



## VYHLÁSENIE O PARAMETROCH

### DoP 0208

pre fischer Zykron- Anchor FZA, FZA-D, FZA-I, FZA ST (mechanická kotva do betónu)

SK

1. Jedinečný identifikačný kód typu výrobku:

**DoP 0208**

2. Zamýšľané použitie/použitia:

**Dodatočné upevnenie v betóne s trhlinami alebo v betóne bez trhlín, pozri prílohu, najmä prílohy B1-B7.**

3. Výrobca:

**fischerwerke GmbH & Co. KG, Klaus-Fischer-Str. 1, 72178 Waldachtal, Nemecko**

4. Splnomocnený zástupca:

**-**

5. Systém(-y) posudzovania a overovania nemennosti parametrov:

**1**

6. Európsky hodnotiaci dokument:

**EAD 330232-01-0601, (Edition 05/2021)**

**ETA-98/0004; 2021-06-16**

**DIBt- Deutsches Institut für Bautechnik**

Notifikovaný(-é) subjekt(-y):

**2873 TU Darmstadt**

7. Deklarované parametre:

#### Mechanická odolnosť a stabilita (BWR 1)

Charakteristická odolnosť v tahu, Metóda A:

Odolnosť voči porušeniu ocele: Prílohy C1-C3

Odolnosť voči porušeniu vytiahnutím: Prílohy C1-C3

Odolnosť voči porušeniu betónového kužeľa: Prílohy C1-C3

Robustnosť: Prílohy C1-C6

Minimálna vzdialenosť od okraj a osová vzdialenosť: Prílohy C7

Vzdialenosť od okraja voči rozštiepliu pri zaťažení: Prílohy C1- C3

Charakteristická odolnosť v šmyku (statické a kvázistatické zaťaženie), Metóda A:

Odolnosť voči porušeniu ocele: (Zaťaženie šmykom) Prílohy C4- C6

Odolnosť voči vylomeniu: Prílohy C4- C6

Charakteristická odolnosť pre zjednodušený návrh:

Metóda B: NPD

Metóda C: NPD

**Posuny:**

Posuny pri statickom a kvázistatickom zaťažení: Prílohy C14, C15

Charakteristická odolnosť a posuny pre seismické výkonnostné kategórie C1 a C2:

Odolnosť pri zaťažení tāhom, posuny, kategória C1: Prílohy C8, C9

Odolnosť pri zaťažení tāhom, posuny, kategória C2: Prílohy C10, C11, C15

Odolnosť pri zaťažení šmykom, posuny, kategória C1: Prílohy C8, C9

Odolnosť pri zaťažení šmykom, posuny, kategória C2: Prílohy C10, C11, C15

Faktor prstencovej medzery: Prílohy C8- C11

#### Bezpečnosť v prípade požiaru (BWR 2)

Reakcia na oheň: Trieda (A1)

**Odolnosť proti ohňu:**

Požiarna odolnosť voči porušeniu ocele (Zaťaženie tāhom) Prílohy C12, C13

Požiarna odolnosť voči vytiahnutiu (Ztaženie tāhom) Prílohy C12, C13

Požiarna odolnosť voči porušeniu ocele (Zaťaženie šmykom) Prílohy C12, C13

#### Životnosť:

Životnosť: Prílohy A7, B1



8. Vhodná technická dokumentácia a/alebo špecifická -  
technická dokumentácia:

Uvedené parametre výrobku sú v zhode so súborom deklarovaných parametrov. Toto vyhlásenie o parametroch sa v súlade s nariadením (EÚ) č. 305/2011 vydáva na výhradnú zodpovednosť uvedeného výrobcu.

Podpísal(-a) za a v mene výrobcu:

Dr.-Ing. Oliver Geibig, konateľ oddelenia Produkt management & vývoj  
Tumlingen, 2021-06-30

Jürgen Grün, konateľ oddelenia Chemická výroba & kvalita

Toto vyhlásenie o vlastnostiach bolo vyhotovené v rôznych jazykoch. V prípade, že dôjde k rozdielnemu výkladu má anglická verzia vždy prednosť.  
Príloha obsahuje dobrovoľné a doplňujúce informácie v anglickom jazyku. Tieto vychádzajú zo zákonom stanovených požiadaviek (jazykovo neutrálnych).

## **Specific Part**

### **1 Technical description of the product**

The fischer-Zykon-Anchor FZA, FZA-D, FZA-I and FZA ST is an anchor made of galvanised or stainless or high corrosion resistant steel which is placed in an undercut hole and anchored by mechanical interlock with displacement-controlled installation.

The bolt projection anchor FZA and the through bolt anchor FZA-D consists of a conical bolt with external thread, an expansion sleeve and a hexagon nut with washer. The internal threaded anchor FZA-I consists of a conical bolt with internal thread and an expansion sleeve. The bold projecting anchor FZA ST consists of a conical bolt with hexagon projecting end, an expansion sleeve with colour marking, a hexagon nut with washer and a plastic sleeve.

The anchor is anchored by impact acting on the expansion sleeve over the cone bolts in the undercuts of the borehole.

The product description is given in Annex A.

### **2 Specification of the intended use in accordance with the applicable European Assessment Document**

The performances given in Section 3 are only valid if the fastener is used in compliance with the specifications and conditions given in Annex B.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the fastener of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

### **3 Performance of the product and references to the methods used for its assessment**

#### **3.1 Mechanical resistance and stability (BWR 1)**

<b>Essential characteristic</b>	<b>Performance</b>
Characteristic resistance to tension load (static and quasi-static loading) Method A	See Annex C1 to C3, Annex C7
Characteristic resistance to shear load (static and quasi-static loading)	See Annex C4 to C6
Displacements	See Annex C14 and C15
Characteristic resistance and displacements for seismic performance category C1 and C2	See Annex C8 to C11

#### **3.2 Safety in case of fire (BWR 2)**

<b>Essential characteristic</b>	<b>Performance</b>
Reaction to fire	Class A1
Resistance to fire	See Annex C12 and C13

#### **3.3 Aspects of durability linked with the Basic Works Requirements**

<b>Essential characteristic</b>	<b>Performance</b>
Durability	See Annex B1

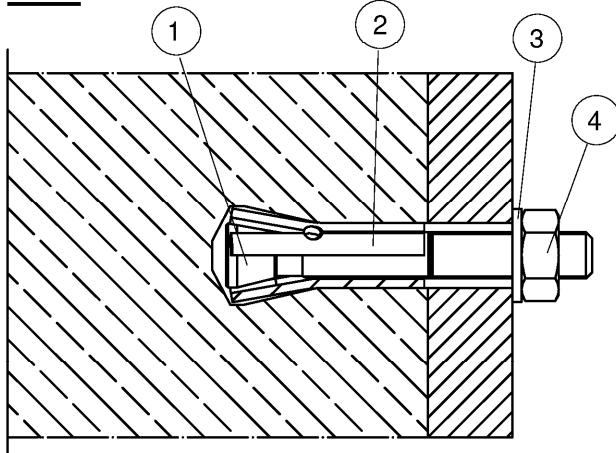
**4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base**

In accordance with the European Assessment Document EAD 330232-01-0601 the applicable European legal act is: [96/582/EC].

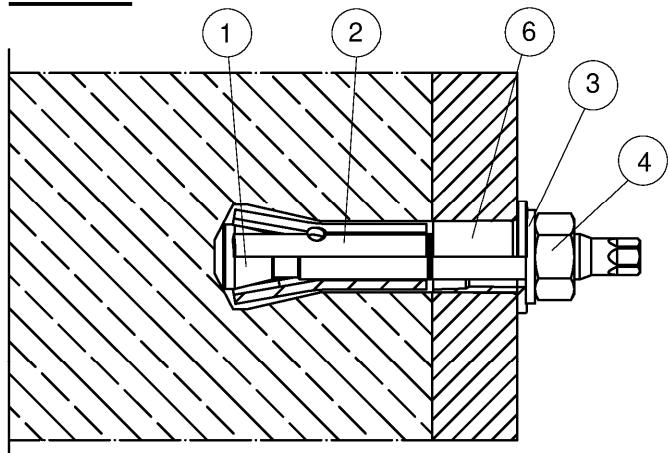
The system to be applied is: 1

## Bolt projecting anchor

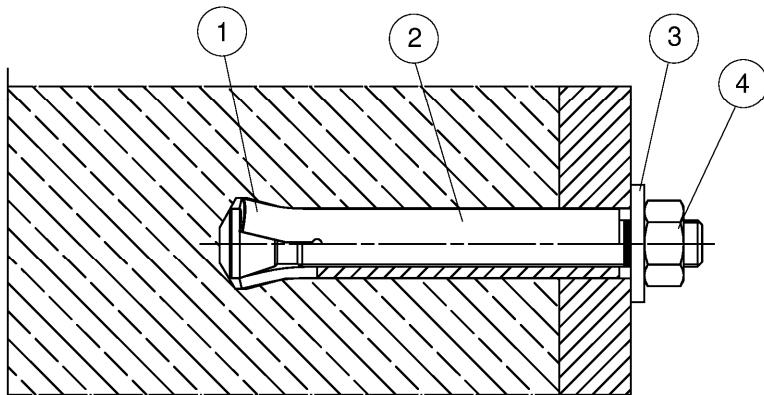
### FZA:



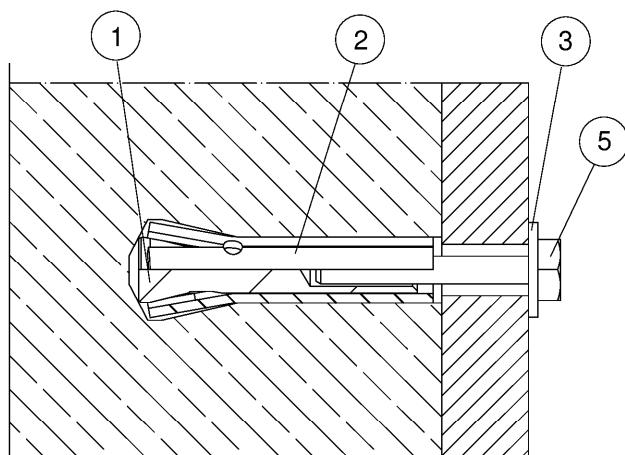
### FZA ST:



## Through bolt anchor FZA D



## Internal thread anchor FZA I



- (1) = Cone bolt
- (2) = Expansion sleeve
- (3) = Washer
- (4) = Hexagon nut
- (5) = Hexagonal screw
- (6) = Plastic sleeve

*(figure not to scale)*

fischer-ZYKON-Anchor FZA, FZA D, FZA I, FZA ST

**Product description**

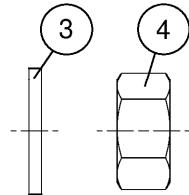
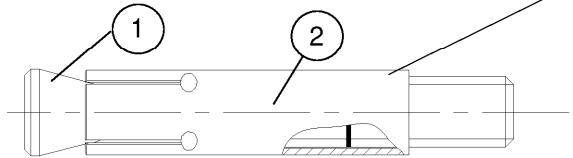
Installed condition

**Annex A 1**

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## Bolt projecting anchor

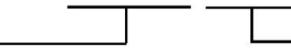
FZA:



Product marking, example:

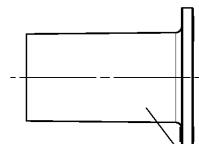
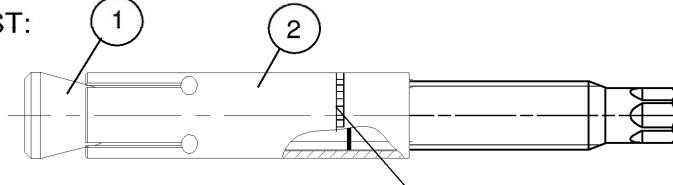
FZA 12x40 R

Brand | type of fastener



Diameter x length expansion sleeve  
identification R or HCR

FZA ST:

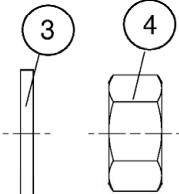
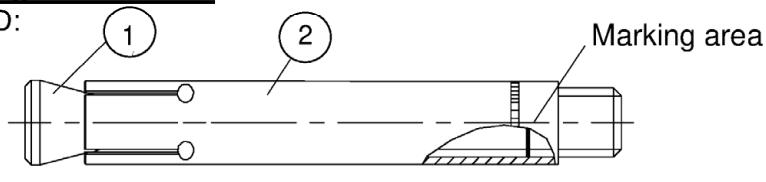


Expansion sleeve with knurling FZA 12x40

Plastic sleeve

## Through bolt anchor

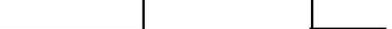
FZA D:



Product marking, example:

FZA 12x50 D/10 R

Brand | type of fastener

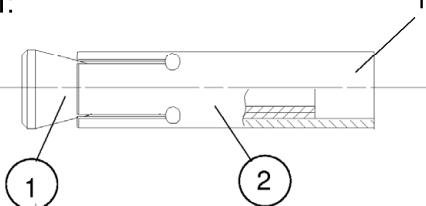


Diameter x length expansion sleeve  
D / max. thickness of fixture ( $t_{fix}$ )  
identification R or HCR

## Internal thread anchor

FZA I:

Product marking see FZA



FZA: Carbon steel, galvanised

FZA HDG: Carbon steel, hot dip galvanised

FZA R: Stainless steel

FZA HCR: High corrosion resistant steel

(figure not to scale)

fischer-ZYKON-Anchor FZA, FZA D, FZA I, FZA ST

### **Product description**

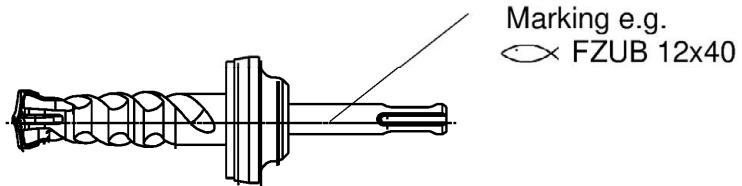
Types of fastener

### **Annex A 2**

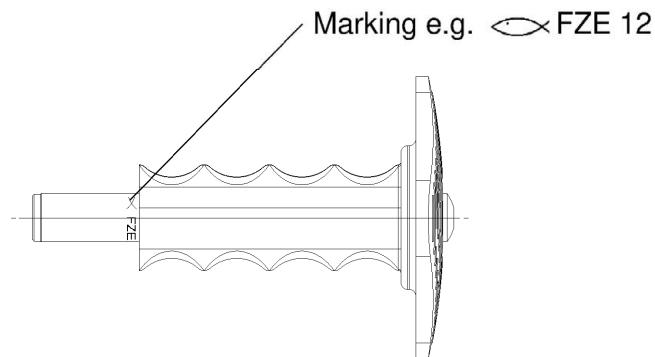
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## **ZYKON drill**

FZUB:

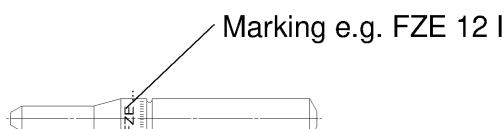


## **Setting tool FZE Plus**



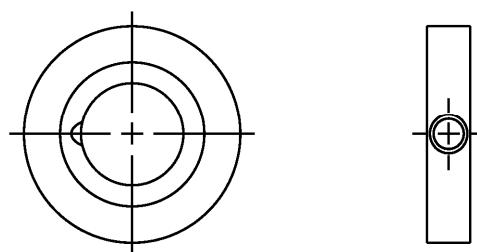
## **Centring pin**

for internal thread anchor



## **Filling disk FFD**

Optional e.g. for seismic application



(figure not to scale)

fischer-ZYKON-Anchor FZA, FZA D, FZA I, FZA ST

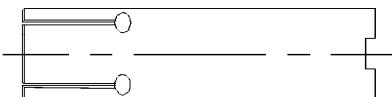
## **Product description**

Drill FZUB, setting tool FZE Plus and filling disk

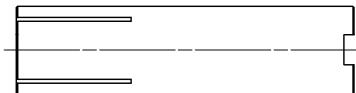
## **Annex A 3**

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## Types of expansion sleeve

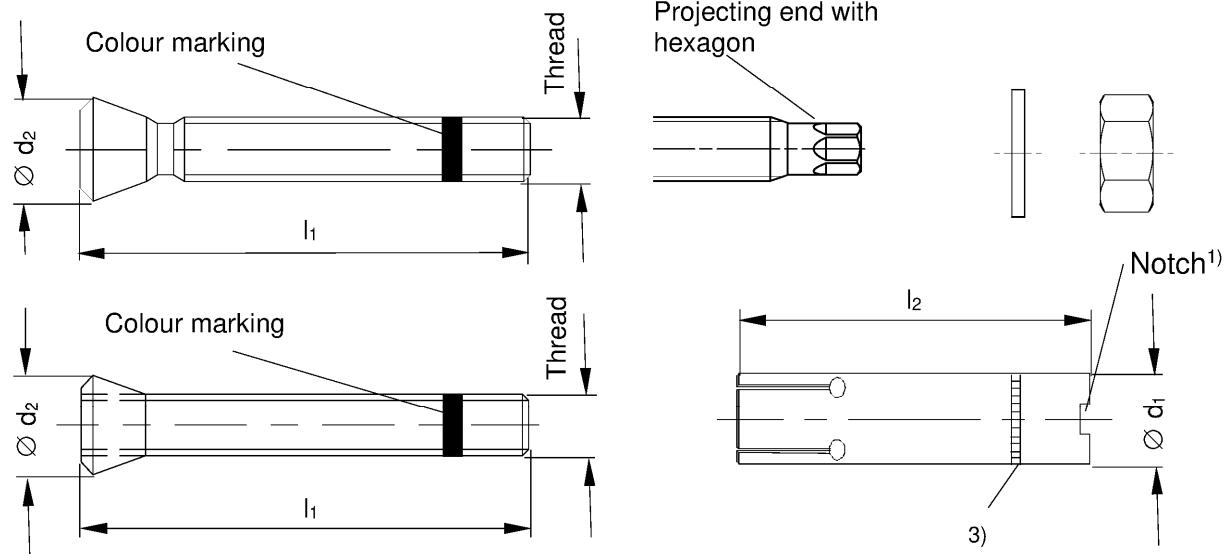


manufactured by punching



manufactured by turning

### FZA



**Table A4.1:** Dimension bolt projecting FZA [mm]

Type of fastener	Thread	$l_1$ min	$l_1$ max	$l_2$	$\varnothing d_1$	$\varnothing d_2$
FZA 10 x 40 M 6 / $t_{fix}^1)$	M6	50	100	40	10	
FZA 12 x 40 M 8 / $t_{fix}^1)$	M8	52	154		12	
FZA 14 x 40 M 10 / $t_{fix}^1)$	M10	54	204		14	
FZA 12 x 50 M 8 / $t_{fix}$	M8	62	164	50	12	
FZA 14 x 60 M 10 / $t_{fix}$	M10	80	232	60	14	
FZA 18 x 80 M 12 / $t_{fix}$	M12	99	301	80	18	
FZA 22 x 100 M 16 / $t_{fix}$	M16	122	374	100	22	
FZA 22 x 125 M 16 / $t_{fix}^1)$		147	399	125		
FZA 12 x 40 ST <sup>1)</sup>	M8	62	164	50 <sup>3)</sup>	12	
FZA 14 x 40 ST <sup>1)</sup>	M10	54	204	40	14	
FZA 14 x 60 ST		80	232	60		

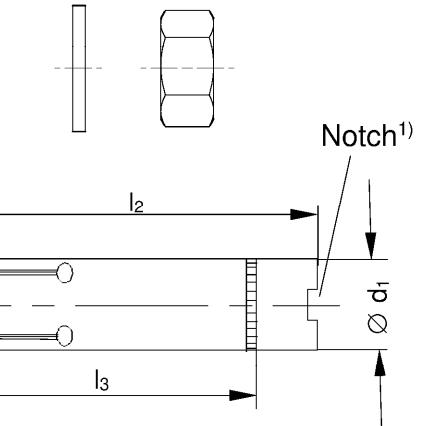
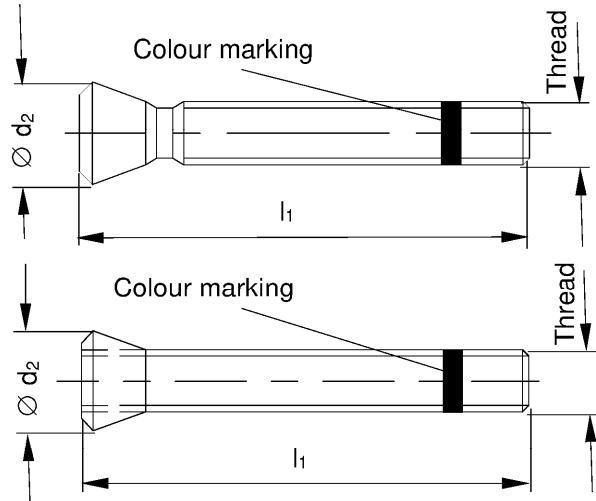
<sup>1)</sup> Expansion sleeve with notch

<sup>2)</sup> Design: threaded bolt with cone nut

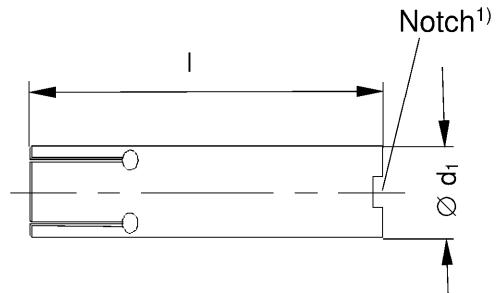
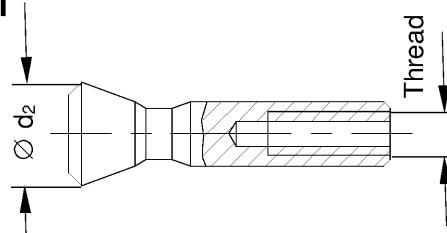
<sup>3)</sup> Expansion sleeve with knurling at FZA 12x40 ST

(figure not to scale)

fischer-ZYKON-Anchor FZA, FZA D, FZA I, FZA ST

**FZA D****Table A5.1:** Dimensions through bolt anchor FZA D [mm]

Type of fastener	Thread	$l_1$	$l_2$	$l_3$	$\varnothing d_1$	$\varnothing d_2$
FZA 12 x 50 M 8 D/10 <sup>1)</sup>	M8	69	50	40	12	
FZA 12 x 60 M 8 D/10		79	60	50		
FZA 12 x 80 M 8 D/30		99	80			
FZA 14 x 80 M 10 D/20	M10	102		60	14	
FZA 14 x 100 M 10 D/40		126	100			
FZA 18 x 100 M 12 D/20	M12	126		80	18	
FZA 18 x 130 M 12 D/50		156	130			
FZA 22 x 125 M 16 D/25	M16	156	125	100		22

