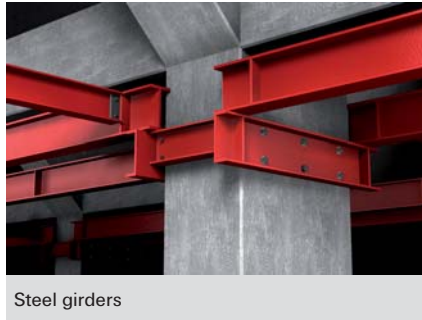


## The fixing system with the highest safety in cracked concrete

High performance steel anchors 4



Steel girders



Installations in tunnels

### VERSIONS

- Zinc-plated steel
- Stainless steel

### BUILDING MATERIALS

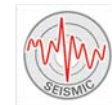
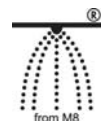
#### Approved for:

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

#### Also suitable for:

- Concrete C12/15
- Natural stone with dense structure

### CERTIFICATES



### ADVANTAGES

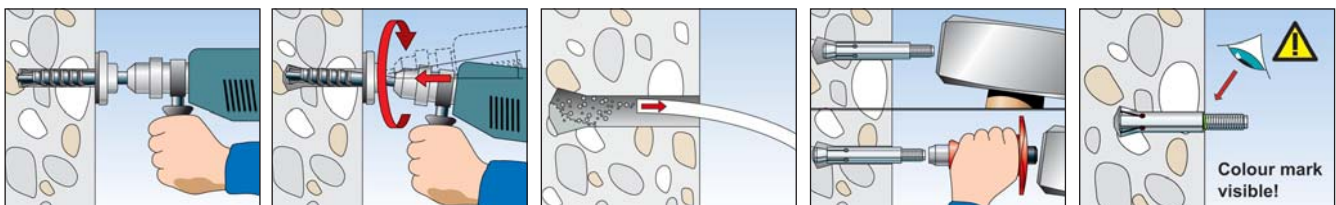
- The special ZYKON undercut technology allows for a positive fit connection and ensures maximum safety, even in large cracks.
- The almost expansion-free installation of the anchor allows small edge distances and axial spacing, and thereby enables flexible use.
- The FZUB special drill allows for a fast installation by creating the undercut without having to change tools.
- The drill hole geometry allows for a very low setting energy, thus reducing the energy required for installation.
- The ideal interaction of threaded bolts and sleeve with FZA-D allows for a high shear load and therefore fewer fixing points.

### APPLICATIONS

- Steelwork constructions
- Guard rails
- Consoles
- Step irons (FZA-ST)
- Ladders
- Cable trays
- Machines
- Staircases
- Gates
- Façades

### FUNCTIONING

- The FZA and FZA-I is suitable for pre-positioned installation, whereas the FZA-D is suitable for push-through installation.
- The undercut drill hole is created using the special FZUB drill.
- Once the anchor has been placed in the drill hole, the expansion sleeve is driven over the cone using the FZE Plus setting tool, and the undercut drill hole is filled with a positive fit.

