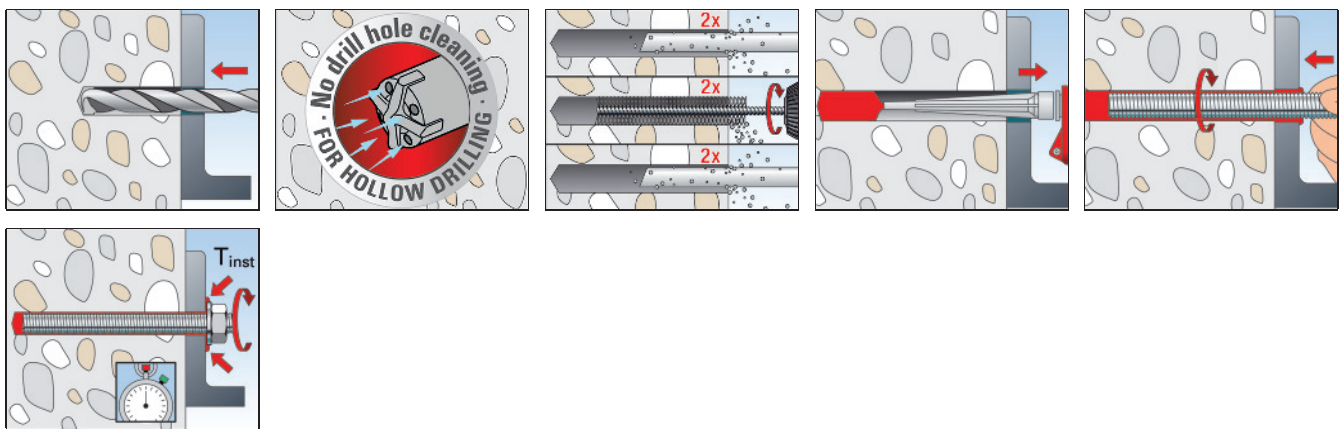
FUNCTIONING

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

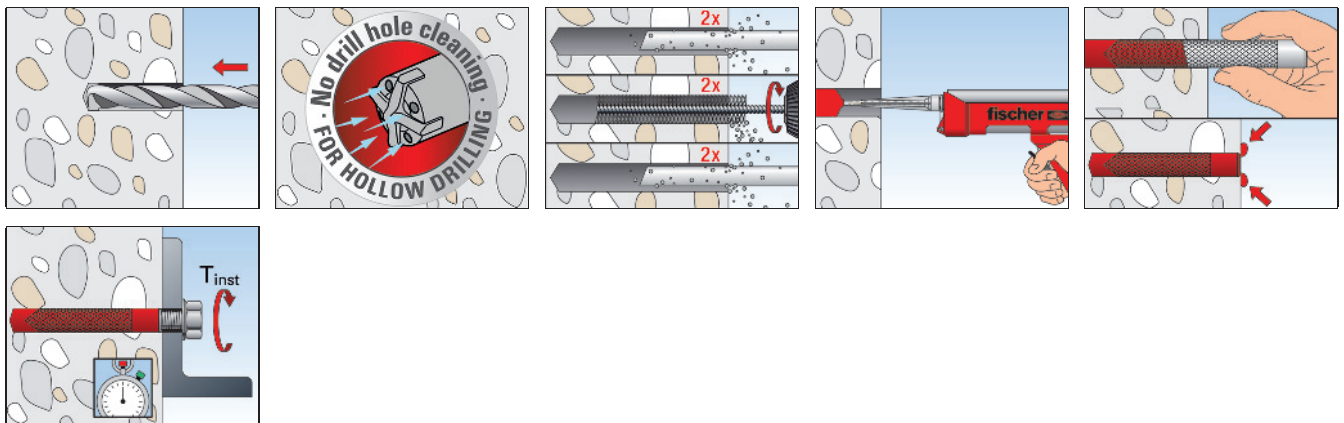
PRE-POSITIONED INSTALLATION: FIS A



PUSH-THROUGH INSTALLATION: FIS A



INSTALLATION: 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



Static mixer **FIS MR Plus**



Static mixer **FIS UMR**

Item	Art.-No.	Approval			Languages on the cartridge	Scale unit	Contents	Sales unit [pcs]
		DIBt	ETA	ICC				
FIS EM Plus 390 S	544154	●	■	▲	DE, EN, FR, NL, ES, PT	180	1 cartridge 390 ml, 2 x FIS MR Plus	6
FIS EM Plus 390 S	544155	●	■	▲	EN, ZH, EL, KO, CS, PL	180	1 cartridge 390 ml, 2 x FIS MR Plus	6
FIS EM Plus 390 S	544176	●	■	▲	CS, SK, RO, AR, FR, EN	180	1 cartridge 390 ml, 2 x FIS MR Plus	6
FIS EM Plus 390 S	544159	●	■	▲	LT, LV, ET, UK, RU, KK	180	1 cartridge 390 ml, 2 x FIS MR Plus	6
FIS EM Plus 585 S	544166	●	■	▲	DE, EN, FR, NL, ES, PT	270	1 cartridge 585 ml + 2 x FIS UMR	6