<sup>1)</sup> Expansion sleeve with notch<sup>2)</sup> Design: threaded bolt with cone nut**FZA I****Table A5.2:** Dimensions internal thread anchor FZA I [mm]

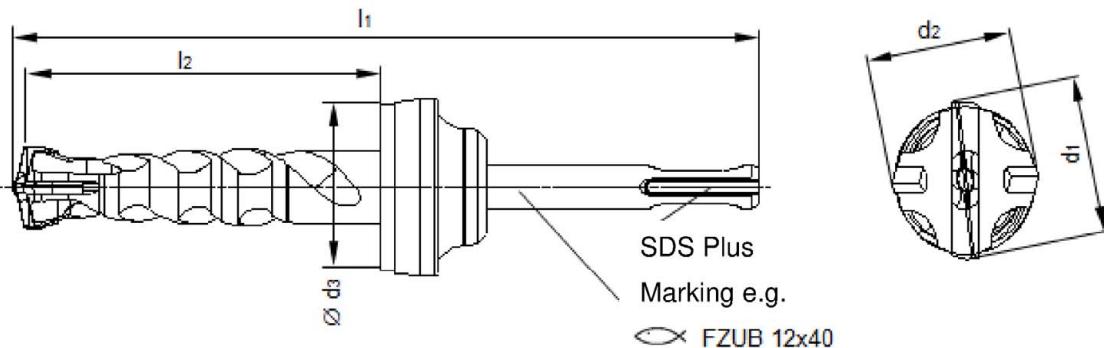
Type of fastener	Gewinde	$l$	$\varnothing d_1$	$\varnothing d_2$
FZA 12 x 40 M 6 I <sup>1)</sup>	M6	40	12	
FZA 12 x 50 M 6 I		50		
FZA 14 x 60 M 8 I	M8	60	14	
FZA 18 x 80 M 10 I	M10	80	18	
FZA 22 x 100 M 12 I	M12	100	22	
FZA 22 x 125 M 12 I <sup>1)</sup>		125		

<sup>1)</sup> Expansion sleeve with notch

(figure not to scale)

fischer-ZYKON-Anchor FZA, FZA D, FZA I, FZA ST

## ZYKON drill FZUB

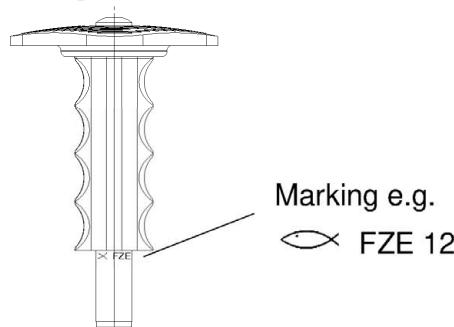


**Table A6.1: Dimensions ZYKON drill FZUB [mm]**

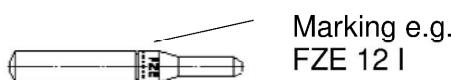
Type of drill	Connection	$l_1$	$l_2 \geq$	$d_1$	$d_2$	$\varnothing d_3 \leq$		
FZUB 10 x 40	SDS plus	126	40	10,35 - 10,80	$d_2 \leq d_1$	39,5		
FZUB 12 x 40		127		12,45 - 12,85				
FZUB 12 x 50		137	50					
FZUB 12 x 60		147	60					
FZUB 12 x 80		167	80					
FZUB 14 x 40		130	40	14,45 - 14,85				
FZUB 14 x 60		152	60					
FZUB 14 x 80		172	80					
FZUB 14 x 100		192	100					
FZUB 18 x 80		172	80	18,75 - 19,15				
FZUB 18 x 100		192	100					
FZUB 18 x 130		222	130					
FZUB 22 x 100		197	100	22,45 - 22,95		43,5		
FZUB 22 x 125		222	125					

For assignment of the ZYKON FZUB drill bits and the FZE-Plus setting tools to be used to the respective fastener types and sizes, acc. to Annex B 2

### Setting tool FZE Plus:



Centring pin for setting tool FZE Plus:



(figure not to scale)

fischer-ZYKON-Anchor FZA, FZA D, FZA I, FZA ST

### Product description

ZYKON drill FZUB and setting tool FZE Plus

### Annex A 6

**Table A7.1:** Materials FZA, FZA D, FZA I<sup>1)</sup> (galvanised  $\geq 5\mu\text{m}$ , ISO 4042:2018)  
FZA HDG, FZA D HDG (hot-dip galavanised<sup>2)</sup>, ISO 10684:2011)

Part	Designation	Material
1	Cone bolt with external thread	Cold form steel or free cutting steel Nominal steel tensile strength: $f_{uk} \leq 1000 \text{ N/mm}^2$
	Conical bolt with internal thread	Steel, EN 10277:2018 Nominal steel tensile strength $f_{uk} \leq 1000 \text{ N/mm}^2$
2	Expansion sleeve seamless or rolled	Steel
3	Washer <sup>1)</sup>	Cold strip, EN 10139:2016
4	Hexagon nut	Steel, property class 8, EN ISO 898-2:2012
5	Screw / threaded rod with nut <sup>1)</sup>	Steel, property class $\geq 5.8$
-	Filling disk FFD <sup>3)</sup>	Steel

**Table A7.2:** Materials FZA R, FZA D R, FZA I R<sup>1)</sup>, FZA ST R

Part	Designation	Material
		Stainless steel acc. to EN 10088:2014 Corrosion resistance class CRC III acc. to EN 1993-1-4:2015
1	Cone bolt with external thread	
	Conical bolt with internal thread	
2	Expansion sleeve seamless or rolled	Stainless steel EN 10088:2014
3	Washer <sup>1)</sup>	
4	Hexagon nut	Stainless steel EN 10088:2014; ISO 3506-2:2018; property class $\geq 70$
5	Screw / threaded rod with nut <sup>1)</sup>	Stainless steel EN 10088:2014; property class $\geq 50$
-	Filling disk FFD <sup>3)</sup>	Stainless steel EN 10088:2014

**Table A7.3:** Materials FZA HCR, FZA D HCR, FZA I HCR<sup>1)</sup>

Part	Designation	Material
		High corrosion resistant steel acc. to EN 10088:2014 Corrosion resistance class CRC V acc. to EN 1993-1-4:2015
1	Cone bolt with external thread	
	Conical bolt with internal thread	
2	Expansion sleeve seamless or rolled	High corrosion resistant steel EN 10088:2014
3	Washer <sup>1)</sup>	
4	Hexagon nut	High corrosion resistant steel EN 10088:2014; ISO 3506-2:2018; property class $\geq 70$
5	Screw / threaded rod with nut <sup>1)</sup>	High corrosion resistant steel EN 10088:2014; property class $\geq 50$
-	Filling disk FFD <sup>3)</sup>	High corrosion resistant steel EN 10088:2014

<sup>1)</sup> FZA I: Washers and screws or threaded rods with hexagon nuts are not included in the scope of delivery

<sup>2)</sup> Alternative method sherardised, EN 13811:2003

<sup>3)</sup> Optional for e.g. seismic application

fischer-ZYKON-Anchor FZA, FZA D, FZA I, FZA ST

**Product description**

Materials

**Annex A 7**

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## Specifications of intended use

### Anchorages subject to:

Size	FZA					
	10x40 M6 12x40 M8 12x40 ST M8 12x50 M8	14x40 M10 14x40 M10 ST 14x60 M10 14x60 M10 ST 18x80 M12 22x100 M12 22x125 M12	12x50 M8 D 12x60 M8 D 12x80 M8 D	14x80 M10 D 14x100 M10 D 18x100 M12 D 18x130 M12 D 22x125 M16 D	12x40 M6 I 12x50 M6 I 14x60 M8 I 18x80 M10 I 22x100 M12 I 22x125 M12 I	
Static and quasi-static loads						
Cracked and uncracked concrete	✓		✓			✓
Fire exposure		✓		✓		
Seismic performance category	C1 C2	1)		1)		1)

1) No performance assessed

### Base materials:

- Compacted reinforced or unreinforced normal weight concrete without fibres (cracked and uncracked) of strength classes C20/25 to C50/60 according to EN 206:2013+A1:2016

### Use conditions (Environmental conditions):

- Structures subject to dry internal conditions:

**FZA, FZA D, FZA HDG, FZA D HDG, FZA I**

- For all other conditions according to EN 1993-1-4:2015-10 corresponding to corrosion resistance class:
  - CRC III: **FZA R, FZA D R, FZA I R, FZA ST R**
  - CRC V: **FZA HCR, FZA D HCR, FZA I HCR**

### Design:

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work
- Verifiable calculation notes and drawings are to be prepared taking account of the loads to be anchored. The position of the anchor is indicated on the design drawings (e.g. position of the anchor relative to reinforcement or to supports, etc.)
- For the internally threaded anchors FZA I the characteristic resistances against steel failure for screws or threaded rods must be designed additionally from the construction site. Screw lengths are to be determined by the planning engineer taking into account the thickness of the component to be connected, the thickness of the washers and the required screw-in depth (according to Annex B4) and tolerances
- Design of fastenings according to EN 1992-4:2018 and EOTA Technical Report TR 055, Edition February 2018

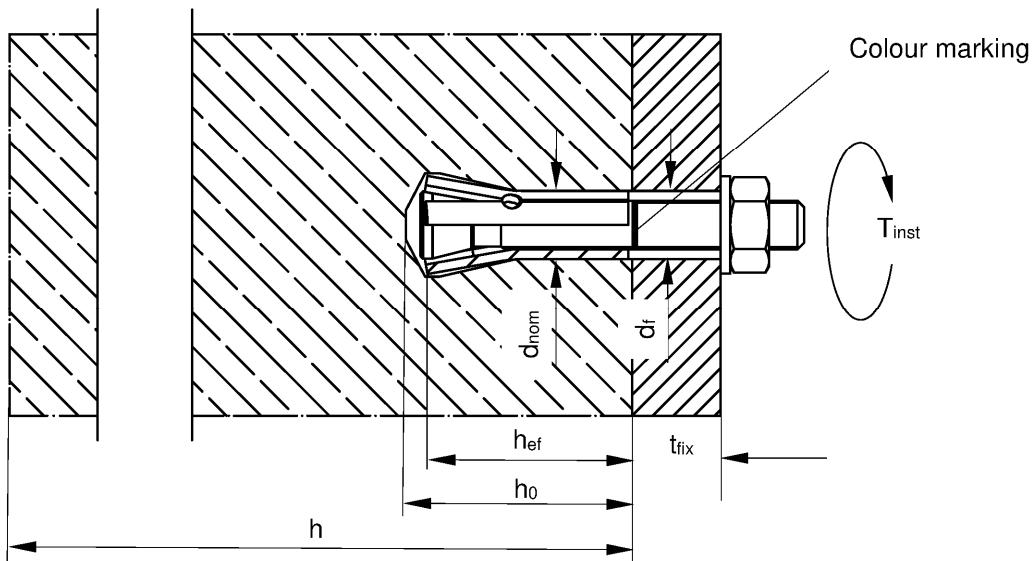
fischer-ZYKON-Anchor FZA, FZA D, FZA I, FZA ST