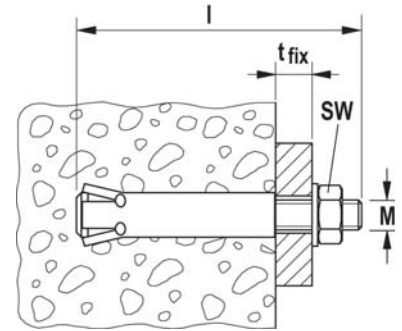


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## TECHNICAL DATA



ZYKON Bolt anchor **FZA**

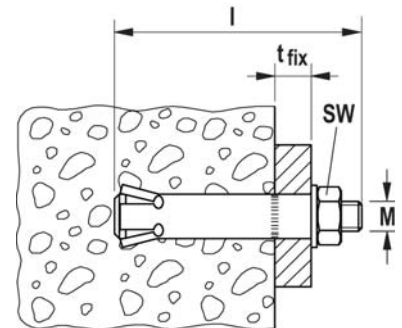


	Zinc-plated steel	Stainless steel	Approval	Seismic-Approval	Required drill bit FZUB	Required setting tool FZE plus	Bolt length	Max. fixture thickness	Thread	Width across nut	Sales unit
	Art.-No.	Art.-No.	ETA				l [mm]	t <sub>fix</sub> [mm]	M	○ SW [mm]	[pcs]
Item	gvz	A4									
FZA 10 x 40 M6/10	060712	060772	■	–	10 x 40	FZE 10 plus	60	10	M 6	10	25
FZA 12 x 40 M 8/15	060715	060775	■	–	12 x 40	FZE 12 plus	69	15	M 8	13	25
FZA 12 x 50 M 8/15	060716	060776	■	–	12 x 50	FZE 12 plus	79	15	M 8	13	20
FZA 12 x 50 M 8/50	–	060774	■	–	12 x 50	FZE 12 plus	114	50	M 8	13	20
FZA 14 x 40 M10/25	060718	–	■	C1	14 x 40	FZE 14 plus	79	25	M 10	17	25
FZA 14 x 40 M10/25	–	060778	■	C1	14 x 40	FZE 14 plus	79	25	M 10	17	20
FZA 14 x 60 M10/25	060719	060779	■	C1	14 x 60	FZE 14 plus	102	25	M 10	17	10
FZA 14 x 60 M10/50	–	060766	■	C1	14 x 60	FZE 14 plus	126	50	M 10	17	10
FZA 18 x 80 M12/25	060721	060781	■	C1	18 x 80	FZE 18 plus	126	25	M 12	19	10
FZA 18 x 80 M12/55	–	060767	■	C1	18 x 80	FZE 18 plus	156	55	M 12	19	10
FZA 22 x 100 M16/60	060724	060782	■	C1	22 x 100	FZE 22 plus	184	60	M 16	24	10
FZA 22 x 125 M16/60	060725	060768	■	C1	22 x 125	FZE 22 plus	209	60	M 16	24	6

## TECHNICAL DATA



ZYKON Through anchor **FZA-D**

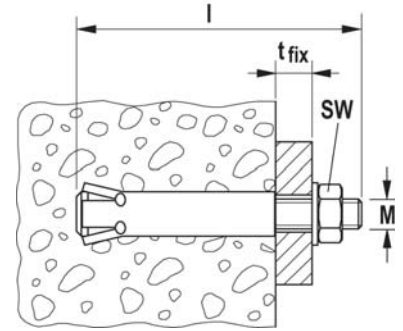


	Zinc-plated steel	Stainless steel	Approval	Seismic-Approval	Required drill bit FZUB	Required setting tool FZE plus	Bolt length	Max. fixture thickness	Thread	Width across nut	Sales unit
	Art.-No.	Art.-No.	ETA				l [mm]	t <sub>fix</sub> [mm]	M	○ SW [mm]	[pcs]
Item	gvz	A4									
FZA 12 x 50 M 8 D/10	060652	060664	■	–	12 x 50	FZE 12 plus	69	10	M 8	13	25
FZA 12 x 60 M 8 D/10	060653	060665	■	–	12 x 60	FZE 12 plus	79	10	M 8	13	25
FZA 12 x 80 M 8 D/30	060654	060666	■	–	12 x 80	FZE 12 plus	99	30	M 8	13	25
FZA 14 x 80 M10 D/20	060657	060669	■	C1	14 x 80	FZE 14 plus	102	20	M 10	17	10
FZA 14 x 100 M 8 D/30	060658	060670	■	C1	14 x 100	FZE 14 plus	126	40	M 10	17	10
FZA 18 x 100 M12 D/20	060684	060672	■	C1	18 x 100	FZE 18 plus	126	20	M 12	19	10
FZA 18 x 130 M12 D/50	060685	060673	■	C1	18 x 130	FZE 18 plus	156	50	M 12	19	10
FZA 22 x 125 M16 D/25	060663	060675	■	C1	22 x 125	FZE 22 plus	156	25	M 16	24	10