FIS EM Plus 585 S	544165	●	■	▲	EN, ZH, RU, KO, CS, PL	270	1 cartridge 585 ml + 2 x FIS UMR	6
FIS EM Plus 585 S	544175	●	■	▲	EN, ZH, RU, KO, CS, PL	270	1 cartridge 585 ml, 1 x FIS UMR, 1 x extension tube Ø 9x250 mm	6
FIS EM Plus 1500 S	544167	●	■	—	DE, IT, FR, NL, CS, SK	700	1 cartridge 1500 ml, 2 x FIS UMR	4
FIS EM Plus 1500 S	544173	●	■	—	EN, ES, PT, ZH, RU, PL	700	1 cartridge 1500 ml, 2 x FIS UMR	4
FIS MR Plus	545853	—	—	—	—	—	10 static mixer FIS MR Plus for 390 ml cartridges	10
FIS UMR	520593	—	—	—	—	—	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 [pcs]
		DIBt	ETA	ICC			
FIS EM Plus 390 S HWK big	544156	●	■	▲	EN, ZH, EL, KO, CS, PL	20 cartridges 390 ml, 20 x FIS MR Plus	1
FIS EM Plus 390 S in bucket	544172	●	■	▲	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 ¹⁾	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.

¹⁾ Without approval

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.