**Intended Use**  
Specifications

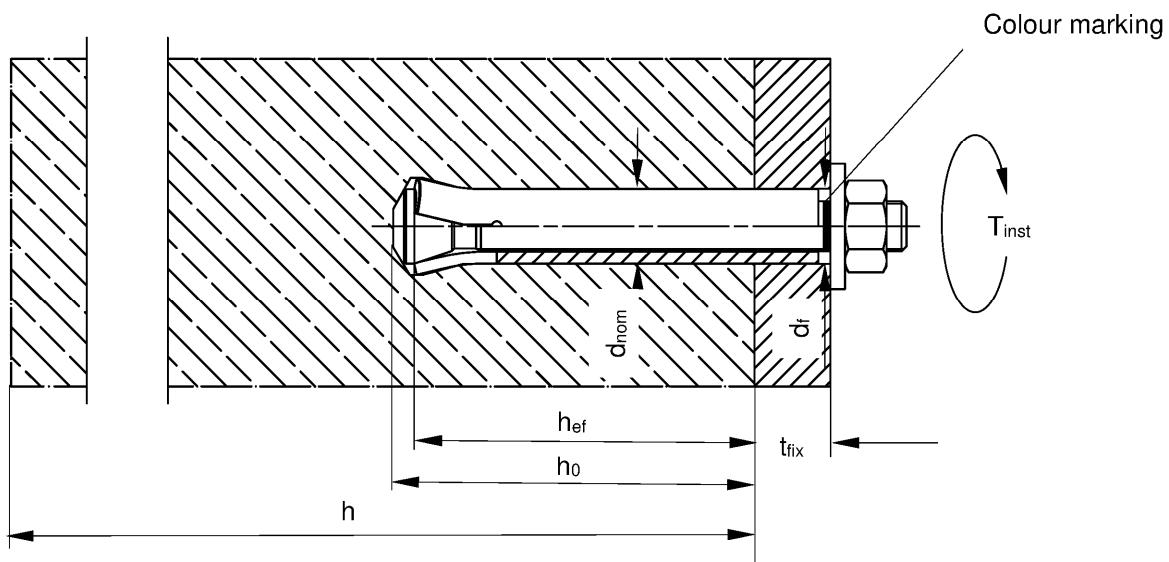
**Annex B 1**

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## Bolt projecting anchor FZA:



## Through bolt anchor FZA D:



(figure not to scale)

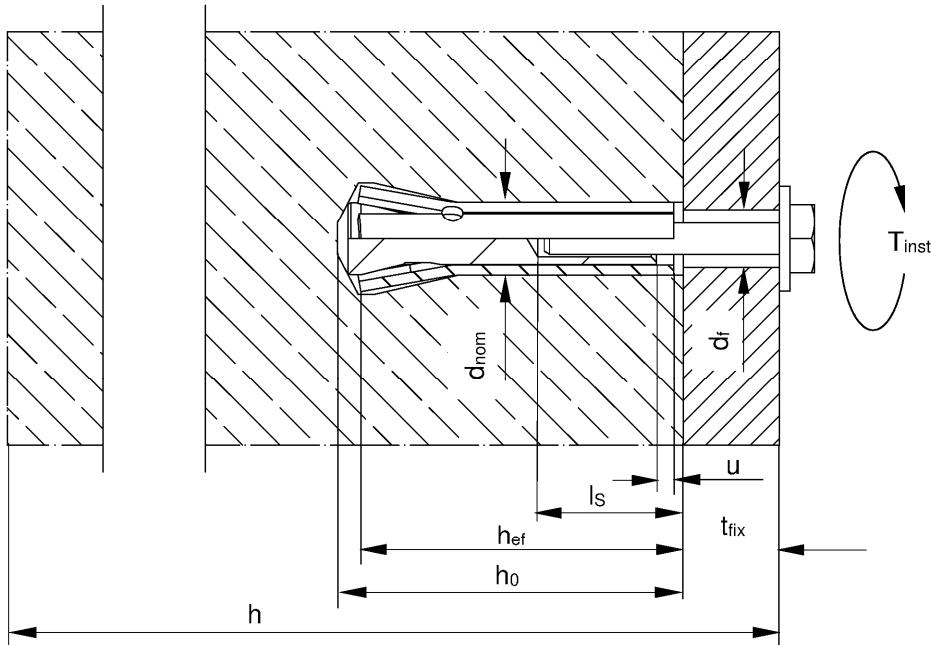
fischer-ZYKON-Anchor FZA, FZA D, FZA I, FZA ST

**Intended Use**  
Installation parameters

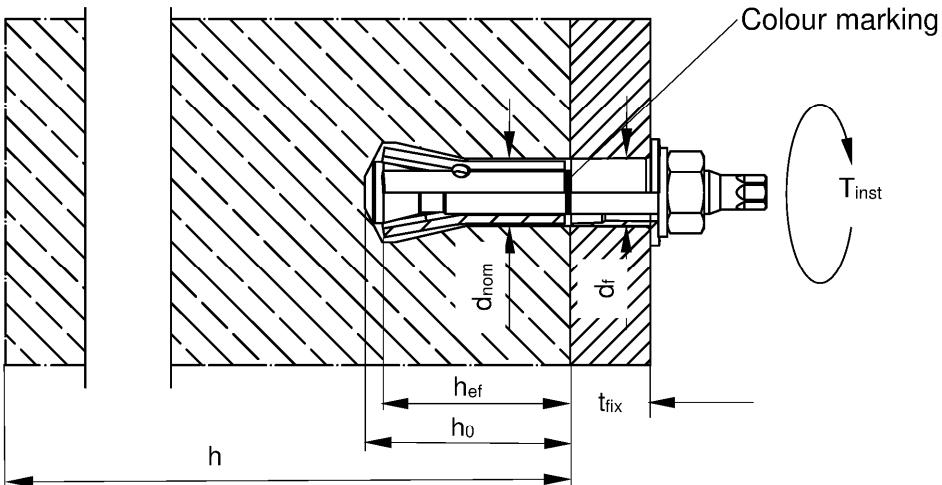
**Annex B 2**

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## Internal thread anchor FZA I:



## Bolt projecting anchor FZA ST:



**Legend:**

- $h_{ef}$  = Effective embedment depth
- $t_{fix}$  = Thickness of fixture
- $d_f$  = Diameter of the clearance hole in the fixture
- $u$  = Gap between conical bolt with internal thread and expansion sleeve (FZA I)
- $h$  = Thickness of concrete member
- $T_{inst}$  = Required torque moment
- $l_s$  = Screw-in depth (FZA I)
- $d_{nom}$  = Nominal anchor diameter
- $h_0$  = Drill hole depth

(figure not to scale)

fischer-ZYKON-Anchor FZA, FZA D, FZA I, FZA ST

**Intended Use**  
Installation parameters

**Annex B 3**

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**Table B4.1: Installation parameters for FZA, FZA D, FZA I, FZA ST**

Type of fastener	Drill hole depth $\geq h_0$ [mm]	$t_{fix}$ [mm]	Drill	Setting tool	$d_f$ <sup>2)</sup> $\leq$ [mm]	$T_{inst}^1)$ [Nm]	Gap $u$ [mm]	Screw-in depth $l_s$ [mm]					
		min   max	FZUB	FZE Plus			max   min						
FZA 10 x 40 M 6 / $t_{fix}$	43	1	50	10x40	10	7	8,5	-					
FZA 12 x 40 M 8 / $t_{fix}$			100	12x40	12	9	20						
FZA 14 x 40 M 10 / $t_{fix}$			150	14x40	14	12	40						
FZA 12 x 50 M 8 / $t_{fix}$			100	12x50	12	9	20						
FZA 14 x 60 M 10 / $t_{fix}$			150	14x60	14	12	40						
FZA 18 x 80 M 12 / $t_{fix}$			200	18x80	18	14	60						
FZA 22 x 100 M 16 / $t_{fix}$			250	22x100	22	18	100						
FZA 22 x 125 M 16 / $t_{fix}$			250	22x125									
FZA 12 x 40 ST	43	1	100	12x40	12	17	20	-					
FZA 14 x 40 ST			150	14x40	14								
FZA 14 x 60 ST			150	14x60									
FZA 12 x 50 M 8 D/10	43	1	10	12x50	12	14	20	-					
FZA 12 x 60 M 8 D/10	53		10	12x60									
FZA 12 x 80 M 8 D/30			30	12x80									
FZA 14 x 80 M 10 D/20	63		20	14x80	14	16	40						
FZA 14 x 100 M 10 D/40			40	14x100									
FZA 18 x 100 M 12 D/20	83	1	20	18x100	18	20	60	-					
FZA 18 x 130 M 12 D/50			50	18x130									
FZA 22 x 125 M 16 D/25	105	-	25	22x125	22	24	100	-					
FZA 12 x 40 M 6 I	43		12x40	12 + FZE 12 I	7	8,5	0 – 4,0	15					
FZA 12 x 50 M 6 I	53		12x50										
FZA 14 x 60 M 8 I	63		14x60	14 + FZE 18 I	9	15	18	12					
FZA 18 x 80 M 10 I	83		18x80										
FZA 22 x 100 M 12 I	103		22x100	22 + FZE 22 I	14	60	0 – 4,5	24					
FZA 22 x 125 M 12 I	127		22x125										
<sup>1)</sup> When using the internal thread anchor FZA I with threaded rods or screws according to Annex A 7, the specified installation torque must also be applied													
<sup>2)</sup> Diameter of the clearance hole in the fixture													

fischer-ZYKON-Anchor FZA, FZA D, FZA I, FZA ST

**Intended Use**  
Installation parameters

**Annex B 4**

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## **Installation instructions for FZA, FZA D, FZA I, FZA ST**

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site
- Use of the anchor only as supplied by the manufacturer without exchanging the components of the anchor
- Checking before placing the anchor to ensure that the strength class of the concrete in which the anchor is to be placed is in the range given and is not lower than that of the concrete to which the characteristic loads apply
- Check of concrete being well compacted, e.g. without significant voids
- Drill hole created perpendicular +/- 5° to concrete surface, positioning without damaging the reinforcement
- In case of aborted hole: new drilling at a minimum distance twice the depth of the aborted drill hole or smaller distance if the aborted drill hole is filled with high strength mortar and if under shear or oblique tension load it is not in the direction of load application
- Anchor must be installed to comply with the correct anchorage depth. This is assured when the front face of the sleeve, for the internal thread, is approximately 1mm below the concrete surface or, in the case of the through bolt versions, approximately 1mm below the front surface of fixture. When using the FZA 12x40 ST the knurling on the sleeve is flush or below the concrete surface. For the bolt and through bolt version the anchor is correctly expanded if the colour marking on the thread of the tapered bolt is visible.

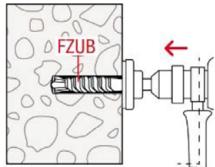
fischer-ZYKON-Anchor FZA, FZA D, FZA I, FZA ST

**Intended Use**  
Installation instructions

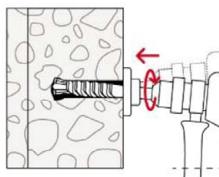
**Annex B 5**

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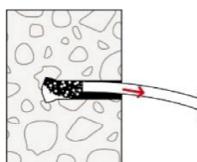
## Pre-positioned installation FZA, FZA I and FZA ST



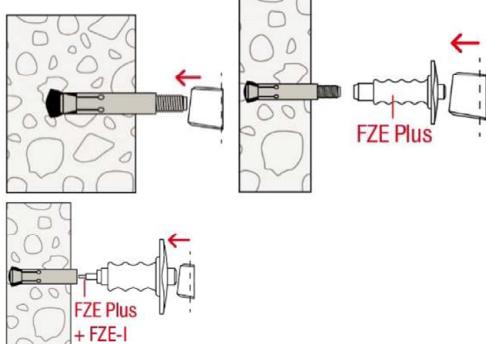
**1.:** The drill hole must be drilled at right angles ( $+/- 5^\circ$ ) to the surface of the anchor base with a hammer drill using the corresponding ZYKON FZUB drill bit. The required drilling depth is reached when the depth stop of the FZUB is in contact with the concrete.



