

FIS EM Plus.
The injection mortar
for strong bonds.



fischer
FIS EM Plus
390 S
EPOXYHÄRZ-MÖRTEL
EPOXY MORTAR
MORTIER EN RESINE EPOXY
EPOXYHÄRZ-MÖRTEL
ARGAMASSA DE RESINA EPOXY

- ✓ Ideal for non-structural bonding applications
- ✓ Ideal for additional reinforcement connections
- ✓ Ideal for fast setting times
- ✓ Ideal for vertical bonding applications and on lean concrete
- ✓ Meets requirements for high modulus and ductility
- ✓ Ideal for injection into cracks

550 g 380 ml

The high-performance injection mortar for post-installed rebar connections and anchorings in cracked concrete.



FIS EM Plus 585 S

FIS EM Plus 390 S

FIS EM Plus 1500 S

Advantages

- The assessment (ETA) guarantees a service life of 100 years for post-installed rebar connections and anchorings in cracked concrete.
- The injection mortar is approved for diamond-drilled and water-filled drill holes, as well as seismic applications of the performance categories C1, C2 and offers a secure hold even under extreme conditions.
- Anchorages with the FIS EM Plus can be carried out safely in sealing surfaces in accordance with the Water Resources Law with a general design approval (aBG) and an additional report.
- The epoxy resin mortar enables the transfer of high loads and variable anchoring depths in combination with the anchor rod FIS A.
- The approved anchoring elements allow a broad range of applications, including temporary and removable fixings with the internal threaded anchor RG M I made of zinc plated or stainless steel R.

Certificates



ETA-17/1056,
for post-installed
rebar connection



ETA-17/0979,
for cracked concrete, Seismic
performance categories C1, C2



ICC-ES for cracked and
uncracked concrete,
post-installed rebar connection



aBG WHG, General design approval
(aBG) Water resources law (WRL)



Fire resistance
class R 240

Performance features at a glance.

Service life up to 120 years



Lasts for eternity:

In the assessment (ETA), anchorages and post-installed rebar connections for the FIS EM Plus are regulated with a service life of 100 years.

An official expert report from the IEA Stuttgart even certifies a service life of 120 years for anchorages.

Seismic applications in earthquake zones



Always on the safe side with FIS EM Plus:

Approved for seismic applications of the performance categories C1 and C2 as well as for the seismic zones A to F according to the ICC-ESR.

Post-installed rebar connections are also approved in the assessment (ETA) for seismic loads.

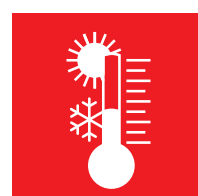
Diamond drilling



Maximum load level in cracked concrete:

FIS EM Plus achieves its maximum load values in diamond drilled holes even without additional roughening. This saves time and avoids misapplication.

Installation temperatures



Well equipped for every season:

The approved installation temperatures of -5 °C to + 40 °C enable the use of FIS EM Plus all year round.

Water-filled drill holes



Can be used in all weather conditions:

According to the assessment (ETA), FIS EM Plus can easily be used in water-filled drill holes and can therefore be used under all work site conditions.

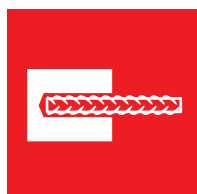
Underwater application



The expert for special applications:

According to the ICC approval, anchorings can also be carried out under water.

Post-installed rebar connections



The partner for strong connections:

Optimised for large diameters and deep drill holes FIS EM Plus is the reliable choice for post-installed rebar connections.

Anchorage in WRL sealing surfaces



Tight, tested and officially certified:

In the system with the anchor rod FIS A and the WRL marking, FIS EM Plus is the first injection mortar with a general design approval (aBG) for WRL-compliant anchorages in FD-/FDE concrete.

Anchorage substrate

Suitable for the following building materials:



Cracked concrete



Uncracked concrete

Approved for anchorages in:

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

Also suitable for:

- Natural stone with dense structure

Functioning

- The epoxy resin mortar FIS EM Plus can be used with the anchor rod FIS A for pre-positioned and push-through installation and with the RG M I internal threaded anchor for push-through installation.
- Resin and hardener are stored in two separate chambers and are only mixed and activated in the static mixer when the cartridge is pressed out.
- The mortar is injected bubble-free from the bottom of the drill hole.
- The mortar bonds the fixing to the drill hole wall over the entire surface and seals the drill hole completely.
- The fixing element is set by hand with a slight twisting movement down to the bottom of the hole.
- For push-through installation, the annular gap between the fixing element and the attachment part is filled with FIS EM Plus.



