

Bolt anchor FAZ II Plus

For highest demands. Powerful and flexible.

4



Balcony railings



Conveyor belt

Applications

- Steel constructions
- Guard rails
- Consoles
- Lifts
- Lifting platforms
- Conveyor belts
- Pumps
- Cable trays
- Façades
- Timber constructions

Advantages

- Quick and easier assembly without the need for drill hole cleaning (M8-M24).
- With the new assessment (ETA), the tensile strengths increase decisively. As a result, fewer fixing points and anchors are required.
- The new ETA confirms the use of the FAZ II Plus for dynamic loads for diameters M16-M24.
- An external independent assessment confirms the service life of anchorages

- up to 120 years. Thus, the FAZ II Plus outlasts a whole century and is perfectly suited for large, long-lasting construction projects (M10-M16).
- The FAZ II Plus allows the absorption of high seismic loads of performance category C1 from M8 and C2 for diameters M10-M24.
- The first bolt anchor M6 with ETA evaluation option 1 ensures a safe and approved anchorage.

Certificates / Features



ETA-19/0520, in concrete
ETA-20/0897, for dynamic
load in concrete



from M10



BZS D 24-601

Building materials

Approved for:

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

Also suitable for:

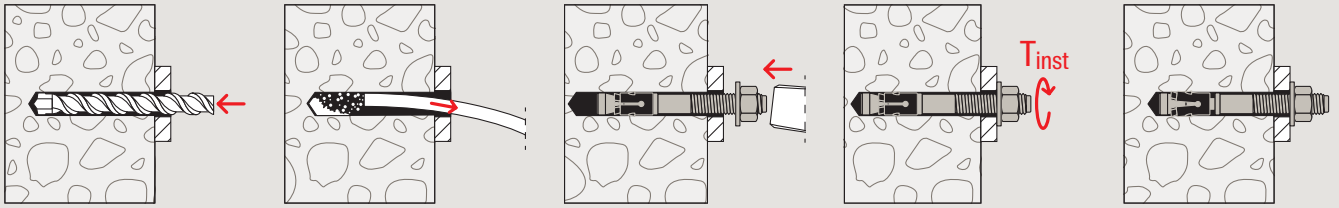
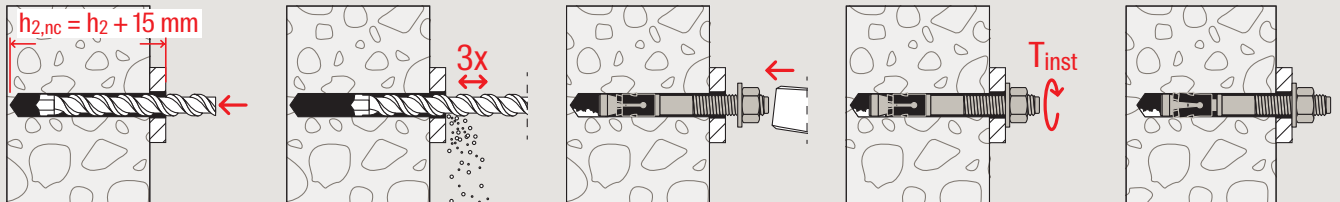
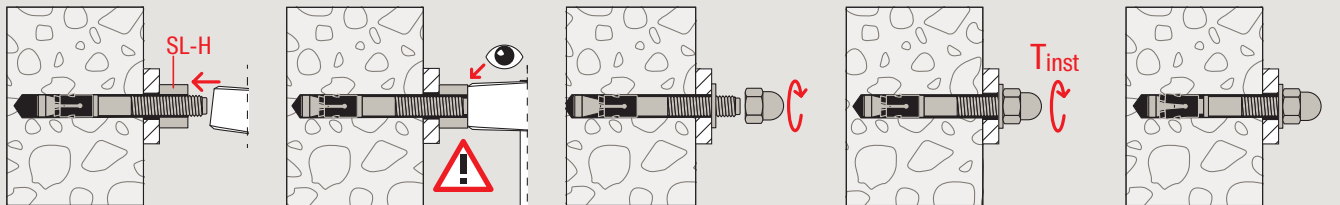
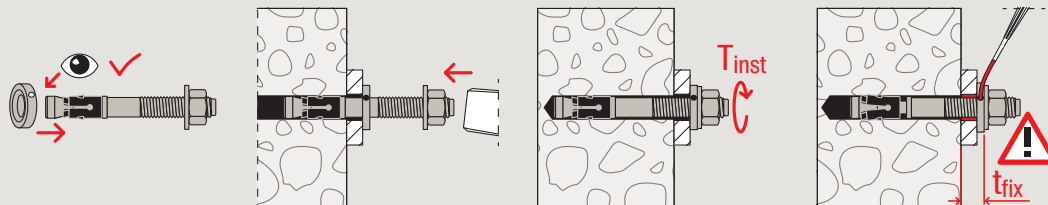
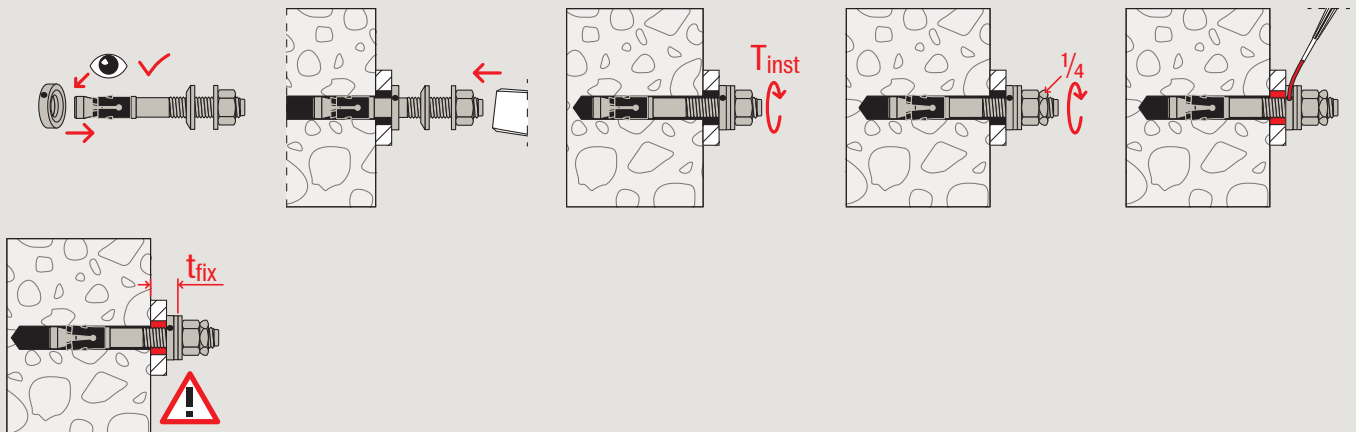
- Concrete C12/15 - C80/95 (classification available)
- Steel fiber concrete (classification available)
- Solid sand-lime brick (classification available)

Versions

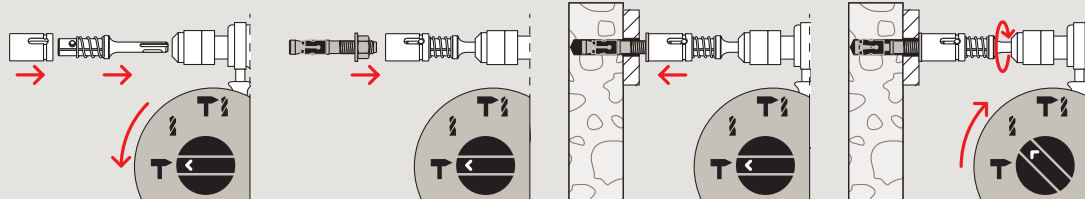
- Galvanised steel
- Stainless steel R
- Highly corrosion-resistant steel HCR

Functioning

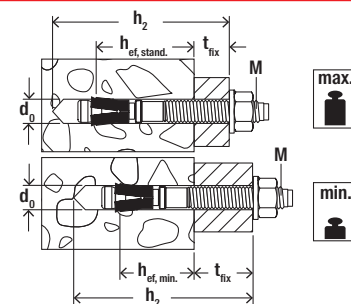
- The FAZ II Plus is suitable for pre-positioned and push-through installation and is also ideal for stand-off installation thanks to the long thread.
- The anchor is set in line with the approval once the preset installation torque is achieved.
- In the case of series installation, we recommend using the FABS or FA-ST II anchor bolt setting tools.
- In case of seismic demands or to minimise the hole clearance, the annular gap can be filled using the filling disc FFD.
- For dynamic loads, an additional „dynamic set“ is used, which is filled with injection mortar (compressive strength $\geq 50 \text{ N/mm}^2$ e.g.: FIS V Plus, FIS EM Plus, FIS HB or FIS SB) after installation.

Push-through installation with hexagon nut**Without borehole cleaning****Push-through installation of the cup nut version with setting gauge****With backfill disc for seismic application****Installation with dynamic set**

Installation with setting tool



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Technical data

Bolt anchor FAZ II Plus



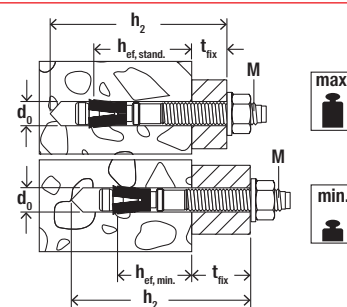
FAZ II Plus

FAZ II Plus R

FAZ II Plus HCR

Item	Galvani- sed steel	Stainless steel	Highly corrosion- resistant steel	Approval			Seis- mic- Ap- proval	Drill diame- ter	Min. drill hole depth for through fixings	Max. usable length hef,stand./ hef,min.	Anchor length	Thread	Width across nut	Instal- lation torque	Sales unit
	Item no. gvz	Item no. R	Item no. HCR	ETA	DIBt	ICC		d ₀ [mm]	h ₂ [mm]	t _{fix} [mm]	l [mm]	ø x length [mm]	SW [mm]	T _{inst} [Nm]	[pcs]
FAZ II Plus 6/10	564572	564607	-	●	●	-	-	6	60	10 / -	65	M6 x 25	10	8	50
FAZ II Plus 6/20	564573	564608	-	●	●	-	-	6	70	20 / -	75	M6 x 35	10	8	50
FAZ II Plus 8/10	564574 ¹⁾	564609 ¹⁾	-	●	●	●	C1	8	65	10 / 20	75	M8 x 38	13	20	50
FAZ II Plus 8/10	-	-	564635 ¹⁾	●	●	●	C1	8	65	10 / 20	75	M8 x 38	13	20	10
FAZ II Plus 8/30	564575 ¹⁾	564610 ¹⁾	-	●	●	●	C1	8	85	30 / 40	95	M8 x 58	13	20	50
FAZ II Plus 8/30	-	-	564636 ¹⁾	●	●	●	C1	8	85	30 / 40	95	M8 x 58	13	20	10
FAZ II Plus 8/50	564576 ¹⁾	564611 ¹⁾	-	●	●	●	C1	8	105	50 / 60	115	M8 x 78	13	20	50
FAZ II Plus 8/50	-	-	564637 ¹⁾	●	●	●	C1	8	105	50 / 60	115	M8 x 78	13	20	10
FAZ II Plus 8/100	564577 ¹⁾	-	-	●	●	●	C1	8	155	100 / 110	165	M8 x 128	13	20	25
FAZ II Plus 8/160	564578 ¹⁾	-	-	●	●	●	C1	8	215	160 / 170	225	M8 x 100	13	20	20
FAZ II Plus 10/10	564579	564612	-	●	●	●	C1 / C2	10	85	10 / 30	95	M10 x 53	17	45	50
FAZ II Plus 10/10	-	-	564638	●	●	●	C1 / C2	10	85	10 / 30	95	M10 x 53	17	45	10
FAZ II Plus 10/20	564580	-	-	●	●	●	C1 / C2	10	95	20 / 40	105	M10 x 63	17	45	25
FAZ II Plus 10/20	-	564613	-	●	●	●	C1 / C2	10	95	20 / 40	105	M10 x 63	17	45	50
FAZ II Plus 10/30	564581	-	-	●	●	●	C1 / C2	10	105	30 / 50	115	M10 x 73	17	45	25
FAZ II Plus 10/30	-	564614	-	●	●	●	C1 / C2	10	105	30 / 50	115	M10 x 73	17	45	50
FAZ II Plus 10/30	-	-	564639	●	●	●	C1 / C2	10	105	30 / 50	115	M10 x 73	17	45	10
FAZ II Plus 10/50	564582	564615	-	●	●	●	C1 / C2	10	125	50 / 70	135	M10 x 93	17	45	20
FAZ II Plus 10/70	-	564616	-	●	●	●	C1 / C2	10	145	70 / 90	155	M10 x 113	17	45	20
FAZ II Plus 10/80	564583	-	-	●	●	●	C1 / C2	10	155	80 / 100	165	M10 x 123	17	45	20
FAZ II Plus 10/100	564584	564617	-	●	●	●	C1 / C2	10	175	100 / 120	185	M10 x 143	17	45	20
FAZ II Plus 10/160	564585	564618	-	●	●	●	C1 / C2	10	235	160 / 180	245	M10 x 193	17	45	20
FAZ II Plus 12/10	564586	564619	-	●	●	●	C1 / C2	12	100	10 / 30	110	M12 x 61	19	60	20
FAZ II Plus 12/10	-	-	564640	●	●	●	C1 / C2	12	100	10 / 30	110	M12 x 61	19	60	10
FAZ II Plus 12/20	564587	564620	-	●	●	●	C1 / C2	12	110	20 / 40	120	M12 x 71	19	60	20
FAZ II Plus 12/30	564588	564621	-	●	●	●	C1 / C2	12	120	30 / 50	130	M12 x 81	19	60	20

¹⁾ With minimum embedment depth only for statically indeterminate systems.



Technical data

Bolt anchor FAZ II Plus



FAZ II Plus

FAZ II Plus R

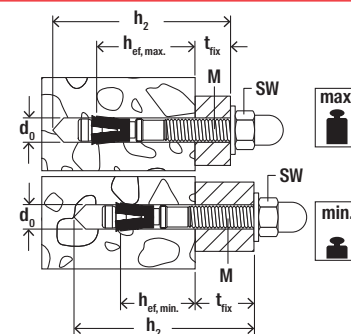
FAZ II Plus HCR

Item	Galvani- sed steel	Stainless steel	Highly corrosion- resistant steel	Approval			Seis- mic- Ap- proval	Drill diami- ter	Min. drill hole depth for through fixings	Max. usable length hef,stand./ hef,min.	Anchor length	Thread	Width across nut	Instal- lation torque	Sales unit
	Item no. gvz	Item no. R	Item no. HCR	ETA	DIBt	ICC		d ₀ [mm]	h ₂ [mm]	t _{fix} [mm]	l [mm]	ø x length [mm]	SW [mm]	T _{inst} [Nm]	[pcs]
FAZ II Plus 12/30	–	–	564641	●	●	●	C1 / C2	12	120	30 / 50	130	M12 x 81	19	60	10
FAZ II Plus 12/50	564589	564622	–	●	●	●	C1 / C2	12	140	50 / 70	150	M12 x 101	19	60	20
FAZ II Plus 12/60	–	564623	–	●	●	●	C1 / C2	12	150	60 / 80	160	M12 x 111	19	60	20
FAZ II Plus 12/80	564590	–	–	●	●	●	C1 / C2	12	170	80 / 100	180	M12 x 131	19	60	20
FAZ II Plus 12/100	564591	564624	–	●	●	●	C1 / C2	12	190	100 / 120	200	M12 x 151	19	60	20
FAZ II Plus 12/160	564592	–	–	●	●	●	C1 / C2	12	250	160 / 180	260	M12 x 186	19	60	10
FAZ II Plus 12/160	–	564625	–	●	●	●	C1 / C2	12	250	160 / 180	260	M12 x 186	19	60	20
FAZ II Plus 12/200	564593	–	–	●	●	●	C1 / C2	12	290	200 / 220	300	M12 x 186	19	60	10
FAZ II Plus 16/5	564594	–	–	●	●	●	C1 / C2	16	115	5 / 25	128	M16 x 64	24	110	10
FAZ II Plus 16/5	–	564626	–	●	●	●	C1 / C2	16	115	5 / 25	128	M16 x 64	24	110	20
FAZ II Plus 16/25	564595	–	564642	●	●	●	C1 / C2	16	135	25 / 45	148	M16 x 84	24	110	10
FAZ II Plus 16/25	–	564627	–	●	●	●	C1 / C2	16	135	25 / 45	148	M16 x 84	24	110	20
FAZ II Plus 16/50	564596	–	564643	●	●	●	C1 / C2	16	160	50 / 70	173	M16 x 109	24	110	10
FAZ II Plus 16/50	–	564628	–	●	●	●	C1 / C2	16	160	50 / 70	173	M16 x 109	24	110	20
FAZ II Plus 16/60	–	564629	–	●	●	●	C1 / C2	16	170	60 / 80	183	M16 x 119	24	110	20
FAZ II Plus 16/100	564597	564630	–	●	●	●	C1 / C2	16	210	100 / 120	223	M16 x 159	24	110	10
FAZ II Plus 16/160	564598	–	–	●	●	●	C1 / C2	16	270	160 / 180	283	M16 x 189	24	110	10
FAZ II Plus 16/200	564599	–	–	●	●	●	C1 / C2	16	310	200 / 220	323	M16 x 189	24	110	10
FAZ II Plus 16/250	564600	–	–	●	●	●	C1 / C2	16	360	250 / 270	373	M16 x 100	24	110	10
FAZ II Plus 16/300	564601	–	–	●	●	●	C1 / C2	16	410	300 / 320	423	M16 x 100	24	110	10
FAZ II Plus 20/30	564602	–	–	●	●	●	C1 / C2	20	155	30 / -	172	M20 x 54	30	200	5
FAZ II Plus 20/30	–	564631	–	●	●	●	C1 / C2	20	155	30 / -	172	M20 x 54	30	200	4
FAZ II Plus 20/60	564603	–	–	●	●	●	C1 / C2	20	185	60 / -	202	M20 x 84	30	200	5
FAZ II Plus 20/60	–	564632	–	●	●	●	C1 / C2	20	185	60 / -	202	M20 x 84	30	200	4
FAZ II Plus 20/160	564604	–	–	●	●	●	C1 / C2	20	285	160 / -	302	M20 x 100	30	200	5
FAZ II Plus 24/30	564605	–	–	●	●	●	C1 / C2	24	185	30 / -	205	M24 x 58	36	270	5
FAZ II Plus 24/30	–	564633	–	●	●	●	C1 / C2	24	185	30 / -	205	M24 x 58	36	270	4
FAZ II Plus 24/60	564606	–	–	●	●	●	C1 / C2	24	215	60 / -	235	M24 x 88	36	270	5
FAZ II Plus 24/60	–	564634	–	●	●	●	C1 / C2	24	215	60 / -	235	M24 x 88	36	270	4

¹⁾ With minimum embedment depth only for statically indeterminate systems.

C1/C2: Only with maximum embedment depth.

Technical data



Bolt anchor FAZ II Plus H (version with cap nut)



FAZ II Plus H

FAZ II Plus H R

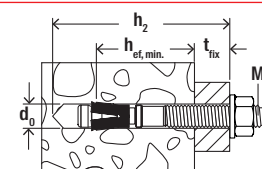
Cap nut FAZ II Plus gvz

Cap nut FAZ II Plus R

Item	Galvani- sed steel	Stainless steel	Approval		Seismic- Approval	Drill dia- meter d_0 [mm]	Min. drill hole depth for through fixings h_2 [mm]	Max. usa- ble length hef,stand./ hef,min. t_{fix} [mm]	Anchor length l [mm]	Thread $\emptyset \times$ length [mm]	Width across nut SW [mm]	Installation torque T_{inst} [Nm]	Sales unit [pcs]
	Item no. gvz	Item no. R	ETA	DIBt									
FAZ II Plus 10/10 H	564687	564691	●	●	C1 / C2	10	87	10 / 30	95	M10 x 53	17	45	20
FAZ II Plus 10/20 H	564688	564692	●	●	C1 / C2	10	97	20 / 40	105	M10 x 63	17	45	20
FAZ II Plus 12/10 H	564689	564693	●	●	C1 / C2	12	99	10 / 30	109	M12 x 61	19	60	20
FAZ II Plus 12/20 H	564690	564694	●	●	C1 / C2	12	109	20 / 40	119	M12 x 71	19	60	20
Cap nut FAZ II Plus M10	569126 ¹⁾	569127 ¹⁾	●	●	–	–	–	–	–	M10	17	–	20
Cap nut FAZ II Plus M12	569128 ¹⁾	569129 ¹⁾	●	●	–	–	–	–	–	M12	19	–	20

¹⁾ Can be combined with all bolt anchors FAZ II M10 and M12 in accordance with approval.