TECHNICAL DATA



Threaded rod FIS A

	Zinc plated, steel grade 5.8 Art.-No.	Zinc plated, steel grade 8.8 Art.-No.	stainless steel Art.-No.	Approval		Drill hole diame- ter FIS EM Plus [mm]	Min. / max. anchorage depth [mm]	Min. / max. usable length [mm]	Min. / max. filling quantity FIS EM [scale units]	Sales unit [pcs]
Item	gvz	gvz	A4	ETA	ICC					
FIS A M 8 x 90	090274	519390	090440	■	▲	10	60 / 78	1 / 19	2 / 3	10
FIS A M 8 x 110	090275	519391	090441	■	▲	10	60 / 98	1 / 39	2 / 3	10
FIS A M 8 x 130	090276	519392	090442	■	▲	10	60 / 118	1 / 59	2 / 4	10
FIS A M 8 x 175	090277	519393	090443	■	▲	10	60 / 160	4 / 104	2 / 5	10
FIS A M 8 x 1000	509214 ¹⁾	—	509230 ¹⁾	■	▲	10	60 / 160	—	2 / 5	10
FIS A M 10 x 110	090278	—	090444	■	▲	12	60 / 96	1 / 37	3 / 4	10
FIS A M 10 x 130	090279	524170	090447	■	▲	12	60 / 116	1 / 57	3 / 5	10
FIS A M 10 x 150	090281	517935	090448	■	▲	12	60 / 136	1 / 77	3 / 5	10
FIS A M 10 x 170	044969	519395	044973	■	▲	12	60 / 156	1 / 97	3 / 6	10
FIS A M 10 x 190	—	517936	—	■	▲	12	60 / 176	1 / 117	3 / 7	10
FIS A M 10 x 200	090282	519396	090449	■	▲	12	60 / 186	1 / 127	3 / 7	10
FIS A M 10 x 1000	509215 ¹⁾	509223 ¹⁾	509231 ¹⁾	■	▲	12	60 / 200	—	3 / 7	10
FIS A M 12 x 120	044971	519397	044974	■	▲	14	70 / 103	1 / 34	3 / 5	10
FIS A M 12 x 140	090283	519398	090450	■	▲	14	70 / 123	1 / 54	3 / 6	10
FIS A M 12 x 160	090284	517937	090451	■	▲	14	70 / 143	1 / 74	3 / 7	10
FIS A M 12 x 180	090285	519399	090452	■	▲	14	70 / 163	1 / 94	3 / 7	10
FIS A M 12 x 200	—	517938	519421	■	▲	14	70 / 183	1 / 114	3 / 8	10
FIS A M 12 x 210	090286	—	090453	■	▲	14	70 / 193	1 / 124	3 / 9	10
FIS A M 12 x 260	090287	—	090454	■	▲	14	70 / 240	4 / 174	3 / 10	10
FIS A M 12 x 1000	509216 ¹⁾	509224 ¹⁾	509232 ¹⁾	■	▲	14	70 / 240	—	3 / 10	10
FIS A M 16 x 130	044972	519400	044975	■	▲	18	80 / 109	1 / 30	5 / 7	10
FIS A M 16 x 175	090288	519401	090455	■	▲	18	80 / 154	1 / 75	5 / 10	10
FIS A M 16 x 200	090289	517939	090456	■	▲	18	80 / 179	1 / 100	5 / 11	10
FIS A M 16 x 250	090290	517940	090457	■	▲	18	80 / 229	1 / 150	5 / 14	10
FIS A M 16 x 300	090291	519402	090458	■	▲	18	80 / 279	1 / 200	5 / 17	10
FIS A M 16 x 1000	509217 ¹⁾	509225 ¹⁾	509233 ¹⁾	■	▲	18	80 / 320	—	5 / 19	10
FIS A M 20 x 245	090292	519404	090459	■	▲	24	90 / 220	1 / 131	11 / 28	10
FIS A M 20 x 290	090293	519406	090460	■	▲	24	90 / 265	1 / 176	11 / 32	10
FIS A M 20 x 1000	—	519410 ¹⁾	519427 ¹⁾	■	▲	24	90 / 400	—	11 / 48	10
FIS A M 24 x 290	090294	—	090461	■	▲	28	96 / 260	1 / 165	15 / 39	5
FIS A M 24 x 380	090295	—	090462	■	▲	28	96 / 350	1 / 255	15 / 52	5
FIS A M 24 x 1000	533881	—	—	■	▲	28	96 / 480	—	15 / 69	10
FIS A M 30 x 430	090297	—	090464	■	▲	35	120 / 394	1 / 275	28 / 88	5

¹⁾ Order washer and nut separately.

TECHNICAL DATA



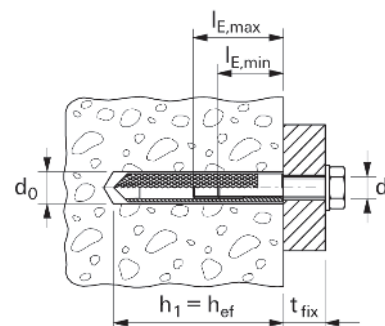
Hexagonal nut and washer

	Zinc plated, steel grade 8.8 Art.-No.	Stainless steel Art.-No.	Width across nut ○ SW [mm]	Washer (outer diameter x thickness) [mm]	Match	Sales unit [pcs]
Item	gvz	A4				
Nut & washer M8	510509	510513	13	16 x 1,6	FIS A M8	50
Nut & washer M10	510510	510514	17	20 x 2	FIS A M10	50
Nut & washer M12	510511	510515	19	24 x 2,5	FIS A M12	25
Nut & washer M16	510512	510516	24	30 x 3	FIS A M16	20
Nut & washer M20	519737	519738	30	37 x 3	FIS A M 20	10