Injection mortar FIS EM Plus with anchor rod FIS A

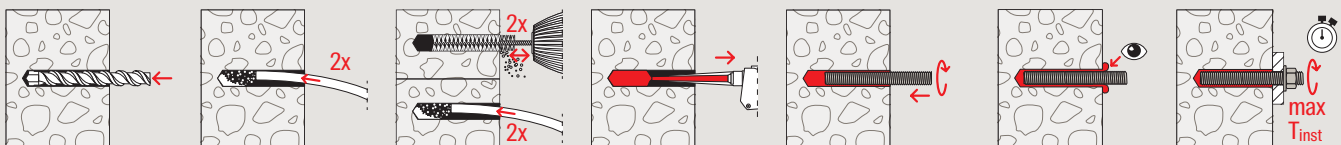
Curing times

Processing and curing times						
Temperature in the anchorage base [°C]	- 5 - 0	>0 - +5	>+5 - +10	>+10 - +20	>+20 - +30	>+30 - +40
Maximum processing time [minutes]	240	150	120	30	14	7
Minimum curing time [hours]	200	90	40	18	10	5

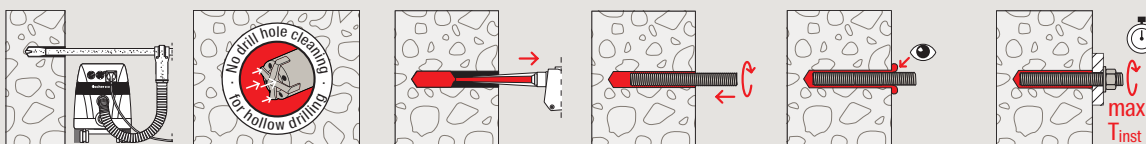
1) In wet concrete and water-filled borehole, double the curing times

Installation

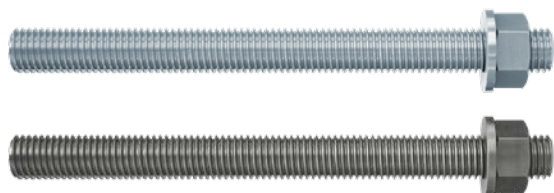
Pre-positioned installation



Pre-positioned installation with hollow drilling



Compatible anchoring elements.

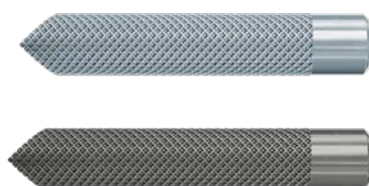


Anchor rod FIS A

Made of zinc plated or stainless steel R.

Anchor rod FIS A

- The anchor rod FIS A is approved for use with FIS EM Plus in sizes M8-M30 made of zinc plated or stainless steel R for use with FIS EM Plus.
- The variable anchoring depths allow optimum adaptation to the application and load requirements.



Internally threaded anchor RG M I

Made of zinc plated or stainless steel R.

Internally threaded anchor RG M I

- The internal threaded anchor RG M I is available in the sizes M8-M20 made of zinc plated or stainless steel R.
- In combination with metric screws or anchor rods, the RG M I can be used to create detachable fixings.



Rebar anchor FRA

Rebar anchor made of reinforcing steel with metric connection thread made of stainless steel.

Rebar anchor FRA

- The FRA rebar anchor is a concrete steel bar with metric connection thread made of stainless steel in sizes M12-M24.
- The stainless steel connection thread in sizes M12-M24 enables the transmission of very high tensile loads.



Concrete-concrete Shear Connector FCC-H

Concrete steel bar with head bolt for structural reinforcement.

Concrete-Concrete Shear Connector FCC-H

- The FCC-H is a concrete steel bar with head bolt for connecting a concrete layer with the existing concrete structure.
- The concrete-concrete shear connector FCC-H is approved by the building authorities for renovation of structures, such as the renovation of bridges, the increase the load-bearing capacity of ceilings or for the reinforcement of columns.

Special applications are our strength.

Post-installed rebar connections

How post-installed rebar connections are professionally carried out.



Approved system for post-installed rebar connections

- The injection mortar FIS EM Plus can be used for post-installed rebar connections in diameters of 8 - 40 mm. The assessment (ETA) certifies also for seismic applications a service life of 100 years.
- The rebar anchor FRA with connection thread made of stainless steel fully uses the load-bearing of the concrete. This allows very high tensile loads to be introduced into the anchorage base.
- Accessories suitable for the construction site such as injection aids and extension hoses ensure a quick work progress. The FIS-rebar case contains all the necessary individual components to ensure an easy, safe and comfortable installation.



ETA-17/1056, EAD 330087-01-0601
Post-installed rebar connections

WRL compliant anchorages

Tight. Tested. Officially sealed.

First WRL-compliant anchorage with general design approval

- FIS EM Plus is the first system approved with a general design approval for WRL-compliant anchorages in FD/FDE concrete.
- For coated concrete, fischer has proven the WRL suitability through an accredited testing institute and an expert opinion.
- The system consisting of injection mortar FIS EM Plus, FIS A anchor rod and WRL marking or WRL set offers safe and uncomplicated installation in WRL sealing surfaces.



General design approval
(aBG WHG - German designation)
Water resource law (WRL)

Applications

Post-installed rebar connections



Rail fastenings, noise barriers and railings



Seismic applications and concrete-concrete connections



Diamond-drilled boreholes, WRL and underwater applications



Reference projects worldwide



Hong Kong-Zhuhai-Macao Bridge

Far - Further - the Hong Kong-Zhuhai-Macao Bridge. 20 times as long as the Golden Gate Bridge in San Francisco, it serves as an over water crossing for tens of thousand of passers-by every day.

Designed for a service life of 120 years, FIS EM Plus was able to convince thanks to its certified durability. The product was also used due to its suitability for anchorages in seacoast regions and for post-installed rebar connections.