C1/C2: Only with maximum embedment depth.



Technical data

Bolt anchor FAZ II Plus K / Bolt anchor FAZ II Plus K GS (short version)

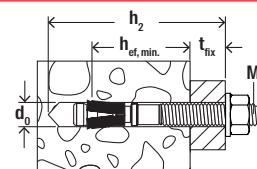


FAZ II Plus K

FAZ II Plus K GS

FAZ II Plus K R

Item	Galvani- sed steel	Stainless steel	Approval		Seismic- Ap- proval	Drill diameter d_0 [mm]	Min. drill hole depth for through fixings h_2 [mm]	Anchor length l [mm]	Max. fixture thickness t_{fix} [mm]	Thread $\emptyset \times$ length [mm]	Washer (ou- ter diameter $\times$ thickness) [mm]	Sales unit [pcs]
	Item no. gvz	Item no. R	ETA	DIBt								
FAZ II Plus 8/5 K	564671	564676	●	●	C1	8	45	60	5	M8 x 23	16 x 1.6	50
FAZ II Plus 10/10 K	564672	564677	●	●	C1 / C2	10	65	75	10	M10 x 33	20 x 2	50
FAZ II Plus 10/20 K	564673	–	●	●	C1 / C2	10	75	85	20	M10 x 43	20 x 2	25
FAZ II Plus 10/20 K	–	564678	●	●	C1 / C2	10	75	85	20	M10 x 43	20 x 2	50
FAZ II Plus 12/10 K	564674	564679	●	●	C1 / C2	12	80	90	10	M12 x 41	18 x 2	20



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Technical data

Bolt anchor FAZ II Plus K / Bolt anchor FAZ II Plus K GS (short version)

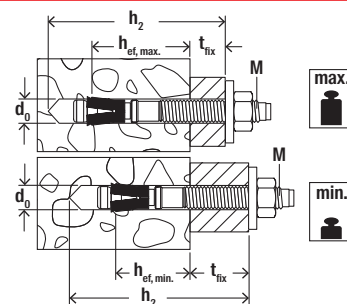


FAZ II Plus K

FAZ II Plus K GS

FAZ II Plus K R

	Galvani- sed steel	Stainless steel	Approval		Seismic-App- proval	Drill diameter	Min. drill hole depth for through fixings	Anchor length	Max. fixture thickness	Thread	Washer (ou- ter diameter x thickness)	Sales unit
	Item no.	Item no.	ETA	DIBt		d ₀ [mm]	h ₂ [mm]	l [mm]	t _{fix} [mm]	ø x length [mm]	[mm]	[pcs]
Item	gvz	R										
FAZ II Plus 12/20 K	564675	564680	●	●	C1 / C2	12	90	100	20	M12 x 51	18 x 2	20
FAZ II Plus 10/10 K GS	564681	–	●	●	C1 / C2	10	65	75	10	M10 x 33	25 x 3	50
FAZ II Plus 12/10 K GS	564682	–	●	●	C1 / C2	12	80	90	10	M12 x 41	30 x 3	20



Technical data

Bolt anchor FAZ II Plus GS (with large washer) / Bolt anchor FAZ II Plus HBS (washer compliant to timber construction standard DIN 1052)

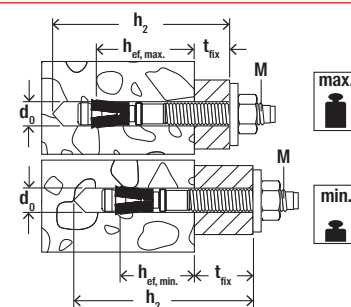


FAZ II Plus GS

FAZ II Plus GS R

FAZ II Plus HBS

	Galvani- sed steel	Stainless steel	Approval		Seismic- Approval	Drill dia- meter	Min. drill hole depth for through fixings	Max. usa- ble length hef, stand./ hef, min.	Anchor length	Thread	Width across nut	Washer (outer dia- meter x thickness)	Instal- lation torque	Sales unit
	Item no.	Item no.	ETA	DIBt		d ₀ [mm]	h ₂ [mm]	t _{fix} [mm]	l [mm]	ø x length [mm]	SW [mm]	[mm]	T _{inst} [Nm]	[pcs]
Item	gvz	R												
FAZ II Plus 8/10 GS	564644	–	●	●	C1	8	65	10 / 20	75	M8 x 38	13	44 x 4	20	50
FAZ II Plus 8/10 GS	–	564663	●	●	C1	8	65	10 / 20	75	M8 x 38	13	22 x 2.5	20	50
FAZ II Plus 8/30 GS	564645	564664	●	●	C1	8	85	30 / 40	95	M8 x 58	13	22 x 2.5	20	50
FAZ II Plus 10/10 GS	564646	564665	●	●	C1 / C2	10	85	10 / 30	95	M10 x 53	17	25 x 3	45	50
FAZ II Plus 10/30 GS	564647	–	●	●	C1 / C2	10	105	30 / 50	115	M10 x 73	17	25 x 3	45	25
FAZ II Plus 10/30 GS	–	564666	●	●	C1 / C2	10	105	30 / 50	115	M10 x 73	17	25 x 3	45	50
FAZ II Plus 12/10 GS	564648	564667	●	●	C1 / C2	12	100	10 / 30	110	M12 x 61	19	30 x 3	60	20
FAZ II Plus 12/20 GS	564649	–	●	●	C1 / C2	12	110	20 / 40	120	M12 x 71	19	30 x 3	60	20
FAZ II Plus 12/30 GS	564650	564668	●	●	C1 / C2	12	120	30 / 50	130	M12 x 81	19	30 x 3	60	20
FAZ II Plus 12/50 GS	564651	–	●	●	C1 / C2	12	140	50 / 70	150	M12 x 101	19	30 x 3	60	20
FAZ II Plus 12/80 GS	564652	–	●	●	C1 / C2	12	170	80 / 100	180	M12 x 131	19	44 x 4	60	20
FAZ II Plus 12/100 GS	564653	–	●	●	C1 / C2	12	190	100 / 120	200	M12 x 151	19	30 x 3	60	20
FAZ II Plus 12/100 GS	564654	–	●	●	C1 / C2	12	190	100 / 120	200	M12 x 151	19	44 x 4	60	20
FAZ II Plus 12/120 GS	564656	–	●	●	C1 / C2	12	210	120 / 140	220	M12 x 171	19	44 x 4	60	20
FAZ II Plus 12/120 GS	564655	–	●	●	C1 / C2	12	210	120 / 140	220	M12 x 171	19	30 x 3	60	20
FAZ II Plus 12/140 GS	564657	–	●	●	C1 / C2	12	230	140 / 160	240	M12 x 186	19	44 x 4	60	20



Technical data

Bolt anchor FAZ II Plus GS (with large washer) / Bolt anchor FAZ II Plus HBS (washer compliant to timber construction standard DIN 1052)

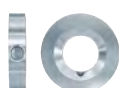


	Galvani- sed steel	Stainless steel	Approval		Seismic- Approval	Drill dia- meter	Min. drill hole depth for through fixings	Max. usa- ble length hef, stand./ hef, min.	Anchor length	Thread	Width across nut	Washer (outer dia- meter x thickness)	Instal- lation torque	Sales unit
	Item no.	Item no.	ETA	DIBt		d ₀ [mm]	h ₂ [mm]	t _{fix} [mm]	l [mm]	ø x length [mm]	SW [mm]	[mm]	T _{inst} [Nm]	[pcs]
Item	gvz	R												
FAZ II Plus 12/160 GS	564658	564669	●	●	C1 / C2	12	250	160 / 180	260	M12 x 186	19	44 x 4	60	20
FAZ II Plus 12/180 GS	564659	–	●	●	C1 / C2	12	270	180 / 200	280	M12 x 186	19	44 x 4	60	20
FAZ II Plus 12/200 GS	564660	–	●	●	C1 / C2	12	290	200 / 220	300	M12 x 186	19	44 x 4	60	20
FAZ II Plus 16/160 GS	–	564670	●	●	C1 / C2	16	270	160 / 180	283	M16 x 189	24	56 x 5	110	4
FAZ II Plus 16/160 GS	564661	–	●	●	C1 / C2	16	270	160 / 180	283	M16 x 189	24	56 x 5	110	10
FAZ II Plus 16/200 GS	564662	–	●	●	C1 / C2	16	310	200 / 220	323	M16 x 189	24	56 x 5	60	10
FAZ II Plus 12/100 HBS	564683	–	●	●	C1 / C2	12	190	100 / 120	205	M12 x 151	19	58 x 6	60	20
FAZ II Plus 12/120 HBS	564684	–	●	●	C1 / C2	12	210	120 / 140	225	M12 x 171	19	58 x 6	60	20
FAZ II Plus 16/160 HBS	564685	–	●	●	C1 / C2	16	270	160 / 180	278	M16 x 189	24	68 x 6	110	10
FAZ II Plus 16/200 HBS	564686	–	●	●	C1 / C2	16	310	200 / 220	328	M16 x 189	24	68 x 6	110	10

C1/C2: Only with maximum embedment depth.

Accessories

Accessories



Filling disc FFD



FABS



FA-ST II



FA-ST II Set

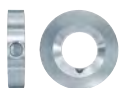


Replacement spring

		Internal diameter D	External-ø	Match	Contents	Sales unit
Item	Item no.	[mm]	d [mm]			[pcs]
FFD 26 x 12 x 6	538458	12	26	FAZ II Plus		4
FFD 26 x 12 x 6 R	541986	12	26	FAZ II Plus		4
FFD 30 x 14 x 6	538459	14	30	FAZ II Plus		4
FFD 30 x 14 x 6 R	541987	14	30	FAZ II Plus		4
FFD 38 x 19 x 7	538460	19	38	FAZ II Plus		4
FFD 40 x 19 x 7 R	541988	19	40	FAZ II Plus		4
FFD 46 x 23 x 8	538461	23	46	FAZ II Plus		4
FFD 50 x 23 x 8 R	541989	23	50	FAZ II Plus		4
FFD 54 x 28 x 10	538462	28	54	FAZ II Plus		4
FFD 55 x 28 x 10 R	541990	28	55	FAZ II Plus		4
FABS	077937	–	–	Bolt anchor M6 - M12		1
FA-ST II M10	558790	–	–	Bolt anchor M10	1 x SDS Adapter, 1 x Socket SW17	1
FA-ST II M12	558791	–	–	Bolt anchor M12	1 x SDS Adapter, 1 x Socket SW19	1

Accessories

Accessories



Filling disc FFD



FABS



FA-ST II



FA-ST II Set



Replacement spring

		Internal diameter D [mm]	External-ø d [mm]	Match	Contents	Sales unit
Item	Item no.					[pcs]
FA-ST II M16	558792	–	–	Bolt anchor M16	1 x SDS Adapter, 1 x Socket SW24	1
FA-ST II Set	558789	–	–	Bolt anchor M10 - M16	1 x SDS Adapter 1 x Socket SW17, SW19, SW24	1
FA-ST II Spring	558793	–	–	FA-ST II M10/M12/M16	5 x Replacement spring	1

Accessories Dynamic set

Accessories Dynamic set



Dynamic set

		Ap- pro- val	External-ø d [mm]	Thickness [mm]	Min. fixture thickness t _{fix} [mm]	Match	Sales unit
Item	Item no.	DIBt					[pcs]
Dynamic set M16	568785	●	38	11	15	FAZ II Plus	10
Dynamic set M20	568786	●	46	13	20	FAZ II Plus	10
Dynamic set M24	568787	●	54	17	24	FAZ II Plus	10
Dynamic set M16 R	568788	●	40	11	15	FAZ II Plus	10
Dynamic set M20 R	568789	●	50	13	20	FAZ II Plus	10
Dynamic set M24 R	568790	●	55	17	24	FAZ II Plus	10

Loads

Bolt anchor FAZ II Plus

Permissible loads of a single anchor¹⁾ in normal concrete of strength class C20/25.

For the design the complete current assessment ETA-19/0520 of 24.05.2023 has to be considered.

Type	Material/ surface ²⁾	Effective anchorage depth h_{ef} [mm]	Minimum member thickness h_{min} [mm]	Instal- lation torque T_{inst} [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			
					$N_{perm}^{3)}$ [kN]	$V_{perm}^{3)}$ [kN]	$s_{min}^{3)}$ [mm]	$c_{min}^{3)}$ [mm]	$N_{perm}^{3)}$ [kN]	$V_{perm}^{3)}$ [kN]	$s_{min}^{3)}$ [mm]	$c_{min}^{3)}$ [mm]
FAZ II Plus 6	gvz	40	80	8	0.7	4.3	35	40	5.0	4.3	35	40
	gvz	80	120	8	0.7	4.3	35	40	5.0	4.3	35	40
	R	40	80	8	0.7	5.0	35	40	5.0	5.0	35	40
	R	80	120	8	0.7	5.0	35	40	5.0	5.0	35	40
FAZ II Plus 8	gvz	35	80	20	2.6	8.5	35	40	4.8	9.3	40	40
	gvz	90	140	20	3.8	9.3	35	40	6.7	9.3	40	40
	R	35	80	20	2.6	8.5	35	40	4.8	10.1	40	40
	R	90	140	20	3.8	10.1	35	40	6.7	10.1	40	40
FAZ II Plus 10	gvz	40	80	45	4.1	10.8	40	45	5.9	15.0	40	45
	gvz	100	150	45	6.2	15.0	40	45	9.5	15.0	40	45
	R	40	80	45	4.1	10.8	40	45	5.9	15.1	40	45
	R	100	150	45	6.2	15.1	40	45	9.5	15.1	40	45
FAZ II Plus 12	gvz	50	100	60	5.8	18.0	50	55	8.3	21.1	50	55
	gvz	125	190	60	9.5	21.1	50	55	10.5	21.1	50	55
	R	50	100	60	5.8	18.0	50	55	8.3	24.1	50	55
	R	125	190	60	9.5	24.1	50	55	10.5	24.1	50	55
FAZ II Plus 16	gvz	65	140	110	8.6	27.5	65	65	12.3	39.1	65	65
	gvz	160	240	110	12.9	39.1	65	65	18.4	39.1	65	65
	R	65	140	110	8.6	27.5	65	65	12.3	39.3	65	65
	R	160	240	110	12.9	40.6	65	65	18.4	40.6	65	65
FAZ II Plus 20	gvz	100	160	200	16.4	47.4	95	85	23.4	47.4	95	95
	gvz	180	270	200	16.4	47.4	95	85	23.4	47.4	95	95
	R	100	160	200	16.4	52.5	95	85	23.4	61.7	95	95
	R	180	270	200	16.4	61.7	95	85	23.4	61.7	95	95
FAZ II Plus 24	gvz	125	200	270	22.9	73.3	100	100	32.7	73.3	100	135
	R	125	200	270	22.9	73.3	100	100	32.7	90.3	100	135

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⁾ 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).

³⁾ 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.

Loads

Bolt anchor FAZ II Plus dynamic

Design values for cyclic fatigue loading¹⁾ of a single anchor in cracked or non-cracked normal concrete of strength class C20/25²⁾.
For the design the complete current assessment ETA-20/0897 of 22.05.2023 has to be considered.

Type	Material/ surface	Effective ancho- rage depth	Mini- mum member thick- ness	Instal- lation torque	Cracked concrete				Non-cracked concrete			
		h_{ef}	h_{min}	T_{inst}	Design values of tension ($\Delta N_{Ed,max}^{(3)}$) and shear loads ($\Delta V_{Ed,max}^{(3)}$); minimum spacing ($s_{min}^{(3)}$) and edge distances ($c_{min}^{(3)}$) with reduced loads				Design values of tension ($\Delta N_{Ed,max}^{(3)}$) and shear loads ($\Delta V_{Ed,max}^{(3)}$); minimum spacing ($s_{min}^{(3)}$) and edge distances ($c_{min}^{(3)}$) with reduced loads			
		[mm]	[mm]	[Nm]	$\Delta N_{Ed,max}^{(3)}$ [kN]	$\Delta V_{Ed,max}^{(3)}$ [kN]	$s_{min}^{(3)}$ [mm]	$c_{min}^{(3)}$ [mm]	$\Delta N_{Ed,max}^{(3)}$ [kN]	$\Delta V_{Ed,max}^{(3)}$ [kN]	$s_{min}^{(3)}$ [mm]	$c_{min}^{(3)}$ [mm]
FAZ II Plus 16	gvz	65	140	110	6.0	4.7	65	65	6.4	4.7	65	65
	gvz	85	140	110	6.4	4.7	65	65	6.4	4.7	65	65
	gvz	160	240	110	6.4	4.7	65	65	6.4	4.7	65	65
	R	65	140	110	3.1	6.0	65	65	3.1	6.0	65	65
	R	85	140	110	3.1	6.0	65	65	3.1	6.0	65	65
	R	160	240	110	3.1	6.0	65	65	3.1	6.0	65	65
FAZ II Plus 20	gvz	100	160	200	8.8	6.1	95	85	8.8	6.1	95	95
	gvz	180	270	200	8.8	6.1	95	85	8.8	6.1	95	95
	R	100	160	200	4.7	9.4	95	85	4.7	9.4	95	95
	R	180	270	200	4.7	9.4	95	85	4.7	9.4	95	95
FAZ II Plus 24	gvz	125	200	270	14.7	9.5	100	100	14.7	9.5	100	135
	R	125	200	270	6.9	13.6	100	100	6.9	13.6	100	135

¹⁾ The design values of the cyclic fatigue loading apply for load cycles $> 10^6$ in accordance with design method I acc. to TR061 – for unknown static lower load. If the static lower load is known and / or for lower number of load cycles higher load values are possible. The partial safety factors as regulated in the design standard are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$. Drill hole cleaning acc. to assessment.

²⁾ For higher concrete strength classes up to C50/60 higher permissible loads may be possible. - see assessment. The concrete is assumed to be standard-reinforced.

³⁾ In the case of combinations of tensile loads and shear loads, with reduced or minimum spacing and edge distances (anchor groups) the design must be carried out in accordance with the provisions of the complete assessment.

Superbond dynamic FSB dyn

Dynamic fixation for FIS A and RG M with Superbond-System FSB.



Pumps



Guide rails for elevators

Applications

- Small road sign
- Promotional sign
- Guide rails for elevators
- Pumps
- Conveyor belts
- Gates and doors
- Machines, components exposed to vibration

Advantages

- The system is the first to offer lightweight, dynamic load specifications in an ETA for fischer FIS A 8.8 and RG M threaded rods using the filling set. The ETA covers zinc-plated steel in sizes M12 and M16, and stainless steel R in sizes M12 to M24.
- FIS A threaded rods must be mounted with FIS SB injection mortar and RG M threaded rods must be mounted with RSB mortar capsules or FIS SB injection

mortar.

- Variable anchoring depth enables ideal adaption to the load and ensures optimised installation and material use.
- The version with RG M threaded rods and RSB capsules is ideal for accessories kits or applications with diamond drill holes.
- Approved threaded rods in stainless steel R can be used outdoors.

