Deutsches Institut für Bautechnik

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Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

European Technical Assessment

ETA-16/0338 of 30 March 2020

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	fischer Zykon Anchor FZA-Q
Product family to which the construction product belongs	Undercut Anchor for use in concrete
Manufacturer	fischerwerke GmbH & Co. KG Klaus-Fischer-Straße 1 72178 Waldachtal DEUTSCHLAND
Manufacturing plant	fischerwerke GmbH & Co. KG
This European Technical Assessment contains	16 pages including 3 annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	EAD 330232-01-0601
This version replaces	ETA-16/0338 issued on 17 August 2016

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Specific Part

1 Technical description of the product

The fischer Zykon Anchor FZA-Q is an anchor made of hot-dipped galvanized steel which is placed into a drilled hole and anchored by torque controlled expansion and mechanical interlock.

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 anchor 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 anchor 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)

Essential characteristic	Performance
Characteristic resistance to tension load (static and quasi-static loading)	See Annex C 1 and C 2
Characteristic resistance to shear load (static and quasi-static loading)	See Annex C 1
Displacements (static and quasi-static loading)	See Annex C 5
Durability	See Annex B 1
Characteristic resistance and displacements for seismic performance category C1 and C2	See Annex C 4 and C 5

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	See Annex C 3

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

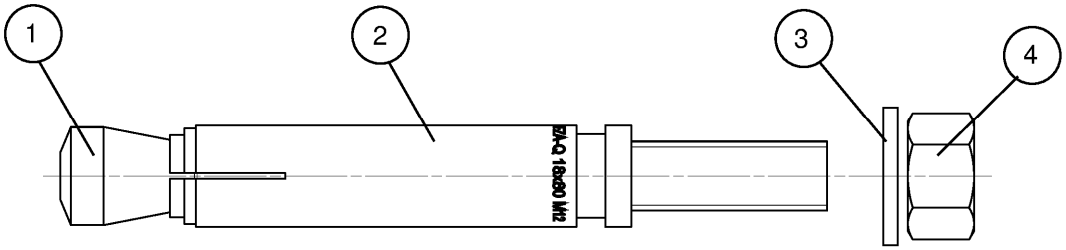
5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 30 March 2020 by Deutsches Institut für Bautechnik

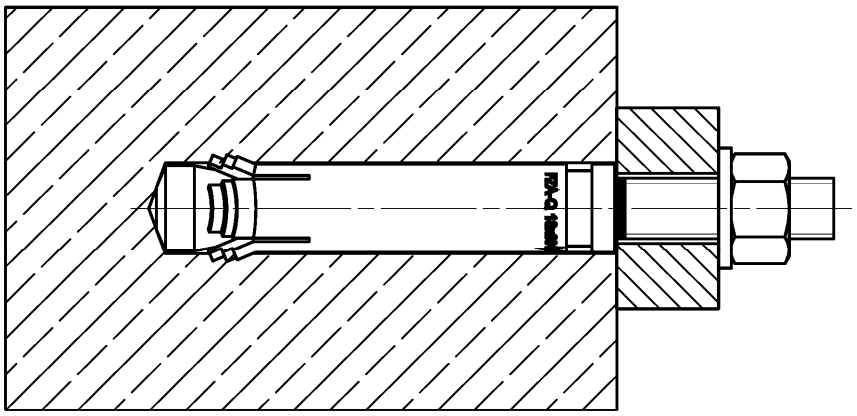
BD Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Ziegler



① Cone bolt
② Expansion sleeve
③ Washer
④ Hexagon nut

Installed condition



(Fig. not to scale)