Anchors for the world's tallest statue

High up: India's "Statue of Unity" towers all statues in the world with a height of 182 metres. From the viewing platform visitors can look far out through openings at the chest level of the statue.

FIS EM Plus scored with high load-bearing capacity in concrete as well as applicability in earthquake-prone areas and gives this "Colossus" a firm hold.

The battery dispenser for professionals.



The advantages at a glance

- The dosing function enables the efficient adjustment of the mortar quantity to match the drill hole size.
- The dispensing speed can be adjusted to the application via a controller.
- The detachable handle and belt hook ensure particularly ergonomic use.
- The sturdy design of the device guarantees reliable and long-lasting processing under demanding building site conditions.
- The 18V technology provides for the necessary dispensing power. Furthermore, the battery is compatible with all Cordless Alliance System (CAS) power tools and chargers worldwide.

More information:

www.fischer-international.com/dispenser

Product range

Epoxy mortar FIS EM Plus



FIS EM Plus 390 S

FIS EM Plus 585 S

FIS EM Plus 1500 S

FIS UMR

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

Dispenser



FIS DM S

FIS AM

FIS DM S-L

FIS DB S Pro

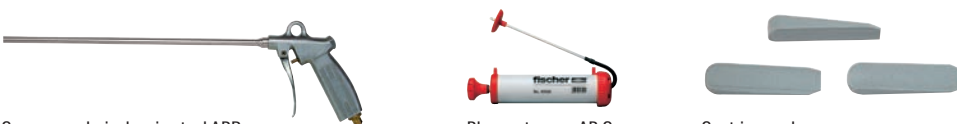
FIS DB SL Pro

FIS AP

FIS DP S-L

Item	Item No.	Description	Suitable for	Sales unit [pcs]
FIS DM S	511118	Manual dispenser	150 T, 300 T, 360 S, 390 S cartridges	1
FIS AM	058000	Manual dispenser	150 T, 300 T, 360 S, 390 S cartridges	1
FIS DM S-L	510992	Manual dispenser	585 S cartridges	1
FIS DB S Pro (EU)	558955	Battery operated dispenser with 1x charger 12-36V EU, 1x battery pack 18V 2.0Ah, 1x screw off handle, 1x belt hook, 1x hard case	150 T, 300 T, 360 S, 390 S cartridges	1
FIS DB S Pro (UK)	564960	Battery operated dispenser with 1x charger 12-36V UK, 1x battery pack 18V 2.0Ah, 1x screw off handle, 1x belt hook, 1x hard case	150 T, 300 T, 360 S, 390 S cartridges	1
FIS DB SL Pro (EU)	562004	Battery operated dispenser with 1x charger 12-36V EU, 1x battery pack 18V 2.0Ah, 1x screw off handle, 1x belt hook, 1x hard case	585 S, 825 S cartridges	1
FIS DB SL Pro (UK)	564961	Battery operated dispenser with 1x charger 12-36V UK, 1x battery pack 18V 2.0Ah, 1x screw off handle, 1x belt hook, 1x hard case	585 S, 825 S cartridges	1
FSS-B 18V 2.0Ah	563787	Battery Pack	FIS DB S Pro, FIS DB SL Pro	1
FSS-B 18V 4.0Ah	552930	Battery Pack	FIS DB S Pro, FIS DB SL Pro	1
FIS AP	058027	Pneumatic dispenser	150 T, 300 T, 360 S, 390 S cartridges	1
FIS DP S-L	511125	Pneumatic dispenser	585 S cartridges	1

Compressed-air cleaning tool, Blow-out pump and Centring wedge



Compressed-air cleaning tool ABP

Blow-out pump AB G

Centring wedge

Item	Item No.	Description	Sales unit [pcs]
Compressed-air cleaning tool ABP	093286	-	1
Blow-out pump AB G	089300	-	1
Centring wedge	093076	10 wedges for overhead installation, from M16	10

Threaded rod FIS A in combination with FIS EM Plus



FIS A, Zinc plated



FIS A, Stainless steel

Item	Item No.			Drill hole diameter	Min. anchorage depth	Max. usable length	Min. filling quantity FIS EM Plus	Max. anchorage depth	Max. usable length	Max. filling quantity FIS EM Plus	Sales unit
	Zinc plated	Zinc plated	Stainless steel								
	Steel grade 5.8	Steel grade 8.8	R FK 70 CRC III	d_0	$h_{ef, min}$	$t_{fix, hef min}$	$h_{ef min}$	$h_{ef max}$	$t_{fix, hef max}$	$h_{ef, max}$	[pcs]
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[scale units]	[mm]	[mm]	[scale units]	[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 140	553763	-	-	10	60	70	2	129	1	2	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	-	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 350	-	558865	-	18	80	250	4	320	10	16	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 350	-	559627	-	20	90	236	24	320	6	120	10
FIS A M 20 x 400	-	558866	-	20	90	286	10	375	1	42	10
FIS A M 20 x 1000*	-	519410	519427	24	90	-	11	400	-	48	10
FIS A M 24 x 290	090294	-	090461	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 24 x 450	-	558867	-	28	96	325	13	420	1	63	5
FIS A M 24 x 650	-	558868	-	28	96	525	13	480	141	63	5
FIS A M 24x 1000*	-	551771	-	28	96	-	13	480	-	63	5
FIS A M 30 x 430	090297	-	090464	35	120	275	28	394	1	88	5
FIS A M 30 x 550	-	558869	-	35	120	396	24	515	1	120	5
FIS A M 30 x 650	-	558870	-	35	120	496	24	600	16	120	5
FIS A M 30 x 750	-	558871	-	35	120	596	24	600	116	120	5


* Order washer and nut separately. - FIS A made of high-corrosion resistant steel HCR upon request. Further dimensions on request.