Certificates / Features



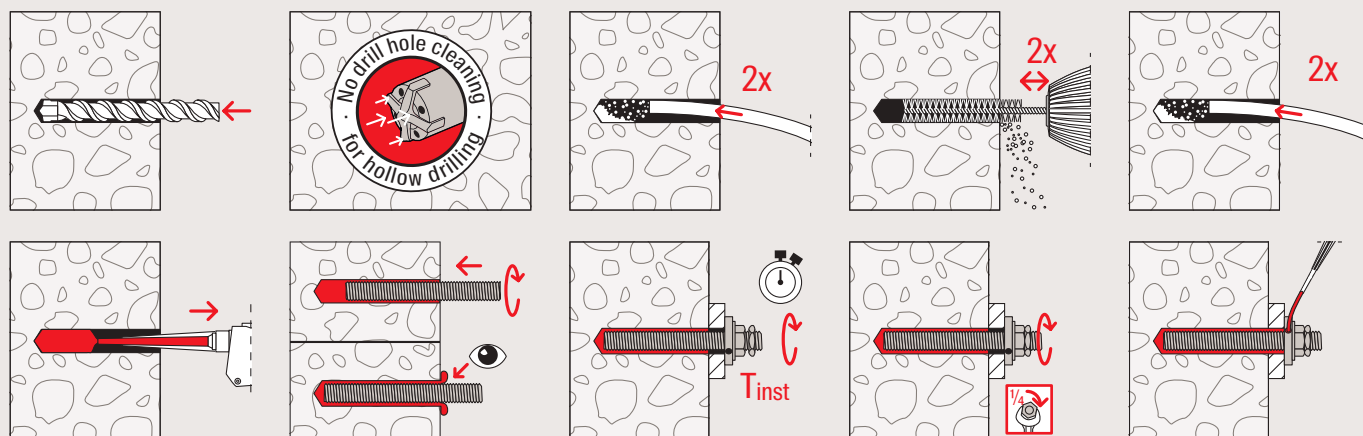
ETA-12/0258, in concrete
ETA-19/0501, for post-installed fasteners in concrete



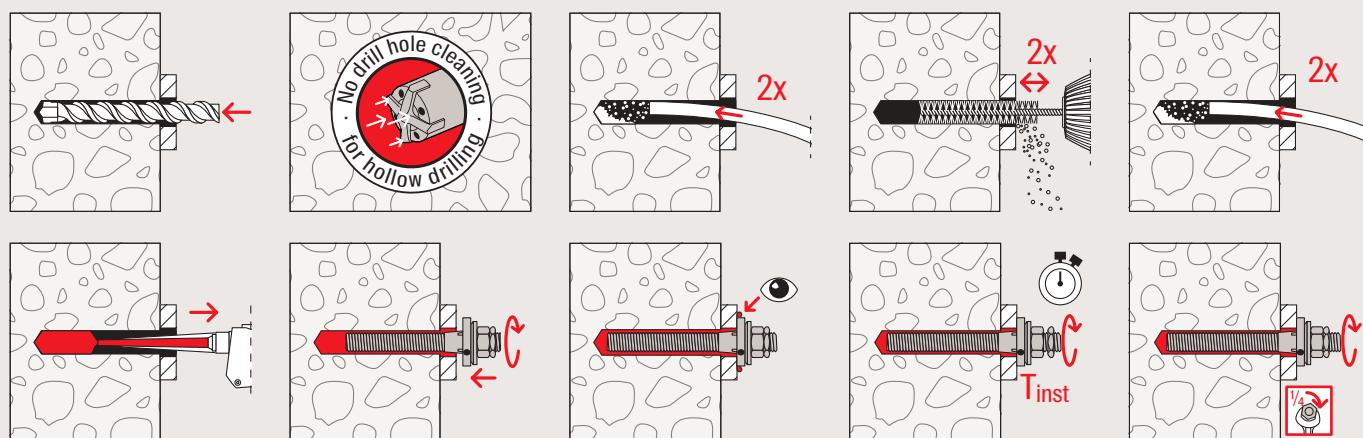
Functioning

- Threaded rod FIS A in combination with injection mortar FIS SB is approved for pre-positioned and push-through installation.
- Threaded rod RG M in combination with the resin capsule RSB is approved for pre-positioned and push-through installation.
- The injection system ensures a full-surface bonding between the fixing element and wall of the drill hole and seals the drill hole.
- The filling disc ensures that the annular gap is filled seamlessly in pre-positioned installation, thereby ensuring reliable load transmission.
- The centering sleeve centres the threaded rod in the fixture, thus ensuring a safe load application.
- The lock nut prevents the hexagonal nut from becoming loose.

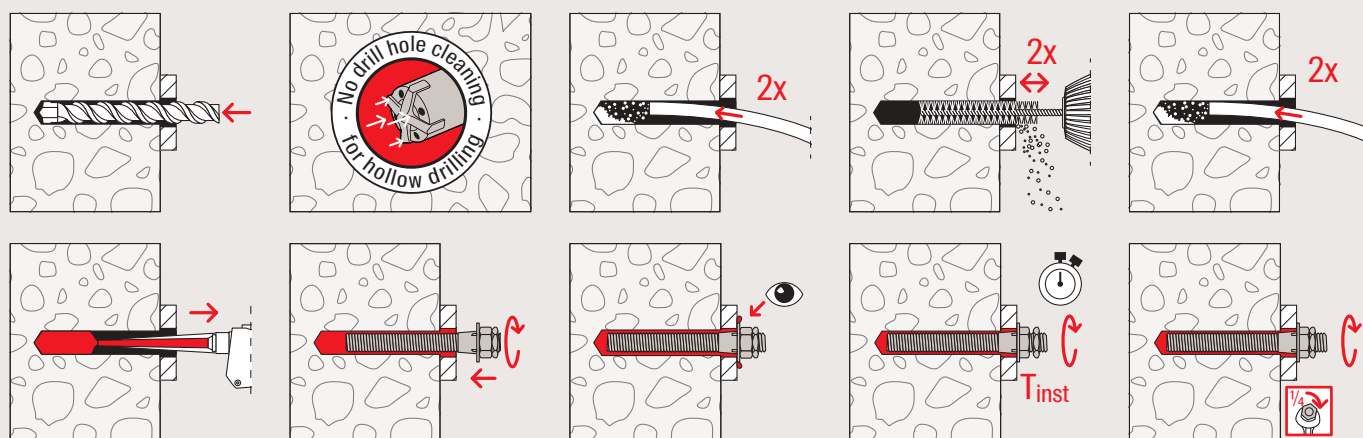
Pre-positioned installation FIS A with filling disc



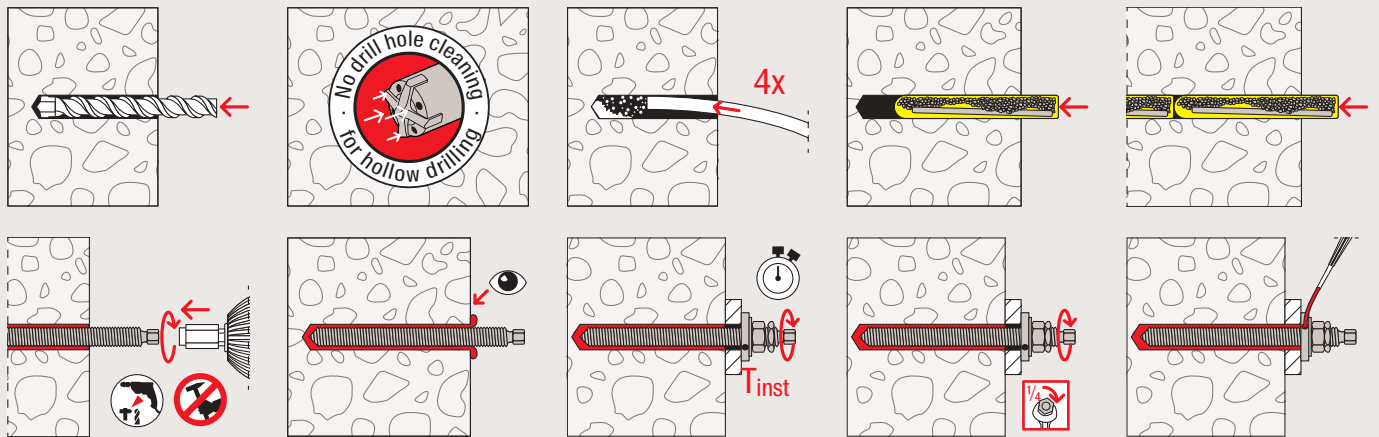
Push-through installation FIS A with filling disc



Push-through installation without filling disc only for M20 / M24

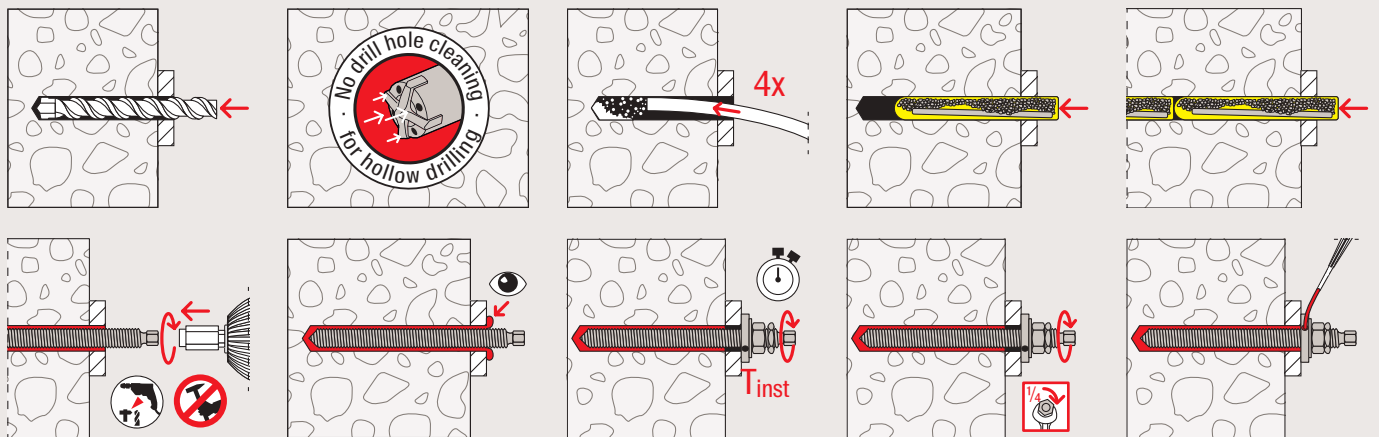


Pre-positioned installation RG M with capsule RSB (hammer drilling)

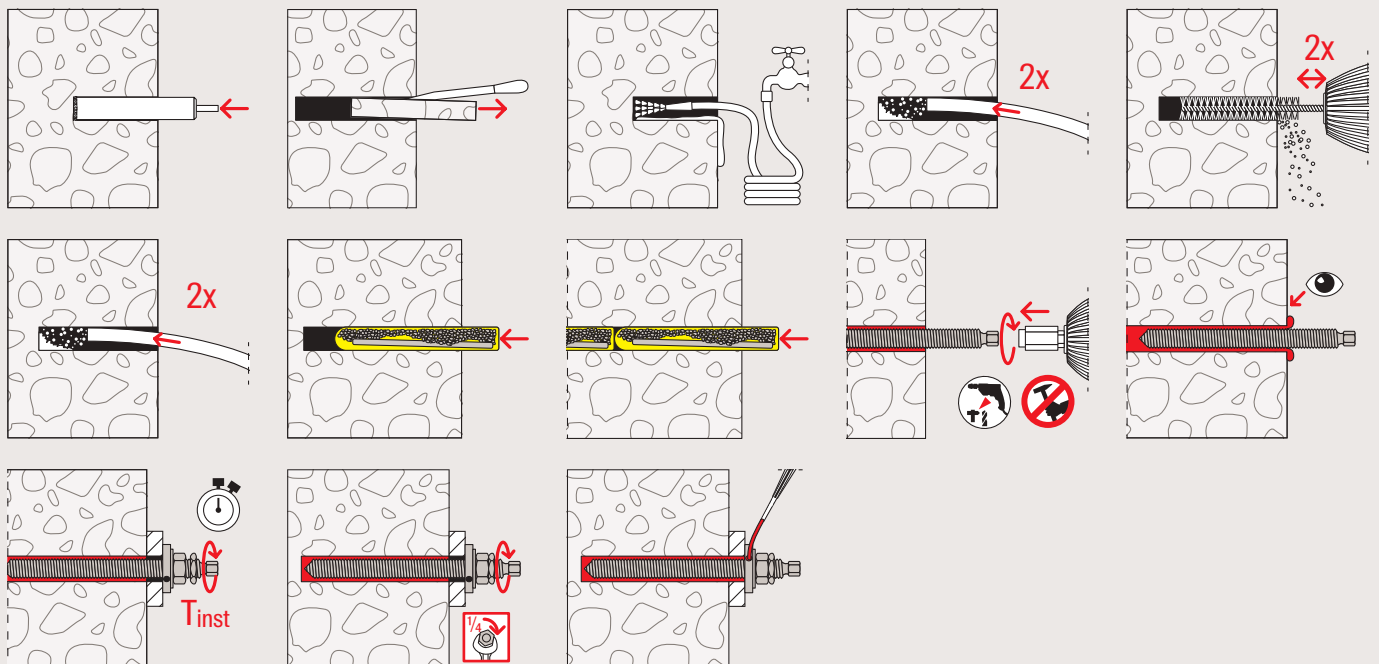


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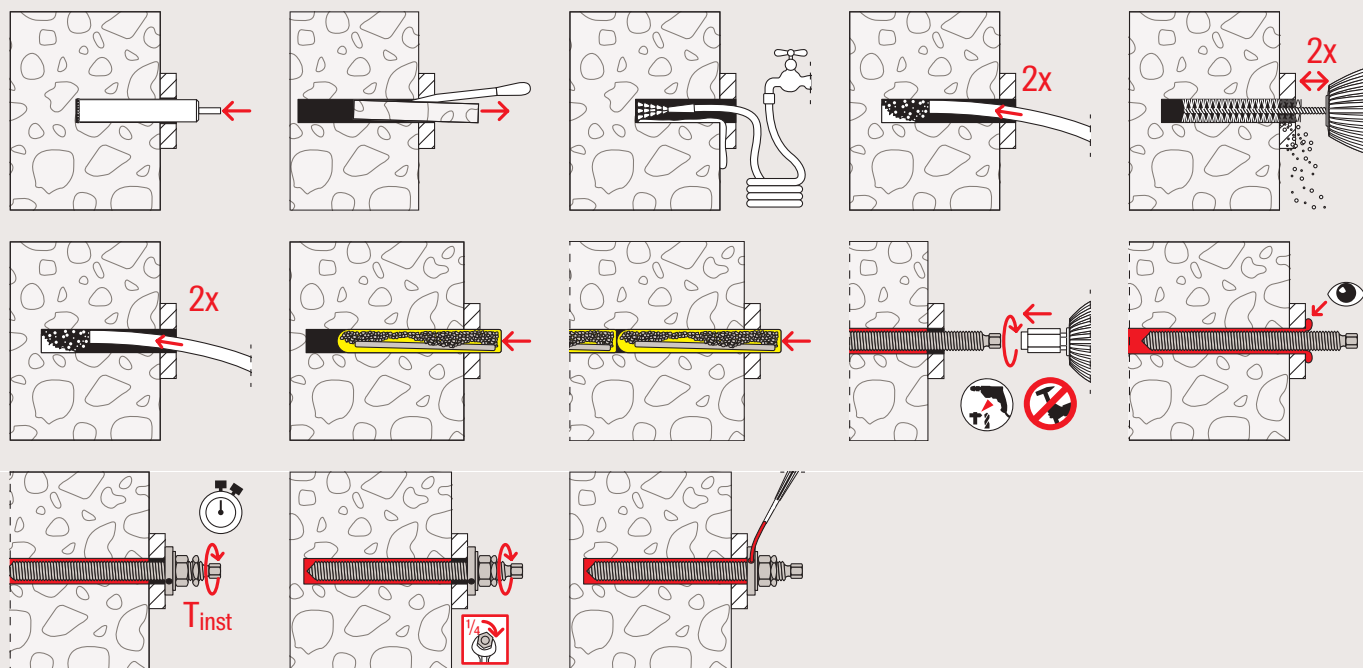
Push-through installation RG M with capsule RSB (hammer drilling)



Pre-positioned installation RG M with capsule RSB (diamond drilling)



Push-through installation RG M with capsule RSB (diamond drilling)



Technical data

Superbond dynamic FSB dyn



FIS SB 390 S

FIS SB 585 S

FIS MR Plus

FIS UMR

Item	Item no.	Approval ETA	Language on label	Scale unit	Contents	Sales unit [pcs]
FIS SB 390 S	519451	●	DE, FR, NL	180	1 x Cartridge 390 ml, 2 x static mixer FIS MR Plus	1
FIS SB 390 S	520555	●	CS, RO, SK	180	1 x Cartridge 390 ml, 2 x static mixer FIS MR Plus	1
FIS SB 390 S	520557	●	BG, DE, SL, SR	180	1 x Cartridge 390 ml, 2 x static mixer FIS MR Plus	1
FIS SB 390 S	520559	●	DA, FI, NO, SV	180	1 x Cartridge 390 ml, 2 x static mixer FIS MR Plus	1
FIS SB 390 S	518831	●	EN, ES, PT	180	1 x Cartridge 390 ml, 2 x static mixer FIS MR Plus	1
FIS SB 390 S	520595	●	HU, PL, RU	180	1 x Cartridge 390 ml, 2 x static mixer FIS MR Plus	1
FIS SB 390 S	519450	●	DE, EN, IT	180	1 x Cartridge 390 ml, 2 x static mixer FIS MR Plus	1
FIS SB 585 S	562065	●	DE, FR, NL	270	1 x Cartridge 585 ml, 2 x static mixer FIS UMR	1
FIS SB 585 S	519452	●	EN, ES, PT	270	1 x Cartridge 585 ml, 2 x static mixer FIS UMR	1
FIS SB 585 S	520526	●	DE, EN, IT	270	1 x Cartridge 585 ml, 2 x static mixer FIS UMR	1
FIS SB 585 S	540990	●	ET, HU, LT, LV, PL, RU	270	1 x Cartridge 585 ml, 2 x static mixer FIS UMR	1
FIS SB HIGH SPEED 390 S	523300	●	DE	180	1 x Cartridge 390 ml, 2 x static mixer FIS MR Plus	1
FIS MR Plus	545853	–	–	–	10 x Static mixer FIS MR Plus for all cartridge sizes from 100 ml to 410 ml	10
FIS UMR	520593	–	–	–	10 x static mixer FIS UMR for 585 & 1500 ml cartridges	10

Technical data

Resin capsule RSB



RSB

Item	Item no.	Approval	Drill hole diameter	Min. drill hole depth	Min. effect. anchorage depth	Match	Sales unit
		ETA	d ₀ [mm]	h ₁ [mm]	h _{ef} [mm]		[pcs]
RSB 12 mini	518822	●	14	75	75	RG M 12	10
RSB 12	518823	●	14	110	110	RG M 12 / RG M 10 I	10
RSB 16 mini	518824	●	18	95	95	RG M 16	10
RSB 16	518825	●	18	125	125	RG M 16 / RG M 12 I	10
RSB 20	518827	●	25	170	170	RG M 20	10
RSB 20 E/24	518828	●	25 / 28	210	210	RG M 20 / RG M 24 / RG M 20 I	5

3

Curing times

FSB dyn								
Temperature in anchoring base	Maximum processing time FIS SB	Maximum processing time FIS SB High Speed	Minimum curing time FIS SB		Minimum curing time FIS SB High Speed		Minimum curing time RSB	
°C	t _{work} [Min.]	t _{work} [Min.]	t _{cure} [hrs.]	[min.]	t _{cure} [hrs.]	[min.]	t _{cure} [hrs.]	[min.]
-30 – -20	–	–	–	–	–	–	120	–
>-20 – -15	–	60	–	–	24	–	48	–
>-15 – -10	60	30	36	–	8	–	30	–
>-10 – -5	30	15	24	–	3	–	16	–
>-5 – 0	20	10	8	–	2	–	10	–
>0 – +5	13	5	4	–	1	–	–	45
>+5 – +10	9	3	2	–	–	45	–	30
>+10 – +20	5	2	1	–	–	30	–	20
>+20 – +30	4	1	–	45	–	15	–	5
> +30 – +40	2	–	–	30	–	–	–	3