## TECHNICAL DATA



Zykon anchor for fixing step irons  
**FZA ST A4**



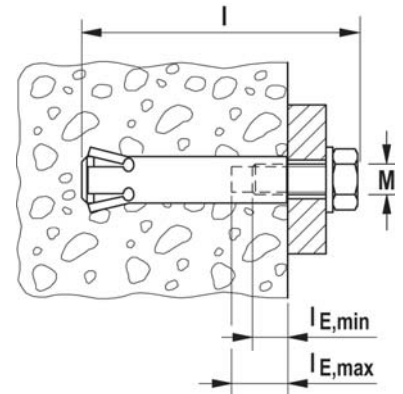
	Stainless steel		Required drill bit FZUB	Required setting tool FZE plus	Max. fixture thickness $t_{fix}$ [mm]	Thread M	Width across nut $\varnothing$ SW [mm]	Sales unit [pcs]	
Item	Art.-No.	A4							
<b>FZA 14 x 40 ST A4</b>	<b>060686</b> 1)		14 x 40	FZE 14 plus	30	M 10	16	20	
<b>FZA 14 x 60 ST A4</b>	<b>060687</b> 1)		14 x 60	FZE 14 plus	30	M 10	16	20	

1) According to DIN 1211GS/1212GS.

## TECHNICAL DATA



ZYKON Internally-threaded anchor **FZA-I**



	Zinc-plated steel	Stainless steel	Approval	Required drill bit FZUB	Required setting tool FZE plus	Internal thread	Min. bolt penetration $l_{E,min}$	Max. bolt penetration $l_{E,max}$	Sales unit [pcs]
Item	Art.-No.	Art.-No.	ETA			A1	[mm]	[mm]	
	gvz	A4							
<b>FZA 12 x 40 M6 I</b>	<b>060758</b>	<b>060783</b>	■	12 x 40	FZE 12 plus	M 6	10	15	25
<b>FZA 12 x 50 M6 I</b>	—	<b>060784</b>	■	12 x 50	FZE 12 plus	M 6	10	15	25
<b>FZA 14 x 60 M8 I</b>	<b>060760</b>	<b>060786</b>	■	14 x 60	FZE 14 plus	M 8	11	17	20
<b>FZA 18 x 80 M10 I</b>	<b>060761</b>	<b>060787</b>	■	18 x 80	FZE 18 plus	M 10	13	21	10
<b>FZA 22 x 100 M12 I</b>	<b>060763</b>	<b>060788</b>	■	22 x 100	FZE 22 plus	M 12	15	25	10
<b>FZA 22 x 125 M12 I</b>	<b>060769</b>	<b>060770</b>	■	22 x 125	FZE 22 plus	M 12	15	25	10

## ACCESSORIES



Drill bit **FZUB**

Item	Art.-No.	Fits anchor			Sales unit [pcs]
		bolt anchor	push-through anchor	internal thread anchor	
<b>FZUB 10 x 40</b>	<b>060622</b>	FZA 10 x 40 M6	-	-	1
<b>FZUB 12 x 40</b>	<b>060623</b>	FZA 12 x 40 M8	-	FZA 12 x 40 M6 I	1
<b>FZUB 12 x 50</b>	<b>060627</b>	FZA 12 x 50 M8	FZA 12 x 50 M8 D/10	FZA 12 x 50 M6 I	1
<b>FZUB 12 x 60</b>	<b>060625</b>	-	FZA 12 x 60 M8 D/10	-	1
<b>FZUB 12 x 80</b>	<b>060626</b>	-	FZA 12 x 80 M8 D/30	-	1
<b>FZUB 14 x 40</b>	<b>060624</b>	FZA 14 x 40 M10	-	-	1
<b>FZUB 14 x 60</b>	<b>060628</b>	FZA 14 x 60 M10	-	FZA 14 x 60 M8 I	1
<b>FZUB 14 x 80</b>	<b>060629</b>	-	FZA 14 x 80 M10 D/20	-	1
<b>FZUB 14 x 100</b>	<b>060630</b>	-	FZA 14 x 100 M10 D/40	-	1
<b>FZUB 18 x 80</b>	<b>060634</b>	FZA 18 x 80 M12	-	FZA 18 x 80 M10I	1
<b>FZUB 18 x 100</b>	<b>060632</b>	-	FZA 18 x 100 M12 D/20	-	1
<b>FZUB 18 x 130</b>	<b>060633</b>	-	FZA 18 x 130 M12 D/50	-	1
<b>FZUB 22 x 100</b>	<b>060636</b>	FZA 22 x 100 M16	-	FZA 22 x 100 M12 I	1
<b>FZUB 22 x 125</b>	<b>060638</b>	FZA 22 x 125 M16	FZA 22 x 125 M16 D/25	FZA 22 x 125 M12 I	1

