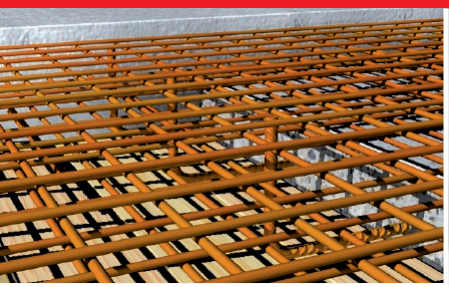
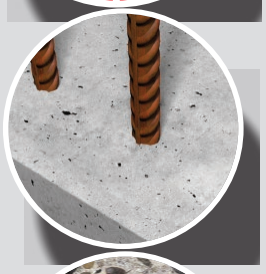


fischer Injection System FIS EM

Ideal for concrete connections



ETA-10/0012
ETAG 001-5

Option 1 for cracked concrete

ETA-09/0089
ETAG 001-5

Post-installed rebar connection (TR23)

Fire resistance classification
R 120
Anchor types see test report

ICC ES
ESR-1990

See ICC-ES Evaluation Report at www.ic-es.org

Inspection agency: IEA (AA-707)

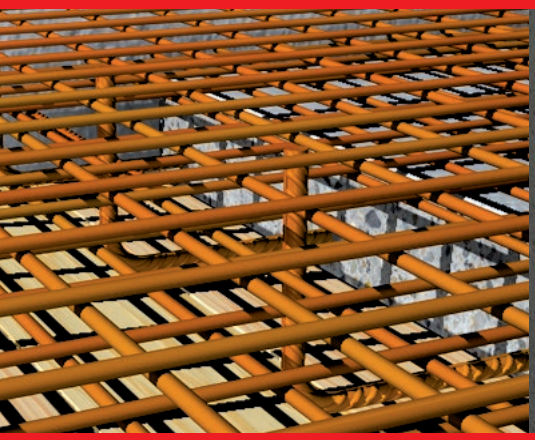
Mit allgemeiner bauaufsichtlicher Zulassung

fischer

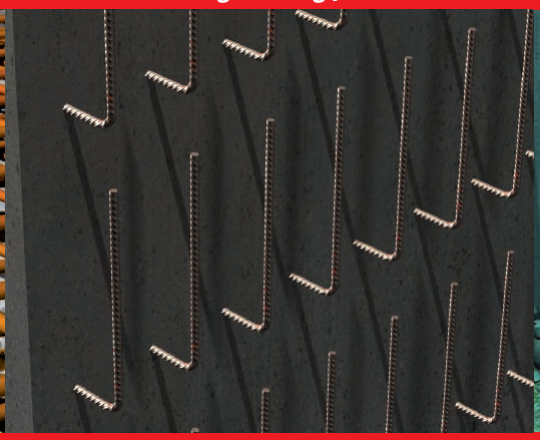
innovative solutions

fischer injection system FIS EM: Powerful for rebar connections. Solution required?

Rebar connections



Structural strengthening / connection



Water-filled drill holes

Diamond-drilled drill holes

Extreme loads

For concrete overlays

Solution found!

The epoxy resin FIS EM is a special resin for post-installed rebar connections of all types and applications, which place extreme demands on an injection system. In combination with the extensive range of accessories, it also develops its full power, in conventional applications.

Specialist for post-installed reinforcement
Extended processing times and extremely low shrinkage predestine the FIS EM mortar perfectly for deep suits depths (≤ 2.0 m) and drill hole diameters (≤ Ø 55 mm), which are common with post-installed rebar connections. Cleaning with hammer-drilled drill holes is reduced to a minimum. No brushing – this saves costly installation time. Approved for use with reinforcement bars Ø 8 – Ø 40mm or rebar anchors FRA.

Rebar anchor FRA

- Perfect combination of metric connection threads made of stainless steel and reinforcement bars in sizes M12 – M24.
- Enables fixing of anchor plates to transfer the introduced loads into the existing reinforcement in the concrete member.