fischer Zykon Anchor FZA-Q

Product description
Installed condition

Annex A 1

Deutsches Institut für Bautechnik DIBt

Product marking and dimensions

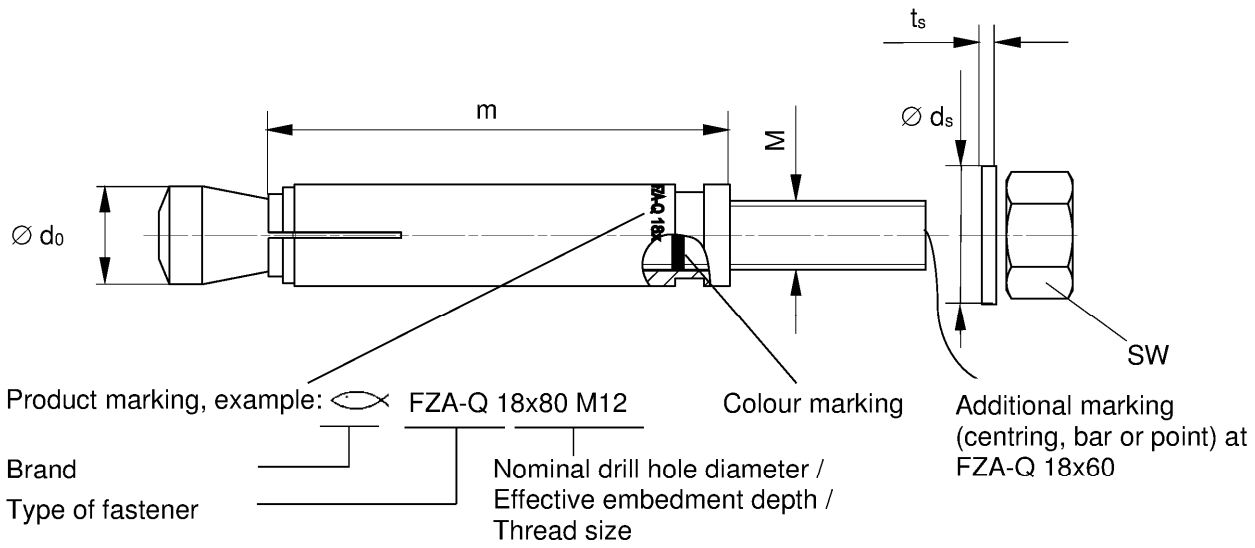


Table A2.1: Dimensions [mm]

Size		FZA-Q 14 x 50 M10	FZA-Q 18 x 60 M12	FZA-Q 18 x 80 M12
M = d	=	10	12	
∅ d_0	=	13,5	17	
m	=	50	60	80
SW	=	17	19	
t_s	≥	1,8	2,3	
∅ d_s	≥	19	23	

Table A2.2: Materials (hot-dip galvanised ≥ 50µm, EN ISO 10684:2011[1)])

Part	Designation	Material
1	Cone bolt[2)]	Cold form steel or free cutting steel class 8.8 acc. to EN ISO 898-1:2013 Nominal steel tensile strength f_{uk} ≤ 1000 N/mm²
2	Expansion sleeve[2)]	Steel
3	Washer	Cold strip, EN 10139:2016
4	Hexagon nut	Steel, property class min. 8, EN ISO 898-2:2012

[1)] Alternative method: sherardised ≥ 50 µm, EN 13811:2003

[2)] Optional: clear paint

(Fig. not to scale)

fischer Zykon Anchor FZA-Q

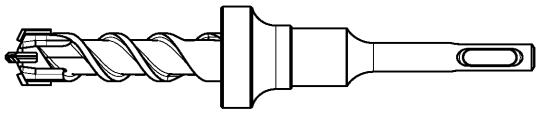
Product description
Product marking, dimensions and materials

Annex A 2

Deutsches Institut für Bautechnik DIBt

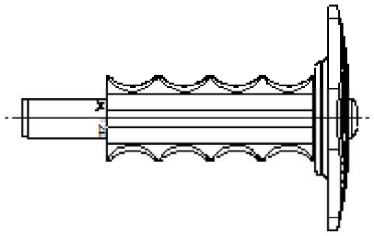
Tools

Drill bit FZBB

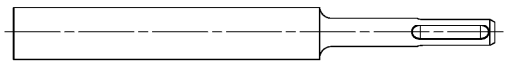


Standard drill bit

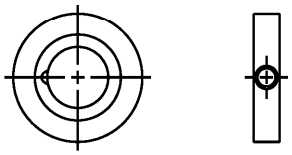
Setting tool FZE



Machine setting tool FZA-Q



Optional fischer filling disc FFD for e.g. seismic applications



fischer Zykon Anchor FZA-Q	**Annex A 3**
Intended Use Tools	

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Specifications of intended use

Size		FZA-Q		
		14 x 50 M10	18 x 60 M12	18 x 80 M12
Hot-dip galvanised		✓		
Static and quasi-static loads				
Cracked and uncracked concrete				
Seismic action for performance category	C1			
	C2			
Fire exposure				

Base materials:

- Compacted reinforced or unreinforced normal weight concrete without fibers (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

Design:

- Fastenings are designed under the responsibility of an engineer experienced in fastenings and concrete work
- Verifiable calculation notes and drawings are to be prepared taking account of the loads to be anchored. The position of the fastener is indicated on the design drawings (e.g. position of the fastener relative to reinforcement or to supports, etc.)
- Design of fastenings according to EN 1992-4:2018

fischer Zykon Anchor FZA-Q	**Annex B 1**
Intended Use Specifications	

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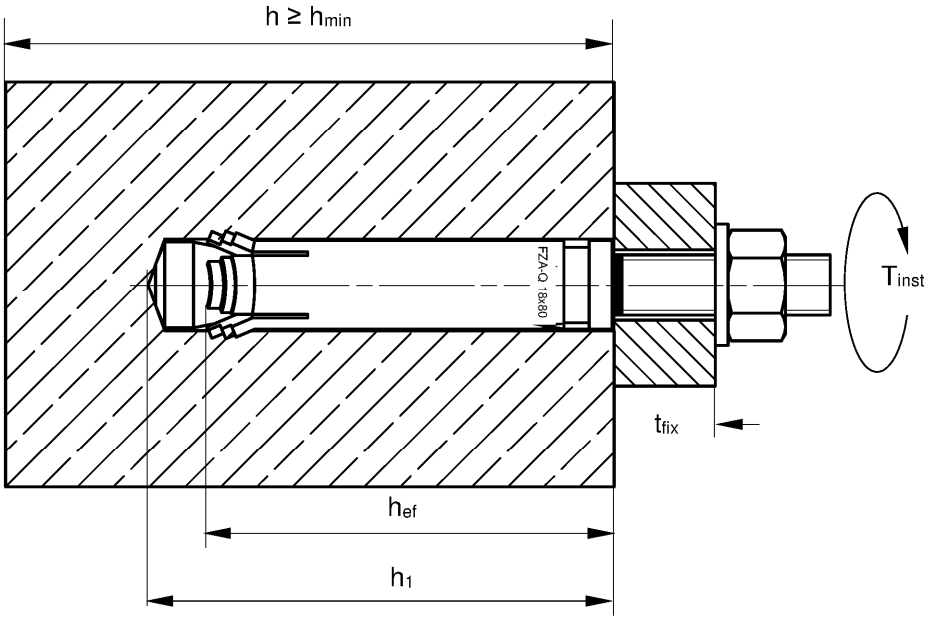
Installation parameters

Table B2.1: Installation parameters

Size				FZA-Q		
				14 x 50 M10	18 x 60 M12	18 x 80 M12
Nominal drill hole diameter	d_0	=	[mm]	14	18	
Depth of drill hole in concrete	h_1	=	[mm]	58	74	94
Cutting diameter of drill bit	d_{cut}	=	[mm]	14,50	18,50	
Diameter of clearance hole in the fixture	d_f	≤	[mm]	12	14	
Maximum installation torque[1)]	T_{inst}	=	[Nm]	20	45	

[1)] Minimum installation torque = hand - tightening



h_{ef} = Effective embedment depth
t_{fix} = Thickness of the fixture
h_1 = Depth of drill hole to deepest point
h = Thickness of the concrete member
h_{min} = Minimum thickness of concrete member
T_{inst} ≤ Maximum installation torque

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Installation instructions

- Fastener installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site
- Use of the fastener only as supplied by the manufacturer without exchanging the components of the fastener
- Checking before placing the fastener to ensure that the strength class of the concrete in which the fastener 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 is not in the direction of load application