Technical data

Anchor rod FIS A



FIS A gvz

Item	Galvani- sed steel, steel grade 8.8	Stainless steel	Ap- pro- val	Drill diameter	Min. / max. anchorage depth	Min. / max. usable length	Min. / max. filling quantity	Sales unit
	Item no. gvz 8.8	Item no. R	ETA	d ₀ [mm]	h _{ef,min / max} [mm]	[mm]	[scale units]	[pcs]
FIS A M12 x 120	519397	044974	●	14	70 / 104	12 / 25	3 / 5	10
FIS A M12 x 140	519398	090450	●	14	70 / 124	12 / 45	3 / 5	10
FIS A M12 x 160	517937	090451	●	14	70 / 144	12 / 65	3 / 7	10
FIS A M12 x 180	519399	090452	●	14	70 / 164	12 / 85	3 / 7	10
FIS A M12 x 200	517938	–	●	14	70 / 184	12 / 105	3 / 7	10
FIS A M12 x 210	–	090453	●	14	70 / 194	12 / 115	3 / 8	10
FIS A M12 x 260	–	090454	●	14	70 / 240	12 / 165	3 / 9	10
FIS A M12 x 280	–	547703	●	14	70 / 240	12 / 85	3 / 9	10
FIS A M16 x 130	519400	044975	●	18	80 / 110	16 / 20	5 / 12	10
FIS A M16 x 175	519401	090455	●	18	80 / 155	16 / 90	5 / 10	10
FIS A M16 x 200	517939	090456	●	18	80 / 180	16 / 90	5 / 11	10
FIS A M16 x 250	517940	090457	●	18	80 / 230	16 / 140	5 / 12	10
FIS A M16 x 300	–	090458	●	18	80 / 280	16 / 190	5 / 17	10
FIS A M20 x 245	–	090459	●	24	90 / 221	20 / 119	11 / 32	10
FIS A M20 x 290	–	090460	●	24	90 / 266	20 / 164	11 / 29	10
FIS A M24 x 290	–	090461	●	28	96 / 261	24 / 151	14 / 34	5

Technical data

Anchor rod FIS A



FIS A gvz

	Galvani- sed steel, steel grade 8.8	Stainless steel	Ap- pro- val	Drill diameter	Min. / max. anchorage depth	Min. / max. usable length	Min. / max. filling quantity	Sales unit
Item	Item no. gvz 8.8	Item no. R	ETA	d ₀ [mm]	h _{ef,min} / max [mm]	[mm]	[scale units]	[pcs]
FIS A M24 x 380	–	090462	●	28	96 / 351	24 / 200	14 / 46	5

Technical data

Threaded rod RG M



RG M R

	Stainless steel	Ap- pro- val	Drill diameter	Anchorage depth (short/ standard/large)	Usable length	Fits capsule RSB	Sales unit
Item	Item no. R	ETA	d ₀ [mm]	h _{ef} [mm]	t _{fix,min} - t _{fix,max} [mm]		[pcs]
RG M12 x 120	535011	●	14	75 / - / -	12 - 13	1 x RSB 12 mini	10
RG M12 x 160	050265	●	14	75 / 110 / -	12 - 53 / 12 - 18	1 x RSB 12 mini 1 x RSB 12	10
RG M12 x 180	512249	●	14	75 / 110 / 150	12-73 / 12-38	1 x RSB 12 mini 1 x RSB 12 2 x RSB 12 mini	10
RG M12 x 200	050576	●	14	75 / 110 / 150	12-93 / 12-58	1 x RSB 12 mini 1 x RSB 12 2 x RSB 12 mini	10
RG M12 x 220	050297	●	14	75 / 110 / 150	12-113 / 12-78 / 12-38	1 x RSB 12 mini 1 x RSB 12 2 x RSB 12 mini	10
RG M12 x 250	095702	●	14	75 / 110 / 150	12-143 / 12-108 / 12-68	1 x RSB 12 mini 1 x RSB 12 2 x RSB 12 mini	10
RG M12 x 300	095705	●	14	75 / 110 / 150	12-193 / 12-158 / 12-118	1 x RSB 12 mini 1 x RSB 12 2 x RSB 12 mini	10
RG M12 x 380	095710 ¹⁾	●	14	75 / 110 / 150	12-200 / 12-200 / 12-198	1 x RSB 12 mini 1 x RSB 12 2 x RSB 12 mini	10
RG M16 x 165	095704	●	18	95 / 125 / -	16-32	1 x RSB 16 mini 1 x RSB 16	10
RG M16 x 190	050266	●	18	95 / 125 / -	16-57 / 16-27	1 x RSB 16 mini 1 x RSB 16	10
RG M16 x 250	050298	●	18	95 / 125 / 190	16-117 / 16-87 / 16-22	1 x RSB 16 mini 1 x RSB 16 2 x RSB 16 mini	10
RG M16 x 300	050299	●	18	95 / 125 / 190	16-167 / 16-137 / 16-72	1 x RSB 16 mini 1 x RSB 16 2 x RSB 16 mini	10
RG M16 x 380	095712 ¹⁾	●	18	95 / 125 / 190	16-200 / 16-2007 / 16-152	1 x RSB 16 mini 1 x RSB 16 2 x RSB 16 mini	10
RG M16 x 500	095713 ¹⁾	●	18	95 / 125 / 190	16-200 / 16-200 / 16-200	1 x RSB 16 mini 1 x RSB 16 2 x RSB 16 mini	10
RG M20 x 260	050267	●	25	- / 170 / 210	20-47	1 x RSB 20 mini 1 x RSB 20 E / 24	10
RG M20 x 350	095706	●	25	- / 170 / 210	20-137 / 20-97	1 x RSB 20 1 x RSB 20 E / 24	10
RG M24 x 300	050268 ¹⁾	●	28	- / 210 / -	24-47	1 x RSB 20 1 x RSB 20 E / 24	10
RG M24 x 400	095715 ¹⁾	●	28	- / 210 / -	24-147	1 x RSB 20 E / 24	10

¹⁾ Straight cut, additional setting tool required.

Technical data

Filling set



Filling sets for subsequent filling of the annular gap

Item	Item no.	External- ϕ d [mm]	Internal diameter D [mm]	Height H [mm]	Min. fixture thickness t_{fix} [mm]	Contents	Sales unit [pcs]
Filling set M12	537218	30	14	6	12	1 x Locking nut 1 x Centring bush 1 x Rounded washer 1 x Fillable bevel washer 1 x Injection nozzle	10
Filling set M12 R	557875	30	14.2	9	12	1 x Locking nut 1 x Centring bush 1 x Rounded washer 1 x Fillable bevel washer 1 x Injection nozzle	10
Filling set M16	537219	38	19	7	16	1 x Locking nut 1 x Centring bush 1 x Rounded washer 1 x Fillable bevel washer 1 x Injection nozzle	10
Filling set M16 R	557876	40	19.2	11	16	1 x Locking nut 1 x Centring bush 1 x Rounded washer 1 x Fillable bevel washer 1 x Injection nozzle	10
Filling set M20	537220	46	23	8	20	1 x Locking nut 1 x Centring bush 1 x Rounded washer 1 x Fillable bevel washer 1 x Injection nozzle 1 x Hexagon nut	10
Filling set M20 R	557877	50	23.3	13	20	1 x Locking nut 1 x Centring bush 1 x Rounded washer 1 x Fillable bevel washer 1 x Injection nozzle	10
Filling set M24 R	557878	55	28	17	24	1 x Locking nut 1 x Centring bush 1 x Rounded washer 1 x Fillable bevel washer 1 x Injection nozzle	10
Filling set M20 R Push-through installation	557879	37	21	–	20	1 x Locking nut, 1 x centring bush	10
Filling set M24 R Push-through installation	557880	44	25	–	24	1 x Locking nut, 1 x centring bush	10

Loads

Superbond dynamic with Superbond mortar FIS SB and threaded rod FIS A resp. RG M

Design values for cyclic fatigue loading¹⁾ of a single anchor normal concrete of strength class C20/25²⁾.
For the design the complete current assessment ETA-19/0501 of 11.06.2024 has to be considered.

Type	Material/ surface	Effective anchorage depth	Minimum member thickness	Installation torque	Cracked concrete				Non-cracked concrete			
					Design values of tension ($\Delta N_{Ed,max}$) and shear loads ($\Delta V_{Ed,max}$); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Design values of tension ($\Delta N_{Ed,max}$) and shear loads ($\Delta V_{Ed,max}$); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
					$\Delta N_{Ed,max}$ ³⁾ [kN]	$\Delta V_{Ed,max}$ ³⁾ [kN]	s_{min} ³⁾ [mm]	c_{min} ³⁾ [mm]	$\Delta N_{Ed,max}$ ³⁾ [kN]	$\Delta V_{Ed,max}$ ³⁾ [kN]	s_{min} ³⁾ [mm]	c_{min} ³⁾ [mm]
FIS A M12 / RG M12	8.8	70	100	40	3.0	2.0	55	55	4.5	2.0	55	55
	8.8	110	140	40	4.5	2.0	55	55	4.5	2.0	55	55
	8.8	240	270	40	4.5	2.0	55	55	4.5	2.0	55	55
	R-70	70	100	40	3.0	2.7	55	55	4.8	2.7	55	55
	R-70	110	140	40	4.9	2.7	55	55	4.9	2.7	55	55
	R-70	240	270	40	4.9	2.7	55	55	4.9	2.7	55	55
FIS A M16 / RG M16	8.8	80	120	60	4.8	3.7	65	65	8.4	3.7	65	65
	8.8	125	170	60	8.4	3.7	65	65	8.4	3.7	65	65
	8.8	320	360	60	8.4	3.7	65	65	8.4	3.7	65	65
	R-70	80	120	60	4.8	4.9	65	65	8.4	4.9	65	65
	R-70	125	170	60	8.8	4.9	65	65	9.2	4.9	65	65
	R-70	320	360	60	9.2	4.9	65	65	9.2	4.9	65	65
FIS A M20/ RG M20	R-70	90	140	120	7.1	7.6	85	85	12.4	7.6	85	85
	R-70	170	220	120	14.3	7.6	85	85	14.3	7.6	85	85
	R-70	400	450	120	14.3	7.6	85	85	14.3	7.6	85	85
FIS A M24/ RG M24	R-70	96	160	150	8.7	11.0	105	105	13.9	11.0	105	105
	R-70	210	270	150	20.6	11.0	105	105	20.6	11.0	105	105
	R-70	480	540	150	20.6	11.0	105	105	20.6	11.0	105	105

¹⁾ The design values of the cyclic fatigue loading apply for load cycles > 10⁸ in accordance with design method I acc. to TR061 - for unknown static lower load. If the static lower load is known and / or for lower number of load cycles higher load values are possible. The partial safety factors as regulated in the design standard are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$. The given load values apply for anchorages in dry and wet concrete and temperatures in the base material up to 50 °C (resp. short-term up to 80 °C). Higher loads are possible at lower temperatures. Drilling method and borehole cleaning according to ETA specifications.

²⁾ For higher concrete strength classes up to C50/60 higher permissible loads may be possible, see ETA. The concrete is assumed to be standard-reinforced.

³⁾ In the case of combinations of tension loads, 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. We recommend using our anchor design software C-FIX.

Loads

Superbond dynamic with Superbond capsule RSB and threaded rod RG M

Design values for cyclic fatigue loading¹⁾ of a single anchor normal concrete of strength class C20/25²⁾.
For the design the complete current assessment E ETA-19/0501 of 11.06.2024 has to be considered.

Type	Material/ surface	Effective anchorage depth h_{ef} [mm]	Minimum member thickness h_{min} [mm]	Installation torque T_{inst} [Nm]	Cracked concrete				Non-cracked concrete			
					Design values of tension ($\Delta N_{Ed,max}$) and shear loads ($\Delta V_{Ed,max}$); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Design values of tension ($\Delta N_{Ed,max}$) and shear loads ($\Delta V_{Ed,max}$); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
					$\Delta N_{Ed,max}^{3)}$ [kN]	$\Delta V_{Ed,max}^{3)}$ [kN]	$s_{min}^{3)}$ [mm]	$c_{min}^{3)}$ [mm]	$\Delta N_{Ed,max}^{3)}$ [kN]	$\Delta V_{Ed,max}^{3)}$ [kN]	$s_{min}^{3)}$ [mm]	$c_{min}^{3)}$ [mm]
RG M 12	8.8	75	110	40	3.3	2.0	55	55	4.5	2.0	55	55
	8.8	110	140	40	4.5	2.0	55	55	4.5	2.0	55	55
	8.8	150	180	40	4.5	2.0	55	55	4.5	2.0	55	55
	R-70	75	110	40	3.3	2.7	55	55	4.9	2.7	55	55
	R-70	110	140	40	4.9	2.7	55	55	4.9	2.7	55	55
	R-70	150	180	40	4.9	2.7	55	55	4.9	2.7	55	55
RG M 16	8.8	95	140	60	6.2	3.7	65	65	8.4	3.7	65	65
	8.8	125	170	60	8.4	3.7	65	65	8.4	3.7	65	65
	8.8	190	230	60	8.4	3.7	65	65	8.4	3.7	65	65
	R-70	95	140	60	6.2	4.9	65	65	9.2	4.9	65	65
	R-70	125	170	60	8.8	4.9	65	65	9.2	4.9	65	65
	R-70	190	230	60	9.2	4.9	65	65	9.2	4.9	65	65
RG M 20	R-70	170	220	120	14.3	7.6	85	85	14.3	7.6	85	85
	R-70	210	260	120	14.3	7.6	85	85	14.3	7.6	85	85
RG M 24	R-70	210	270	150	20.6	11.0	105	105	20.6	11.0	105	105

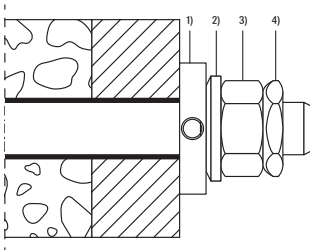
¹⁾ The design values of the cyclic fatigue loading apply for load cycles $> 10^6$ in accordance with design method I acc. to TR061 - for unknown static lower load. If the static lower load is known and / or for lower number of load cycles higher load values are possible. The partial safety factors as regulated in the design standard are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$. The given load values apply for anchorages in dry and wet concrete and temperatures in the base material up to 50 °C (resp. short-term up to 80 °C). Higher loads are possible at lower temperatures. Drill hole cleaning as per specification in the ETA. Drilling method and borehole cleaning according to ETA specifications.

²⁾ For higher concrete strength classes up to C50/60 higher permissible loads may be possible, see ETA. The concrete is assumed to be standard-reinforced.

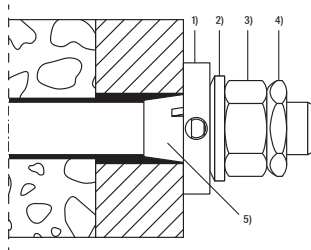
³⁾ In the case of combinations of tension loads, shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups) the design must be carried out in accordance with the provisions of the complete ETA. We recommend using our anchor design software C-FIX.

Installation drawings dynamic

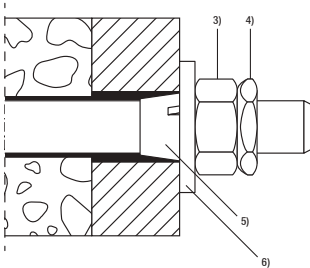
Pre-assembly with FIS A and injection system
Sizes: M12, M16, M20, M24



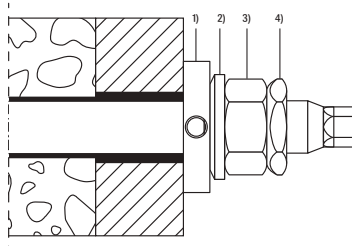
Push-through installation with FIS A and injection system
Sizes: M12, M16, M20, M24



Push-through installation with FIS A and injection system
Sizes: M12, M16, M20, M24



Pre-assembly / Push-through installation with RG M and cartridge system RSB
Sizes: M12, M16, M20, M24



- ¹⁾ filling disc for subsequent backfilling of the annular gap
- ²⁾ cone (used for filling)
- ³⁾ hex nut
- (Included in the delivery of the anchor rod)
- ⁴⁾ locking nut
- ⁵⁾ centring sleeve
- ⁶⁾ washer
- (Included in the delivery of the anchor rod)

Injection mortar FIS VL

The solid injection mortar for standard applications in cracked concrete and masonry.

3



High-bay warehouses

Applications

- Steelwork constructions
- Timber constructions
- Guard rails
- Façades
- Staircases
- Steel brackets
- Machines
- Masts
- Awnings
- Canopies
- Gates
- Consoles
- Pipelines
- Gratings
- Satellite antennas

Advantages

- The FIS VL is approved for use in cracked concrete and masonry, and achieves a high load-bearing capacity in these conditions.
- The temperature resistance of the FIS VL injection mortar of -40 °C to +120 °C allows for a solid load level even when

subjected to high temperature demands, thus providing great flexibility.

- FIS VL HIGH SPEED has a significantly shorter curing time than FIS VL, thus also ensuring swift work progress even at low temperatures.

Certificates / Features



ETA-10/0352, in concrete
ETA-15/0263, in masonry
ETA-15/0539, for post-installed rebar connections

Building materials

Approved for anchorings in:

- Concrete C20/25 to C50/60, cracked
- Hollow blocks made from lightweight concrete
- Vertically perforated brick
- Perforated sand-lime brick
- Solid sand-lime brick
- Solid brick
- Rebar connections
- Aerated concrete

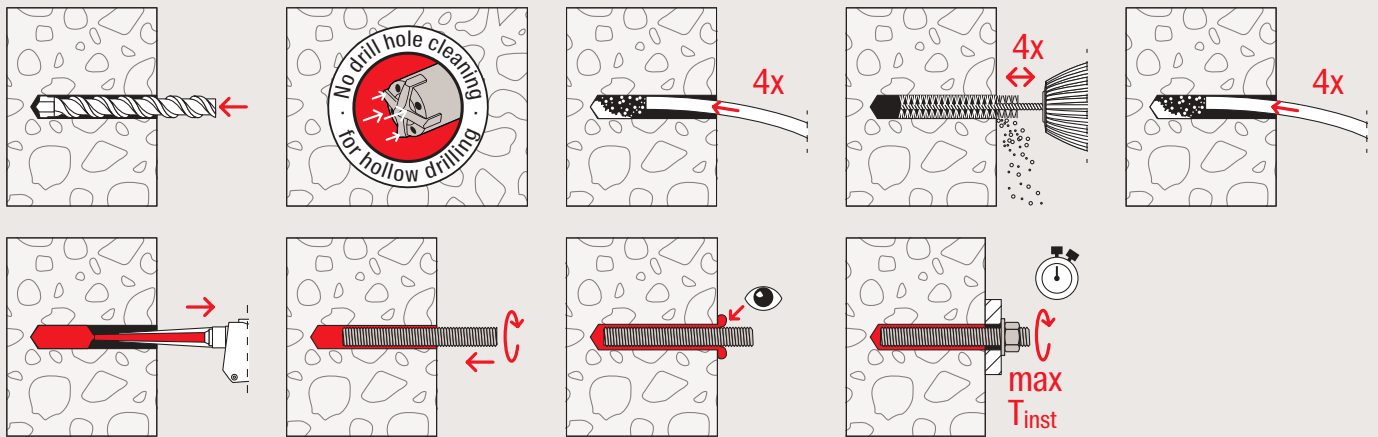
Also suitable for:

- Concrete C12/15
- Hollow blocks made from concrete

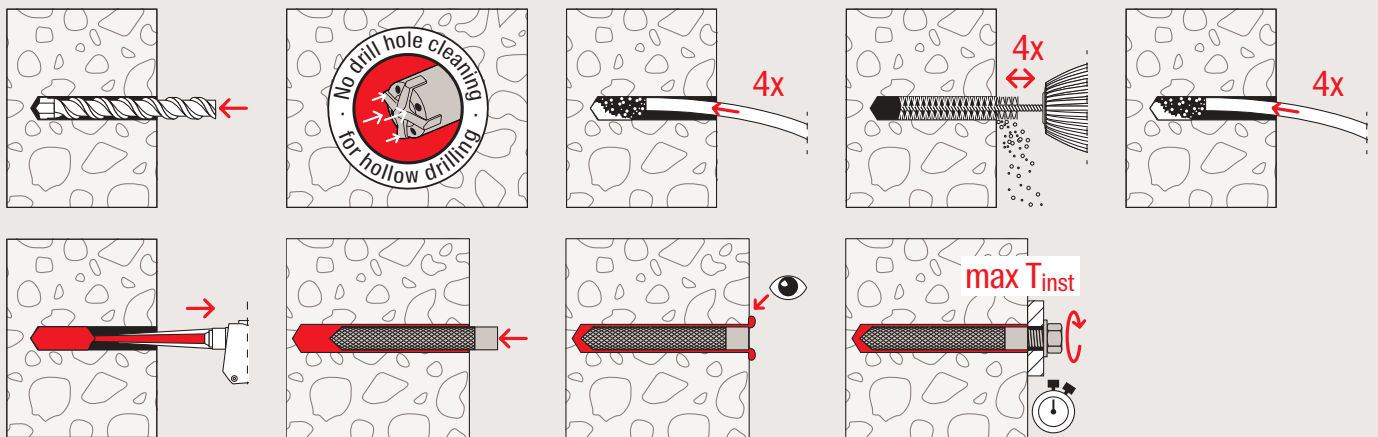
Functioning

- The FIS VL is a 2-component injection mortar based on vinyl ester.
- Resin and hardener are stored in two separate chambers and are not mixed and activated until extrusion through the static mixer.
- The mortar is extruded bubble free from the drill hole base.
- The mortar bonds the entire surface of the anchor with the drill hole wall and seals the drill hole.
- The injection mortar FIS VL 150 C and 300 T can be applied without a special tool using a standard dispenser.
- Partially used cartridges can be reused by changing the static mixer.