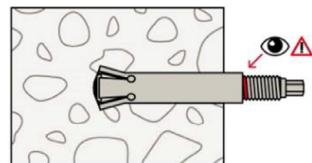
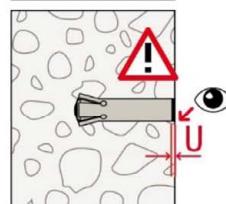
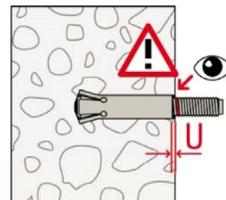
**2.:** Once the FZUB depth stop meets the concrete, create the drill hole undercut by making circular swiveling movements with the hammer drill while the hammer mechanism is engaged. Press the hammer drill firmly against the anchor base: 1 - 2 swiveling movements are sufficient for  $\varnothing 14\text{ mm}$ , with 3 - 5 movements for  $\varnothing 18\text{ mm}$  and  $\varnothing 22\text{ mm}$ .



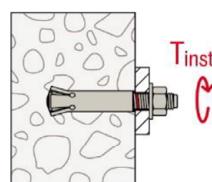
**3.: Clean drill hole.**



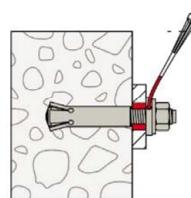
**4.: Insert the anchor into the drill hole and then drive the expansion sleeve in with hammer-set device FZE Plus, using a manual hammer.**



**5.:** The anchor is correctly expanded if the colour marking on the thread of the tapered bolt is visible or the gap  $u$  between conical bolt with internal thread and expansion sleeve (FZA I) is fulfilled. When using the FZA 12x40 ST the knurling on the sleeve is flush or below the concrete surface.

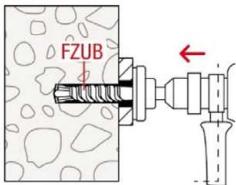


**6.: Mount installation object (e.g. anchor plate), washer and nut, screw (for FZA I) or threaded rod with washer and nut (for FZA I) and apply installation torque with torque spanner.**

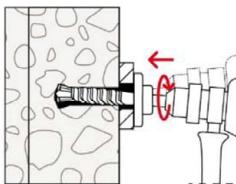


**Optional:** The gap between bolt and fixture may be filled with mortar (compressive strength  $\geq 50\text{ N/mm}^2$  e.g. FIS SB) after step 6 (for eliminating the annular gap). The filling disc is additional to the standard washer. The thickness of the filling disc must be considered for definition of  $t_{fix}$ . Countersunk of the filling disc in direction to the anchor plate.

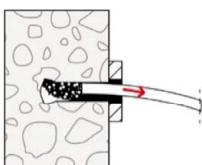
## Push-through installation FZA D



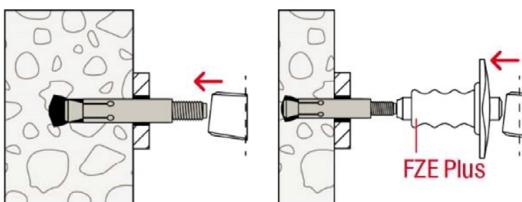
1.: Create a drill hole through the installation object perpendicular to the surface of the anchor base with a hammer drill, using the corresponding Zykron universal drill bit FZUB. The required drill depth is reached once the FZUB depth stop meets the fixture.



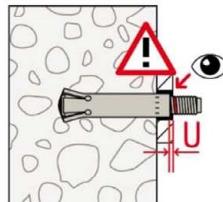
2.: Once the FZUB depth stop meets the fixture, create the drill hole undercut by making circular swiveling movements with the hammer drill while the hammer mechanism is engaged. Press the hammer drill firmly against the anchor base: 1 - 2 swiveling movements are sufficient for  $\varnothing$  14 mm, with 3 - 5 movements for  $\varnothing$  18 mm and  $\varnothing$  22 mm.



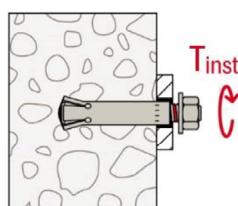
3.: Clean drill hole.



4.: Insert the anchor into the drill hole through the installation object (e.g. anchor plate) and then drive the expansion sleeve in with hammer-set device FZE Plus, using a manual hammer.



5.: The anchor is correctly expanded if the colour marking on the thread of the tapered bolt is visible.



6.: Mount installation object (e.g. anchor plate), washer and nut and apply installation torque with torque spanner.

fischer-ZYKON-Anchor FZA, FZA D, FZA I, FZA ST

**Intended Use**  
Installation instructions

**Annex B 7**

Appendix 16 / 31

**Table C1.1:** Characteristic values of **tension** resistance under static and quasi-static action for **bolt projecting anchor FZA, FZA ST**

Type of anchor / size	FZA (bolt projecting anchor)							
	10x40 M6	12x40 12x40 ST M8	14x40 14x40 ST M10	12x50 M8	14x60 14x60 ST M10	18x80 M12	22x100 M16	22x125 M16
<b>Steel failure for FZA</b>								
Characteristic resistance $N_{Rk,s}$ [kN]	16,1	29,3	46,4	29,3	46,4	67,4	125,6	
Partial factor $\gamma_{Ms}$ [-]					1,5			
<b>Steel failure for FZA HDG</b>								
Characteristic resistance $N_{Rk,s}$ [kN]	13,1	25,0	40,7	25,0	40,7	60,1	115	
Partial factor $\gamma_{Ms}$ [-]					1,5			
<b>Steel failure for FZA R</b>								
Characteristic resistance $N_{Rk,s}$ [kN]	14,1	25,6	40,6	25,6	40,6	59,0	109,9	
Partial factor $\gamma_{Ms}$ [-]					1,87			
<b>Steel failure for FZA HCR</b>								
Characteristic resistance $N_{Rk,s}$ [kN]	14,1	25,6	40,6	25,6	40,6	59,0	109,9	
Partial factor $\gamma_{Ms}$ [-]					1,5			
Modulus of elasticity $E_s$ [N/mm <sup>2</sup> ]					210.000			
<b>Pullout failure for FZA, FZA HDG, FZA R, FZA HCR</b>								
Characteristic resistance in cracked concrete C20/25 uncracked $N_{Rk,p}$ [kN]		6		9	12	24	40	
		12		17,4	22,9	35,2	49,2	68,8
Increasing factors concrete $\psi_c$ [-]	C25/30			1,12				
	C30/37			1,22				
	C35/45			1,32				
	C40/50			1,41				
	C45/55			1,50				
	C50/60			1,58				
Installation factor $\gamma_{inst}$ [-]		1,2				1,0		
<b>Concrete cone failure and splitting failure for FZA, FZA HDG, FZA R, FZA HCR</b>								
Effective embedment depth $h_{ef}$ [mm]		40		50	60	80	100	125
Factor for uncracked concrete $k_{ucr,N}$ [-]				11,0				
Factor for cracked concrete $k_{cr,N}$				7,7				
Minimum thickness of concrete member $h_{min}$		100		110	130	160	200	250
Characteristic spacing $S_{cr,N} = S_{cr,sp}$ [mm]				3 $h_{ef}$				
Characteristic edge distance $C_{cr,N} = C_{cr,sp}$				1,5 $h_{ef}$				
Characteristic resistance to splitting $N^0_{Rk,sp}$ [kN]					min { $N^0_{Rk,c}; N_{Rk,p}$ } <sup>1)</sup>			
1) $N^0_{Rk,c}$ acc. to EN 1992-4:2018								
fischer-ZYKON-Anchor FZA, FZA D, FZA I, FZA ST							<b>Annex C 1</b>	
Performances Characteristic values of resistance under tension loads for bolt projecting anchor FZA								Appendix 17 / 31

**Table C2.1:** Characteristic values of **tension** resistance under static and quasi-static action for **through bolt anchor FZA D**

Type of anchor / size	FZA D (through bolt anchor)							
	12x50 M8D/10	12x60 M8D/10	12x80 M8D/30	14x80 M10D/20	14x100 M10D/40	18x100 M12D/20	18x130 M12D/50	22x125 M16D/25
<b>Steel failure for FZA D</b>								
Characteristic resistance $N_{Rk,s}$ [kN]		29,3		46,4		67,4		125,6
Partial factor $\gamma_{Ms}$ [-]				1,5				
<b>Steel failure for FZA D HDG</b>								
Characteristic resistance $N_{Rk,s}$ [kN]		25,0		40,7		60,1		115,0
Partial factor $\gamma_{Ms}$ [-]				1,5				
<b>Steel failure for FZA D R</b>								
Characteristic resistance $N_{Rk,s}$ [kN]		25,6		40,6		59,0		109,9
Partial factor $\gamma_{Ms}$ [-]				1,87				
<b>Steel failure for FZA HCR</b>								
Characteristic resistance $N_{Rk,s}$ [kN]		25,6		40,6		59,0		109,9
Partial factor $\gamma_{Ms}$ [-]				1,5				
Modulus of elasticity $E_s$ [N/mm <sup>2</sup> ]				210.000				
<b>Pullout failure for FZA D, FZA D HDG, FZA D R, FZA D HCR</b>								
Characteristic resistance in cracked concrete C20/25 uncracked N <sub>Rk,p</sub> [kN]	6	9	12	24	40			
	12	17,4	22,9	35,2	49,2			
Increasing factors concrete $\psi_c$ [-]	C25/30		1,12					
	C30/37		1,22					
	C35/45		1,32					
	C40/50		1,41					
	C45/55		1,50					
	C50/60		1,58					
Installation factor $\gamma_{inst}$ [-]	1,2		1,0					
<b>Concrete cone failure and splitting failure for FZA D, FZA D HDG, FZA D R, FZA D HCR</b>								
Effective embedment depth $h_{ef}$ [mm]	40	50	60	80	100			
Factor for uncracked concrete k <sub>ucr,N</sub> [-]			11,0					
Factor for cracked concrete k <sub>cr,N</sub>			7,7					
Minimum thickness of concrete member $h_{min}$	100	110	130	160	200			
Characteristic spacing S <sub>cr,N</sub> = S <sub>cr,sp</sub> [mm]			3 h <sub>ef</sub>					
Characteristic edge distance C <sub>cr,N</sub> = C <sub>cr,sp</sub>			1,5 h <sub>ef</sub>					
Characteristic resistance to splitting N <sup>0</sup> <sub>Rk,sp</sub> [kN]			min {N <sup>0</sup> <sub>Rk,c</sub> ; N <sub>Rk,p</sub> } <sup>1)</sup>					
1) N <sup>0</sup> <sub>Rk,c</sub> acc. to EN 1992-4:2018								
fischer-ZYKON-Anchor FZA, FZA D, FZA I, FZA ST							<b>Annex C 2</b>	
<b>Performances</b> Characteristic values of resistance under tension loads for through bolt anchor FZA D							Appendix 18 / 31	

