fischer

DECLARATION OF PERFORMANCE

DoP 0166

for fischer Zykon- Anchor FZA-Q (Mechanical anchor for use in concrete)   EN

1. Unique identification code of the product-type: **DoP 0166**

2. Intended use/es: **Post-installed fastening in cracked or uncracked concrete.**
                                        See appendix, especially annexes   B1- B4
3. Manufacturer: **fischerwerke GmbH & Co. KG, Klaus-Fischer-Str. 1, 72178 Waldachtal, Germany**

4. Authorised representative: **–**

5. System/s of AVCP: **1**

6. European Assessment Document: **EAD 330232-01-0601, (Edition 12/ 2019)**
   European Technical Assessment: **ETA-16/0338; 2020-03-30**
   Technical Assessment Body: **DIBt- Deutsches Institut für Bautechnik**
   Notified body/ies: **1343 MPA Darmstadt / 2873 TU Darmstadt**

7. Declared performance/s:
   Mechanical resistance and stability (BWR 1)

Characteristic resistance to tension load (static and quasi-static loading):	Resistance to steel failure:	Annex C1	E_S= 210 000 MPa
	Resistance to pull- out failure:	Annex C1	
	Resistance to concrete cone failure:	Annex C1	
	Robustness:	Annex C1	
	Minimum edge distance and spacing:	Annex C2	
	Edge distance to prevent splitting under load:	Annex C1	
Characteristic resistance to shear load (static and quasi-static loading), Method A:	Resistance to steel failure (shear load):	Annex C1	
	Resistance to pry-out failure:	Annex C1	
Characteristic resistance and displacements for seismic performance categories C1 and C2:	Resistance to tension load, displacements, category C1:	Annex C4	
	Resistance to tension load, displacements, category C2:	Annexes C4, C5	
	Resistance to shear load, displacements, category C1:	Annex C4	
	Resistance to shear load, displacements, category C2:	Annexes C3, C5	
	Factor for annular gap:	Annex C4	
Characteristic Resistance for simplified design:	Method B:	NPD	
	Method C:	NPD	
Displacements and durability:	Displacements under static and quasi-static loading:	Annex C5	
	Durability:	Annexes A2, B1	

Safety in case of fire (BWR 2)

Reaction to fire:	Class (A1)	
Resistance to fire:	Fire resistance to steel failure (tension load):	Annex C3
	Fire resistance to pull-out failure (tension load):	Annex C3
	Fire resistance to steel failure (shear load):	Annex C3

8. Appropriate Technical Documentation and/or Specific   –
   Technical Documentation:

The performance of the product identified above is in conformity with the set of declared performance/s. This declaration of performance is issued, in accordance with Regulation (EU) No 305/2011, under the sole responsibility of the manufacturer identified above.

Signed for and on behalf of the manufacturer by:

Thilo Pregartner, Dr.-Ing.   Peter Schillinger, Dipl.-Ing.
Tumlingen, 2020-04-20

This DoP has been prepared in different languages. In case there is a dispute on the interpretation the English version shall always prevail.

The Appendix includes voluntary and complementary information in English language exceeding the (language-neutrally specified) legal requirements.

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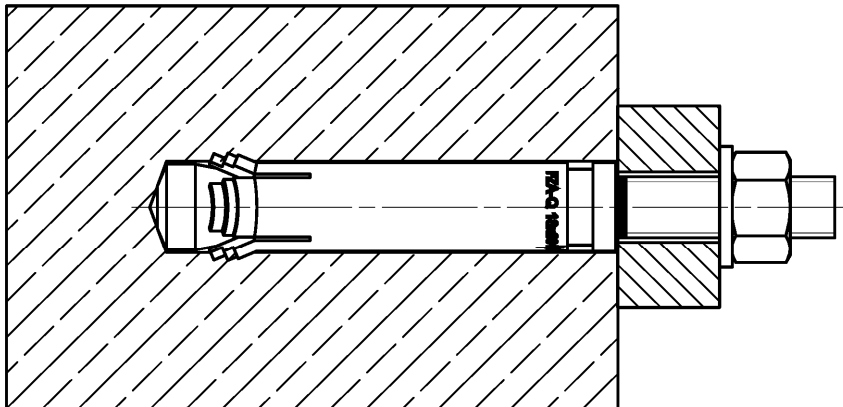
In accordance with the European Assessment Document EAD 330232-01-0601 the applicable European legal act is: [96/582/EC].