TECHNICAL DATA



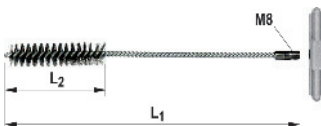
Internal threaded anchor **RG M I**



	Zinc-plated steel Art.-No.	Stainless steel Art.-No.	Approval ETA	Drill hole diameter d ₀ [mm]	Min. bolt penetration l _{E,min} [mm]	Max. bolt penetration l _{E,max} [mm]	Fill quantity [scale units]	Sales unit [pcs]
Item	gvz	A4						
RG 8 x 75 M 5 I	048221 1)	—	—	10	8	14	3	10
RG 10 x 75 M 6 I	048222 1)	—	—	12	10	16	3	10
RG 12 x 90 M 8 I	050552 1)	050565 1)	—	14	8	18	3	10
RG 16 x 90 M 10 I	050553 1)	050566 1)	—	18	10	23	4	10
RG 18 x 125 M 12 I	050562 1)	050567 1)	—	20	12	26	6	10
RG 22 x 160 M 16 I	050563 1)	050568 1)	—	24	16	35	8	5
RG 28 x 200 M 20 I	050564 1)	050569 1)	—	32	20	45	24	5

1) Setting tool is included in each package.

ACCESSORIES DRILL HOLE CLEANING



Cleaning brush **BS**

Item	Art.-No.	Length L ₁ [mm]	Length L ₂ [mm]	Brush diameter [mm]	For drill diameter [mm]	Sales unit [pcs]
BS ø 10	078178	120	50	11	10	1
BS ø 12	078179	150	80	13	12	1
BS ø 14	078180	250	80	16	14	1
BS ø 16/18	078181	250	80	20	16/18	1
BS ø 24	078182	300	100	26	24	1
BS ø 28	078183	350	100	30	28	1
BS ø 35	078184	400	100	40	30/32/35	1



Cleaning brush with thread M 8



SDS-Adapter M8

Item	Art.-No.	Brush diameter [mm]	For drill diameter [mm]	Sales unit [pcs]
BSB for drill-Ø 40 mm	505061	42	40	1
BSB for drill-Ø 45 mm	506254	47	45	1
BSB for drill-Ø 55 mm	505062	58	55	1
FIS brush extension	508791	—	—	1
SDS Chuck	530332	—	—	1

3

Chemical fixings



Compressed-air cleaning tool **ABP**

Item	Art.-No.	Match	Sales unit [pcs]
Compressed-air cleaning tool ABP	059456	FIS A M 16 - M 30	1

DISPENSER



Dispenser **FIS DM S**



Dispenser **FIS AM**



FIS DCD S

Item	Art.-No.	Adapted for	Performance data	Sales unit [pcs]
FIS DM S	511118	FIS V 360 S, FIS HB 345 S, FIS HB 150 C, FIS EM Plus 390 S, FIS VS 150 C, FIS P 360 S, FIS P 300 T, FIS SB 390 S, FIS PM 360 S, FIS VL 300 T and 1K-cartridges	—	1
FIS AM	058000	FIS V 360 S, FIS HB 345 S, FIS HB 150 C, FIS EM Plus 390 S, FIS VS 150 C, FIS VW 360 S, FIS P 360 S, FIS P 300 T, FIS SB 390 S, FIS PM 360 S, FIS VL 300 T and 1K-cartridges	—	1
FIS DCD S	543629	Cartridges with 150ml, 300ml, 360ml and 390ml content	—	1
Battery Pack for FIS DCD S	543946	FIS DCD S	Battery pack 7,2 V // Li-ION	1