Accessories

Nut and washer



Hexagonal nut and washer

Item	Item No.		Width across nut  SW	Washer (outer diameter x thickness) [mm]	Match	Sales unit [pcs]
	Zinc plated steel grade 8.8	Stainless steel R				
Nut & washer M8	510509	510113	13	16 x 1.6	FIS A M8 x 1.000	50
Nut & washer M10	510510	510514	17	20 x 2.0	FIS A M10 x 1.000	50
Nut & washer M12	510511	510515	19	24 x 2.5	FIS A M12 x 1.000	25
Nut & washer M16	510512	510516	24	30 x 3.0	FIS A M16 x 1.000	20
Nut & washer M20	519737	519738	30	37 x 3.0	FIS A M20 x 1.000	10
Nut & washer M24	552110	-	36	37 x 3.0	FIS A M24 x 1.000	5
Nut & washer M30	559124	-	46	56 x 4,0	FIS A M30 x 1.000	5

Internal-threaded anchor RG M I in combination with FIS EM Plus



RG M I, Zinc-plated



RG M I, Stainless steel

Item	Item No.		Internal thread M [mm]	Drill hole diameter d_o [mm]	Anchorage depth h_{ef} [mm]	filling quantity FIS EM Plus [scale units]	Min. bolt penetration [mm]	Max. bolt penetration [mm]	Sales unit [pcs]
	Zinc plated Steel grade 5.8	Stainless steel R							
RG 12 x 90 M 8 I	050552	050565	M8	14	90	5	8	18	10
RG 16 x 90 M 10 I	050553	050566	M10	18	90	7	10	23	10
RG 16 x 125 M 12 I	050562	050567	M12	20	125	11	12	26	10
RG 22 x 160 M 16 I	050563	050568	M16	24	160	17	16	35	5
RG 28 x 200 M 20 I	050564	050569	M20	32	200	48	20	45	5

Rebar anchor FRA in combination with FIS EM Plus



Rebar anchor FRA

Item	Item No.	Approval ETA	Total length l [mm]	Max. fixing thickness t_{fix} [mm]	Drill hole d_o [Ø mm]	Fill quantity [scale units]	Sales unit [pcs]
FRA 16/1100 M 16-60*	505533	●	1180	60	20	81	8
FRA 20/1400 M 20-60*	505534	●	1485	60	25	160	4

* Concrete steel bar with metric thread made of stainless steel R.

Concrete-Concrete Shear Connector FCC in combination with FIS EM Plus



FCC-H

Item	Item No.	Drill hole diameter [mm]	Rebar diameter [mm]	Anchor length [mm]	Material	Sales unit [pcs]
FCC-H 12 x 230	520082	16	12	230	Concrete steel bar B 500 B	100
FCC-H 14 x 290 *	520083	18	14	290	Concrete steel bar B 500 B	50
FCC-H 16 x 360 *	520085	20	16	360	Concrete steel bar B 500 B	25

WRL marking for LI-/ LIP-concrete



WRL marking

Item	Item No.	Suitable for	Content	Outer diameter [mm]	Sales Unit [pcs]
WRL marking LI-concrete M8	558307	FIS A M8 R	10x WRL marking disc M8	35	10
WRL marking LI-concrete M10	558308	FIS A M10 R	10x WRL marking disc M10	35	10
WRL marking LI-concrete M12	558309	FIS A M12 R	10x WRL marking disc M12	40	10
WRL marking LI-concrete M16	558310	FIS A M16 R	10x WRL marking disc M16	50	10
WRL marking LI-concrete M20	558311	FIS A M20 R	10x WRL marking disc M20	60	10
WRL marking LI-concrete M24	558312	FIS A M24 R	10x WRL marking disc M24	65	10

WRL set for coated concrete



WRL marking



Filling disc



Rounded washer

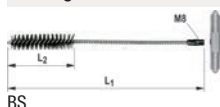


Injection adapter

Item	Item No.	Zinc plated Item No.	Stainless steel R Item No.	Suitable for	Height filling disc ¹⁾ [mm]	Content	Sales Unit [pcs]
WRL Set coated concrete M8	558313	558313	558319	FIS A M8	6	10 pcs. each of marking disc, filling disc, rounded washer, 3x injection adapter	10
WRL Set coated concrete M10	558314	558314	558320	FIS A M10	6	10 pcs. each of marking disc, filling disc, rounded washer, 3x injection adapter	10
WRL Set coated concrete M12	558315	558315	558321	FIS A M12	6	10 pcs. each of marking disc, filling disc, rounded washer, 3x injection adapter	10
WRL Set coated concrete M16	558316	558316	558322	FIS A M16	7	10 pcs. each of marking disc, filling disc, rounded washer, 3x injection adapter	10
WRL Set coated concrete M20	558317	558317	558323	FIS A M20	8	10 pcs. each of marking disc, filling disc, rounded washer, 3x injection adapter	10
WRL Set coated concrete M24	558318	558318	558324	FIS A M24	10	10 pcs. each of marking disc, filling disc, rounded washer, 3x injection adapter	10

¹⁾ When using the WRL Set, the usable length must be reduced by the thickness of the WRL Set.