The system to be applied is: 1
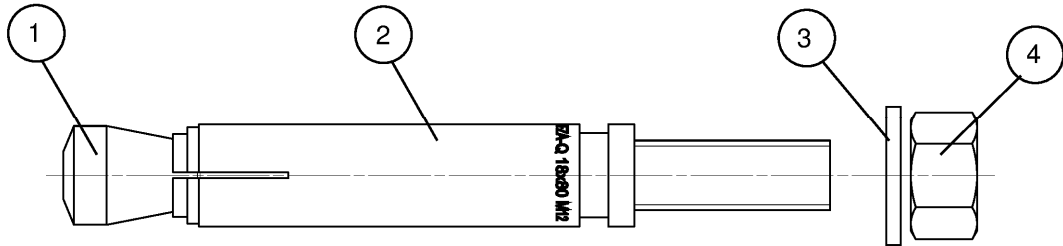
①   Cone bolt
②   Expansion sleeve
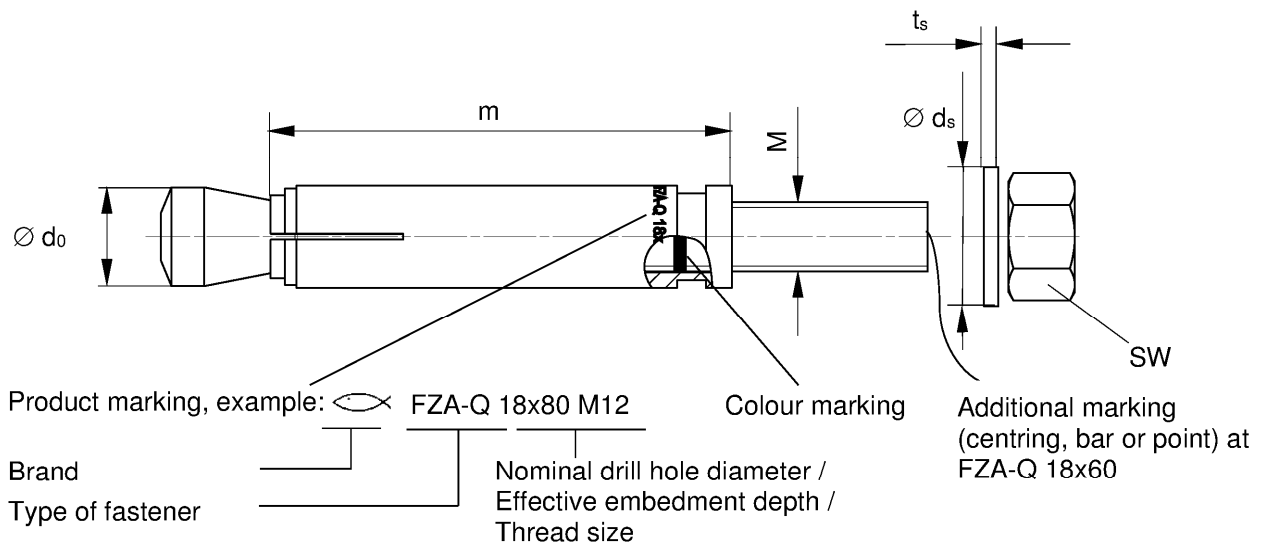③   Washer
④   Hexagon nut

Installed condition

fischer Zykon Anchor FZA-Q

Product description
Installed condition

Annex A 1

Product marking and dimensions

Product marking, example: FZA-Q 18x80 M12

Brand

Type of fastener

Nominal drill hole diameter / Effective embedment depth / Thread size

Colour marking

Additional marking (centring, bar or point) at FZA-Q 18x60

SW

Table A2.1:   Dimensions [mm]

