

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

Permissible loads of a single anchor<sup>1)2)</sup> 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 <sup>3)</sup>	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

<sup>1)</sup> 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  $\gamma_c = 1.4$  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.

<sup>2)</sup> 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  $\Psi_{sus}$  for sustained load was taken into account with 1.0.

<sup>3)</sup> 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).

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

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

Permissible loads of a single anchor<sup>1)2)</sup> 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 <sup>3)</sup>	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

<sup>1)</sup> 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  $s \geq 3 \times h_{gr}$  and an edge distance  $c \geq 1.5 \times h_{gr}$ . Accurate data see ETA.

<sup>2)</sup> 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  $\Psi_{sus}$  for sustained load was taken into account with 1.0.

<sup>3)</sup> 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).

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

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

Permissible loads<sup>1)2)</sup> for a single anchor in masonry for pre-positioned installation.

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

Type	Compressive brick strength $f_b$ [N/mm <sup>2</sup> ]	Brick raw density $\rho$ [kg/dm <sup>3</sup> ]	Minimum brick dimensions <sup>3)</sup> (L x W x H) [mm]	Effective anchorage depth $h_{ef}$ [mm]	Minimum member thickness $h_{min}$ [mm]	Maximum installation torque $T_{inst,max}$ [Nm]	Permissible tensile load <sup>4)</sup> $N_{perm}$ [kN]	Permissible shear load <sup>4)</sup> $V_{perm}$ [kN]	Minimum-spacing <sup>5)</sup> $s_{min \parallel} / s_{min \perp}$ [mm]	Characteristic resp. minimum edge distance <sup>5)</sup> $c_{cr} = c_{min}$ [mm]
<b>Solid brick Mz, NF, acc. to EN 771-1</b>										
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
<b>Solid sand-lime brick KS, acc. to EN 771-2</b>										
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
<b>Vertically perforated brick Hlz, acc. to EN 771-1<sup>3)</sup></b>										
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
<b>Perforated sand-lime brick KSL, acc. to EN 771-2<sup>3)</sup></b>										
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
<b>Lightweight concrete hollow block Hbl, acc. EN 771-3<sup>3)</sup></b>										
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
<b>Aerated concrete acc. to EN 771-4<sup>6)</sup></b>										
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

<sup>1)</sup> 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.

<sup>2)</sup> 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.

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

<sup>4)</sup> 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.

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

<sup>6)</sup> Cylindrical drill hole.

## 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	FIS V Plus	FIS VS Plus Low Speed	FIS VW Plus High Speed		FIS V Plus		FIS VS Plus Low Speed	
	[min.]	[min.]	[min.]	[hrs.]	[min.]	[hrs.]	[min.]	[hrs.]	[min.]
-10 – -5 <sup>2)</sup>	–	–	–	12	–	–	–	–	–
> -5 – 0 <sup>2)</sup>	5	–	–	3	–	24	–	–	–
> 0 – +5 <sup>2)</sup>	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