fischer Zykon Anchor FZA-Q	**Annex B 3**
Intended Use Installation instructions	

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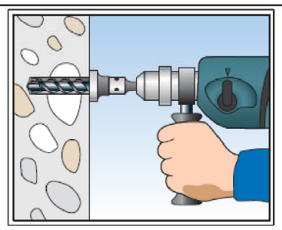
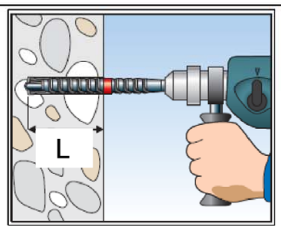
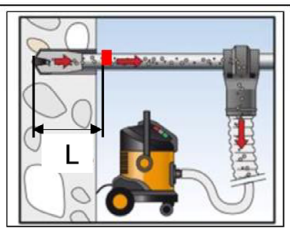
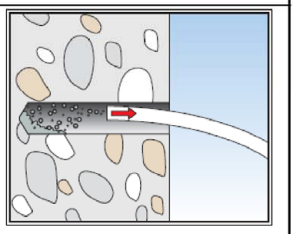
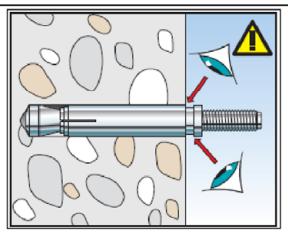
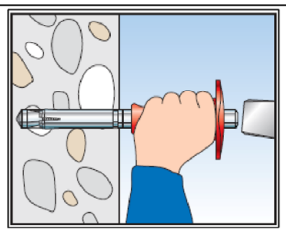
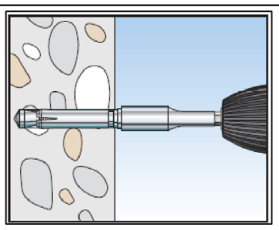
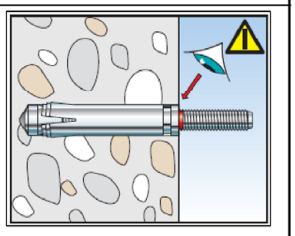
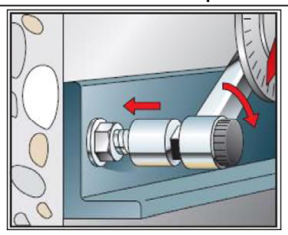
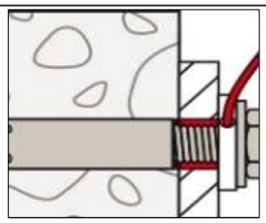
<table>
<tr><td>Drill and clean</td><td> 
1a
Stop drill FZBB</td><td> 
1b
Hammer drill</td><td> 
1c (next step: 3)
Drill the hole with hollow driller</td><td> 
2
Clean drill hole</td></tr>
<tr><td>Set fastener</td><td> 
3
Check drill depth</td><td> 
4a
Hand-setting</td><td> 
4b
Machine-setting</td><td> 
5
Check control colour</td></tr>
<tr><td>Installation torque / marking length</td><td> 
6
Apply T_{inst}</td><td></td><td colspan="2">1b / 1c – marking length / stop length:
<table><tr><td>Size</td><td>L</td></tr><tr><td>FZA-Q 14x50 M10</td><td>58</td></tr><tr><td>FZA-Q 18x60 M12</td><td>74</td></tr><tr><td>FZA-Q 18x80 M12</td><td>94</td></tr></table></td></tr>
<tr><td>Optional</td><td> 
7
Filling of the annular gap</td><td colspan="3">The gap between bolt and fixture may be filled with mortar (compressive strength ≥ 50 N/mm² 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.</td></tr>
</table>

(Fig. not to scale)

fischer Zykon Anchor FZA-Q

Intended Use
Installation instructions

Annex B 4

Deutsches Institut für Bautechnik DIBt

Table C1.1: Characteristic **tension resistance** under static and quasi-static action

Size				FZA-Q 14 x 50 M10	FZA-Q 18 x 60 M12	FZA-Q 18 x 80 M12
Steel failure						
Characteristic resistance		$N_{Rk,s}$	[kN]	40,7	60,1	
Partial factor for steel failure		γ_{Ms}	[-]	1,5		
Modulus of elasticity		E_s	[N/mm²]	210.000		
Pullout failure						
Characteristic resistance in C20/25	cracked concrete	$N_{Rk,p}$	[kN]	10,0	16,0	22,2
	uncracked concrete			17,4	22,9	35,2
Increasing factor for $N_{Rk,p}$		ψ_c	[-]	$(f_{ck} / 20)^{0,5}$		
Installation safety factor		γ_{inst}	[-]	1,0		
Concrete cone and splitting failure						
Effective embedment depth		h_{ef}	[mm]	50	60	80
Factor for cracked concrete		$k_{cr,N}$	[-]	7,7		
Factor for uncracked concrete		$k_{ucr,N}$		11,0		
Characteristic spacing		$s_{cr,N}$	[mm]	3 h_{ef}		
Characteristic edge distance		$c_{cr,N}$		1,5 h_{ef}		
Characteristic spacing		$s_{cr,sp}$		3,5 h_{ef}		
Characteristic edge distance		$c_{cr,sp}$		1,75 h_{ef}		
Characteristic resistance to splitting		$N^0_{Rk,sp}$	[kN]	min $\{N^0_{Rk,c}; N_{Rk,p}\}$ [1)]		