## ACCESSORIES



Setting tool **FZE plus**

Item	Art.-No.	Fits anchor			Sales unit [pcs]
		bolt anchor	push-through anchor	internal thread anchor	
<b>FZE 10 plus</b>	<b>044637</b> <sup>1)</sup>	FZA 10 x ... M6	-	-	1
<b>FZE 12 plus</b>	<b>044638</b>	FZA 12 x ... M8	FZA 12 x ... M8 D	FZA 12 x ... M6 I	1
<b>FZE 14 plus</b>	<b>044639</b>	FZA 14 x ... M10	FZA 14 x ... M10 D	FZA 14 x ... M8 I	1
<b>FZE 18 plus</b>	<b>044640</b>	FZA 18 x ... M12	FZA 18 x ... M12 D	FZA 18 x ... M10 I	1
<b>FZE 22 plus</b>	<b>044641</b>	FZA 22 x ... M16	FZA 22 x ... M16 D	FZA 22 x ... M12 I	1

1) Without centring pin.

## LOADS

### ZYKON Bolt anchor FZA

zinc plated steel / stainless steel

Permissible loads of a single anchor in cracked normal concrete (concrete tension zone) of strength class C20/25 (~B25) <sup>1) 2) 3) 8)</sup>										Minimum spacings while reducing the load	
Type	Material fixing element	Minimum member thickness	Effective anchorage depth	Installation torque	Permissible tensile load	Permissible shear load	Required edge distance (with one edge) for		Required spacing for	Min. spacing	Min. edge distance
							Max. tension load c	Max. shear load c			
		$h_{min}$ [mm]	$h_{ef}$ [mm]	$T_{inst}$ [Nm]	$N_{perm}^{4)}$ [kN]	$V_{perm}^{4)}$ [kN]	[mm]	[mm]	Max. Load s [mm]	$s_{min}^{5) 6)}$ [mm]	$c_{min}^{5) 6)}$ [mm]
FZA 10 x 40 M6	gvz	100	40	8,5	2,4	4,6	35	95	120	40	35
	A4							65			
FZA 12 x 40 M8	gvz	100	40	20	2,4	5,6	40	120	120	40	40
	A4										
FZA 12 x 50 M8	gvz	110	50	20	4,3	7,9	45	160	150	50	45
	A4							115			
FZA 14 x 40 M10	gvz	100	40	40	2,4	5,6	70	115	120	70	70
	A4										
FZA 14 x 60 M10	gvz	130	60	40	5,7	13,3	60	245	180	60	55
	A4					9,3		165			
FZA 18 x 80 M12	gvz	160	80	60	9,5	19,3	85	315	240	80	70
	A4					13,5		210			
FZA 22 x 100 M16	gvz	200	100	100	17,1	34,3	150	500	300	100	100
	A4					25,2		355			
FZA 22 x 125 M16	gvz	250	125	100	19,0	35,9	140	450	375	125	125
	A4					25,2		300			

For the design the complete assessment ETA-98/0004 has to be considered.<sup>7)</sup>

<sup>1)</sup> The partial safety factors for material resistance as regulated in the ETA-98/0004 as well as a partial safety factor for load actions of  $\gamma_L = 1,4$  are considered. As a single anchor counts e.g. an anchor with a spacing  $s \geq 3 \cdot h_{ef}$  and an edge distance  $c \geq 1,5 \cdot h_{ef}$ . Accurate data see ETA-98/0004.