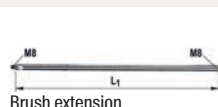
Cleaning brushes



BS



SDS-Adapter M8



Brush extension



Compressed air nozzle

Item	Item No.	Length L ₁ [mm]	Length L ₂ [mm]	Brush diameter ø [mm]	For drill diameter [mm]	Sales unit [pcs]
BS ø 8	078177	120	50	9	8	1
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 20/22	052277	180	80	25	20/22	1
BS ø 24	078182	300	100	26	24	1
BS ø 25	097806	300	100	27	25	1
BS ø 28	078183	350	100	30	28	1
BS ø 30/32/35	078184	400	100	40	30/32/35	1
Brush extension	508791	410	—	—	—	1
Compressed air nozzle D16-D19	511957	—	—	—	—	2
Compressed air nozzle D20-D25	511958	—	—	—	—	2

Loads according to ICC

Injection System FIS EM Plus with anchor rod FIS A resp. RGM

Permissible loads of a single anchor¹⁾²⁾ in normal-weight concrete of strength class 20 Mpa resp. 3000 psi. For the design the complete current ICC-ES Evaluation Report ESR-1990 has to be considered.

Type	Material/ surface ³⁾	Effective anchorage depth h_{ef} [mm]	Minimum member thickness h_{min} [mm]	Maximum installation torque $T_{inst,max}$ [Nm]	Cracked concrete				Non-cracked concrete			
					Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
					$N_{perm}^{4)}$ [kN]	$V_{perm}^{4)}$ [kN]	$s_{min}^{4)}$ [mm]	$c_{min}^{4)}$ [mm]	$N_{perm}^{4)}$ [kN]	$V_{perm}^{4)}$ [kN]	$s_{min}^{4)}$ [mm]	$c_{min}^{4)}$ [mm]
FIS A M8	5.8	60	100	10	6.8	5.1	40	40	9.6	5.1	40	40
		80	110	10	9.7	5.1	40	40	9.7	5.1	40	40
		160	190	10	9.7	5.1	40	40	9.7	5.1	40	40
	R-70	60	100	10	6.8	6.8	40	40	9.6	7.1	40	40
		80	110	10	10.5	11.3	40	40	13.6	7.1	40	40
		160	190	10	13.6	7.1	40	40	13.6	7.1	40	40
FIS A M10	5.8	60	100	20	6.8	6.8	45	45	9.6	8.0	45	45
		90	120	20	12.5	8.0	45	45	15.4	8.0	45	45
		200	230	20	15.4	8.0	45	45	15.4	8.0	45	45
	R-70	60	100	20	6.8	6.8	45	45	9.6	9.6	45	45
		90	120	20	12.5	11.3	45	45	17.6	11.3	45	45
		200	230	20	21.6	11.3	45	45	21.6	11.3	45	45
FIS A M12	5.8	70	100	40	8.6	11.7	55	55	12.1	11.7	55	55
		110	140	40	16.9	11.7	55	55	22.5	11.7	55	55
		240	270	40	22.5	11.7	55	55	22.5	11.7	55	55
	R-70	70	100	40	8.6	16.3	55	55	12.1	16.3	55	55
		110	140	40	16.9	16.3	55	55	23.8	16.3	55	55
		240	270	40	31.4	16.3	55	55	31.4	16.3	55	55
FIS A M16	5.8	80	120	60	10.5	21.0	65	65	14.8	21.7	65	65
		125	170	60	20.5	21.7	65	65	28.8	21.7	65	65
		320	360	60	41.7	21.7	65	65	41.7	21.7	65	65
	R-70	80	120	60	10.5	21.0	65	65	14.8	29.5	65	65
		125	170	60	20.5	30.4	65	65	28.8	30.4	65	65
		320	360	60	58.4	30.4	65	65	58.4	30.4	65	65
FIS A M20	5.8	90	140	120	12.5	25.0	85	85	17.6	33.9	85	85
		170	220	120	32.5	33.9	85	85	45.7	33.9	85	85
		400	450	120	65.2	33.9	85	85	65.2	33.9	85	85
	R-70	90	140	120	12.5	25.0	85	85	17.6	35.2	85	85
		170	220	120	32.5	47.4	85	85	45.7	47.4	85	85
		400	450	120	91.3	47.4	85	85	91.3	47.4	85	85
FIS A M24	5.8	96	160	150	13.8	27.6	105	105	19.4	38.8	105	105
		210	270	150	44.6	48.8	105	105	62.8	48.8	105	105
		480	540	150	93.9	48.8	105	105	93.9	48.8	105	105
	R-70	96	160	150	13.8	27.6	105	105	19.4	38.8	105	105
		210	270	150	44.6	68.3	105	105	62.8	68.3	105	105
		480	540	150	131.4	68.3	105	105	131.4	68.3	105	105
FIS A M30	5.8	120	190	300	19.3	38.5	140	140	27.1	54.3	140	140
		280	350	300	68.7	77.6	140	140	96.7	77.6	140	140
		600	670	300	149.3	77.6	140	140	149.3	77.6	140	140
	R-70	120	190	300	19.3	38.5	140	140	27.1	54.3	140	140
		280	350	300	68.7	108.7	140	140	96.7	108.7	140	140
		600	670	300	209.0	108.7	140	140	209.0	108.7	140	140

¹⁾ The partial safety factors for material resistance as regulated in ESR report as well as a partial safety factor for load actions are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$ and an edge distance $c \geq 1.5 \times h_{ef}$. Accurate data see related ESR report.