Pneumatic dispenser **FIS AP**



Dispenser **FIS DM S-L**



Dispenser **FIS DP S-L**

Item	Art.-No.	Adapted for	Performance data	Sales unit [pcs]
FIS AP	058027	FIS V 360 S, FIS HB 345 S, FIS HB 150 C, FIS EM Plus 390 S, FIS VS 150 C, FIS VW 360 S, FIS P 360 S, FIS P 300 T, FIS SB 390 S, FIS PM 360 S, FIS VL 300 T and 1K-cartridges	Recommended pressure 6 bar air consumption max. 40 l/min	1
FIS DM S-L	510992	FIS EM Plus 585 S / FIS SB 585 S	—	1
FIS DP S-L	511125	FIS EM Plus 585 S / FIS SB 585 S	Recommended pressure 6 bar	1



Pneumatic dispenser **FIS DP S-XL**

Item	Art.-No.	Adapted for	Performance data	Sales unit [pcs]
FIS DP S-XL	512401	FIS SB 1500 S, FIS EM Plus 1500 S	Recommended pressure 6 bar air consumption max. 40 l/min	1

ACCESSORIES



Injection adapter
for drill Ø 12 - 25 mm



Injection adapter f
or drill Ø 30 - 55 mm



Extension tube

Item	Art.-No.	Colour	Length [mm]	Sales unit [pcs]
Injection-adapter (Ø 9) for drill-Ø 12 mm	001497	ecru	-	10
Injection-adapter (Ø 9) for drill-Ø 14 mm	001498	blue	-	10
Injection-adapter (Ø 9) for drill-Ø 16 mm	001499	red	-	10
Injection-adapter (Ø 9) for drill-Ø 18 mm	001483	yellow	-	10
Injection-adapter (Ø 9) for drill-Ø 24 mm	520944	transparent	-	10
Injection-adapter (Ø 15) for drill-Ø 24 mm	520945	transparent	-	10
Injection-adapter (Ø 9) for drill-Ø 25 mm	001507	black	-	10
Injection-adapter (Ø 15) for drill-Ø 25 mm	001509	black	-	10
Injection-adapter (Ø 9) for drill-Ø 28 mm	520946	transparent	-	10
Injection-adapter (Ø 15) for drill-Ø 28 mm	520947	transparent	-	10
Injection-adapter (Ø 9) for drill-Ø 30 mm	090689	grey	-	10
Injection-adapter (Ø 15) for drill-Ø 30 mm	090700	grey	-	10
Injection-adapter (Ø 9) for drill-Ø 35 mm	090699	brown	-	10
Injection-adapter (Ø 15) for drill-Ø 35 mm	090701	brown	-	10
FIS Extension tube	048983	-	1000	10
FIS EXT Ø 15	530800	transparent	10000	1

LOADS

Injection system FIS EM Plus: Injection resin FIS EM Plus with Threaded rod FIS A²⁾

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) ^{1) 3) 4) 8)}										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 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			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		
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			215	960		
	C-70	120	80		12,3	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 A²⁾

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) ^{1) 3) 4) 8)}										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		
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		

LOADS

Injection system FIS EM Plus: Injection resin FIS EM Plus with Threaded rod FIS A²⁾

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) ^{1) 3) 4) 8)}										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 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. ⁷⁾

¹⁾ 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.

²⁾ Also valid for anchor rod RG M in the same property class.

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

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

⁵⁾ 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.

⁶⁾ Minimum possible axial spacings resp. edge distance while reducing the permissible load.

⁷⁾ 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).

⁸⁾ 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 $w_k \sim 0,3\text{mm}$.