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

<sup>3)</sup> Drill method hammer drilling.

<sup>4)</sup> For combinations of tensile loads, shear loads, bending moments as well as reduced edge distances or spacings (anchor groups) see ETA-98/0004.

<sup>5)</sup> Minimum possible axial spacings resp. edge distance while reducing the permissible load.

<sup>6)</sup> Minimum possible spacing resp. edge distance while reducing the permissible load for the required minimum member thickness. The combination of minimum edge distance and minimum spacing is not possible. One of both values has to be increased acc. ETA-98/0004.

<sup>7)</sup> The given loads refer to the European Technical Assessment ETA-98/0004, issue date 12/09/2016. Design of the loads according ETAG 001, Annex C, Method A (for static resp. quasi-static loads).

## LOADS

### ZYKON-Bolt anchor FZA

zinc plated steel / stainless steel

Permissible loads of a single anchor in non-cracked normal concrete (concrete compression zone) of strength class C20/25 (~B25) <sup>1)2)3)</sup>										Minimum spacings while reducing the load	
Type	Material fixing element	Minimum member thickness $h_{min}$ [mm]	Effective anchorage depth $h_{ef}$ [mm]	Installation torque $T_{inst}$ [Nm]	Permissible tensile load $N_{perm}^{4)}$ [kN]	Permissible shear load $V_{perm}^{4)}$ [kN]	Required edge distance (with one edge) for		Required spacing for Max. Load s [mm]	Min. spacing $s_{min}^{5)6)}$ [mm]	Min. edge distance $c_{min}^{5)6)}$ [mm]
							Max. tension load c [mm]	Max. shear load c [mm]			
FZA 10 x 40 M6	gvz	100	40	8,5	3,6	4,6	40	65	120	40	35
	A4							50			
FZA 12 x 40 M8	gvz	100	40	20	3,6	7,9	40	120	120	40	40
	A4							85			
FZA 12 x 50 M8	gvz	110	50	20	5,7	8,4	45	115	150	50	45
	A4							75			
FZA 14 x 40 M10	gvz	100	40	40	3,6	7,9	70	115	120	70	70
	A4										
FZA 14 x 60 M10	gvz	130	60	40	9,5	13,3	75	170	180	60	55
	A4							110			
FZA 18 x 80 M12	gvz	160	80	60	14,3	19,3	95	210	240	80	70
	A4							140			
FZA 22 x 100 M16	gvz	200	100	100	19,0	35,9	110	355	300	100	100
	A4							235			
FZA 22 x 125 M16	gvz	250	125	100	19,0	35,9	125	300	375	125	125
	A4							195			

For the design the complete assessment ETA-98/0004 has to be considered.<sup>7)</sup>

<sup>1)</sup> The partial safety factors for material resistance as regulated in the ETA-98/0004 as well as a partial safety factor for load actions of  $\gamma_L = 1,4$  are considered. As an single anchor counts e.g. an anchor with a spacing  $s \geq 3 \cdot h_{ef}$  and an edge distance  $c \geq 1,5 \cdot h_{ef}$ . Accurate data see ETA-98/0004.

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

<sup>3)</sup> Drill method hammer drilling.

<sup>4)</sup> For combinations of tensile loads, shear loads, bending moments as well as reduced edge distances or spacings (anchor groups) see ETA-98/0004.

<sup>5)</sup> Minimum possible axial spacings resp. edge distance while reducing the permissible load.

<sup>6)</sup> Minimum possible spacing resp. edge distance while reducing the permissible load for the required minimum member thickness. The combination of minimum edge distance and minimum spacing is not possible. One of both values has to be increased acc. ETA-98/0004.