Size	FZA-Q		
	14 x 50 M10	18 x 60 M12	18 x 80 M12
M = d		10	12	
$\varnothing$ d$_0$	=	13,5	17	
m		50	60	80
SW		17	19	
t$_S$	$\geq$	1,8	2,3	
$\varnothing$ d$_s$		19	23	

Table A2.2:   Materials (hot-dip galvanised $\geq$ 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 $f_{uk} \leq$ 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 $\geq$ 50 µm, EN 13811:2003

[2] Optional: clear paint

(Fig. not to scale)

fischer Zykon Anchor FZA-Q

Product description
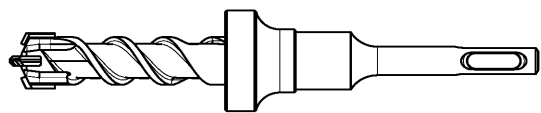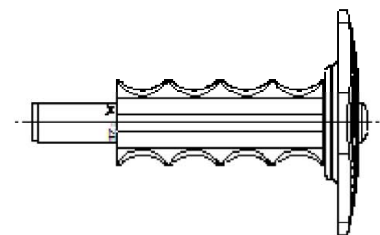Product marking, dimensions and materials

Annex A 2

Tools
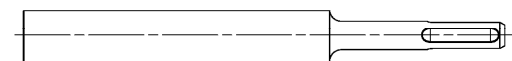
Drill bit FZBB
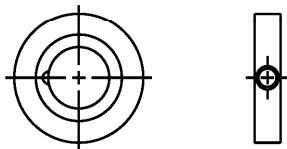

Standard drill bit

Setting tool FZE

Machine setting tool FZA-Q

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

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fischer Zykon Anchor FZA-Q

Intended Use
Tools

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

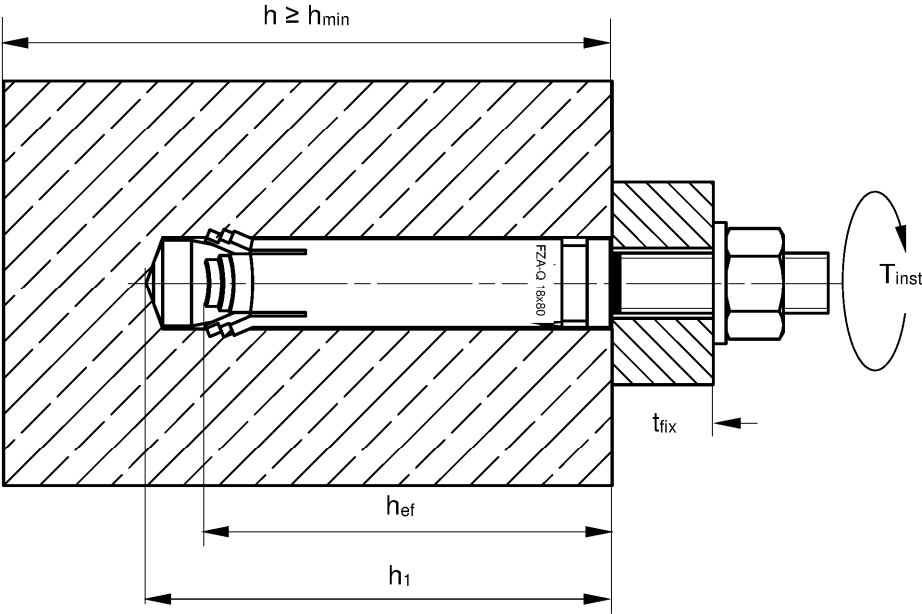fischer Zykon Anchor FZA-Q

Intended Use
Specifications

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			58	74	94
Cutting diameter of drill bit	d_{cut}			14,50	18,50	
Diameter of clearance hole in the fixture	d_f	$\leq$		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} $\leq$ Maximum installation torque

fischer Zykon Anchor FZA-Q
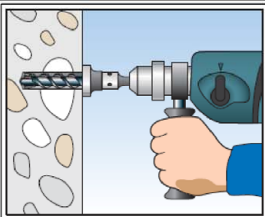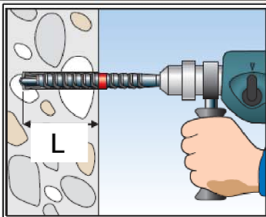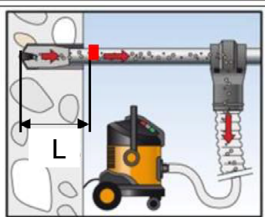
Intended Use
Installation parameters