²⁾ The specified loads are valid for anchorages in dry concrete and short term loads only. Values for sustained loads, are given in ESR report. For temperatures in the anchoring substrate up to 50 °C / 122 °F (resp. short term up to 72 °C / 162 °F). Drill hole cleaning as per specification in related ESR report.

³⁾ Further steel grades, versions and technical data see related ESR report, e.g. for dry internal conditions, galvanised steel (gvz); for damp interiors and for outdoor use, stainless steel (R).

⁴⁾ In the case of combinations of tension and shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups), the design must be carried out in accordance with the provisions of the complete related ESR report and the provisions of the ACI 318-14 Ch. 17 or ACI 318-11 appendix D.

Injection System FIS EM Plus with fractional threaded rod

Permissible loads of a single anchor¹⁾²⁾ in normal-weight concrete of strength class 20 Mpa resp. 3000 psi.
For the design the complete current ICC-ES Evaluation Report ESR-1990 has to be considered.

Type	Material/ surface ³⁾	Effective anchorage depth h_{ef} [in]	Minimum member thickness h_{min} [in]	Maximum installation torque $T_{inst,max}$ [ft-lb]	Cracked concrete				Non-cracked concrete			
					Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
					$N_{perm}^{4)}$ [lb]	$V_{perm}^{4)}$ [lb]	$s_{min}^{4)}$ [in]	$c_{min}^{4)}$ [in]	$N_{perm}^{4)}$ [lb]	$V_{perm}^{4)}$ [lb]	$s_{min}^{4)}$ [in]	$c_{min}^{4)}$ [in]
3/8"	ASTM A36	2-3/8	4	15	1,531	1,245	1.67	1.67	2,156	1,245	1.67	1.67
		5	6	15	2,394	1,245	1.67	1.67	2,394	1,245	1.67	1.67
		7-1/2	8-3/4	15	2,394	1,245	1.67	1.67	2,394	1,245	1.67	1.67
	ASTM A193 B7	2-3/8	4	15	1,531	1,649	1.67	1.67	2,156	2,322	1.67	1.67
		5	6	15	4,461	2,471	1.67	1.67	4,461	2,471	1.67	1.67
		7-1/2	8-3/4	15	4,461	2,471	1.67	1.67	4,461	2,471	1.67	1.67
1/2"	ASTM A36	2-3/4	4	30	1,929	2,282	2.26	2.26	2,717	2,282	2.26	2.26
		6-1/2	7-3/4	30	4,381	2,282	2.26	2.26	4,381	2,282	2.26	2.26
		10	11-1/4	30	4,381	2,282	2.26	2.26	4,381	2,282	2.26	2.26
	ASTM A193 B7	2-3/4	4	30	1,929	4,155	2.26	2.26	2,717	4,520	2.26	2.26
		6-1/2	7-3/4	30	6,982	4,520	2.26	2.26	8,165	4,520	2.26	2.26
		10	11-1/4	30	8,165	4,520	2.26	2.26	8,165	4,520	2.26	2.26
5/8"	ASTM A36	3-1/8	4-1/2	50	2,313	3,631	2.56	2.56	3,258	3,631	2.56	2.56
		7-7/8	9-1/2	50	6,979	3,631	2.56	2.56	6,979	3,631	2.56	2.56
		12-1/2	14	50	6,979	3,631	2.56	2.56	6,979	3,631	2.56	2.56
	ASTM A193 B7	3-1/8	4-1/2	50	2,313	4,982	2.56	2.56	3,258	7,017	2.56	2.56
		7-7/8	9-1/2	50	9,318	7,202	2.56	2.56	13,010	7,202	2.56	2.56
		12-1/2	14	50	13,010	7,202	2.56	2.56	13,010	7,202	2.56	2.56
3/4"	ASTM A36	3-1/2	5-1/4	90	2,766	5,374	3.15	3.15	3,896	5,374	3.15	3.15
		9-1/4	11	90	10,331	5,374	3.15	3.15	10,331	5,374	3.15	3.15
		15	16-3/4	90	10,331	5,374	3.15	3.15	10,331	5,374	3.15	3.15
	ASTM A193 B7	3-1/2	5-1/4	90	2,766	5,957	3.15	3.15	3,896	8,391	3.15	3.15
		9-1/4	11	90	11,868	10,669	3.15	3.15	16,715	10,669	3.15	3.15
		15	16-3/4	90	19,256	10,669	3.15	3.15	19,256	10,669	3.15	3.15
1"	ASTM A36	4	6-1/4	135	3,394	7,309	4.33	4.33	4,780	9,732	4.33	4.33
		12	14-1/4	135	17,547	9,732	4.33	4.33	18,711	9,732	4.33	4.33
		20	22-1/4	135	18,711	9,732	4.33	4.33	18,711	9,732	4.33	4.33
	ASTM A193 B7	4	6-1/4	135	3,394	7,309	4.33	4.33	4,780	10,295	4.33	4.33
		12	14-1/4	135	17,547	19,317	4.33	4.33	24,715	19,317	4.33	4.33
		20	22-1/4	135	34,870	19,317	4.33	4.33	34,870	19,317	4.33	4.33
1 - 1/4"	ASTM A36	5	7-3/4	240	4,715	10,155	6.30	6.30	6,641	14,303	6.30	6.30
		15	17-3/4	240	24,403	15,562	6.30	6.30	29,940	15,562	6.30	6.30
		25	27-3/4	240	29,940	15,562	6.30	6.30	29,940	15,562	6.30	6.30
	ASTM A193 B7	5	7-3/4	240	4,715	10,155	6.30	6.30	6,641	14,303	6.30	6.30
		15	17-3/4	240	24,403	30,895	6.30	6.30	34,370	30,895	6.30	6.30
		25	27-3/4	240	52,713	30,895	6.30	6.30	55,786	30,895	6.30	6.30