<sup>7)</sup> The given loads refer to the European Technical Assessment ETA-98/0004, issue date 12/09/2016. Design of the loads according ETAG 001, Annex C, Method A (for static resp. quasi-static loads).

## LOADS

### ZYKON Through anchor FZA-D

zinc plated steel / stainless steel

Permissible loads of a single anchor in cracked normal concrete (concrete tension zone) of strength class C20/25 (~B25) <sup>1) 2) 3) 8)</sup>										Minimum spacings while reducing the load	
Type	Material fixing element	Minimum member thickness	Effective anchorage depth	Installation torque	Permissible tensile load	Permissible shear load	Required edge distance (with one edge) for		Required spacing for	Min. spacing	Min. edge distance
							Max. tension load c	Max. shear load c			
		$h_{min}$ [mm]	$h_{ef}$ [mm]	$T_{inst}$ [Nm]	$N_{perm}^{4)}$ [kN]	$V_{perm}^{4)}$ [kN]	[mm]	[mm]	Max. Load s [mm]	$s_{min}^{5) 6)}$ [mm]	$c_{min}^{5) 6)}$ [mm]
FZA 12 x 50 M8 D	gvz	100	40	20	2,4	5,6	35	120	120	40	35
	A4										
FZA 12 x 60 M8 D	gvz	110	50	20	4,3	7,9	45	160	150	50	45
	A4										
FZA 14 x 80 M10 D	gvz	130	60	40	5,7	13,3	60	245	180	60	55
	A4										
FZA 18 x 100 M12 D	gvz	160	80	60	9,5	19,3	85	315	240	80	70
	A4										
FZA 22 x 125 M16 D	gvz	200	100	100	17,1	34,3	150	500	300	100	100
	A4										

For the design the complete assessment ETA-98/0004 has to be considered.<sup>7)</sup>

<sup>1)</sup> The partial safety factors for material resistance as regulated in the ETA-98/0004 as well as a partial safety factor for load actions of  $\gamma_L = 1,4$  are considered. As a single anchor counts e.g. an anchor with a spacing  $s \geq 3 \cdot h_{ef}$  and an edge distance  $c \geq 1,5 \cdot h_{ef}$ . Accurate data see ETA-98/0004.

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

<sup>3)</sup> Drill method hammer drilling.

<sup>4)</sup> For combinations of tensile loads, shear loads, bending moments as well as reduced edge distances or spacings (anchor groups) see ETA-98/0004.

<sup>5)</sup> Minimum possible axial spacings resp. edge distance while reducing the permissible load.

<sup>6)</sup> Minimum possible spacing resp. edge distance while reducing the permissible load for the required minimum member thickness. The combination of minimum edge distance and minimum spacing is not possible. One of both values has to be increased acc. ETA-98/0004.

<sup>7)</sup> The given loads refer to the European Technical Assessment ETA-98/0004, issue date 12/09/2016. Design of the loads according ETAG 001, Annex C, Method A (for static resp. quasi-static loads).

<sup>8)</sup> A reinforcement in the concrete to prevent splitting is required. The width of the cracks has to be limited under consideration of the splitting forces at  $w_k \sim 0,3\text{mm}$ .

## LOADS

### ZYKON Through anchor FZA-D

zinc plated steel / stainless steel

Permissible loads of a single anchor in non-cracked normal concrete (concrete compression zone) of strength class C20/25 (~B25) <sup>1) 2) 3)</sup>										Minimum spacings while reducing the load	
Type	Material fixing element	Minimum member thickness	Effective anchorage depth	Installation torque	Permissible tensile load	Permissible shear load	Required edge distance (with one edge) for		Required spacing for	Min. spacing	Min. edge distance
							Max. tension load c	Max. shear load c			
		$h_{min}$ [mm]	$h_{ef}$ [mm]	$T_{inst}$ [Nm]	$N_{perm}^{4)}$ [kN]	$V_{perm}^{4)}$ [kN]	[mm]	[mm]	Max. Load s [mm]	$s_{min}^{5) 6)}$ [mm]	$c_{min}^{5) 6)}$ [mm]
FZA 12 x 50 M8 D	gvz	100	40	20	3,6	7,9	40	120	120	40	35
	A4										
FZA 12 x 60 M8 D	gvz	110	50	20	5,7	8,4	45	115	150	50	45
	A4										
FZA 14 x 80 M10 D	gvz	130	60	40	9,5	13,3	75	170	180	60	55
	A4										
FZA 18 x 100 M12 D	gvz	160	80	60	14,3	19,3	95	210	240	80	70
	A4										
FZA 22 x 125 M16 D	gvz	200	100	100	19,0	35,9	110	355	300	100	100
	A4										