**Table C3.1:** Characteristic values of **tension** resistance under static and quasi-static action for **internal thread anchor FZA I**

Type of anchor / size	FZA I (internal thread anchor)						
	12x40 M6 I	12x50 M6 I	14x60 M8 I	18x80 M10 I	22x100 M12 I	22x125 M12 I	
<b>Steel failure for FZA I<sup>1)</sup></b>							
Characteristic resistance	N <sub>Rk,s</sub> [kN]	21,7	28,7	37,4	84,2		
Partial factor	γ <sub>Ms</sub> [-]		1,5				
<b>Steel failure for FZA I R<sup>1)</sup></b>							
Characteristic resistance	N <sub>Rk,s</sub> [kN]	22,2	26,8	34,9	61,7		
Partial factor	γ <sub>Ms</sub> [-]		1,5				
<b>Steel failure for FZA I HCR<sup>1)</sup></b>							
Characteristic resistance	N <sub>Rk,s</sub> [kN]	19,4	26,8	34,9	78,5		
Partial factor	γ <sub>Ms</sub> [-]		1,5				
Modulus of elasticity	E <sub>s</sub> [N/mm <sup>2</sup> ]		210.000				
<b>Pullout failure for FZA I, FZA I R, FZA I HCR</b>							
Characteristic resistance in concrete C20/25	cracked N <sub>Rk,p</sub> [kN] uncracked	6 12	9 17,4	12 22,9	24 35,2	40 49,2 68,8	
Increasing factors concrete	ψ <sub>c</sub> [-]	C25/30		1,12			
		C30/37		1,22			
		C35/45		1,32			
		C40/50		1,41			
		C45/55		1,50			
		C50/60		1,58			
Installation factor	γ <sub>inst</sub> [-]	1,2		1,0			
<b>Concrete cone failure and splitting failure for FZA I, FZA I R, FZA I HCR</b>							
Effective embedment depth	h <sub>ef</sub> [mm]	40	50	60	80	100	125
Factor for uncracked concrete	k <sub>ucr,N</sub> [-]			11,0			
Factor for cracked concrete	k <sub>cr,N</sub>			7,7			
Min. thickness of concrete member	h <sub>min</sub>	100	110	130	160	200	250
Characteristic spacing	S <sub>cr,N</sub> = S <sub>cr,sp</sub> [mm]			3 h <sub>ef</sub>			
Characteristic edge distance	C <sub>cr,N</sub> = C <sub>cr,sp</sub>			1,5 h <sub>ef</sub>			
Characteristic resistance to splitting	N <sup>0</sup> <sub>Rk,sp</sub> [kN]			min {N <sup>0</sup> <sub>Rk,c</sub> ; N <sub>Rk,p</sub> } <sup>2)</sup>			

<sup>1)</sup> The characteristic resistances against steel failure for screws or threaded rods must be designed additionally from the construction site - these values could become decisive

2) N<sup>0</sup><sub>Bk,c</sub> acc. to EN 1992-4:2018

fischer-ZYKON-Anchor E7A, E7A D, E7A L, E7A ST

## Performances

#### Characteristic values of resistance under tension loads for internal thread anchor FZA 1

Annex C 3

**Table C4.1:** Characteristic values of shear resistance under static and quasi-static action for bolt projecting anchor FZA, FZA ST

Type of anchor / size	10x40 M6	12x40 M8	14x40 M10	12x50 M8	14x60 M10	18x80 M12	22x100 M16	22x125 M16
<b>Steel failure without lever arm FZA, FZA HDG</b>								
Characteristic resistance $V^0_{Rk,s}$ [kN]	8,8	16,1	25,5	16,1	25,5	37,1	69,1	
Partial factor $\gamma_{Ms}$					1,25			
Factor for ductility $k_7$					1,0			
<b>Steel failure with lever arm FZA, FZA HDG</b>								
Characteristic bending resistance $M^0_{Rk,s}$ [Nm]	12,2	30,0	59,8	30,0	59,8	104,8	266,4	
Partial factor $\gamma_{Ms}$					1,25			
Factor for ductility $k_7$					1,0			
<b>Steel failure without lever arm FZA R</b>								
Characteristic resistance $V^0_{Rk,s}$ [kN]	9,2	16,7	26,4	16,7	26,4	38,4	76,9	
Partial factor $\gamma_{Ms}$					1,56			
Factor for ductility $k_7$					1,0			
<b>Steel failure with lever arm FZA R</b>								
Characteristic bending resistance $M^0_{Rk,s}$ [Nm]	10,7	26,2	52,3	26,2	52,3	91,7	233,1	
Partial factor $\gamma_{Ms}$					1,56			
Factor for ductility $k_7$					1,0			
<b>Steel failure without lever arm FZA HCR</b>								
Characteristic resistance $V^0_{Rk,s}$ [kN]	9,2	16,7	26,4	16,7	26,4	38,4	76,9	
Partial factor $\gamma_{Ms}$					1,25			
Factor for ductility $k_7$					1,0			
<b>Steel failure with lever arm FZA HCR</b>								
Characteristic bending resistance $M^0_{Rk,s}$ [Nm]	10,7	26,2	52,3	26,2	52,3	91,7	233,1	
Partial factor $\gamma_{Ms}$					1,25			
Factor for ductility $k_7$					1,0			
<b>Concrete pryout failure FZA, FZA HDG, FZA R, FZA HCR</b>								
Factor for pryout failure $k_8$	[-]	1,3	2,4	1,3		3,1		
<b>Concrete edge failure</b>								
Effective length in concrete $l_f$		40		50	60	80	100	125
Effective diameter of anchor $d_{nom}$	[mm]	10	12	14	12	14	18	22
Installation factor $\gamma_{inst}$	[-]			1,0				

fischer-ZYKON-Anchor FZA, FZA D, FZA I, FZA ST

#### Performances

Characteristic values of resistance under shear loads for bolt projecting anchor FZA

#### Annex C 4

**Table C5.1:** Characteristic values of shear resistance under static and quasi-static action for through bolt anchor FZA D

Type of anchor / size	FZA D (through bolt anchor)											
	12x50 M8D/ 10	12x60 M8D/ 10	12x80 M8D/ 30	14x80 M10D/ 20	14x100 M10D/ 40	18x100 M12D/ 20	18x130 M12D/ 50	22x125 M16D/ 25				
<b>Steel failure without lever arm FZA D, FZA D HDG</b>												
Characteristic resistance $V^0_{Rk,s}$ [kN]	26,2		41,4		64,9		104,8					
Partial factor $\gamma_{Ms}$	1,26											
Factor for ductility $k_7$	1,0											
<b>Steel failure with lever arm FZA D, FZA D HDG</b>												
Characteristic bending resistance $M^0_{Rk,s}$ [Nm]	30,0		59,8		104,8		266,4					
Partial factor $\gamma_{Ms}$	1,25											
Factor for ductility $k_7$	1,0											
<b>Steel failure without lever arm FZA D R</b>												
Characteristic resistance $V^0_{Rk,s}$ [kN]	30,4		43,2		88,3		141,0					
Partial factor $\gamma_{Ms}$	1,96		1,92		1,56							
Factor for ductility $k_7$	1,0											
<b>Steel failure with lever arm FZA D R</b>												
Characteristic bending resistance $M^0_{Rk,s}$ [Nm]	26,2		52,3		91,7		233,1					
Partial factor $\gamma_{Ms}$	1,56											
Factor for ductility $k_7$	1,0											
<b>Steel failure without lever arm FZA D HCR</b>												
Characteristic resistance $V^0_{Rk,s}$ [kN]	30,4		43,2		88,3		141,0					
Partial factor $\gamma_{Ms}$	1,85		1,79		1,44		1,46					
Factor for ductility $k_7$	1,0											
<b>Steel failure with lever arm FZA D HCR</b>												
Characteristic bending resistance $M^0_{Rk,s}$ [Nm]	26,2		52,3		91,7		233,1					
Partial factor $\gamma_{Ms}$	1,25											
Factor for ductility $k_7$	1,0											
<b>Concrete prout failure FZA D, FZA D HDG, FZA D R, FZA D HCR</b>												
Factor for prout failure $k_8$	[-]		1,3		3,1							
<b>Concrete edge failure</b>												
Effective length in concrete $l_f$	[mm]	40		50		60		80				
Effective diameter of anchor $d_{nom}$		12		14		18		22				
Installation factor $\gamma_{inst}$	[-]		1,0									
fischer-ZYKON-Anchor FZA, FZA D, FZA I, FZA ST												
<b>Performances</b> Characteristic values of resistance under shear loads for through bolt anchor FZA D							<b>Annex C 5</b>					
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**Table C6.1:** Characteristic values of shear resistance under static and quasi-static action for internal thread anchor FZA I

Type of anchor / size	FZA I (internal thread anchor)					
	12x40 M6 I	12x50 M6 I	14x60 M8 I	18x80 M10 I	22x100 M12 I	22x125 M12 I
<b>Steel failure without lever arm FZA I<sup>1)</sup></b>						
Characteristic resistance	V <sup>0</sup> <sub>Rk,s</sub> [kN]		11,9	15,8	20,6	46,3
Partial factor	γ <sub>Ms</sub>			1,25		
Factor for ductility	k <sub>7</sub>	[-]		1,0		
<b>Steel failure with lever arm FZA I<sup>1)</sup></b>						
Characteristic bending resistance	M <sup>0</sup> <sub>Rk,s</sub> [Nm]		19,3	30,1	44,7	150,9
Partial factor	γ <sub>Ms</sub>			1,25		
Factor for ductility	k <sub>7</sub>	[-]		1,0		
<b>Steel failure without lever arm FZA I R<sup>1)</sup></b>						
Characteristic resistance	V <sup>0</sup> <sub>Rk,s</sub> [kN]		14,4	17,4	22,7	43,2
Partial factor	γ <sub>Ms</sub>			1,25		
Factor for ductility	k <sub>7</sub>	[-]		1,0		
<b>Steel failure with lever arm FZA I R<sup>1)</sup></b>						
Characteristic bending resistance	M <sup>0</sup> <sub>Rk,s</sub> [Nm]		19,8	28,1	41,7	110,7
Partial factor	γ <sub>Ms</sub>			1,25		
Factor for ductility	k <sub>7</sub>	[-]		1,0		
<b>Steel failure without lever arm FZA I HCR<sup>1)</sup></b>						
Characteristic resistance	V <sup>0</sup> <sub>Rk,s</sub> [kN]		12,6	17,4	22,7	55,0
Partial factor	γ <sub>Ms</sub>			1,25		
Factor for ductility	k <sub>7</sub>	[-]		1,0		
<b>Steel failure with lever arm FZA I HCR<sup>1)</sup></b>						
Characteristic bending resistance	M <sup>0</sup> <sub>Rk,s</sub> [Nm]		17,3	28,1	41,7	140,8
Partial factor	γ <sub>Ms</sub>			1,25		
Factor for ductility	k <sub>7</sub>	[-]		1,0		
<b>Concrete prout failure FZA I, FZA I R, FZA I HCR</b>						
Factor for prout failure	k <sub>8</sub>	[-]	1,3		3,1	
<b>Concrete edge failure</b>						
Effective length in concrete	l <sub>f</sub>	[mm]	40	50	60	80
Effective diameter of anchor	d <sub>nom</sub>		12	14	18	22
Installation factor	γ <sub>inst</sub>	[-]		1,0		