Annex B 2

Installation instructions
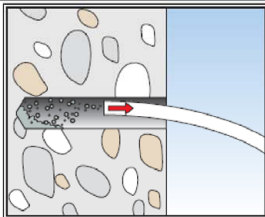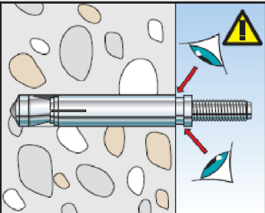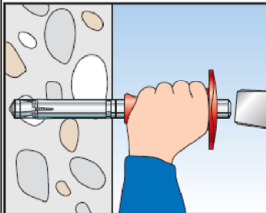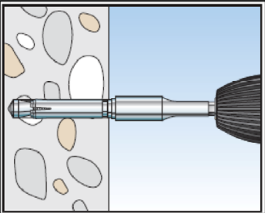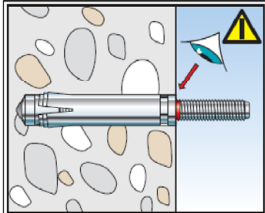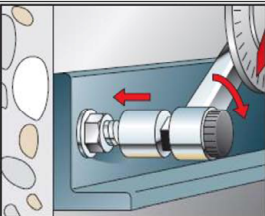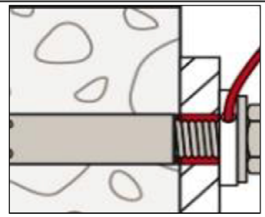
- Fastener installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site

- 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	
Intended Use Installation instructions	**Annex B 3** Appendix 7/ 13

Drill and clean	1a Stop drill FZBB	1b Hammer drill	1c (next step: 3) Drill the hole with hollow driller	2 Clean drill hole

Set fastener	3 Check drill depth	4a Hand-setting	4b Machine-setting	5 Check control colour

Installation torque / marking length

6
Apply T_{inst}

1b / 1c – marking length / stop length:

Size	L
FZA-Q 14x50 M10	58
FZA-Q 18x60 M12	74
FZA-Q 18x80 M12	94

Optional

7
Filling of the annular gap

The gap between bolt and fixture may be filled with mortar (compressive strength $\geq$ 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.

(Fig. not to scale)

fischer Zykon Anchor FZA-Q

Intended Use
Installation instructions

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

Size			FZA-Q		
			14 x 50 M10	18 x 60 M12	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
Characteristic resistance in C20/25 — 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	18 x 60 M12	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

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

Annex C 1

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}		100	100	75
Uncracked concrete					
Minimum spacing	s_{min}	[mm]	120	100	75
	for $c \geq$		120	120	90
Minimum edge distance	c_{min}	[mm]	100	100	90
	for $s \geq$		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

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	2,6	2,7	3,0	1,4	2,7	3,0
18 x 60 M12 [kN]	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	1,0	2,7	3,0	0,8	2,1	2,4
18 x 60 M12 [kN]	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 $s_{min,fi}$	$4 \cdot h_{ef}$		
Edge distance $c_{min,fi}$ [mm]	$c_{min,fi} = 2 \cdot h_{ef}$, 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

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

Size			FZA-Q		
			14 x 50 M10	18 x 60 M12	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	18 x 60 M12	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	$\geq 1,50$
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	Annex C 4
Performances Characteristic resistance under seismic performance categories C1 and C2	Appendix 12/ 13

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

fischer Zykon Anchor FZA-Q	**Annex C 5**
Performances Displacement under tension and shear loads	Appendix 13/ 13