¹⁾ The partial safety factors for material resistance as regulated in ESR report as well as a partial safety factor for load actions are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$ and an edge distance $c \geq 1.5 \times h_{ef}$. Accurate data see related ESR report.

²⁾ The specified loads are valid for anchorages in dry concrete and short term loads only. Values for sustained loads, are given in ESR report. For temperatures in the anchoring substrate up to 50 °C / 122 °F (resp. short term up to 72 °C / 162 °F). Drill hole cleaning as per specification in related ESR report.

³⁾ Further steel grades, versions and technical data see related ESR report, e.g. for dry internal conditions, galvanised steel (gvz); for damp interiors and for outdoor use, stainless steel (R).

⁴⁾ In the case of combinations of tension and shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups), the design must be carried out in accordance with the provisions of the complete related ESR report and the provisions of the ACI 318-14 Ch. 17 or ACI 318-11 appendix D.

Loads according to ETA

Injection system FIS EM Plus with threaded rod FIS A resp. RG M

Permissible loads of a single anchor^{1) 2)} in normal concrete of strength class C20/25.

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

Type	Material/ surface ³⁾	Effective anchorage depth	Minimum member thickness	Maximum installation- torque	Cracked concrete				Non-cracked concrete			
					Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
					$N_{perm}^{4)}$ [kN]	$V_{perm}^{4)}$ [kN]	$s_{min}^{4)}$ [mm]	$c_{min}^{4)}$ [mm]	$N_{perm}^{4)}$ [kN]	$V_{perm}^{4)}$ [kN]	$s_{min}^{4)}$ [mm]	$c_{min}^{4)}$ [mm]
FIS A M 8	5.8	60	100	10	5.4	6.3	40	40	9.0	6.3	40	40
	5.8	80	110	10	7.2	6.3	40	40	9.0	6.3	40	40
	5.8	160	190	10	9.0	6.3	40	40	9.0	6.3	40	40
	R-70	60	100	10	5.4	6.0	40	40	9.9	6.0	40	40
	R-70	80	110	10	7.2	6.0	40	40	9.9	6.0	40	40
	R-70	160	190	10	9.9	6.0	40	40	9.9	6.0	40	40
FIS A M 10	5.8	60	100	20	6.7	9.7	45	45	10.9	9.7	45	45
	5.8	90	120	20	10.1	9.7	45	45	13.8	9.7	45	45
	5.8	200	230	20	13.8	9.7	45	45	13.8	9.7	45	45
	R-70	60	100	20	6.7	9.2	45	45	10.9	9.2	45	45
	R-70	90	120	20	10.1	9.2	45	45	15.7	9.2	45	45
	R-70	200	230	20	15.7	9.2	45	45	15.7	9.2	45	45
FIS A M 12	5.8	70	100	40	9.6	14.3	55	45	13.7	14.3	55	45
	5.8	110	140	40	17.8	14.3	55	45	20.5	14.3	55	45
	5.8	240	270	40	20.5	14.3	55	45	20.5	14.3	55	45
	R-70	70	100	40	9.6	13.7	55	45	13.7	13.7	55	45
	R-70	110	140	40	17.8	13.7	55	45	22.5	13.7	55	45
	R-70	240	270	40	22.5	13.7	55	45	22.5	13.7	55	45
FIS A M 16	5.8	80	120	60	11.7	23.5	65	50	16.8	26.9	65	50
	5.8	125	170	60	22.9	26.9	65	50	32.7	26.9	65	50
	5.8	320	360	60	37.6	26.9	65	50	37.6	26.9	65	50
	R-70	80	120	60	11.7	23.5	65	50	16.8	25.2	65	50
	R-70	125	170	60	22.9	25.2	65	50	32.7	25.2	65	50
	R-70	320	360	60	42.0	25.2	65	50	42.0	25.2	65	50
FIS A M 20	5.8	90	140	120	14.0	28.0	85	55	20.0	40.0	85	55
	5.8	170	220	120	36.3	42.3	85	55	51.9	42.3	85	55
	5.8	400	450	120	58.6	42.3	85	55	58.6	42.3	85	55
	R-70	90	140	120	14.0	28.0	85	55	20.0	39.4	85	55
	R-70	170	220	120	36.3	39.4	85	55	51.9	39.4	85	55
	R-70	400	450	120	65.7	39.4	85	55	65.7	39.4	85	55
FIS A M 24	5.8	96	160	150	15.4	30.8	105	60	22.0	44.1	105	60
	5.8	210	270	150	49.9	60.6	105	60	71.3	60.6	105	60
	5.8	480	540	150	84.3	60.6	105	60	84.3	60.6	105	60
	R-70	96	160	150	15.4	30.8	105	60	22.0	44.1	105	60
	R-70	210	270	150	49.9	56.8	105	60	71.3	56.8	105	60
	R-70	480	540	150	94.3	56.8	105	60	97.3	56.8	105	60
FIS A M 30	5.8	120	190	300	21.6	43.1	140	80	30.8	61.6	140	80
	5.8	280	350	300	76.8	96.0	140	80	109.8	96.0	140	80
	5.8	600	670	300	133.8	96.0	140	80	133.8	96.0	140	80
	R-70	120	190	300	21.6	43.1	140	80	30.8	61.6	140	80
	R-70	280	350	300	76.8	90.2	140	80	109.8	90.2	140	80
	R-70	600	670	300	150.1	90.2	140	80	150.1	90.2	140	80