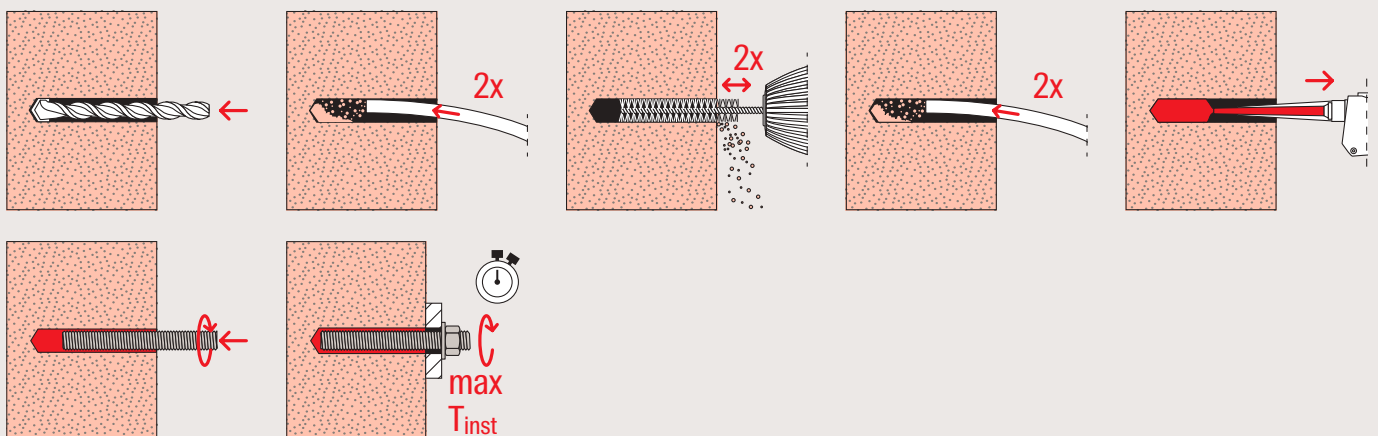
Installation in concrete with FIS VL and FIS A / RG M



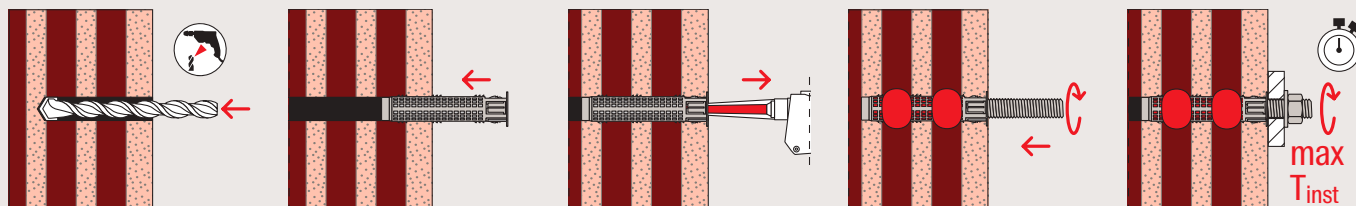
Installation in concrete with FIS VL and RG M I



Installation in solid brick with FIS VL and FIS A / RG M

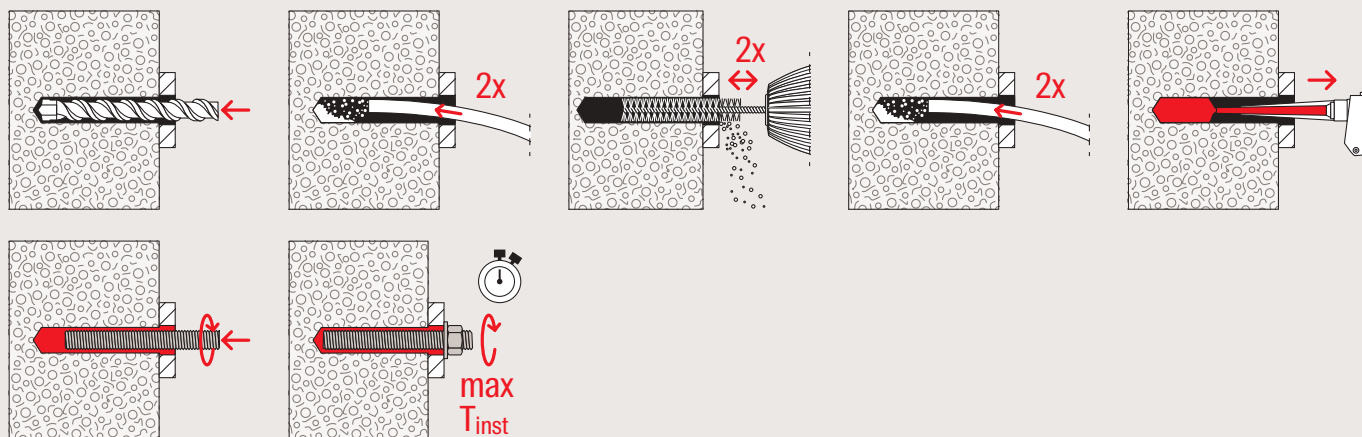


Installation in hollow blocks with FIS VL and FIS HK + FIS A / RG M



3

Installation in aerated concrete with FIS VL and FIS A / RG M



Technical data

Injection mortar FIS VL						
FIS VL 300 T	FIS VL 360 S	FIS VL 410 C	FIS MR Plus			
Item	Item no.	Ap- pro- val ETA	Language on label	Scale unit	Contents	Sales unit [pcs]
FIS VL 300 T	519557	●	DE	150	1 x Cartridge 300 ml, 2 x static mixer FIS MR Plus	1
FIS VL 300 T electro	519558	●	DE	150	1 x Cartridge 300 ml, 2 x static mixer FIS MR Plus	1
FIS VL 300 T	539461	●	EN, ES, PT	150	1 x Cartridge 300 ml, 2 x static mixer FIS MR Plus	1
FIS VL 300 T	537149	●	EN, ES, PT	150	1 x Cartridge 300 ml, 2 x static mixer FIS MR Plus	1
FIS VL 300 T with clip	538583	●	CS, HU, SK	150	1 x Cartridge 300 ml, 2 x static mixer FIS MR Plus	1
FIS VL 300 T	540983	●	ET, LT, LV, PL	150	1 x Cartridge 300 ml, 2 x static mixer FIS MR Plus	1
FIS VL 300 T in bucket	539462	●	EN, ES, PT	150	20 x Cartridge 300 ml, 40 x static mixer FIS MR Plus	1
FIS VL 300 T HIGH SPEED	571912	●	DE	150	1 x Cartridge 300 ml, 2 x static mixer FIS MR Plus	1
FIS VL 300 T HIGH SPEED with clip	538585	●	CS, SK	150	1 x Cartridge 380 ml, 2 x static mixer FIS MR Plus	1
FIS VL 360 S	519556	●	DE	180	1 x Cartridge 360 ml, 2 x static mixer FIS MR Plus	1
FIS VL 360 S	558795	●	AR, EL, EN	180	1 x Cartridge 360 ml, 2 x static mixer FIS MR Plus	1
FIS VL 410 C	539463	●	EL, EN, ES, PT	200	1 x Cartridge 410 ml, 2 x static mixer FIS MR Plus	1
FIS VL 410 C	538584	●	CS, SK	200	1 x Cartridge 410 ml, 2 x static mixer FIS MR Plus	1
FIS VL 410 C HIGH SPEED	538586	●	CS, SK	200	1 x Cartridge 410 ml, 1 x static mixer FIS MR Plus	1
FIS VL 410 C	540986	●	EN, PL, UK	200	1 x Cartridge 410 ml, 2 x static mixer FIS MR Plus	1
FIS VL 410 C in bucket	538549	●	EN, TR	200	16 x Cartridge 410 ml, 32 x static mixer FIS MR Plus	1
FIS VL 410 C in bucket	539464	●	EL, EN, ES, PT	200	16 x Cartridge 410 ml, 32 x static mixer FIS MR Plus	1
FIS VL 300 T HWK big	538589	●	CS, SK	150	20 x Cartridge 300 ml, 40 x static mixer FIS MR Plus	1
FIS VL 410 C HWK big	538590	●	CS, SK	200	16 x Cartridge 410 ml, 32 x static mixer FIS MR Plus	1
FIS MR Plus	545853	–	–	–	10 x Static mixer FIS MR Plus for all cartridge sizes from 100 ml to 410 ml	10

Curing times

FIS VL High Speed FIS VL						
Temperature at anchoring base [°C]	Maximum processing time t_{work}		Minimum curing time $t_{\text{cure}}^{1)}$			
	FIS VL High Speed [min.]	FIS VL [min.]	FIS VL High Speed [hrs.]	[min.]	FIS VL [hrs.]	[min.]
-10 – -5 ²⁾	–	–	12	–	–	–
> -5 – 0 ²⁾	5	–	3	–	24	–
> 0 – +5 ²⁾	5	13	3	–	3	–
> +5 – +10	3	9	–	50	–	90
> +10 – +20	1	5	–	30	–	60
> +20 – +30	–	4	–	–	–	45
> +30 – +40	–	2	–	–	–	35

1) In wet concrete or water filled holes the curing times must be doubled.

2) Minimal cartridge temperature +5 °C

Loads

Injection system FIS VL with threaded rod FIS A in solid and perforated masonry

Permissible loads¹⁾²⁾ for a single anchor in masonry for pre-positioned installation.

For the design the complete current assessment ETA-15/0263 has to be considered.

	Compressive brick strength	Brick raw density	Minimum brick dimensions ³⁾	Effective anchor- age depth	Mini- mum member thick- ness	Maximum installa- tion torque	Permis- sible tensile load ⁴⁾	Permis- sible shear load ⁴⁾	Minimum- spacing ⁵⁾	Charac- teristic resp. minimum edge dis- tance ⁵⁾
Type	f_b [N/mm ²]	ρ [kg/dm ³]	(L x B x H) [mm]	h_{ef} [mm]	h_{min} [mm]	$T_{inst,max}$ [Nm]	N_{perm} [kN]	V_{perm} [kN]	$s_{min} \parallel s_{min \perp}$ [mm]	$c_{cr} = c_{min}$ [mm]
Solid sand-lime brick KS, acc. to EN 771-2										
M8	≥ 12	≥ 1.8	240 x 115 x 71	≥ 50	115	5	1.14	0.43	80 / 150	60
M8	≥ 12	≥ 1.8	240 x 115 x 71	100	240	5	2.29	0.86	80 / 300	60
M10	≥ 12	≥ 1.8	240 x 115 x 71	100	240	15	1.57	0.57	80 / 300	60
M10	≥ 12	≥ 1.8	240 x 115 x 71	200	240	15	3.43	0.57	80 / 600	60
M12	≥ 12	≥ 1.8	240 x 115 x 71	100	240	15	1.29	0.57	80 / 300	60
M12	≥ 12	≥ 1.8	240 x 115 x 71	200	240	15	3.43	0.57	80 / 300	60
Perforated sand-lime brick KSL, acc. to EN 771-2³⁾										
M8 with FIS H 12 x 85 K	≥ 12	≥ 1.4	240 x 175 x 113	85	175	2	0.71	0.71	100 / 115	60
M8 / M10 with FIS H 16 x 85 K	≥ 12	≥ 1.4	240 x 175 x 113	85	175	2	0.86	1.29	100 / 115	80
M12 with FIS H 20 x 85 K	≥ 12	≥ 1.4	240 x 175 x 113	85	175	2	0.86	1.29	100 / 115	80
M8 / M10 with FIS H 16 x 130 K	≥ 12	≥ 1.4	240 x 175 x 113	130	175	2	0.86	1.29	100 / 115	80
Vertically perforated brick Hlz, acc. to EN 771-1³⁾										
M8 with FIS H 12 x 85 K	≥ 10	≥ 0.9	240 x 175 x 113	85	175	2	1.14	1.14	240 / 115	100
M8 / M10 with FIS H 16 x 85 K	≥ 10	≥ 0.9	240 x 175 x 113	85	175	2	1.00	1.57	240 / 115	100
M12 with FIS H 20 x 85 K	≥ 10	≥ 0.9	240 x 175 x 113	85	175	2	1.43	1.71	240 / 115	100
M8 / M10 with FIS H 16 x 130 K	≥ 10	≥ 0.9	240 x 175 x 113	130	175	2	1.43	1.57	240 / 115	100
M12 with FIS H 20 x 130 K	≥ 10	≥ 0.9	240 x 175 x 113	130	175	2	1.43	1.71	240 / 115	100
Aerated concrete acc. to EN 771-4⁶⁾										
M8	≥ 2	≥ 0.35	-	≥ 100	130	1	0.54	0.43	250 / 250	100
M8	≥ 4	≥ 0.50	-	200	230	8	1.07	0.71	80 / 80	100
M10	≥ 2	≥ 0.35	-	≥ 100	130	2	0.54	0.43	250 / 250	100
M10	≥ 4	≥ 0.50	-	200	230	12	1.79	0.71	80 / 80	100
M12	≥ 2	≥ 0.35	-	≥ 100	130	2	0.71	0.54	250 / 250	100
M12	≥ 4	≥ 0.50	-	200	230	16	1.79	0.71	80 / 80	100

¹⁾ The required partial safety factors for material resistance as well as a partial safety factor for load actions of $\gamma_l = 1.4$ are considered. Load values are valid for zinc-plated steel, stainless steel R and highly corrosion-resistant steel HCR. In perforated bricks and hollow blocks threaded rod FIS A in combination with anchor sleeve FIS H K.

²⁾ The given loads are valid for installation and use of fixations in dry masonry - use category d/d - for temperatures in the substrate up to 50 °C (resp. short term up to 80 °C) and drill hole cleaning according to assessment. The given brick types in combination with the permissible loads are an extract of the assessment.

³⁾ More information about, e.g. hole patterns, assortment of anchor sleeves FIS H K see assessment.

⁴⁾ In the case of combinations of tensile and shear loads, bending moments and reduced edge and axial spacings (anchor groups), the design must be carried out in accordance with the provisions of the complete assessment.

⁵⁾ Minimum feasible spacing resp. edge distance. Details as well as to the distances to joints see assessment.

⁶⁾ Cylindrical drill hole.

Loads

Injection system FIS VL 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-10/0352 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 M 8	5.8	60	100	10	-	-	-	-	6.6	6.3	40	40
	5.8	80	110	10	-	-	-	-	8.8	6.3	40	40
	5.8	160	190	10	-	-	-	-	9.0	6.3	40	40
	R-70	60	100	10	-	-	-	-	6.6	6.0	40	40
	R-70	80	110	10	-	-	-	-	8.8	6.0	40	40
	R-70	160	190	10	-	-	-	-	13.8	6.0	40	40
FIS A M 10	5.8	60	100	20	4.5	9.7	45	45	8.2	9.7	45	45
	5.8	90	120	20	6.7	9.7	45	45	12.3	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	4.5	9.2	45	45	8.2	9.2	45	45
	R-70	90	120	20	6.7	9.2	45	45	12.3	9.2	45	45
	R-70	200	230	20	15.0	9.2	45	45	15.7	9.2	45	45
FIS A M 12	5.8	70	100	40	6.3	14.3	55	55	11.4	14.3	55	55
	5.8	110	140	40	9.9	14.3	55	55	18.1	14.3	55	55
	5.8	240	270	40	20.5	14.3	55	55	20.5	14.3	55	55
	R-70	70	100	40	6.3	13.7	55	55	11.4	13.7	55	55
	R-70	110	140	40	9.9	13.7	55	55	18.1	13.7	55	55
	R-70	240	270	40	21.5	13.7	55	55	22.5	13.7	55	55
FIS A M 16	5.8	80	120	60	9.6	23.0	65	65	14.0	26.9	65	65
	5.8	125	170	60	15.0	26.9	65	65	24.9	26.9	65	65
	5.8	320	360	60	37.6	26.9	65	65	37.6	26.9	65	65
	R-70	80	120	60	9.6	23.0	65	65	14.0	25.2	65	65
	R-70	125	170	60	15.0	25.2	65	65	24.9	25.2	65	65
	R-70	320	360	60	38.3	25.2	65	65	42.0	25.2	65	65
FIS A M 20	5.8	90	140	120	11.7	28.0	85	85	16.7	40.0	85	85
	5.8	170	220	120	23.3	42.3	85	85	40.3	42.3	85	85
	5.8	400	450	120	54.9	42.3	85	85	58.6	42.3	85	85
	R-70	90	140	120	11.7	28.0	85	85	16.7	39.4	85	85
	R-70	170	220	120	23.3	39.4	85	85	40.3	39.4	85	85
	R-70	400	450	120	54.9	39.4	85	85	65.7	39.4	85	85
FIS A M 24	5.8	96	160	150	-	-	-	-	18.4	44.1	105	105
	5.8	210	270	150	-	-	-	-	56.5	60.6	105	105
	5.8	480	540	150	-	-	-	-	84.3	60.6	105	105
	R-70	96	160	150	-	-	-	-	18.4	44.1	105	105
	R-70	210	270	150	-	-	-	-	56.5	56.8	105	105
	R-70	480	540	150	-	-	-	-	94.3	56.8	105	105
FIS A M 30	5.8	120	190	300	-	-	-	-	25.7	61.6	140	140
	5.8	280	350	300	-	-	-	-	89.0	96.0	140	140
	5.8	600	670	300	-	-	-	-	133.8	96.0	140	140
	R-70	120	190	300	-	-	-	-	25.7	61.6	140	140
	R-70	280	350	300	-	-	-	-	89.0	90.2	140	140
	R-70	600	670	300	-	-	-	-	150.1	90.2	140	140

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 80 °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 (guz); 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.

Loads

Injection system FIS VL 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-10/0352 has to be considered.

					Non-cracked concrete			
	Screw Material ³⁾	Effective anchorage depth	Minimum member thickness	Maximum Installation torque	Permissible tension (N _{perm} ⁴⁾ and shear loads (V _{perm} ⁴); minimum spacing (s _{min} ⁴⁾ and edge distances (c _{min} ⁴) with reduced loads			
Type		h _{ef} [mm]	h _{min} [mm]	T _{inst, max} [Nm]	N _{perm} ⁴⁾ [kN]	V _{perm} ⁴⁾ [kN]	s _{min} ⁴⁾ [mm]	c _{min} ⁴⁾ [mm]
RG M 8 I	5.8	90	120	10	9.0	5.3	55	55
	8.8	90	120	10	13.8	8.3	55	55
	R-70	90	120	10	9.9	5.9	55	55
RG M 10 I	5.8	90	130	20	13.8	8.3	65	65
	8.8	90	130	20	16.7	13.3	65	65
	R-70	90	130	20	15.7	9.3	65	65
RG M 12 I	5.8	125	170	40	20.5	12.1	75	75
	8.8	125	170	40	26.6	19.3	75	75
	R-70	125	170	40	22.5	13.5	75	75
RG M 16 I	5.8	160	210	80	37.6	22.4	95	95
	8.8	160	210	80	39.5	30.9	95	95
	R-70	160	210	80	39.5	25.1	95	95
RG M 20 I	5.8	200	260	120	55.2	35.4	125	125
	8.8	200	260	120	55.2	42.9	125	125
	R-70	200	260	120	55.2	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 80 °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 mortar FIS V Plus

The powerful universal mortar for concrete and masonry.