[1)] $N^0_{Rk,c}$ according to EN 1992-4:2018

Table C1.2: Characteristic **shear resistance** under static and quasi-static action

Size			**FZA-Q 14 x 50 M10**	**FZA-Q 18 x 60 M12**	**FZA-Q 18 x 80 M12**
Steel failure without lever arm					
Characteristic resistance	$V^0_{Rk,s}$	[kN]	20,4	33,7	
Partial factor for steel failure	γ_{Ms}	[-]	1,25		
Factor for ductility	k_7		1,0		
Steel failure with lever arm and concrete pryout failure					
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	60,0	105,0	
Partial factor for steel failure	γ_{Ms}	[-]	1,25		
Factor for ductility	k_7		1,0		
Factor for pryout failure	k_8		1,0	2,0	
Concrete edge failure					
Effective length in concrete	l_f	[mm]	50	60	80
Effective diameter of fastener	d_{nom}		14	18	

fischer Zykon Anchor FZA-Q

Annex C 1

Performances
Characteristic tension resistance under static and quasi-static action
Characteristic shear resistance under static and quasi-static action

Deutsches Institut für Bautechnik DIBt

Table C2.1: Minimum thickness of concrete members, minimum spacings and edge distances

Size			FZA-Q		
			14 x 50 M10	**14 x 50 M10 18 x 60 M12**	**14 x 50 M10 18 x 60 M12 18 x 80 M12**
Minimum thickness of concrete member		h_{min} [mm]	**100**	**120**	**160**
Cracked concrete					
Minimum	spacing	s_{min} [mm]	120	120	75
	edge distance	c_{min} [mm]	100	100	75
Uncracked concrete					
Minimum spacing		s_{min} [mm]	120	100	75
		for $c \geq$ [mm]	120	120	90
Minimum edge distance		c_{min} [mm]	100	100	90
		for $s \geq$ [mm]	180	160	75

Intermediate values for s_{min} and c_{min} by linear interpolation

fischer Zykon Anchor FZA-Q

Performances
Minimum thickness of concrete member, minimum spacings and edge distances

Annex C 2

Deutsches Institut für Bautechnik DIBt

Table C3.1: Characteristic **tension resistance** under **fire exposure**

FZA-Q		R30			R60		
		$N_{Rk,s,fi}$	$N_{Rk,p,fi}$	$N_{Rk,c,fi}$	$N_{Rk,s,fi}$	$N_{Rk,p,fi}$	$N_{Rk,c,fi}$
14 x 50 M10	[kN]	2,6	2,7	3,0	1,4	2,7	3,0
18 x 60 M12		8,4	4,0	4,8	4,2	4,0	4,8
18 x 80 M12			5,5	9,9		5,5	9,9

FZA-Q		R90			R120		
		$N_{Rk,s,fi}$	$N_{Rk,p,fi}$	$N_{Rk,c,fi}$	$N_{Rk,s,fi}$	$N_{Rk,p,fi}$	$N_{Rk,c,fi}$
14 x 50 M10	[kN]	1,0	2,7	3,0	0,8	2,1	2,4
18 x 60 M12		2,5	4,0	4,8	1,7	3,2	3,8
18 x 80 M12			5,5	9,9		4,4	7,9

Table C3.2: Characteristic **shear resistance** under **fire exposure**

FZA-Q	R30		R60	
	$V_{Rk,s,fi}$ [kN]	$M^0_{Rk,s,fi}$ [Nm]	$V_{Rk,s,fi}$ [kN]	$M^0_{Rk,s,fi}$ [Nm]
14 x 50 M10	2,6	3,4	1,4	1,8
18 x 60 M12	8,4	13,1	4,2	6,5
18 x 80 M12				

FZA-Q	R90		R120	
	$V_{Rk,s,fi}$ [kN]	$M^0_{Rk,s,fi}$ [Nm]	$V_{Rk,s,fi}$ [kN]	$M^0_{Rk,s,fi}$ [Nm]
14 x 50 M10	1,0	1,3	0,8	1,0
18 x 60 M12	2,5	3,9	1,7	2,6
18 x 80 M12				

Table C3.3: **Minimum spacings** and **minimum edge distances** under **fire exposure** for **tension** and **shear** load