For the design the complete assessment ETA-98/0004 has to be considered.<sup>7)</sup>

<sup>1)</sup> The partial safety factors for material resistance as regulated in the ETA-98/0004 as well as a partial safety factor for load actions of  $\gamma_L = 1,4$  are considered. As a single anchor counts e.g. an anchor with a spacing  $s \geq 3 \cdot h_{ef}$  and an edge distance  $c \geq 1,5 \cdot h_{ef}$ . Accurate data see ETA-98/0004.

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

<sup>3)</sup> Drill method hammer drilling.

<sup>4)</sup> For combinations of tensile loads, shear loads, bending moments as well as reduced edge distances or spacings (anchor groups) see ETA-98/0004.

<sup>5)</sup> Minimum possible axial spacings resp. edge distance while reducing the permissible load.

<sup>6)</sup> Minimum possible spacing resp. edge distance while reducing the permissible load for the required minimum member thickness. The combination of minimum edge distance and minimum spacing is not possible. One of both values has to be increased acc. ETA-98/0004.

<sup>7)</sup> The given loads refer to the European Technical Assessment ETA-98/0004, issue date 12/09/2016. Design of the loads according ETAG 001, Annex C, Method A (for static resp. quasi-static loads).

## LOADS

### ZYKON-Internally-threaded anchor FZA-I

zinc plated steel / stainless steel

Permissible loads of a single anchor in cracked normal concrete (concrete tension zone) of strength class C20/25 (~B25) <sup>1) 2) 3) 8)</sup>										Minimum spacings while reducing the load	
Type	Screw material resp. screw surface	Minimum member thickness	Effective anchorage depth	Installation torque	Permissible tensile load	Permissible shear load	Required edge distance (with one edge) for		Required spacing for	Min. spacing	Min. edge distance
							Max. tension load c	Max. shear load c			
		$h_{min}$ [mm]	$h_{ef}$ [mm]	$T_{inst}$ [Nm]	$N_{perm}^{4)}$ [kN]	$V_{perm}^{4)}$ [kN]	[mm]	[mm]	Max. Load s [mm]	$s_{min}^{5) 6)}$ [mm]	$c_{min}^{5) 6)}$ [mm]
FZA 12 x 40 M6 I	8.8	100	40	8,5	2,4	4,1	35	85	120	40	35
	A4-70							65			
FZA 12 x 50 M6 I	A4-70	110	50	8,5	4,3	3,2	45	65	150	50	45
FZA 14 x 60 M8 I	8.8	130	60	15	5,7	5,4	60	90	180	60	55
	A4-70							75			
FZA 18 x 80 M10 I	8.8	160	80	30	9,5	5,6	85	85	240	80	70
	A4-70							80			
FZA 22 x 100 M12 I	8.8	200	100	60	17,1	13,2	150	165	300	100	100
	A4-70							155			
FZA 22 x 125 M12 I	8.8	250	125	60	19,0	13,2	140	150	375	125	125
	A4-70							145			

For the design the complete assessment ETA-98/0004 has to be considered.<sup>7)</sup>

<sup>1)</sup> The partial safety factors for material resistance as regulated in the ETA-98/0004 as well as a partial safety factor for load actions of  $\gamma_L = 1,4$  are considered. As a single anchor counts e.g. an anchor with a spacing  $s \geq 3 \cdot h_{ef}$  and an edge distance  $c \geq 1,5 \cdot h_{ef}$ . Accurate data see ETA-98/0004.