Specialist for structural strengthening
The concrete connector FCC is approved for reconstruction or increasing the load bearing capacity of concrete structures and concrete members.

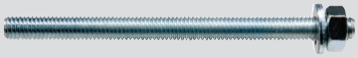
Concrete connector FCC

- Flanged headed reinforcement bar FCC-H in sizes Ø 10 – Ø 28mm or FCC-A consisting of anchor rods and nuts in sizes M10 – M30.
- For connecting a concrete overlay with the existing concrete structure.

Specialist for applications with extreme requirements
The epoxy resin mortar FIS EM is approved for installation even under extreme conditions, such as in water-filled or diamond-drilled drill holes. Again a test report for anchorings exposed to seismic loads is available.

Also for conventional anchorings in cracked and non-cracked concrete
The extremely high performance of the resin, the extensive range of accessories, and the simple processing also ensure a broad and cost-effective range of application in cracked and non-cracked concrete.

Anchor rods FIS A / RG M

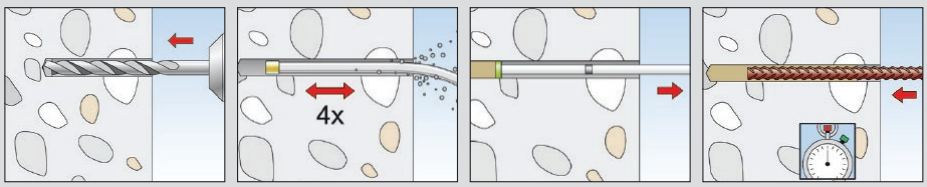


- Anchor rods, zinc-plated or made of stainless steel A4 of M8 – M30 in different lengths provide a high degree of flexibility.
- Variable embedment depths from 60 – 600 mm enable design optimalisation in line with load requirement and reduction of costly drilling work and installation times.

Internal threaded anchor RG MI

- Internal threaded anchor, zinc-plated or made of stainless steel A4 M8 – M20.
- Metric internal threads suitable for common metric screws and threaded rods.
- Allows removable connections.

Installation with injection mortar FIS EM in hammer-drilled drill hole



ETA-10/0012
ETAG 001-5
Option 1 for cracked concrete

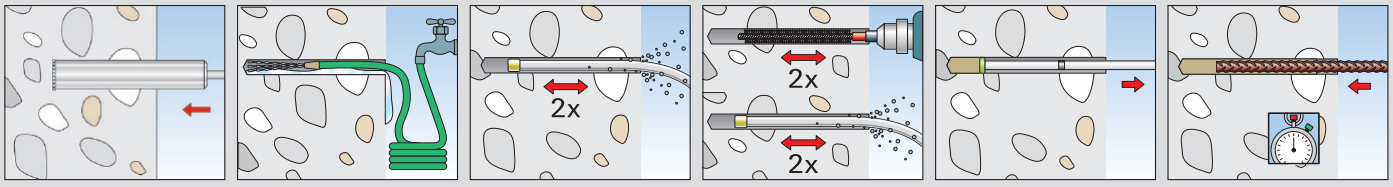
ETA-09/0089
ETAG 001-5
Post-installed rebar connection (TR23)

Fire resistance classification R 120
Anchor types see test report

ICC ES ESR-1990
See ICC-ES Evaluation Report at www.icc-es.org
Inspection agency: IEA (AA-707)

Mit allgemeiner bauaufsichtlicher Zulassung

Installation with injection mortar FIS EM in diamond-drilled drill hole



fischer injection system FIS EM: Full range

Processing and curing times

System temperature [°C]	+5 to +10	> +10 to +20	> +20 to +30	> +30 to +40
Maximum processing time [minutes]	120	30	14	7
Minimum curing time [1] [hours]	40	18	10	5

[1] In damp concrete and water-filled drill holes, the curing time is to be doubled.