¹⁾ Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA 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 $s \geq 3 \times h_{ef}$ and an edge distance $c \geq 1.5 \times h_{ef}$. Accurate data see ETA.

²⁾ The specified loads are valid for anchorages in dry and damp concrete. For temperatures in the anchoring substrate up to 50 °C (resp. short term up to 72 °C). Drill hole cleaning as per specification in the ETA. The factor Ψ_{sus} for sustained load was taken into account with 1.0.

³⁾ Further steel grades, versions and technical data see ETA, e.g. for dry internal conditions, galvanised steel (gvz); for damp interiors and for outdoor use, stainless steel (R).

⁴⁾ In the case of combinations of tension and shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups), the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018. We recommend using our anchor design software C-FIX.

Injection system FIS EM Plus with internal threaded anchor RG M I

Permissible loads of a single anchor^{1) 2)} in normal concrete of strength class C20/25.
For the design the complete current assessment ETA-17/0979 has to be considered.

Type	Screw material ³⁾	Effective anchorage depth h_{ef} [mm]	Minimum member thickness h_{min} [mm]	Maximum installation-torque $T_{inst,max}$ [Nm]	Cracked concrete				Non-cracked concrete			
					Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
					$N_{perm}^{4)}$ [kN]	$V_{perm}^{4)}$ [kN]	$s_{min}^{4)}$ [mm]	$c_{min}^{4)}$ [mm]	$N_{perm}^{4)}$ [kN]	$V_{perm}^{4)}$ [kN]	$s_{min}^{4)}$ [mm]	$c_{min}^{4)}$ [mm]
RG M8 I	5.8	90	120	10	9.0	5.3	55	55	9.0	5.3	55	55
	8.8	90	120	10	11.3	8.3	55	55	13.8	8.3	55	55
	R-70	90	120	10	9.9	5.9	55	55	9.9	5.9	55	55
RG M10 I	5.8	90	130	20	12.9	8.3	65	65	13.8	8.3	65	65
	8.8	90	130	20	12.9	13.3	65	65	20.0	13.3	65	65
	R-70	90	130	20	12.9	9.3	65	65	15.7	9.3	65	65
RG M12 I	5.8	125	170	40	20.2	12.1	75	75	20.5	12.1	75	75
	8.8	125	170	40	20.2	19.3	75	75	32.4	19.3	75	75
	R-70	125	170	40	20.2	13.5	75	75	22.5	13.5	75	75
RG M16 I	5.8	160	210	80	33.2	22.4	95	95	37.6	22.4	95	95
	8.8	160	210	80	33.2	30.9	95	95	47.4	30.9	95	95
	R-70	160	210	80	33.2	25.1	95	95	42.0	25.1	95	95
RG M20 I	5.8	200	260	120	46.4	35.4	125	125	58.6	35.4	125	125
	8.8	200	260	120	46.4	51.4	125	125	66.3	51.4	125	125
	R-70	200	260	120	46.4	39.4	125	125	66.7	39.4	125	125

¹⁾ Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA 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 $s \geq 3 \times h_{ef}$ and an edge distance $c \geq 1.5 \times h_{ef}$. Accurate data see ETA.

²⁾ The specified loads are valid for anchorages in dry and damp concrete. For temperatures in the anchoring substrate up to 50 °C (resp. short term up to 72 °C). Drill hole cleaning as per specification in the ETA. The factor Ψ_{sus} for sustained load was taken into account with 1.0.

³⁾ Further steel grades, versions and technical data see ETA, e.g. for dry internal conditions, galvanised steel (gvz); for damp interiors and for outdoor use, stainless steel (R).

⁴⁾ In the case of combinations of tension and shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups), the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018. We recommend using our anchor design software C-FIX.

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