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

<sup>3)</sup> Drill method hammer drilling.

<sup>4)</sup> For combinations of tensile loads, shear loads, bending moments as well as reduced edge distances or spacings (anchor groups) see ETA-98/0004.

<sup>5)</sup> Minimum possible axial spacings resp. edge distance while reducing the permissible load.

<sup>6)</sup> Minimum possible spacing resp. edge distance while reducing the permissible load for the required minimum member thickness. The combination of minimum edge distance and minimum spacing is not possible. One of both values has to be increased acc. ETA-98/0004.

<sup>7)</sup> The given loads refer to the European Technical Assessment ETA-98/0004, issue date 12/09/2016. Design of the loads according ETAG 001, Annex C, Method A (for static resp. quasi-static loads).

<sup>8)</sup> A reinforcement in the concrete to prevent splitting is required. The width of the cracks has to be limited under consideration of the splitting forces at  $w_k \sim 0,3\text{mm}$ .

## LOADS

### ZYKON-Internally-threaded anchor FZA-I

zinc plated steel / stainless steel

Permissible loads of a single anchor in non-cracked normal concrete (concrete compression zone) of strength class C20/25 (~B25) <sup>1) 2) 3)</sup>										Minimum spacings while reducing the load	
Type	Screw material resp. screw surface	Minimum member thickness	Effective anchorage depth	Installation torque	Permissible tensile load	Permissible shear load	Required edge distance (with one edge) for		Required spacing for	Min. spacing	Min. edge distance
							Max. tension load c	Max. shear load c			
		$h_{min}$ [mm]	$h_{ef}$ [mm]	$T_{inst}$ [Nm]	$N_{perm}^{4)}$ [kN]	$V_{perm}^{4)}$ [kN]	[mm]	[mm]	Max. Load s [mm]	$s_{min}^{5) 6)}$ [mm]	$c_{min}^{5) 6)}$ [mm]
FZA 12 x 40 M6 I	8.8	100	40	8,5	3,6	4,1	40	60	120	40	35
	A4-70							50			
FZA 12 x 50 M6 I	A4-70	110	50	8,5	5,4	3,2	45	50	150	50	45
FZA 14 x 60 M8 I	8.8	130	60	15	9,3	5,4	75	70	180	60	55
	A4-70							60			
FZA 18 x 80 M10 I	8.8	160	80	30	9,6	5,6	70	70	240	80	70
	A4-70							5,4			
FZA 22 x 100 M12 I	8.8	200	100	60	19,0	13,2	110	120	300	100	100
	A4-70							115			
FZA 22 x 125 M12 I	8.8	250	125	60	19,0	13,2	125	125	375	125	125
	A4-70							12,7			

For the design the complete assessment ETA-98/0004 has to be considered.<sup>7)</sup>

<sup>1)</sup> The partial safety factors for material resistance as regulated in the ETA-98/0004 as well as a partial safety factor for load actions of  $\gamma_L = 1,4$  are considered. As a single anchor counts e.g. an anchor with a spacing  $s \geq 3 \cdot h_{ef}$  and an edge distance  $c \geq 1,5 \cdot h_{ef}$ . Accurate data see ETA-98/0004.

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

<sup>3)</sup> Drill method hammer drilling.

<sup>4)</sup> For combinations of tensile loads, shear loads, bending moments as well as reduced edge distances or spacings (anchor groups) see ETA-98/0004.

<sup>5)</sup> Minimum possible axial spacings resp. edge distance while reducing the permissible load.

<sup>6)</sup> Minimum possible spacing resp. edge distance while reducing the permissible load for the required minimum member thickness. The combination of minimum edge distance and minimum spacing is not possible. One of both values has to be increased acc. ETA-98/0004.

<sup>7)</sup> The given loads refer to the European Technical Assessment ETA-98/0004, issue date 12/09/2016. Design of the loads according ETAG 001, Annex C, Method A (for static resp. quasi-static loads).