FIS EM 390 S

FIS EM 585 S

FIS EM 1500 S

FIS Mixer Red

Ultra Mixer Red

Injection mortar FIS EM

Type	Art. No.	Approval			Languages on the cartridge	Contents	Sales unit
		DIBt	ETA	ICC			[pcs]
FIS EM 390 S	093048	●	■	▲	D, GB, F, NL, E, P	1 cartridge 390 ml + 2 x mixing nozzles	6
FIS EM 390 S	093049	●	■	▲	GB, CZ, PL, GR, PRC, ROK	1 cartridge 390 ml + 2 x mixing nozzles	6
FIS EM 390 S	502289	●	■	▲	LT, LV, EE, UA, RUS, KZ	1 cartridge 390 ml + 2 x mixing nozzles	6
FIS EM 585 S	508831	●	■	▲	D, GB, F, NL, E, P	1 cartridge 585 ml + 2 x mixing nozzles	6
FIS EM 585 S	509266	●	■	▲	GB, PRC, RU, ROK, CZ, PL	1 cartridge 585 ml + 2 x mixing nozzles	6
FIS EM 585 S	535514	●	■	▲	GB, PRC, RU, ROK, CZ, PL	1 cartridge 585 ml + 1 x FIS UMR, 1 x extension tube Ø 9x250mm	6
FIS EM 1500 S	512080	●	■	-	D, F, I, GB, E, P, NL, CZ, RC, ROK	1 cartridge 1500 ml + 2 x mixing nozzles	4
FIS Mixer Red	096448	-	-	-	-	10 static mixing nozzles for FIS EM 390 S	10
Ultra Mixer Red	520593	-	-	-	-	10 static mixing nozzles for FIS EM 585 S, FIS EM 1500 S	10

FIS DM S

FIS AP

FIS DC S

FIS AM

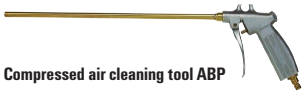
FIS DM S-L

FIS DP S-L

FIS S-XL

Dispensers

Type	Art. No.	Description	Sales unit [pcs]
FIS DM S	511118	Manual dispenser for FIS EM 390 S	1
FIS AP	058027	Pneumatic dispenser for FIS EM 390 S	1
FIS DC S	513423	Battery dispenser for FIS EM 390 S	1
Battery Pack (LI-ION) Battery 10.8 Volt	513425	10.8 V / LI-ION FIS DC S 1 (replacement battery)	1
FIS AM	058000	Manual dispenser for FIS EM 390 S	1
FIS DM S-L	510992	Manual dispenser for FIS EM 585 S	1
FIS DP S-L	511125	Pneumatic dispenser for FIS EM 585 S	1
FIS DP S-XL	512401	Pneumatic dispenser for FIS EM 1500 S	1



Compressed air cleaning tool ABP

Centring device

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

Type	Art. No.	Description	Sales unit [pcs]
Compressed air cleaning gun ABP	093286	-	1
Centring device	093076	-	10

fischer injection system FIS EM: Full range

Anchor rod FIS A for installation with FIS EM

Type	Zinc-plated steel grade 5.8 Art. No.	Zinc-plated steel grade 8.8 Art. No.	Stainless steel A4-70 Art. No.	Drill hole diameter d_o [mm]	Minimum anchorage depth $h_{ef,min}$ [mm]	Usable length with $h_{ef,min}$ $t_{fix,hef\,min}$ [mm]	Fill quantity FIS EM at $h_{ef,min}$ [scale units]	Maximum anchorage depth $h_{ef,max}$ [mm]	Usable length with $h_{ef,max}$ $t_{fix,hef\,max}$ [mm]	Fill quantity FIS EM at $h_{ef,max}$ [scale units]	Sales unit [pcs]
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.