Rescue ladders



Steel constructions

Applications

- Steelwork constructions
- Timber constructions
- Guard rails
- Façades
- Staircases
- Steel brackets
- Machines
- Masts
- Awnings
- Canopies
- Gates
- Consoles
- Pipelines
- Gratings
- Satellite antennas

Advantages

- The FIS V Plus injection mortar has numerous system approvals, such as in cracked and non-cracked concrete, masonry and for special applications.
- The ETA assessment for a service life of 100 years offers permanent safety for all applications.
- The approved use in water-filled drill holes enables a wide range of applications, even under harsh environmental conditions.
- FIS VW Plus High Speed has a significantly shorter curing time than FISV Plus, thus also ensuring swift work progress

even at low temperatures.

- Due to the possible installation temperature of -10° to 40°C the universal mortar can be applied all year long.
- FIS VS Plus Low Speed with extended gelling time prevents premature curing of the mortar at higher temperatures and is ideally suited to large drill hole depths.
- The extensive range of accessories is ideally suited to the FIS V Plus injection mortar family, increases the great flexibility of the system and thus allows for a broad range of applications.

Certificates / Features



ETA-20/0729, in masonry
ETA-20/0603, in concrete
ETA-20/0728, for post-installed rebar connections



Building materials

Approved for anchorings in:

- Concrete C20/25 to C50/60, cracked and non-cracked
- Hollow blocks made from lightweight concrete
- Hollow blocks made from concrete
- Vertically perforated brick
- Perforated sand-lime brick
- Solid sand-lime brick
- Aerated concrete
- Solid brick

Approved for:

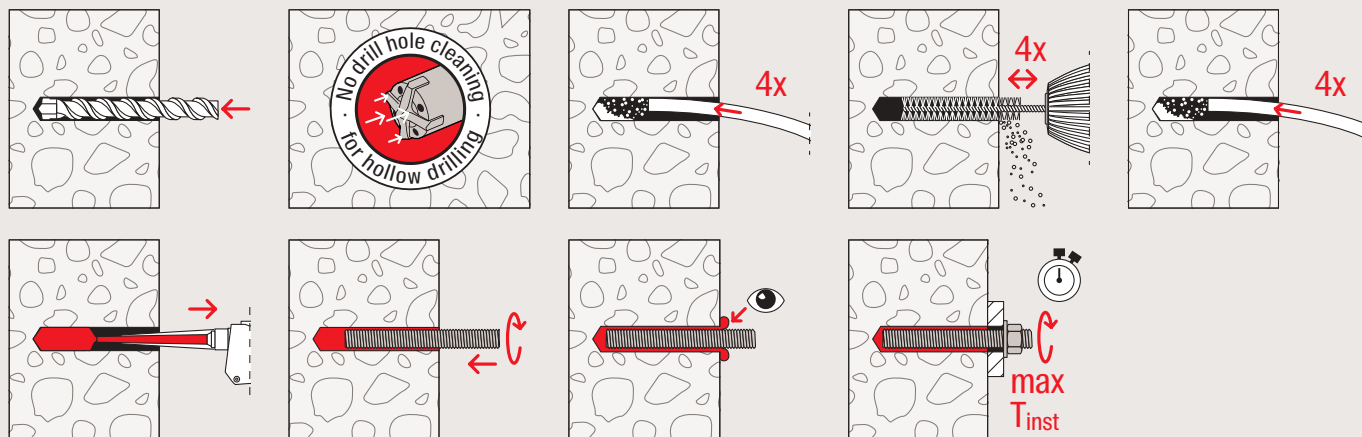
- Rebar connections
- Remedial wall tie VBS 8
- Weather facing reconstruction system FWS II
- Stand-off installation TherMax

Functioning

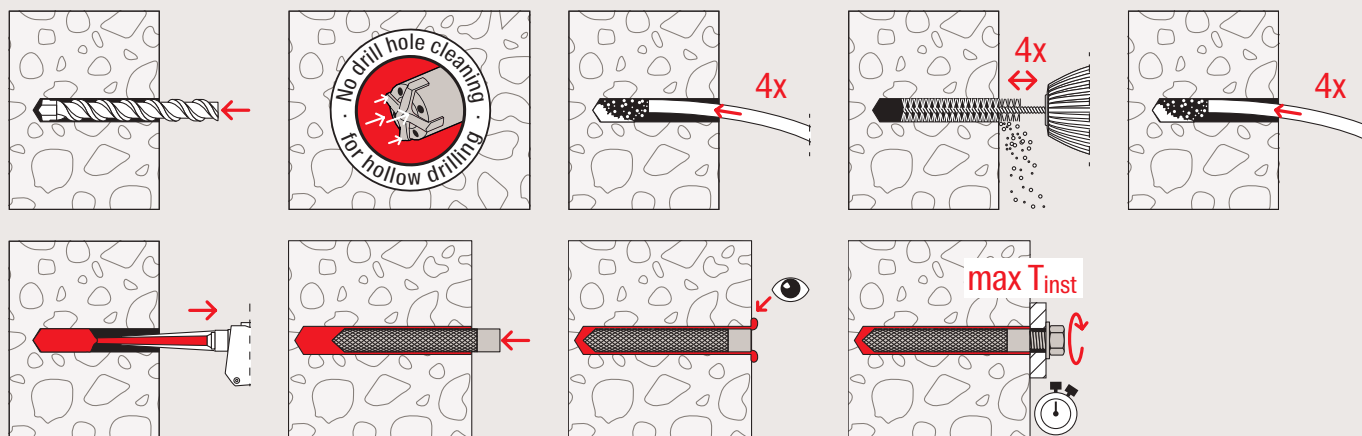
- FIS V Plus is a 2-component injection mortar based on a vinyl ester hybrid concept.
- Resin and hardener are stored in two separate chambers and are not mixed and activated until extrusion through the static mixer.
- The mortar is extruded bubble free from the drill hole base.
- The mortar bonds the entire surface of the anchor with the drill hole wall and seals the drill hole.
- The injection cartridges are quick and easy to use with the fischer dispensers.
- Partially used cartridges can be reused by changing the static mixer.

Installation in concrete with FIS V Plus and FIS A / RG M

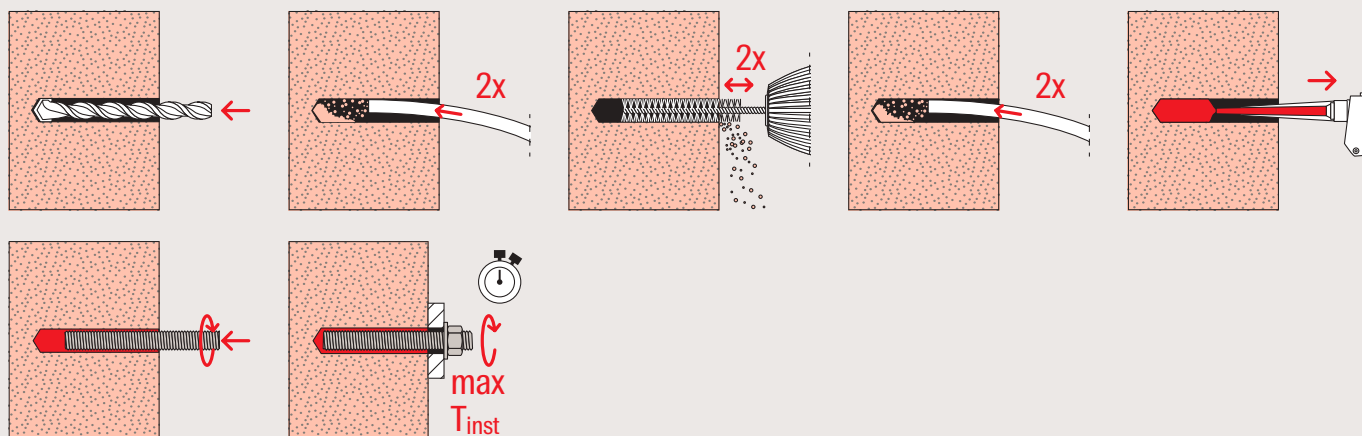
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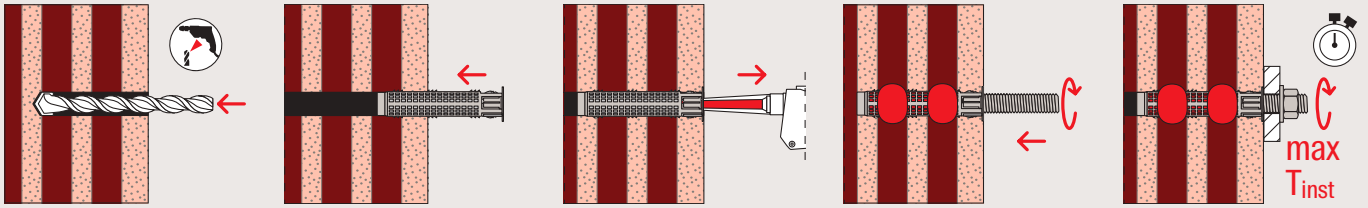
Installation in concrete with FIS V Plus and RG M I



Installation in solid brick with FIS V Plus and FIS A

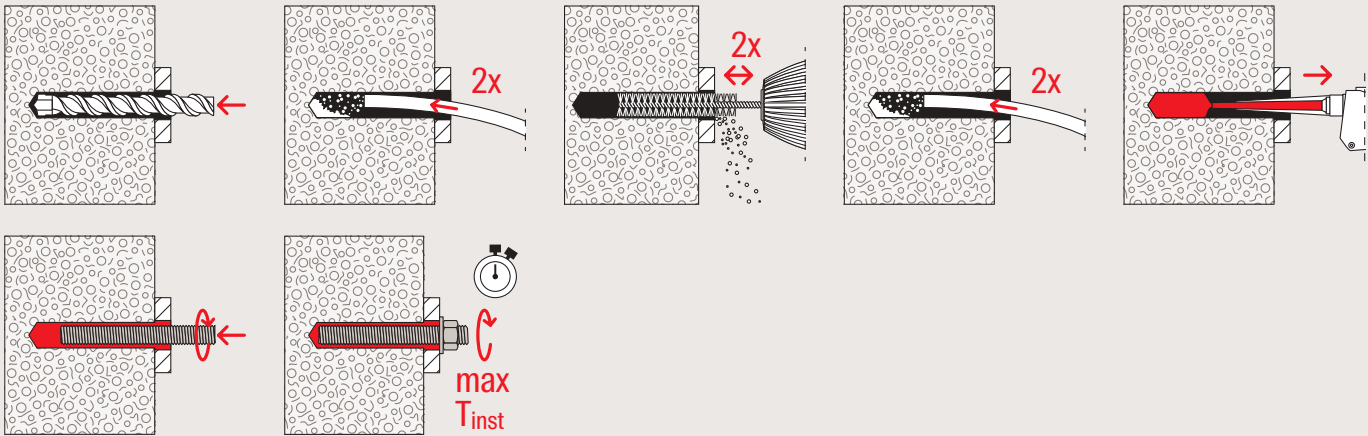


Installation in hollow blocks with FIS V Plus and FIS HK + FIS A

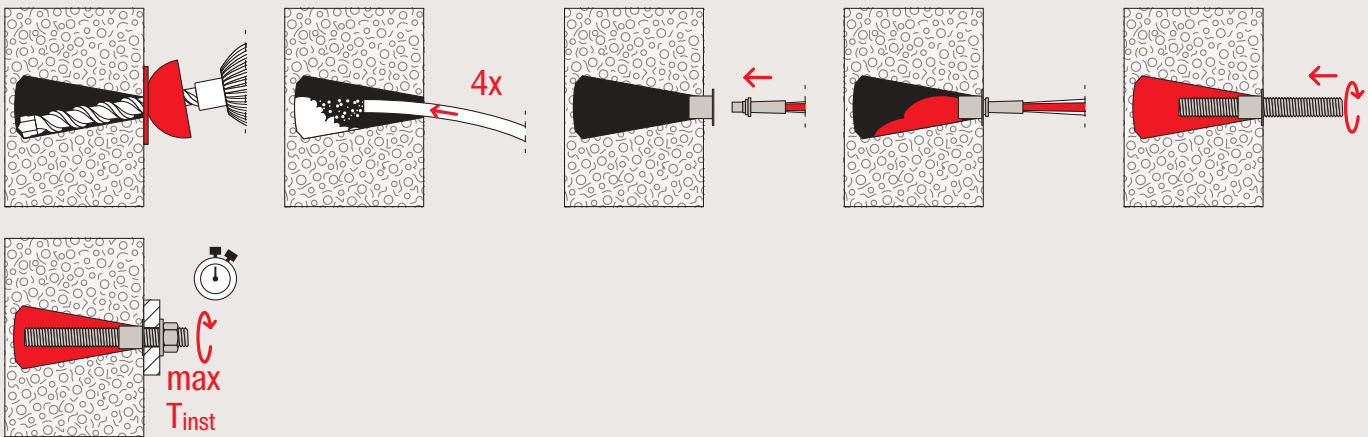


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Installation in aerated concrete with FIS V Plus and FIS A / RG M



Installation in undercut drill hole in aerated concrete with FIS V Plus and FIS A / RG M



Technical data

3

Injection mortar FIS V Plus 300 T								
								
FIS V Plus 300 T		FIS MR Plus						
Item	Item no.	Approval			Language on label	Scale unit	Contents	Sales unit [pcs]
		ETA	DIBt	ICC				
FIS V Plus 300 T	563281	●	●	●	DE	150	1 x Cartridge 300 ml, 2 x static mixer FIS MR Plus	1
FIS V Plus 300 T	563282	●	●	●	DE, EN, IT	150	1 x Cartridge 300 ml, 2 x static mixer FIS MR Plus	1
FIS V Plus 300 T	563292	●	●	●	EN, ES, PT	150	1 x Cartridge 300 ml, 2 x static mixer FIS MR Plus	1
FIS V Plus 300 T	569074	●	●	●	DA, FI, NO, SV	150	1 x Cartridge 300 ml, 2 x static mixer FIS MR Plus with transparent clip	1
FIS V Plus 300 T	569254	●	●	●	AR, EN, FR	150	1 x Cartridge 300 ml, 2 x static mixer FIS MR Plus	1
FIS V Plus 300 T	563279	●	●	●	DE, FR, NL	150	1 x Cartridge 300 ml, 2 x static mixer FIS MR Plus with transparent clip	1
FIS VS Plus 300 T	563278	●	●	●	ES, PT	150	1 x Cartridge 300 ml, 2 x static mixer FIS MR Plus with transparent clip	1
FIS VS Plus 300 T	563290	●	●	●	EL, HU, PL, RO	150	1 x Cartridge 300 ml, 2 x static mixer FIS MR Plus with transparent clip	1
FIS VS Plus 300 T	563291	●	●	●	FR	150	1 x Cartridge 300 ml, 2 x static mixer FIS MR Plus with transparent clip	1
FIS VS Plus 300 T	563280	●	●	●	EN, ES, PT	150	1 x Cartridge 300 ml, 2 x static mixer FIS MR Plus	1
FIS VW Plus 300 T	563286	●	●	●	DA, FI, NO, SV	150	1 x Cartridge 300 ml, 2 x static mixer FIS MR Plus with transparent clip	1
FIS VW Plus 300 T	563287	●	●	●	CS, HU, PL, RU	150	1 x Cartridge 300 ml, 2 x static mixer FIS MR Plus	1
FIS VW Plus 300 T	563293	●	●	●	DE, EN, HU, IT	150	1 x Cartridge 300 ml, 2 x static mixer FIS MR Plus	1
FIS MR Plus	545853	–	–	–	–	–	10 x Static mixer FIS MR Plus for all cartridge sizes from 100 ml to 410 ml	10

Technical data

Injection mortar FIS V Plus								
								
FIS V Plus 360 S		FIS MR Plus						
Item	Item no.	Approval			Language on label	Scale unit	Contents	Sales unit [pcs]
		ETA	DIBt	ICC				
FIS V Plus 360 S	558744	●	●	●	EN	180	1 x Cartridge 360 ml, 2 x static mixer FIS MR Plus	1
FIS V Plus 360 S	558745	●	●	●	DE	180	1 x Cartridge 360 ml, 2 x static mixer FIS MR Plus	1
FIS V Plus 360 S	558746	●	●	●	EN, ES, PT	180	1 x Cartridge 360 ml, 2 x static mixer FIS MR Plus	1
FIS V Plus 360 S	558747	●	●	●	AR, EN, ZH	180	1 x Cartridge 360 ml, 2 x static mixer FIS MR Plus	1
FIS V Plus 360 S	558753	●	●	●	IT, PL, RO	180	1 x Cartridge 360 ml, 2 x static mixer FIS MR Plus	1
FIS V Plus 360 S	558752	●	●	●	DE, FR, NL	180	1 x Cartridge 360 ml, 2 x static mixer FIS MR Plus	1
FIS V Plus 360 S	558754	●	●	●	AR, EL, TR	180	1 x Cartridge 360 ml, 2 x static mixer FIS MR Plus	1
FIS V Plus 360 S	558755	●	●	●	DA, FI, NO, SV	180	1 x Cartridge 360 ml, 2 x static mixer FIS MR Plus	1
FIS V Plus 360 S	558758	●	●	●	EN, ES, PT (Americas)	180	1 x Cartridge 360 ml, 2 x static mixer FIS MR Plus	1
FIS V Plus 360 S	558760	●	●	●	KK, RU, UK	180	1 x cartridge 360 ml, 2 x static mixer FIS MR Plus	1
FIS V Plus 360 S	558762	●	●	●	CS, HU, SK	180	1 x Cartridge 360 ml, 2 x static mixer FIS MR Plus	1
FIS V Plus 360 S	560635	●	●	●	AR, EN, FR	180	1 x Cartridge 360 ml, 2 x static mixer FIS MR Plus	1
FIS V Plus 360 S	561055	●	●	●	EN, PL, UK	180	1 x Cartridge 360 ml, 2 x static mixer FIS MR Plus	1
FIS MR Plus	545853	–	–	–	–	–	10 x Static mixer FIS MR Plus for all cartridge sizes from 100 ml to 410 ml	10

Technical data

Injection mortar FIS VS Plus								
								
FIS VS Plus 360 S		FIS MR Plus						
Item	Item no.	Approval			Language on label	Scale unit	Contents	Sales unit
		ETA	DIBt	ICC				
FIS VS Plus 360 S	558750	●	●	●	EN, ES, PT	180	1 x Cartridge 360 ml, 2 x static mixer FIS MR Plus	1
FIS VS Plus 360 S	558749	●	●	●	JA, KO, ZH	180	1 x Cartridge 360 ml, 2 x static mixer FIS MR Plus	1
FIS VS Plus 360 S	561057	●	●	●	EN, PL, UK	180	1 x Cartridge 360 ml, 2 x static mixer FIS MR Plus	1
FIS MR Plus	545853	–	–	–	–	–	10 x Static mixer FIS MR Plus for all cartridge sizes from 100 ml to 410 ml	10