LOADS

Injection system FIS EM Plus: Injection resin FIS EM Plus with Threaded rod FIS A²⁾

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) ^{1) 3) 4)}										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 8	5.8	100	60	10	9,0	5,1	75	70	180	40	40
		110	80				55		240		
		190	160				40	60	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				110	100	240		
		190	160		12,4		40	80	480		

LOADS

Injection system FIS EM Plus: Injection resin FIS EM Plus with Threaded rod FIS A²⁾

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) ^{1) 3) 4)}										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 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		22,4		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				190	145	270		
		230	200		19,5		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		
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		285	405	375		
		360	320		60,0		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		270		
		220	170		53,3		385	525	510		
		450	400		93,3		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		385	455	510		
		450	400		81,9		135	260	1200		

LOADS

Injection system FIS EM Plus: Injection resin FIS EM Plus with Threaded rod FIS A²⁾

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) ^{1) 3) 4)}										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 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		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		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		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		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		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		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		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		355	385	1620		
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. ⁷⁾

¹⁾ 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.

²⁾ Also valid for anchor rod RG M in the same property class.

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

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

⁵⁾ 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.

⁶⁾ Minimum possible axial spacings resp. edge distance while reducing the permissible load.

⁷⁾ 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) ^{1) 2) 3) 7)}										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			
		h_{min} [mm]	h_{ef} [mm]	T_{max} [Nm]	$N_{perm}^{4)}$ [kN]	$V_{perm}^{4)}$ [kN]			Max. Load s_{cr} [mm]	$s_{min}^{5)}$ [mm]	$c_{min}^{5)}$ [mm]
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	8,3	135	135	270	65	65
	8.8					13,3		235			
	A4-70					9,3		155			
RG M12 I	5.8	170	125	40	20,2	12,1	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	22,4	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	35,4	300	380	600	125	125
	8.8					42,9		480			
	A4-70					39,4		430			

For the design the complete assessment ETA-17/0979 has to be considered. ⁶⁾

¹⁾ 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.

²⁾ For higher concrete strength classes up to C50/60 higher permissible loads may be possible.

³⁾ Drill method hammer drilling resp. hollow drilling. For further allowable drill methods and application conditions see ETA-17/0979.

⁴⁾ 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.

⁵⁾ Minimum possible axial spacings resp. edge distance while reducing the permissible load.

⁶⁾ 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).

⁷⁾ 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) ^{1) 2) 3)}										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
		h_{min} [mm]	h_{ef} [mm]	T_{max} [Nm]	$N_{perm}^{4)}$ [kN]	$V_{perm}^{4)}$ [kN]	Max. tension load c [mm]	Max. shear load c [mm]	Max. Load s_{cr} [mm]	$s_{min}^{5)}$ [mm]	$c_{min}^{5)}$ [mm]
RG M8 I	5.8	120	90	10	9,0	5,3	55	65	270	55	55
	8.8				13,8	8,3	110	95			
	A4-70				9,9	5,9	55	70			
RG M10 I	5.8	130	90	20	13,8	8,3	105	90	270	65	65
	8.8				20,5	13,3	190	155			
	A4-70				15,7	9,3	130	100			
RG M12 I	5.8	170	125	40	20,5	12,1	130	110	375	75	75
	8.8				32,4	19,3	265	190			
	A4-70				22,5	13,5	155	125			
RG M16 I	5.8	210	160	80	37,6	22,4	255	180	480	95	95
	8.8				48,7	30,9	365	265			
	A4-70				42,0	25,1	300	205			
RG M20 I	5.8	270	200	120	58,6	35,4	365	245	600	125	125
	8.8				68,0	42,9	445	315			
	A4-70				65,7	39,4	430	285			

For the design the complete assessment ETA-17/0979 has to be considered. ⁶⁾

¹⁾ 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.

²⁾ For higher concrete strength classes up to C50/60 higher permissible loads may be possible.

³⁾ Drill method hammer drilling resp. hollow drilling. For further allowable drill methods and application conditions see ETA-17/0979.

⁴⁾ 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.

⁵⁾ Minimum possible axial spacings resp. edge distance while reducing the permissible load.

⁶⁾ 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).