Nut and washer

Type	Zinc-plated steel grade 8 Art. No.	Stainless steel A4-70 Art. No.	Wrench size SW	Washer (outside-Ø x thickness) [mm]	Fits	Sales unit [pcs]
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 for installation with FIS EM

Type	Art. No.	Approval		Total length l [mm]	Max. fixing thickness t_{fix} [mm]	Drill hole d [Ø mm]	Fill quantity [scale units]	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 connector FCC for installation with FIS EM

Type	Art. No.	Approval DIBt	Nominal drill hole diameter [mm]	Bar diameter [mm]	Anchor length [mm]	Material	Sales unit [pcs]
FCC-H 10 x 180	520081	●	14	10	180	Reinforcement bar B 500 B	100
FCC-H 12 x 230	520082	●	16	12	230	Reinforcement bar B 500 B	100
FCC-H 14 x 290 *	520083	●	18	14	290	Reinforcement bar B 500 B	50
FCC-H 16 x 360 *	520085	●	20	16	360	Reinforcement bar B 500 B	25

*on request other sizes up to ⌀ 28 cm

Internal threaded anchor RG MI for installation with FIS EM

Type	Zinc-plated steel grade 5.8 Art. No.	Stain less steel A4-70 Art. No.	Connection thread M	Drill hole diameter d_o [mm]	Effective anchorage depth h_{ef} [mm]	Fill quantity [scale units]	Minimum bolt penetration [mm]	Maximum bolt penetration [mm]	Sales unit [pcs]
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 brush BS

SDS chuck with internal thread M8

Cleaning brushes BS

Type	Art. No.	Description	Fits	Drill-Ø d_o	Sales unit [pcs]
BS ø 10	078178		RG M 8 / RG M 5 I	10 mm	1
BS ø 12	078179		RG M 10 / RG M 6 I	12 mm	1
BS ø 14	078180		RG M 12 / RG M 8 I	14 mm	1
BS ø 18	078181		RG M 16 / RG M 10 I	16 /18 mm	1
BS ø 20	052277		RG M 12 I	20 mm	1
BS ø 24	078182		RG M 20 / RG M 16 I	24 mm	1
BS ø 25	097806		RG M 20 / RG M I	27 mm	1
BS ø 28	078183		RG M 24/27	30 mm	1
BS ø 35	078184		RG 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

Load table
FIS EM.

Injection system FIS EM with concrete steel bars made of steel type B 500 B[5]

Design values of the resistances and permitted loads[1] [6] from single post-installation concrete steel bars in normal concrete C20/25[2]. For planning[7] and dimensioning, the approval certificates ETA - 09/0089 and Z-21.8 -1874 are to be considered in their entirety.

			Cracked and non-cracked concrete	
Concrete steel bars	**Base value of anchorage lengths[4] for FIS EM $l_{b,rqd}$ [mm]**	**Max. approved anchoring depth max l_v [mm]**	**Max. design value of the central tension load $N_{Rd,s}$[3] [kN]**	**Max. permitted central tension load $N_{perm,s}$[3] [kN]**
Ø 8 mm	378	1800	21.9	15.6
Ø 10 mm	473	1800	34.1	24.4
Ø 12 mm	567	1800	49.2	35.1
Ø 14 mm	662	1800	66.9	47.8
Ø 16 mm	756	1800	87.4	62.4
Ø 20 mm	945	1800	136.6	97.6
Ø 25 mm	1181	2000	213.4	152.4
Ø 28 mm	1323	2000	267.7	191.2
Ø 32 mm	1512	2000	349.7	249.8
Ø 36 mm	1701	2000	442.6	316.1
Ø 40 mm	1890	2000	546.4	390.3