Technical data

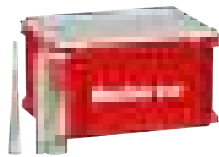
Injection mortar FIS VW Plus								
								
FIS VW Plus 360 S		FIS MR Plus						
Item	Item no.	Approval			Language on label	Scale unit	Contents	Sales unit
		ETA	DIBt	ICC				
FIS VW Plus 360 S	569072	●	●	●	DA, FI, NO, SV	180	1 x Cartridge 360 ml, 2 x static mixer FIS MR Plus	1
FIS VW Plus 360 S	558759	●	●	●	DE	180	1 x Cartridge 360 ml, 2 x static mixer FIS MR Plus	1
FIS VW Plus 360 S	558764	●	●	●	EN, HU	180	1 x Cartridge 360 ml, 2 x static mixer FIS MR Plus	1
FIS VW Plus 360 S	558765	●	●	●	DE, FR, NL	180	1 x Cartridge 360 ml, 2 x static mixer FIS MR Plus	1
FIS VW Plus 360 S	558768	●	●	●	CS, HU, SK	180	1 x Cartridge 360 ml, 2 x static mixer FIS MR Plus	1
FIS VW Plus 360 S	558767	●	●	●	KK, RU, UK	180	1 x cartridge 360 ml, 2 x static mixer FIS MR Plus	1
FIS VW Plus 360 S	562602	●	●	●	EN, PL, UK	180	1 x Cartridge 360 ml, 2 x static mixer FIS MR Plus	1
FIS MR Plus	545853	–	–	–	–	–	10 x Static mixer FIS MR Plus for all cartridge sizes from 100 ml to 410 ml	10

Technical data

Injection mortar FIS V Plus HWK K								
								
FIS V Plus 360 S HWK K								
Item	Item no.	Approval			Language on label	Scale unit	Contents	Sales unit
		ETA	DIBt	ICC				
FIS V Plus 300 T HWK small	563283	●	●	●	DE, FR, NL	150	10 x Cartridge 300 ml, 20 x static mixer FIS MR Plus	1
FIS V Plus 360 S HWK small	558770	●	●	●	DE	180	10 x Cartridge 360 ml, 20 x static mixer FIS MR Plus	1
FIS V Plus 360 S HWK small	558769	●	●	●	DE, FR, NL	180	10 x Cartridge 360 ml, 20 x static mixer FIS MR Plus	1
FIS V Plus 360 S HWK small	558771	●	●	●	CS, HU, SK	180	10 x Cartridge 360 ml, 20 x static mixer FIS MR Plus	1

Technical data

Injection mortar FIS V Plus HWK G



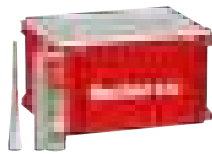
FIS V Plus 360 S HWK G

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Item	Item no.	Approval			Language on label	Scale unit	Contents	Sales unit [pcs]
		ETA	DIBt	ICC				
FIS V Plus 300 T HWK big	563294	●	●	●	DE, FR, NL	150	20 x Cartridge 300 ml, 40 x static mixer FIS MR Plus	1
FIS V Plus 360 S HWK big	558748	●	●	●	AR, EN, ZH	180	20 x Cartridge 360 ml, 40 x static mixer FIS MR Plus	1
FIS V Plus 360 S HWK big	558756	●	●	●	DE	180	20 x Cartridge 360 ml, 40 x static mixer FIS MR Plus	1
FIS V Plus 360 S HWK big	558757	●	●	●	DE, FR, NL	180	20 x Cartridge 360 ml, 40 x static mixer FIS MR Plus	1
FIS V Plus 360 S HWK big	560637	●	●	●	AR, EN, FR	180	20 x cartridge 360 ml, 40 x static mixer FIS MR Plus	1

Technical data

Injection mortar FIS VW Plus HWK G



FIS VW Plus 360 S (DE)
HWK G

Item	Item no.	Approval			Language on label	Scale unit	Contents	Sales unit [pcs]
		ETA	DIBt	ICC				
FIS VW Plus 360 S HWK big	558766	●	●	●	DE	180	20 x Cartridge 360 ml, 40 x static mixer FIS MR Plus	1

Technical data

Injection mortar FIS V Plus

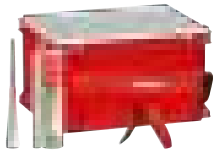


FIS V Plus 360 S

Item	Item no.	Approval			Language on label	Scale unit	Contents	Sales unit [pcs]
		ETA	DIBt	ICC				
FIS V Plus 360 S in bucket	558743	●	●	●	EN	180	20 x Cartridge 360 ml, 40 x static mixer FIS MR Plus	20
FIS V Plus 360 S in bucket	558751	●	●	●	AR, EN, ZH	180	20 x Cartridge 360 ml, 20 x static mixer FIS MR Plus	1
FIS V Plus 360 S in bucket	558763	●	●	●	DE, FR, NL	180	20 x Cartridge 360 ml, 20 x static mixer FIS MR Plus	1
FIS V Plus 360 S	558772	●	●	●	KK, RU, UK	180	20 x cartridge 360 ml, 40 x static mixer FIS MR Plus	1
FIS V Plus 360 S	560636	●	●	●	AR, EN, FR	180	20 x cartridge 360 ml, 20 x static mixerFIS MR Plus	1
FIS VS Plus 360 S in bucket	562601	●	●	●	IT, PL, RO	180	20 x Cartridge 360 ml, 20 x static mixer FIS MR Plus	1
FIS VS Plus 360 S in bucket	562603	●	●	●	EN, ES, PT	180	20 x Cartridge 360 ml, 40 x static mixer FIS MR Plus	1

Technical data

FIS V Plus 360 S HWK big + FIS DM S Pro



FIS V Plus 360 S HWK big +
FIS DM S Pro

Item	Item no.	Approval			Language on label	Scale unit	Contents	Sales unit [pcs]
		ETA	DIBt	ICC				
FIS V Plus 360 S Set	558773	●	●	●	IT, PL, RO	180	12 x cartridge 360 ml, 24 x static mixer FIS MR Plus 1 x dispenser FIS DM S Pro	1
FIS V Plus 360 S Set	558775	●	●	●	EN, ES, PT	180	12 x cartridge 360 ml, 24 x static mixer FIS MR Plus, 1 x dispenser FIS DM S Pro	1
FIS V Plus 360 S Set	560032	●	●	●	DE, FR, NL	180	12 x Cartridge 360 ml, 24 x static mixer FIS MR Plus 1 x Dispenser FIS DM S Pro	1
FIS V Plus 360 S Set	560033	●	●	●	CS, HU, SK	180	12 x Cartridge 360 ml, 24 x static mixer FIS MR Plus 1 x Dispenser FIS DM S Pro	1

Technical data

Injection mortar FIS V Plus 380 + 410



FIS VW Plus 380 C

FIS V Plus 410 C

FIS V Plus 410 C in bucket

Item	Item no.	Approval			Language on label	Scale unit	Contents	Sales unit [pcs]
		ETA	DIBt	ICC				
FIS VW Plus 380 C	558785	●	●	●	CS, PL, SK	190	1 x cartridge 380 ml, 2 x static mixer FIS MR Plus	1
FIS VW Plus 410 C	569342	●	●	●	DE, FR, IT	200	1 x Cartridge 410 ml, 2 x static mixer FIS MR Plus	1
FIS V Plus 410 C	558780	●	●	●	DE, EN, IT	200	1 x Cartridge 410 ml, 2 x static mixer FIS MR Plus	1
FIS V Plus 410 C	558784	●	●	●	EN, ES, PT (Americas)	200	1 x Cartridge 410 ml, 2 x static mixer FIS MR Plus	1
FIS V Plus 410 C in bucket	558782	●	●	●	DE, EN, IT	200	16 x cartridge 410 ml, 32 x static mixer FIS MR Plus	1
FIS V Plus 410 C in bucket	558783	●	●	●	EN, RU, TR	200	16 x Cartridge 410 ml, 32 x static mixer FIS MR Plus	1
FIS V Plus 410 C HWK big	558781	●	●	●	DE, EN, IT	200	20 x Cartridge 410 ml, 40 x static mixer FIS MR Plus	1

Technical data

Injection mortar FIS V Plus 825 S



FIS V Plus 825 S

Item	Item no.	Approval			Language on label	Scale unit	Contents	Sales unit [pcs]
		ETA	DIBt	ICC				
FIS V Plus 825 S	567511	●	●	●	DE, EN, FR, IT, NL	415	1 x Cartridge 825 ml, 2 x static mixer FIS JMR 825	1
FIS V Plus 825 S	567512	●	●	●	EN, ES, FR, PT, TR	415	1 x Cartridge 825 ml, 2 x static mixer FIS JMR 825	1
FIS V Plus 825 S	567513	●	●	●	CS, EN, PL, RU, SK	415	1 x Cartridge 825 ml, 2 x static mixer FIS JMR 825	1

Technical data

Injection mortar FIS V Plus



3

Thermosafe case FIS V Plus

Item	Item no.	Approval			Contents	Sales unit [pcs]
		ETA	DIBt	ICC		
FIS V Plus 360 S Thermosafe	558950	●	●	●	6 x Cartridge 360 ml 12 x Static mixer FIS MR Plus 1 x Brush set BS ø12 1 x Blow-out pump AB G 1 x Dispenser FIS DM S Pro	1

Curing times

FIS VW Plus High Speed FIS V Plus FIS VS Plus Low Speed									
Temperature at anchoring base [°C]	Maximum processing time t_{work}			Minimum curing time $t_{cure}^{1)}$					
	FIS VW Plus High Speed [min.]	FIS V Plus [min.]	FIS VS Plus Low Speed [min.]	FIS VW Plus High Speed		FIS V Plus		FIS VS Plus Low Speed	
				[hrs.]	[min.]	[hrs.]	[min.]	[hrs.]	[min.]
-10 – -5 ²⁾	–	–	–	12	–	–	–	–	–
> -5 – 0 ²⁾	5	–	–	3	–	24	–	–	–
> 0 – +5 ²⁾	5	13	–	3	–	3	–	6	–
> +5 – +10	3	9	20	–	50	–	90	3	–
> +10 – +20	1	5	10	–	50	–	60	2	–
> +20 – +30	–	4	6	–	–	–	45	–	60
> +30 – +40	–	2	4	–	–	–	35	–	30

1) In wet concrete or water filled holes the curing times must be doubled.

2) Minimal cartridge temperature +5 °C

Loads

Injection system FIS V 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-20/0603 has to be considered.

Type	Screw Material ³⁾	Effective anchor- age depth h_{ef} [mm]	Minimum member thickness h_{min} [mm]	Maximum installa- tion torque $T_{inst, max}$ [Nm]	Non-cracked concrete			
					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]
RG M 8 I	5.8	90	120	10	9.0	5.3	55	55
	8.8	90	120	10	13.8	8.3	55	55
	R-70	90	120	10	9.9	5.9	55	55
RG M 10 I	5.8	90	130	20	13.8	8.3	65	65
	8.8	90	130	20	20.0	13.3	65	65
	R-70	90	130	20	15.7	9.3	65	65
RG M 12 I	5.8	125	170	40	20.5	12.1	75	75
	8.8	125	170	40	32.0	19.3	75	75
	R-70	125	170	40	22.5	13.5	75	75
RG M 16 I	5.8	160	210	80	37.6	22.4	95	95
	8.8	160	210	80	47.4	30.9	95	95
	R-70	160	210	80	42.0	25.1	95	95
RG M 20 I	5.8	200	260	120	58.6	35.4	125	125
	8.8	200	260	120	66.3	51.4	125	125
	R-70	200	260	120	65.7	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 80 °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.

Loads

Injection system FIS V 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-20/0603 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 M 8	5.8	60	100	10	3.9	6.3	40	40	9.0	6.3	40	40
	5.8	80	110	10	5.3	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	3.9	6.0	40	40	9.9	6.0	40	40
	R-70	80	110	10	5.3	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	5.4	9.7	45	45	10.9	9.7	45	45
	5.8	90	120	20	8.1	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	5.4	9.2	45	45	10.9	9.2	45	45
	R-70	90	120	20	8.1	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	8.2	14.3	55	45	13.7	14.3	55	45
	5.8	110	140	40	12.8	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	8.2	13.7	55	45	13.7	13.7	55	45
	R-70	110	140	40	12.8	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	11.5	23.0	65	50	16.8	26.9	65	50
	5.8	125	170	60	18.0	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	11.5	23.0	65	50	16.8	25.2	65	50
	R-70	125	170	60	18.0	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	28.0	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	28.0	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	37.7	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	37.7	56.8	105	60	71.3	56.8	105	60
	R-70	480	540	150	86.2	56.8	105	60	94.3	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	56.5	96.0	140	80	109.8	96.0	140	80
	5.8	600	670	300	121.2	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	56.5	90.2	140	80	109.8	90.2	140	80
	R-70	600	670	300	121.2	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 80 °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 (guz); 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.

Loads

Injection system FIS V Plus with threaded rod FIS A in solid and perforated masonry

Permissible loads^{1,2)} for a single anchor in masonry for pre-positioned installation.

For the design the complete current assessment ETA-20/0729 has to be considered.

	Compressive brick strength	Brick raw density	Minimum brick dimensions ³⁾	Effective anchor- age depth	Minimum member thickness	Maximum installation torque	Permissible tensile load ⁴⁾	Permissible shear load ⁴⁾	Minimum-spacing ⁵⁾	Characteristic resp. minimum edge distance ³⁾
Type	f_b [N/mm ²]	ρ [kg/dm ³]	(L x W x H) [mm]	h_{ef} [mm]	h_{min} [mm]	$T_{inst,max}$ [Nm]	N_{perm} [kN]	V_{perm} [kN]	$s_{min} \parallel / s_{min \perp}$ [mm]	$c_{cr} = c_{min}$ [mm]
Solid brick Mz, NF, acc. to EN 771-1										
M6	≥ 12	≥ 1.8	240 x 115 x 71	≥ 50	115	4	1.14	0.71	240 / 75	100
M8	≥ 12	≥ 1.8	240 x 115 x 71	≥ 50	115	10	1.14	0.71	240 / 75	100
M10	≥ 12	≥ 1.8	240 x 115 x 71	80	115	10	1.42	1.14	240 / 75	100
M10	≥ 12	≥ 1.8	240 x 115 x 71	200	240	10	3.43	2.43	240 / 75	100
M12	≥ 12	≥ 1.8	240 x 115 x 71	80	115	10	1.57	1.14	240 / 75	100
M12	≥ 12	≥ 1.8	240 x 115 x 71	200	240	10	2.29	3.28	240 / 75	100
Solid sand-lime brick KS, acc. to EN 771-2										
M6	≥ 12	≥ 1.8	240 x 115 x 71	50	115	3	1.14	0.42	80 / 150	60
M6	≥ 12	≥ 1.8	240 x 115 x 71	100	115	3	1.57	0.89	80 / 300	60
M8	≥ 12	≥ 1.8	240 x 115 x 71	50	115	5	1.14	0.42	80 / 150	60
M8	≥ 12	≥ 1.8	240 x 115 x 71	100	115	5	2.29	0.89	80 / 300	60
M10	≥ 12	≥ 1.8	240 x 115 x 71	100	115	15	1.57	0.57	80 / 300	60
M10	≥ 12	≥ 1.8	240 x 115 x 71	200	240	15	3.42	0.57	80 / 600	60
M12	≥ 12	≥ 1.8	240 x 115 x 71	100	115	15	1.28	0.57	80 / 300	60
M12	≥ 12	≥ 1.8	240 x 115 x 71	200	240	15	3.42	0.57	80 / 600	60
M16	≥ 12	≥ 1.8	240 x 115 x 71	100	115	25	1.57	0.57	80 / 300	60
M16	≥ 12	≥ 1.8	240 x 115 x 71	200	240	25	3.42	0.57	80 / 600	60
Vertically perforated brick Hlz, acc. to EN 771-3³⁾										
M6 / M8 with FIS H 12 x 85 K	≥ 12	≥ 1.0	370 x 240 x 237	85	240	2	0.34	0.43	100 / 100	100
M8 / M10 with FIS H 16 x 130 K	≥ 12	≥ 1.0	370 x 240 x 237	130	240	2	0.86	0.57	100 / 100	100
M12 / M16 with FIS H 20 x 130 K	≥ 12	≥ 1.0	370 x 240 x 237	130	240	2	1.14	0.57	100 / 100	100
Perforated sand-lime brick KSL, acc. to EN 771-2³⁾										
M6 / M8 with FIS H 12 x 85 K	≥ 12	≥ 1.4	240 x 175 x 113	85	175	2	0.71	0.71	100 / 115	60
M8 / M10 with FIS H 16 x 130 K	≥ 12	≥ 1.4	240 x 175 x 113	130	175	2	1.00	1.29	100 / 115	80
M12 / M16 with FIS H 20 x 85 K	≥ 12	≥ 1.4	240 x 175 x 113	85	175	2	1.00	1.14	100 / 115	80
Lightweight concrete hollow block Hbl, acc. EN 771-3³⁾										
M6 / M8 with FIS H 12 x 85 K	≥ 2	≥ 1.0	362 x 240 x 240	85	240	2	0.43	0.26	100 / 240	60
M6 / M8 with FIS H 12 x 85 K	≥ 4	≥ 1.0	362 x 240 x 240	85	240	2	0.86	0.57	100 / 240	60
M8 / M10 with FIS H 16 x 85 K	≥ 2	≥ 1.0	362 x 240 x 240	85	240	2	0.43	0.26	100 / 240	60
M8 / M10 with FIS H 16 x 85 K	≥ 4	≥ 1.0	362 x 240 x 240	85	240	2	0.86	0.57	100 / 240	60
M12 / M16 with FIS H 20 x 200 K	≥ 2	≥ 1.0	362 x 240 x 240	200	240	2	0.71	0.26	100 / 240	60
M12 / M16 with FIS H 20 x 200 K	≥ 4	≥ 1.0	362 x 240 x 240	200	240	2	1.57	0.57	100 / 240	60
Aerated concrete acc. to EN 771-4⁶⁾										
M8	≥ 2	≥ 0.35	-	100	130	1	0.54	0.43	250 / 250	100
M8	≥ 4	≥ 0.50	-	200	230	8	1.07	0.71	80 / 80	100
M10	≥ 2	≥ 0.35	-	100	130	2	0.54	0.43	250 / 250	100
M10	≥ 4	≥ 0.50	-	200	230	12	1.79	0.71	80 / 80	100
M12	≥ 2	≥ 0.35	-	100	130	2	0.71	0.54	250 / 250	100
M12	≥ 4	≥ 0.50	-	200	230	16	1.79	0.71	80 / 80	100
M16	≥ 2	≥ 0.35	-	100	130	2	0.71	0.43	250 / 250	100
M16	≥ 4	≥ 0.50	-	200	230	20	1.79	0.71	80 / 80	100

¹⁾ The required partial safety factors for material resistance as well as a partial safety factor for load actions of $\gamma_L = 1.4$ are considered. Load values are valid for zinc-plated steel, stainless steel R and highly corrosion-resistant steel HCR. In perforated bricks and hollow blocks threaded rod FIS A in combination with anchor sleeve FIS H K.

²⁾ The given loads are valid for installation and use of fixations in dry masonry - use category d/d - for temperatures in the substrate up to 50 °C (resp. short term up to 80 °C) and drill hole cleaning according to assessment. The given brick types in combination with the permissible loads are an extract of the assessment.

³⁾ More information about, e.g. hole patterns, assortment of anchor sleeves FIS H K see assessment.

⁴⁾ In the case of combinations of tensile and shear loads, bending moments and reduced edge and axial spacings (anchor groups), the design must be carried out in accordance with the provisions of the complete assessment.

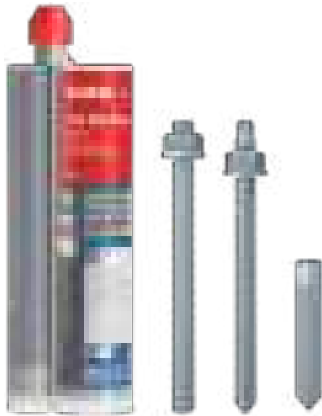
⁵⁾ Minimum feasible spacing resp. edge distance. Details as well as to the distances to joints see assessment.

⁶⁾ Cylindrical drill hole.

Epoxy mortar FIS EM Plus

The powerful injection mortar for rebar connections and cracked concrete.

3



Rail fastenings



Rebar connections

Applications

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

Advantages

- The ETA assessment guarantees a service life of 100 years. The expert report of IEA Stuttgart even confirms a working life up to 120 years and thus underlines the reliability and durability of the FIS EM Plus.
- With the threaded rod FIS A, the loads to be applied can be designed variably by selecting the anchorage depth. The mortar is approved for diamond drilled and water-filled drillholes as well as seismic applications and thus offers safety under extreme conditions.
- In combination with the fischer anchor rods FIS A/RG M (8.8 gvz or stainless steel R) and the matching filling set, the system offers an approval-compliant solution for anchoring dynamic loads.
- In combination with the fischer anchor rods FIS A/RG M (8.8 gvz or stainless steel R) and the matching filling set, the system offers an approval-compliant solution for anchoring dynamic loads.
- For practical use on the building site, FIS EM Plus can be processed at low temperatures down to -5°C.