<sup>1)</sup> The characteristic resistances against steel failure for screws or threaded rods must be designed additionally from the construction site - these values often become decisive

fischer-ZYKON-Anchor FZA, FZA D, FZA I, FZA ST

#### Performances

Characteristic values of resistance under shear loads for internal thread anchor FZA I

#### Annex C 6

**Table C7.1: Minimum thickness of concrete members, minimum spacings and minimum edge distances of bolt projecting anchor FZA, FZA ST**

Type of fastener	FZA (bolt projecting anchor)							
	10x40 M6	12x40 12x40 ST M8	14x40 14x40 ST M10	12x50 M8	14x60 14x60 ST M10	18x80 M12	22x100 M16	22x125 M16
Minimum spacing $S_{min}$	40		[mm]	70	50	60	80	100
Minimum edge distance $C_{min}$	35	40			45	55	70	
Minimum thickness of concrete member $h_{min}$	100			110	130	160	200	250

**Table C7.2: Minimum thickness of concrete members, minimum spacings and minimum edge distances of through bolt anchor FZA D**

Type of fastener	FZA D (through bolt anchor)										
	12x50 M8 D/10	12x60 M8 D/10	12x80 M8 D/30	14x80 M10 D/20	14x100 M10 D/40	18x100 M12 D/20	18x130 M12 D/50	22x125 M16 D/25			
Minimum spacing $S_{min}$	40		[mm]	50		60		80			
Minimum edge distance $C_{min}$	35	45		55		70					
Minimum thickness of concrete member $h_{min}$	100			110		130		160			
								200			

**Table C7.3: Minimum thickness of concrete members, minimum spacings and minimum edge distances of internal thread anchor FZA I**

Type of fastener	FZA (internal thread anchor)					
	12x40 M6 I	12x50 M6 I	14x60 M8 I	18x80 M10 I	22x100 M12 I	22x125 M12 I
Minimum spacing $S_{min}$	40	50	60	80	100	125
Minimum edge distance $C_{min}$	35	45	55	70		
Minimum thickness of concrete member $h_{min}$	100	110	130	160	200	250

fischer-ZYKON-Anchor FZA, FZA D, FZA I, FZA ST

#### Performances

Minimum thickness of concrete members, minimum spacings and minimum edge distances

#### Annex C 7

**Table C8.1: Characteristic values for seismic performance category C1 for bolt projecting anchor FZA**

Type of anchor / size	14x40 M10	14x60 M10	18x80 M12	22x100 M16	22x125 M16
<b>Steel failure FZA</b>					
Characteristic resistance	N <sub>Rk,s,C1</sub> [kN]	46,4	67,4	126	
Partial factor	γ <sub>Ms,C1</sub> [-]		1,5		
<b>Steel failure FZA HDG</b>					
Characteristic resistance	N <sub>Rk,s,C1</sub> [kN]	40,7	60,1	115	
Partial factor	γ <sub>Ms,C1</sub> [-]		1,5		
<b>Steel failure FZA R</b>					
Characteristic resistance	N <sub>Rk,s,C1</sub> [kN]	40,6	59,0	110	
Partial factor	γ <sub>Ms,C1</sub> [-]		1,87		
<b>Steel failure FZA HCR</b>					
Characteristic resistance	N <sub>Rk,s,C1</sub> [kN]	40,6	59,0	110	
Partial factor	γ <sub>Ms,C1</sub> [-]		1,5		
<b>Pullout failure</b>					
Characteristic resistance in cracked concrete	N <sub>Rk,p,C1</sub> [kN]	6,0	20,0	40,0	
Installation factor	γ <sub>inst</sub> [-]	1,2		1,0	
<b>Steel failure without lever arm FZA, FZA HDG</b>					
Characteristic resistance	V <sub>Rk,s,C1</sub> [kN]	20,9	33,8	62,8	
Partial factor	γ <sub>Ms,C1</sub> [-]		1,25		
<b>Steel failure without lever arm FZA R</b>					
Characteristic resistance	V <sub>Rk,s,C1</sub> [kN]	18,3	29,5	55,0	
Partial factor	γ <sub>Ms,C1</sub> [-]		1,56		
<b>Steel failure without lever arm FZA HCR</b>					
Characteristic resistance	V <sub>Rk,s,C1</sub> [kN]	18,3	29,5	55,0	
Partial factor	γ <sub>Ms,C1</sub> [-]		1,25		
Factor for anchorages	with annular gap α <sub>gap</sub> [-]		0,5		
	without annular gap		1,0		

fischer-ZYKON-Anchor FZA, FZA D, FZA I, FZA ST

#### Performances

Characteristic values for seismic performance category C1 for bolt projecting anchor FZA

#### Annex C 8

**Table C9.1: Characteristic values for seismic performance category C1 for through bolt anchor FZA D**

Type of anchor / size	FZA D (through bolt anchor)				
	14x80 M10D/20	14x100 M10D/40	18x100 M12D/20	18x130 M12D/50	22x125 M16D/25
<b>Steel failure FZA D</b>					
Characteristic resistance	N <sub>Rk,s,C1</sub> [kN]	46,4		67,4	126
Partial factor	γ <sub>Ms,C1</sub> [-]			1,5	
<b>Steel failure FZA D HDG</b>					
Characteristic resistance	N <sub>Rk,s,C1</sub> [kN]	40,7		60,1	115
Partial factor	γ <sub>Ms,C1</sub> [-]			1,5	
<b>Steel failure FZA D R</b>					
Characteristic resistance	N <sub>Rk,s,C1</sub> [kN]	40,6		59,0	110
Partial factor	γ <sub>Ms,C1</sub> [-]			1,87	
<b>Steel failure FZA D HCR</b>					
Characteristic resistance	N <sub>Rk,s,C1</sub> [kN]	40,6		59,0	110
Partial factor	γ <sub>Ms,C1</sub> [-]			1,5	
<b>Pullout failure</b>					
Characteristic resistance in cracked concrete	N <sub>Rk,p,C1</sub> [kN]	6,0		20,0	40,0
Installation factor	γ <sub>inst</sub> [-]			1,0	
<b>Steel failure without lever arm FZA D, FZA D HDG</b>					
Characteristic resistance	V <sub>Rk,s,C1</sub> [kN]	20,9		33,8	62,8
Partial factor	γ <sub>Ms,C1</sub> [-]			1,25	
<b>Steel failure without lever arm FZA D R</b>					
Characteristic resistance	V <sub>Rk,s,C1</sub> [kN]	18,3		29,5	55,0
Partial factor	γ <sub>Ms,C1</sub> [-]			1,56	
<b>Steel failure without lever arm FZA D HCR</b>					
Characteristic resistance	V <sub>Rk,s,C1</sub> [kN]	18,3		29,5	55,0
Partial factor	γ <sub>Ms,C1</sub> [-]			1,25	
Factor for anchorages	with annular gap without annular gap	α <sub>gap</sub> [-]		0,5 1,0	

fischer-ZYKON-Anchor FZA, FZA D, FZA I, FZA ST

#### Performances

Characteristic values for seismic performance category C1 for through bolt anchor FZA D

#### Annex C 9

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**Table C10.1: Characteristic values for seismic performance category C2 for bolt projecting anchor FZA**

Type of anchor / size	FZA (bolt projecting anchor)				
	14x40 M10 / $t_{fix}$	14x60 M10 / $t_{fix}$	18x80 M12 / $t_{fix}$	22x100 M16 / $t_{fix}$	22x125 M16 / $t_{fix}$
<b>Steel failure FZA</b>					
Characteristic resistance	$N_{Rk,s,C2}$ [kN]	46,4	67,4	126,0	
Partial factor	$\gamma_{Ms,C2}$ [-]		1,50		
<b>Steel failure FZA HDG</b>					
Characteristic resistance	$N_{Rk,s,C2}$ [kN]	40,7	60,1	115,0	
Partial factor	$\gamma_{Ms,C2}$ [-]		1,50		
<b>Steel failure FZA R</b>					
Characteristic resistance	$N_{Rk,s,C2}$ [kN]	40,6	59,0	110,0	
Partial factor	$\gamma_{Ms,C2}$ [-]		1,87		
<b>Steel failure FZA HCR</b>					
Characteristic resistance	$N_{Rk,s,C2}$ [kN]	40,6	59,0	110,0	
Partial factor	$\gamma_{Ms,C2}$ [-]		1,50		
<b>Pullout failure</b>					
Characteristic resistance in cracked concrete	$N_{Rk,p,C2}$ [kN]	6,0	7,5	24,0	25,0
Installation factor	$\gamma_{inst}$ [-]	1,2		1,0	
<b>Steel failure without lever arm FZA, FZA HDG</b>					
Characteristic resistance	$V_{Rk,s,C2}$ [kN]	15,6	24,5	47,0	
Partial factor	$\gamma_{Ms,C2}$ [-]		1,25		
<b>Steel failure without lever arm FZA R</b>					
Characteristic resistance	$V_{Rk,s,C2}$ [kN]	16,1	25,3	52,3	
Partial factor	$\gamma_{Ms,C2}$ [-]		1,56		
<b>Steel failure without lever arm FZA HCR</b>					
Characteristic resistance	$V_{Rk,s,C2}$ [kN]	16,1	25,3	52,3	
Partial factor	$\gamma_{Ms,C2}$ [-]		1,25		
Factor for anchorages	with annular gap without annular gap	$\alpha_{gap}$ [-]	0,5 1,0		

fischer-ZYKON-Anchor FZA, FZA D, FZA I, FZA ST

#### Performances

Characteristic values for seismic performance category C2 for bolt projecting anchor FZA

#### Annex C 10

**Table C11.1:** Characteristic values for seismic performance category C2 for through bolt anchor FZA D

Type of anchor / size	FZA D (through bolt anchor)				
	14x80 M10D/20	14x100 M10D/40	18x100 M12D/20	18x130 M12D/50	22x125 M16D/25
<b>Steel failure FZA D</b>					
Characteristic resistance	N <sub>Rk,s,C2</sub> [kN]	46,4		67,4	126,0
Partial factor	γ <sub>Ms,C2</sub> [-]		1,50		
<b>Steel failure FZA D, FZA HDG</b>					
Characteristic resistance	N <sub>Rk,s,C2</sub> [kN]	40,7		60,1	115,0
Partial factor	γ <sub>Ms,C2</sub> [-]		1,50		
<b>Steel failure FZA D R</b>					
Characteristic resistance	N <sub>Rk,s,C2</sub> [kN]	40,6		59,0	110,0
Partial factor	γ <sub>Ms,C2</sub> [-]		1,87		
<b>Steel failure FZA D HCR</b>					
Characteristic resistance	N <sub>Rk,s,C2</sub> [kN]	40,6		59,0	110,0
Partial factor	γ <sub>Ms,C2</sub> [-]		1,50		
<b>Pullout failure</b>					
Characteristic resistance in cracked concrete	N <sub>Rk,p,C2</sub> [kN]	6,0	7,5	24,0	25,0
Installation factor	γ <sub>inst</sub> [-]		1,0		
<b>Steel failure without lever arm FZA D, FZA D HDG</b>					
Characteristic resistance	V <sub>Rk,s,C2</sub> [kN]	15,6		24,5	47,0
Partial factor	γ <sub>Ms,C2</sub> [-]		1,25		
<b>Steel failure without lever arm FZA D R</b>					
Characteristic resistance	V <sub>Rk,s,C2</sub> [kN]	16,1		25,3	52,3
Partial factor	γ <sub>Ms,C2</sub> [-]		1,56		
<b>Steel failure without lever arm FZA D HCR</b>					
Characteristic resistance	V <sub>Rk,s,C2</sub> [kN]	16,1		25,3	52,3
Partial factor	γ <sub>Ms,C2</sub> [-]		1,25		
Factor for anchorages	with annular gap without annular gap	α <sub>gap</sub> [-]		0,5 1,0	

fischer-ZYKON-Anchor FZA, FZA D, FZA I, FZA ST

#### Performances

Characteristic values for seismic performance category C2 for through bolt anchor FZA D