[1] The partial safety factors of the resistances and a partial safety factor of the effect of γ_F= 1.4, which are regulated in the European standard EN 1992-1-1, are considered.
[2] The ETA approval for FIS EM allows post-installation rebar connections in concrete C12/15 to C50/60. The specified base value of the anchorage length changes
[3] When using full steel load capacity.
[4] Base value of the anchorage length according to EN 1992-1-1, section 8.4.3 for concrete strength class C20/25 for "good bonding conditions".
[5] All concrete steel bars with a characteristic yield strength f_{yk} = 400 – 600 N/mm² according to EN 1992-1-1 Appendix C, table C.1 and C.2N are permitted. This changes the specified base value of the anchorage length and the steel load capacity (see footnote [3]).
[6] With FIS EM, post-installed concrete steel bars are permitted in dry and damp concrete for temperatures in the anchoring base of up to +50°C (or short-term up to +80°C) and best possible drill hole cleaning according to the approval certificate.
[7] To determine the installation dimensions (minimum concrete cover, distances, etc.), as well as any required shear reinforcement, see EN 1992-1-1 and the general installation rules of the building approvals.

Injection system FIS EM with threaded rod FIS A (strength class 5.8) Highest permissible loads of a single anchor[1] [6]

in normal concrete C20/25 [4]. When dimensioning, observe the approval certificate ETA - 10/0012 in its entirety.

					Cracked concrete				Non-cracked concrete			
Model	**Min. effective anchorage depth $h_{ef,min}$ [mm]**	**Max. effective anchorage depth $h_{ef,max}$ [mm]**	**Min. component thickness h_{min} [mm]**	**Installation torque T_{inst} [Nm]**	**Permissible tension load $N_{perm.}$[3] [kN]**	**Permissible shear load $V_{perm.}$[3] [kN]**	**Min. axial spacing s_{min}[2] [mm]**	**min. edge distance c_{min}[2] [mm]**	**Permissible tensile load $N_{perm.}$[3] [kN]**	**Permissible shear load $V_{perm.}$[3] [kN]**	**Min. axial spacing s_{min}[2] [mm]**	**Min. axial spacing c_{min}[2] [mm]**
FIS A M8	60		100	10.0	5.0	5.1	40	40	9.0	5.1	40	40
		160	190	10.0	9.0	5.1	40	40	9.0	5.1	40	40
FIS A M10	60		100	20.0	6.3	8.6	45	45	11.2	8.6	45	45
		200	230	20.0	13.8	8.6	45	45	13.8	8.6	45	45
FIS A M12	70		100	40.0	8.8	12.0	55	55	14.1	12	55	55
		240	270	40.0	20.5	12.0	55	55	20.5	12	55	55
FIS A M16	80		116	60.0	10.2	22.3	65	65	14.3	22.3	65	65
		320	356	60.0	37.6	22.3	65	65	37.6	22.3	65	65
FIS A M20	90		138	120.0	12.2	29.3	85	85	17.1	34.9	85	85
		400	448	120.0	58.6	34.9	85	85	58.6	34.9	85	85
FIS A M24	96		152	150.0	13.4	32.2	105	105	18.8	45.2	105	105
		480	536	150.0	84.3	50.9	105	105	84.3	50.9	105	105
FIS A M27	108		168	200.0	16.0	38.5	120	120	22.5	54.0	120	120
		540	600	200.0	109.5	65.7	120	120	109.5	65.7	120	120
FIS A M30	120		190	300.0	18.8	45.1	140	140	26.3	63.2	140	140
		600	670	300.0	133.8	80.6	140	140	133.8	80.6	140	140

[1] The partial safety factors of the resistances and a partial safety factor of the effect of γ_F = 1.4, which are regulated in the approval, are considered. A single anchor could be, for example, an anchor with an axial spacing $s \geq 3 \times h_{ef}$ and an edge distance $c \geq 1.5 \times h_{ef}$. See approval certificate for exact details.
[2] Lowest possible axial spacing and edge distance with simultaneous reduction of permitted load.
[3] With combinations of tension and shear loads, bend torques and reduced axial spacing and centre distance (anchor groups), see approval certificate.
[4] With higher concrete strengths up to C50/60, higher permitted loads are possible.
[6] The specified loads are valid for anchorages in dry and damp concrete for temperatures in the base material of up to +35°C (or short-term up to +60°C) and best-possible drill hole cleaning according to the approval certificate.

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