Certificates / Features



ETA-17/0979, in concrete
ETA-23/0842 post-installed
fasteners in concrete under
fatigue cyclic loading

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



Building materials

Approved for anchorings in:

- Concrete C20/25 to C50/60, cracked and non-cracked
- Sealing surfaces according WRL (Water Resources Law)
- Glued laminated or glued solid timber of spruce (Picea abies), fir (Abies alba) or pine (Pinus sylvestris)

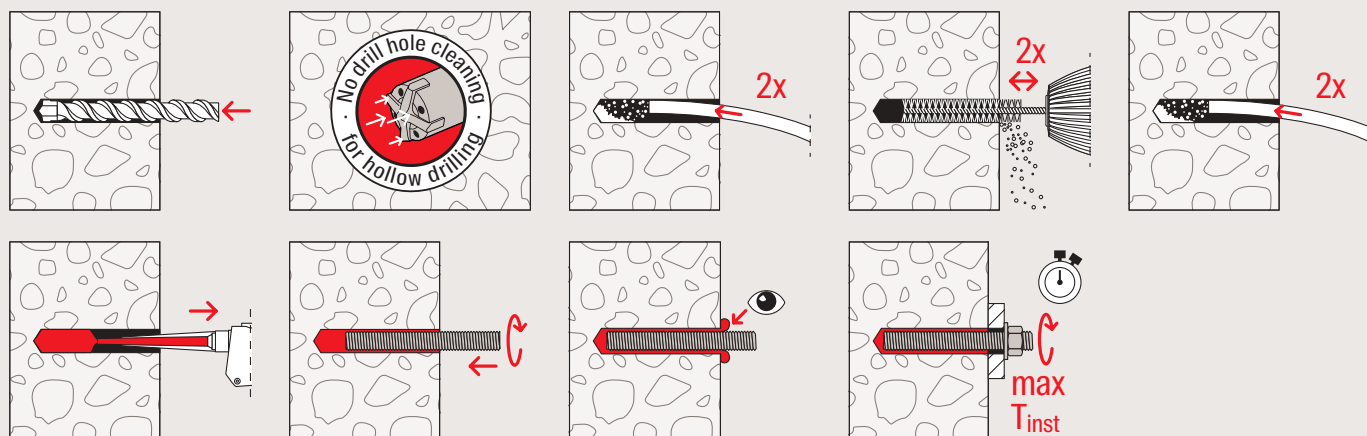
Also suitable for:

- Natural stone with dense structure

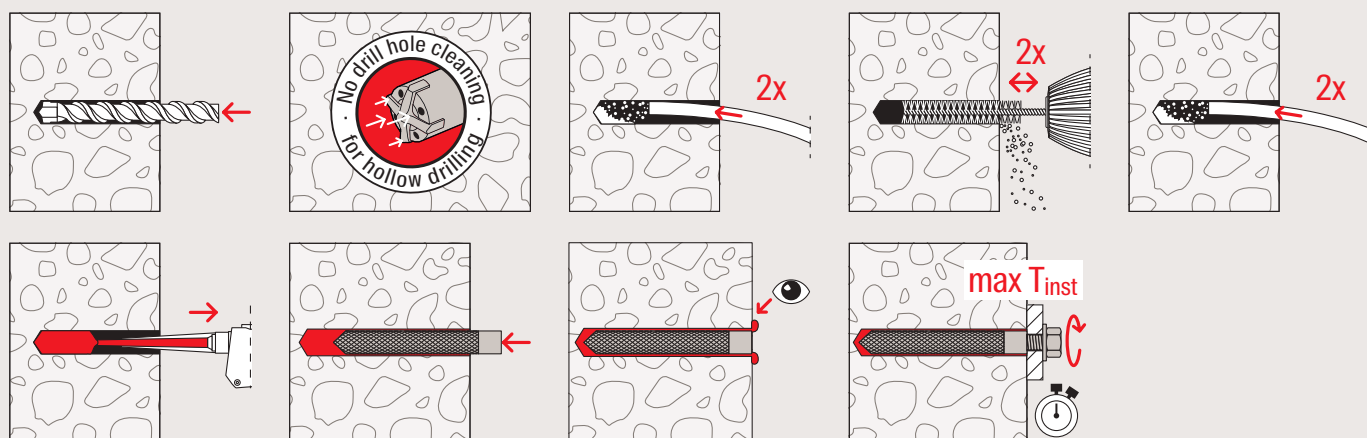
Functioning

- The epoxy mortar FIS EM Plus combined with the FIS A anchor 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 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.

Installation in concrete with FIS EM Plus and FIS A / RG M



Installation in concrete with FIS EM Plus and RG M I



Technical data

Epoxy mortar FIS EM Plus

Epoxy mortar FIS EM Plus								
     								
		Approval			Language on label	Scale unit	Contents	Sales unit
Item	Item no.	ETA	DIBt	ICC				[pcs]
FIS EM Plus 300 T	575314	•	•	•	AR, EN, PT	142	1 x Cartridge 300 ml, 2 x static mixer FIS MR Plus	1
FIS EM Plus 300 T	575313	•	•	•	DE, IT	142	1 x Cartridge 300 ml, 2 x static mixer FIS MR Plus	1
FIS EM Plus 300 T	575312	•	•	•	EN, ES, FR	142	1 x Cartridge 300 ml, 2 x static mixer FIS MR Plus	1
FIS EM Plus 390 S	544154	•	•	•	EN, FR, NL	180	1 x Cartridge 390 ml, 2 x static mixer FIS MR Plus	1
FIS EM Plus 390 S	544176	•	•	•	CS, RO, SK	180	1 x Cartridge 390 ml, 2 x static mixer FIS MR Plus	1
FIS EM Plus 390 S	544155	•	•	•	AR, EN, ZH	180	1 x Cartridge 390 ml, 2 x static mixer FIS MR Plus	1
FIS EM Plus 390 S	544159	•	•	•	KK, RU, UK	180	1 x Cartridge 390 ml, 2 x static mixer FIS MR Plus	1
FIS EM Plus 390 S	567987	•	•	•	EL, HU, KO	180	1 x Cartridge 390 ml, 2 x static mixer FIS MR Plus	1
FIS EM Plus 585 S	544166	•	•	•	EL, EN, ES, PT	270	1 x Cartridge 585 ml, 2 x static mixer FIS UMR	1
FIS EM Plus 585 S	544165	•	•	•	CS, KO, PL, SK	270	1 x Cartridge 585 ml, 2 x static mixer FIS UMR	1
FIS EM Plus 585 S	567989	•	•	•	DE, FR, NL	270	1 x Cartridge 585 ml, 2 x static mixer FIS UMR	1
FIS EM Plus 585 S	544175	•	•	•	EN, KO, ZH	270	1 x Cartridge 585 ml 1 x static mixer FIS UMR 1 x Extension tube Ø 9 x 250 mm	1
FIS EM Plus 1500 S	544167	•	•	•	DE, EN, ES, FR, IT	670	1 x Cartridge 1500 ml, 2 x static mixer FIS UMR	1

Technical data

Epoxy mortar FIS EM Plus













FIS EM Plus 300 T

FIS EM Plus 390 S

FIS EM Plus 585 S

FIS EM Plus 1500 S

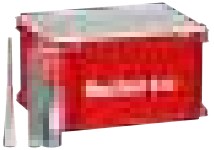
FIS MR Plus

FIS UMR

		Approval			Language on label	Scale unit	Contents	Sales unit
	Item no.	ETA	DIBt	ICC				[pcs]
Item								
FIS MR Plus	545853	–	–	–	–	–	10 x Static mixer FIS MR Plus for all cartridge sizes from 100 ml to 410 ml	10
FIS UMR	520593	–	–	–	–	–	10 x static mixer FIS UMR for 585 & 1500 ml cartridges	10

Technical data

Epoxy mortar FIS EM Plus





FIS EM Plus 390 S HWK big

FIS EM Plus in bucket

		Approval			Language on label	Scale unit	Contents	Sales unit
	Item no.	ETA	DIBt	ICC				[pcs]
Item								
FIS EM Plus 390 S in bucket	544172 ¹⁾	●	●	●	AR, EN, ZH	180	20 x Cartridge 390 ml, 20 x static mixer FIS MR Plus	1
FIS EM Plus 390 S HWK big	544156 ¹⁾	●	●	●	EN, FR, KO	180	20 x Cartridge 390 ml, 20 x static mixer FIS MR Plus	1

¹⁾ Dangerous goods - no express shipping possible.

Curing times

FIS EM Plus		
Temperature in anchoring base	Maximum processing time	Minimum curing time ¹⁾
[°C]	t _{work} [min.]	t _{cure} [hrs.]
-5 – 0	240	200
> 0 – +5	150	90
> +5 – +10	120	40
> +10 – +20	30	18
> +20 – +30	14	10
> +30 – +40	7	5

¹⁾ In wet concrete or water filled holes the curing times must be doubled.

Loads

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 of 22.04.2024 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 M 8	5.8	60	90	10	5.2	6.2	40	40	8.7	6.2	40	40
	5.8	80	110	10	6.9	6.2	40	40	8.7	6.2	40	40
	5.8	160	190	10	8.7	6.2	40	40	8.7	6.2	40	40
	R-70	60	90	10	5.2	5.9	40	40	9.8	5.9	40	40
	R-70	80	110	10	6.9	5.9	40	40	9.8	5.9	40	40
	R-70	160	190	10	9.8	5.9	80	40	9.8	5.9	40	40
FIS A M 10	5.8	60	90	20	7.6	9.9	45	45	10.9	9.9	45	45
	5.8	90	120	20	11.4	9.9	45	45	13.8	9.9	45	45
	5.8	200	230	20	13.8	9.9	45	45	13.8	9.9	45	45
	R-70	60	90	20	7.6	9.3	45	45	10.9	9.3	45	45
	R-70	90	120	20	11.4	9.3	45	45	15.5	9.3	45	45
	R-70	200	230	20	15.5	9.3	45	45	15.5	9.3	45	45
FIS A M 12	5.8	70	100	40	9.6	14.4	55	45	13.7	14.4	55	45
	5.8	110	140	40	18.8	14.4	55	45	20.0	14.4	55	45
	5.8	240	270	40	20.0	14.4	55	45	20.0	14.4	55	45
	R-70	70	100	40	9.6	13.5	55	45	13.7	13.5	55	45
	R-70	110	140	40	18.8	13.5	55	45	22.5	13.5	55	45
	R-70	240	270	40	22.5	13.5	55	45	22.5	13.5	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	37.4	26.9	65	50	37.4	26.9	65	50
	R-70	80	120	60	11.7	23.5	65	50	16.8	25.1	65	50
	R-70	125	170	60	22.9	25.1	65	50	32.7	25.1	65	50
	R-70	320	360	60	42.0	25.1	65	50	42.0	25.1	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	42.0	85	55	51.9	42.0	85	55
	5.8	400	450	120	58.3	42.0	85	55	58.3	42.0	85	55
	R-70	90	140	120	14.0	28.0	85	55	20.0	39.2	85	55
	R-70	170	220	120	36.3	39.2	85	55	51.9	39.2	85	55
	R-70	400	450	120	65.5	39.2	85	55	65.5	39.2	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	60.5	105	60	71.3	60.5	105	60
	5.8	480	540	150	84.0	60.5	105	60	84.0	60.5	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	56.5	105	60	71.3	56.5	105	60
	R-70	480	540	150	94.4	56.5	105	60	94.4	56.5	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	96.2	140	80	109.8	96.2	140	80
	5.8	600	670	300	133.6	96.2	140	80	133.6	96.2	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	89.9	140	80	109.8	89.9	140	80
	R-70	600	670	300	150.0	89.9	140	80	150.0	89.9	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 $\gamma_t = 1.4$ 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). Higher loads are possible at lower temperatures. Drilling method and borehole cleaning according to ETA specifications. 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.

Loads

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 of 22.04.2024 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	8.7	6.2	55	55	8.7	6.2	55	55
	8.8	90	120	10	11.3	8.3	55	55	13.9	8.3	55	55
	R-70	90	120	10	9.8	5.9	55	55	9.8	5.9	55	55
RG M10 I	5.8	90	130	20	12.9	9.9	65	65	13.8	9.9	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	15.5	9.3	65	65
RG M12 I	5.8	125	170	40	20.0	14.4	75	75	20.0	14.4	75	75
	8.8	125	170	40	20.2	19.3	75	75	32.1	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	26.9	95	95	37.3	26.9	95	95
	8.8	160	210	80	33.2	35.9	95	95	47.4	35.9	95	95
	R-70	160	210	80	33.2	25.1	95	95	41.9	25.1	95	95
RG M20 I	5.8	200	260	120	46.4	42.0	125	125	58.3	42.0	125	125
	8.8	200	260	120	46.4	56.0	125	125	66.3	56.0	125	125
	R-70	200	260	120	46.4	39.2	125	125	65.4	39.2	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). Higher loads are possible at lower temperatures. Drilling method and borehole cleaning according to ETA specifications. 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.

Loads

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

Design values for cyclic fatigue loading¹⁾ of a single anchor in cracked or non-cracked normal concrete of strength class C20/25²⁾
 For the design the complete current assessment ETA-23/0842 of 11.06.2024 has to be considered.

Type	Material / surface	Effective anchorage depth	Minimum member thickness	Installation torque	Cracked concrete				Non-cracked concrete			
		h_{ef}	h_{min}	T_{inst}	Design values of tension ($\Delta N_{Ed,max}$) and shear loads ($\Delta V_{Ed,max}$); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Design values of tension ($\Delta N_{Ed,max}$) and shear loads ($\Delta V_{Ed,max}$); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
		[mm]	[mm]	[Nm]	$\Delta N_{Ed,max}^{3)}$ [kN]	$\Delta V_{Ed,max}^{3)}$ [kN]	$s_{min}^{3)}$ [mm]	$c_{min}^{3)}$ [mm]	$\Delta N_{Ed,max}^{3)}$ [kN]	$\Delta V_{Ed,max}^{3)}$ [kN]	$s_{min}^{3)}$ [mm]	$c_{min}^{3)}$ [mm]
FIS A M 12	8.8	70	100	40	3.8	2.0	55	55	4.5	2.0	55	55
	8.8	110	140	40	4.5	2.0	55	55	4.5	2.0	55	55
	8.8	240	270	40	4.5	2.0	55	55	4.5	2.0	55	55
	R-70	70	100	40	3.8	2.6	55	55	4.9	2.6	55	55
	R-70	110	140	40	4.9	2.6	55	55	4.9	2.6	55	55
	R-70	240	270	40	4.9	2.6	55	55	4.9	2.6	55	55
FIS A M 16	8.8	80	120	60	5.7	3.7	65	65	8.4	3.7	65	65
	8.8	125	170	60	8.4	3.7	65	65	8.4	3.7	65	65
	8.8	320	360	60	8.4	3.7	65	65	8.4	3.7	65	65
	R-70	80	120	60	5.7	4.9	65	65	9.2	4.9	65	65
	R-70	125	170	60	9.2	4.9	65	65	9.2	4.9	65	65
	R-70	320	360	60	9.2	4.9	65	65	9.2	4.9	65	65
FIS A M 20	R-70	90	140	120	8.1	7.6	85	85	14.0	7.6	85	85
	R-70	170	220	120	14.3	7.6	85	85	14.3	7.6	85	85
	R-70	400	450	120	14.3	7.6	85	85	14.3	7.6	85	85
FIS A M 24	R-70	96	160	150	9.9	11.0	105	105	15.4	11.0	105	105
	R-70	210	270	150	20.6	11.0	105	105	20.6	11.0	105	105
	R-70	480	540	150	20.6	11.0	105	105	20.6	11.0	105	105

¹⁾ The design values of the cyclic fatigue loading apply for load cycles > 10⁸ in accordance with design method I acc. to TR061 – for unknown static lower load. If the static lower load is known and / or for lower number of load cycles higher load values are possible. The partial safety factors as regulated in the design standard are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$. The given load values apply for anchorages in dry and wet concrete and temperatures in the base material up to 50 °C (resp. short-term up to 72 °C). Higher loads are possible at lower temperatures. Drilling method and borehole cleaning according to ETA specifications.

²⁾ For higher concrete strength classes up to C50/60 higher permissible loads may be possible, see assessment. The concrete is assumed to be standard-reinforced.

³⁾ In the case of combinations of tensile loads, 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. We recommend using our anchor design software C-FIX.

Loads

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

Design values for cyclic fatigue loading¹⁾ of a single anchor in cracked or non-cracked normal concrete of strength class C20/25²⁾
For the design the complete current assessment ETA-23/0842 of 11.06.2024 has to be considered.

Type	Material / surface	Effective anchorage depth	Minimum member thickness	Installation torque	Cracked concrete				Non-cracked concrete			
		h_{ef}	h_{min}	T_{inst}	Design values of tension ($\Delta N_{Ed,max}$) and shear loads ($\Delta V_{Ed,max}$); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Design values of tension ($\Delta N_{Ed,max}$) and shear loads ($\Delta V_{Ed,max}$); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
		[mm]	[mm]	[Nm]	$\Delta N_{Ed,max}^{3)}$ [kN]	$\Delta V_{Ed,max}^{3)}$ [kN]	$s_{min}^{3)}$ [mm]	$c_{min}^{3)}$ [mm]	$\Delta N_{Ed,max}^{3)}$ [kN]	$\Delta V_{Ed,max}^{3)}$ [kN]	$s_{min}^{3)}$ [mm]	$c_{min}^{3)}$ [mm]
FIS A M 12	8.8	70	100	40	3.8	2.0	55	55	4.5	2.0	55	55
	8.8	110	140	40	4.5	2.0	55	55	4.5	2.0	55	55
	8.8	240	270	40	4.5	2.0	55	55	4.5	2.0	55	55
	R-70	70	100	40	3.8	2.6	55	55	4.9	2.6	55	55
	R-70	110	140	40	4.9	2.6	55	55	4.9	2.6	55	55
	R-70	240	270	40	4.9	2.6	55	55	4.9	2.6	55	55
FIS A M 16	8.8	80	120	60	5.7	3.7	65	65	8.4	3.7	65	65
	8.8	125	170	60	8.4	3.7	65	65	8.4	3.7	65	65
	8.8	320	360	60	8.4	3.7	65	65	8.4	3.7	65	65
	R-70	80	120	60	5.7	4.9	65	65	9.2	4.9	65	65
	R-70	125	170	60	9.2	4.9	65	65	9.2	4.9	65	65
	R-70	320	360	60	9.2	4.9	65	65	9.2	4.9	65	65
FIS A M 20	R-70	90	140	120	8.1	7.6	85	85	14.0	7.6	85	85
	R-70	170	220	120	14.3	7.6	85	85	14.3	7.6	85	85
	R-70	400	450	120	14.3	7.6	85	85	14.3	7.6	85	85
FIS A M 24	R-70	96	160	150	9.9	11.0	105	105	15.4	11.0	105	105
	R-70	210	270	150	20.6	11.0	105	105	20.6	11.0	105	105
	R-70	480	540	150	20.6	11.0	105	105	20.6	11.0	105	105

¹⁾ The design values of the cyclic fatigue loading apply for load cycles > 10⁶ in accordance with design method I acc. to TR061 – for unknown static lower load. If the static lower load is known and / or for lower number of load cycles higher load values are possible. The partial safety factors as regulated in the design standard are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$. The given load values apply for anchorages in dry and wet concrete and temperatures in the base material up to 50 °C (resp. short-term up to 72 °C). Higher loads are possible at lower temperatures. Drilling method and borehole cleaning according to ETA specifications.

²⁾ For higher concrete strength classes up to C50/60 higher permissible loads may be possible, see assessment. The concrete is assumed to be standard-reinforced.

³⁾ In the case of combinations of tensile loads, 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. We recommend using our anchor design software C-FIX.