Size			FZA-Q		
			14 x 50 M10	**18 x 60 M12**	**18 x 80 M12**
Spacing	$s_{min,fi}$	[mm]	$4 \cdot h_{ef}$		
Edge distance	$c_{min,fi}$		$c_{min,fi} = 2 \cdot h_{ef}$, for fire exposure from more than one side $c_{min,fi} \geq 300$ mm		

fischer Zykon Anchor FZA-Q

Performances
Characteristic resistance under fire exposure

Annex C 3

Deutsches Institut für Bautechnik DIBt

Table C4.1: Characteristic values of **tension** and **shear resistance** under **seismic performance category C1**

Size			FZA-Q 14 x 50 M10	FZA-Q 18 x 60 M12	FZA-Q 18 x 80 M12
Steel failure					
Characteristic resistance tension load C1	$N_{Rk,s,C1}$	[kN]	40,7	60,1	
Partial factor for steel failure	$\gamma_{Ms,C1}$	[-]	1,5		
Pullout failure					
Characteristic resistance tension load in cracked concrete C1	$N_{Rk,p,C1}$	[kN]	10,0	16,0	22,0
Installation sensitivity factor	$\gamma_{2,C1}$	[-]	1,0		
Steel failure without lever arm					
Characteristic resistance shear load C1	$V_{Rk,s,C1}$	[kN]	15,9	30,3	
Partial factor for steel failure	$\gamma_{Ms,C1}$	[-]	1,25		

Table C4.2: Characteristic values of **tension** and **shear resistance** under **seismic performance category C2**

Size			**FZA-Q 14 x 50 M10**	**FZA-Q 18 x 60 M12**	**FZA-Q 18 x 80 M12**
Steel failure					
Characteristic resistance tension load C2	$N_{Rk,s,C2}$	[kN]	40,7	60,1	
Partial factor for steel failure	$\gamma_{Ms,C2}$	[-]	1,5		
Pullout failure					
Characteristic resistance tension load in cracked concrete C2	$N_{Rk,p,C2}$	[kN]	4,0	4,7	6,5
Installation safety factor	$\gamma_{2,C2}$	[-]	1,0		
Steel failure without lever arm					
Characteristic resistance shear load C2	$V_{Rk,s,C2}$	[kN]	11,8	23,3	
Partial factor for steel failure	$\gamma_{Ms,C2}$	[-]	1,25		

Table C4.3: Annular gap for seismic performance categories C1 and C2

Δ_{gap}								
$\Delta_{gap} = d_f - d$	[mm]	0,00[1)]	0,25	0,50	0,75	1,00	1,25	≥ 1,50
α_{gap}		1,00	0,86	0,75	0,66	0,60	0,54	0,50

[1)] Filling of the Δ_{gap} according Annex B4

fischer Zykon Anchor FZA-Q

Performances
Characteristic resistance under seismic performance categories C1 and C2

Annex C 4

Deutsches Institut für Bautechnik DIBt

Table C5.1: Displacements under static and quasi-static **tension** loads

Size				FZA-Q		
				14 x 50 M10	**18 x 60 M12**	**18 x 80 M12**
Tension load in cracked concrete C20/25	N		[kN]	5,1	10,5	
Displacements	δ_{N0}		[mm]	0,4	0,8	
	$\delta_{N\infty}$			0,9	1,7	
Tension load in uncracked concrete C20/25	N		[kN]	12,2	16,2	
Displacements	δ_{N0}		[mm]	0,9	1,0	
	$\delta_{N\infty}$			1,5	1,7	

Table C5.2: Displacements under static and quasi-static **shear** loads

Size			FZA-Q		
			14 x 50 M10	**18 x 60 M12**	**18 x 80 M12**
Shear load in cracked and uncracked concrete C20/25	V	[kN]	9,5	19,3	
Displacements	δ_{V0}	[mm]	0,9	2,1	
	$\delta_{V\infty}$		1,6	3,1	

Table C5.3: Displacements under **tension** loads for **seismic performance category C2**

Size				FZA-Q		
				14 x 50 M10	**18 x 60 M12**	**18 x 80 M12**
Displacement	DLS	$\delta_{N,C2}$	[mm]	3,2	4,0	
	ULS	$\delta_{N,C2}$		13,3	12,9	

Table C5.4: Displacements under **shear** loads for **seismic performance category C2**

Size				FZA-Q		
				14 x 50 M10	**18 x 60 M12**	**18 x 80 M12**
Displacement	DLS	$\delta_{V,C2}$	[mm]	3,6	4,6	4,6
	ULS	$\delta_{V,C2}$		6,8	6,8	6,6

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Performances
Displacement under tension and shear loads

Annex C 5