#### Annex C 11

**Table C12.1:** Characteristic values for resistance to fire<sup>1)</sup>

FZA, FZA HDG		10x40 M6 12x40 M6 I 12x50 M6 I	12x40 M8 12x40 ST M8 12x50 M8 D/10	12x50 M8 12x60 M8 D/10 12x80 M8 D/30 14x60 M8 I 18x80 M10 I	14x40 M10 14x40 ST M10				
<b>Steel failure for tension load and shear load (<math>F_{Rk,s,fi} = N_{Rk,s,fi} = V_{Rk,s,fi}</math>)</b>									
Characteristic resistance	$F_{Rk,s,fi}$ [kN]	R30	1,2	2,2	5,2				
		R60	0,7	1,3	2,6				
		R90	0,5	1,0	1,8				
		R120		0,8	1,3				
	$M^0_{Rk,s,fi}$ [Nm]	R30	0,9	2,3	6,7				
		R60	0,5	1,3	3,4				
		R90	0,4	1,0	2,3				
		R120		0,9	1,7				
<b>Pullout failure</b>									
Characteristic resistance	$N_{Rk,p,fi}$ [kN]	R30	1,5	2,3	1,5				
		R60							
		R90							
		R120	1,2	1,8	1,2				
FZA, FZA HDG		14x60 M10 14x60 ST M10 14x80 M10 D/20 14x100 M10 D/40	18x80 M12 18x100 M12 D/20 18x130 M12 D/50 22x100 M12 I 22x125 M12 I	22x100 M16 22x125 M16 D/25	22x125 M16				
<b>Steel failure for tension load and shear load (<math>F_{Rk,s,fi} = N_{Rk,s,fi} = V_{Rk,s,fi}</math>)</b>									
Characteristic resistance	$F_{Rk,s,fi}$ [kN]	R30	5,2	7,5	13,9				
		R60	2,6	3,8	7,0				
		R90	1,8	2,5	4,7				
		R120	1,3	1,9	3,6				
	$M^0_{Rk,s,fi}$ [Nm]	R30	6,7	11,6	29,5				
		R60	3,4	5,9	14,9				
		R90	2,3	4,0	10,0				
		R120	1,7	3,0	7,6				
<b>Pullout failure</b>									
Characteristic resistance	$N_{Rk,p,fi}$ [kN]	R30	3,0	5,0	10,0				
		R60							
		R90							
		R120	2,4	4,0	8,0				
<b>Edge distance (for all anchor variants and sizes)</b>									
R30 to R120 $c_{cr,fi}$ [mm]		-	$2 \cdot h_{ef}$						
In case of fire attack from more than one site, the minimum edge distance shall be $\geq 300$ mm									
<b>Spacing (for all anchor variants and sizes)</b>									
R30 to R120 $s_{cr,fi}$ [mm]		-	$2 \cdot c_{cr,fi}$						
1) The embedment depth has to be increased for wet concrete by at least 30 mm compared to the given value									
fischer-ZYKON-Anchor FZA, FZA D, FZA I, FZA ST									
<b>Performances</b> Characteristic values for resistance to fire									
<b>Annex C 12</b>									
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**Table C13.1:** Characteristic values for resistance to fire<sup>1)</sup>

FZA R, FZA HCR	10x40 M6 12x40 M6 I 12x50 M6 I	12x40 M8 12x40 ST M8 12x50 M8 D/10	12x50 M8 12x60 M8 D/10 12x80 M8 D/30 14x60 M8 I 18x80 M10 I	14x40 M10 14x40 ST M10		
<b>Steel failure for tension load and shear load (<math>F_{Rk,s,fi} = N_{Rk,s,fi} = V_{Rk,s,fi}</math>)</b>						
Characteristic resistance	$F_{Rk,s,fi}$ [kN]	R30	2,0	3,6		
		R60	1,2	2,3		
		R90	0,9	1,9		
		R120	0,7	1,6		
	$M^0_{Rk,s,fi}$ [Nm]	R30	1,5	3,7		
		R60	0,9	2,4		
		R90	0,7	1,9		
		R120	0,5	1,7		
<b>Pullout failure</b>						
Characteristic resistance	$N_{Rk,p,fi}$ [kN]	R30	1,5	2,3		
		R60				
		R90				
		R120	1,2	1,8		
FZA R, FZA HCR		14x60 M10 14x60 ST M10 14x80 M10 D/20 14x100 M10 D/40	18x80 M12 18x100 M12 D/20 18x130 M12 D/50 22x100 M12 I 22x125 M12 I	22x100 M16 22x125 M16 D/25		
<b>Steel failure for tension load and shear load (<math>F_{Rk,s,fi} = N_{Rk,s,fi} = V_{Rk,s,fi}</math>)</b>						
Characteristic resistance	$F_{Rk,s,fi}$ [kN]	R30	5,7	11,8		
		R60	3,6	7,0		
		R90	3,0	5,5		
		R120	2,6	4,7		
	$M^0_{Rk,s,fi}$ [Nm]	R30	7,4	18,3		
		R60	4,7	10,9		
		R90	3,8	8,5		
		R120	3,4	7,3		
<b>Pullout failure</b>						
Characteristic resistance	$N_{Rk,p,fi}$ [kN]	R30	3,0	10,0		
		R60				
		R90				
		R120	2,4	4,0		
<b>Edge distance (for all anchor variants and sizes)</b>						
R30 to R120	$c_{cr,fi}$ [mm]	-	$2 \cdot h_{ef}$			
In case of fire attack from more than one side, the minimum edge distance shall be $\geq 300$ mm						
<b>Spacing (for all anchor variants and sizes)</b>						
R30 to R120	$s_{cr,fi}$ [mm]	-	$2 \cdot c_{cr,fi}$			
1) The embedment depth has to be increased for wet concrete by at least 30 mm compared to the given value						
fischer-ZYKON-Anchor FZA, FZA D, FZA I, FZA ST						
<b>Performances</b> Characteristic values for resistance to fire			<b>Annex C 13</b>			
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**Table C14.1:** Displacements due to **tension** loads for **bolt projecting anchor FZA**

Type of fastener / size	FZA (bolt projecting anchor)							
	10x40 M6	12x40 M8	14x40 M10	12x50 M8	14x60 M10	18x80 M12	22x100 M16	22x125 M16
Tension load in cracked concrete	N [kN]	2,0		3,5	5,0	8,0	16,0	
Displacement	$\frac{\delta_{N0}}{\delta_{N\infty}}$ [mm]	0,8		1,1				
Tension load in uncracked concrete	N [kN]	3,3		4,8	7,5	12,7	17,9	
Displacement	$\frac{\delta_{N0}}{\delta_{N\infty}}$ [mm]	0,8		1,1				

The displacements do not apply for FZA ST

**Table C14.2:** Displacements due to **tension** loads for **through bolt anchor FZA D**

Type of fastener / size	FZA D (through bolt anchor)							
	12x50 M8D/ 10	12x60 M8D/ 10	12x80 M8D/ 30	14x80 M10D/ 20	14x100 M10D/ 40	18x100 M12D/ 20	18x130 M12D/ 50	22x125 M16D/ 25
Tension load in cracked concrete	N [kN]	2,0	3,5		5,0	8,0		16,0
Displacement	$\frac{\delta_{N0}}{\delta_{N\infty}}$ [mm]	0,8		1,1				
Tension load in uncracked concrete	N [kN]	3,3	4,8		7,5	12,7		17,9
Displacement	$\frac{\delta_{N0}}{\delta_{N\infty}}$ [mm]	0,8		1,1				

**Table C14.3:** Displacements due to **tension** loads for **internal thread anchor FZA I**

Type of fastener / size	FZA I (internal thread anchor FZA I)						
	12x40 M6 I	12x50 M6 I	14x60 M8 I	18x80 M10 I	22x100 M12 I	22x125 M12 I	
Tension load in cracked concrete	N [kN]	2,0	3,5	5,0	8,0	16,0	
Displacement	$\frac{\delta_{N0}}{\delta_{N\infty}}$ [mm]	0,8		1,1			
Tension load in uncracked concrete	N [kN]	3,3	4,8	7,5	12,7	17,9	
Displacement	$\frac{\delta_{N0}}{\delta_{N\infty}}$ [mm]	0,8		1,1			

fischer-ZYKON-Anchor FZA, FZA D, FZA I, FZA ST

**Performances**  
Displacements due to tension loads

**Annex C 14**

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**Table C15.1:** Displacements due to shear loads for bolt projecting anchor FZA and through bolt anchor FZA D

Type of fastener / size	FZA (bolt projecting anchor) and FZA D (through bolt anchor)							
	10x40 M6	14x40 M10	12x40 M8	12x50 M8	12x50 M8D/10	12x60 M8D/10	12x80 M8D/30	14x80 M10D/20
Shear load in cracked and uncracked concrete	V [kN]	4,0	9,0		5,0			12,5
Displacement	$\frac{\delta v_0}{\delta v_\infty}$ [mm]	2,0	1,9		0,7			1,9
		3,0	2,8		1,0			2,8
	14x60 M10	14x100 M10D/ 40	18x80 M12	18x100 M12D/ 20	18x130 M12D/ 50	22x100 M16	22x125 M16	22x125 M16D/ 25
Shear load in cracked and uncracked concrete	V [kN]	12,5	12,5		19,0			30,0
Displacement	$\frac{\delta v_0}{\delta v_\infty}$ [mm]	1,9			2,1			
		2,8			3,1			

The displacements do not apply for FZA ST

**Table C15.2:** Displacements due to shear loads for internal thread anchor FZA I

Type of fastener / size	FZA I (internal thread anchor)					
	12x40 M6 I	12x50 M6 I	14x60 M8 I	18x80 M10 I	22x100 M12 I	22x125 M12 I
Shear load in cracked and Uncracked concrete	V [kN]		5,0	12,5	19,0	30,0
Displacement	$\frac{\delta N_0}{\delta N_\infty}$ [mm]		0,7	1,9		2,1
			1,0	2,8		3,1

**Table C15.3:** Displacements due to tension and shear loads for seismic performance category C2 for FZA and FZA D

Type of fastener / size	FZA (bolt projecting anchor) and FZA D (through bolt anchor)				
	14x40 M10	14x60 M10 14x80 M10 D 14x100 M10 D	18x80 M12 18x100 M12 D 18x130 M12 D	22x100 M16 22x125 M16 D	22x125 M16
Displacement	$\frac{\delta N_{C2}(DLS)}{\delta N_{C2}(ULS)}$ [mm]	3,8		4,7	4,9
	$\frac{\delta v_{C2}(ULS)}{\delta v_{C2}(DLS)}$	13,5		12,7	13,1
		4,3		4,6	5,0
		6,9		7,0	6,9

fischer-ZYKON-Anchor FZA, FZA D, FZA I, FZA ST

#### Performances

Displacements due to shear loads

Displacements due to tension and shear loads for seismic performance category C2

#### Annex C 15