

DECLARATION OF PERFORMANCE

DoP 0361

for fischer Bolt Anchor FWA Plus (Mechanical anchor for use in concrete)

EN

- | | |
|---|--|
| 1. <u>Unique identification code of the product-type:</u> | DoP 0361 |
| 2. <u>Intended use/es:</u> | Post-installed mechanical anchor für use in uncracked concrete, see appendix, especially annexes B1 - B3. |
| 3. <u>Manufacturer:</u> | fischerwerke GmbH & Co. KG, Klaus-Fischer-Str. 1, 72178 Waldachtal, Germany |
| 4. <u>Authorised representative:</u> | – |
| 5. <u>System/s of AVCP:</u> | 1 |
| 6. <u>European Assessment Document:</u> | EAD 330232-01-0601 |
| European Technical Assessment: | ETA-24/0714; 2024-10-15 |
| Technical Assessment Body: | ETA-Danmark A/S |
| Notified body/ies: | 2873 TU Darmstadt |

7. Declared performance/s:

Mechanical resistance and stability (BWR 1)

Characteristic resistance to tension load (static and quasi-static loading) Method A:

- 1 Resistance to steel failure: Annex C1
- 2 Resistance to pull- out failure: Annex C1
- 3 Resistance to concrete cone failure: Annex C1
- 4 Robustness: Annex C1
- 5 Minimum edge distance and spacing: Annex C2
- 6 Edge distance to prevent splitting under load: Annex C1

Characteristic resistance to shear load (static and quasi-static loading):

- 7 Resistance to steel failure (shear load): Annex C2
- 8 Resistance to pry-out failure: Annex C2

Characteristic Resistance for simplified design:

- 9 Method B: NPD
- 10 Method C: NPD

Displacements:

- 11 Displacements under static and quasi-static loading: Annex C2

Characteristic resistance and displacements for seismic performance categories C1 and C2:

- 12 Resistance to tension load, displacements, category C1: NPD
Resistance to tension load, displacements, category C2: NPD
- 13 Resistance to shear load, displacements, category C1: NPD
Resistance to shear load, displacements, category C2: NPD
- 14 Factor for annular gap: NPD

Safety in case of fire (BWR 2)

- 15 Reaction to fire: Class (A1)

Resistance to fire:

- 16 Fire resistance to steel failure (tension load): NPD
- 17 Fire resistance to pull-out failure (tension load): NPD
- 18 Fire resistance to steel failure (shear load): NPD

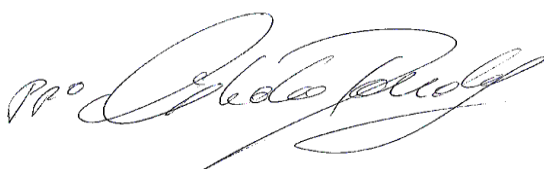
Durability:

- 19 Durability: Annexes A3, B1

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:



Dr. Ronald Mihala, Head of Development and Production Management
Tumlingen, 2024-10-29



Jürgen Grün, Managing Director Chemistry & Quality

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.

Mechanical resistance and stability (BWR 1)		
Characteristic resistance to tension load (static and quasi-static loading) Method A:		
1	Resistance to steel failure:	$N_{Rk,s}$ [kN]
2	Resistance to pull-out failure:	$N_{Rk,p}$ [kN], ψ_c [-]
3	Resistance to concrete cone failure:	$k_{cr,N}$, $k_{ucr,N}$ [-], h_{ef} , $c_{cr,N}$ [mm]
4	Robustness:	γ_{inst} [-]
5	Minimum edge distance and spacing:	c_{min} , s_{min} , h_{min} [mm]
6	Edge distance to prevent splitting under load:	$N^0_{Rk,sp}$ [kN], $c_{cr,sp}$ [mm]
Characteristic resistance to shear load (static and quasi-static loading):		
7	Resistance to steel failure (shear load):	$V^0_{Rk,s}$ [kN], $M^0_{Rk,s}$ [Nm], k_7 [-]
8	Resistance to pry-out failure:	k_8 [-]
Characteristic resistance for simplified design:		
9	Method B:	F^0_{Rk} [kN], $M^0_{Rk,s}$ [Nm], ψ_c [-], c_{cr} , s_{cr} , s_{min} , c_{min} , h_{min} [mm]
10	Method C:	F_{Rk} [kN], $M^0_{Rk,s}$ [Nm], c_{cr} , s_{cr} , s_{min} , h_{min} [mm]
Displacements:		
9	Displacements under static and quasi-static loading:	δ_{N0} , $\delta_{N\infty}$, δ_{V0} , $\delta_{V\infty}$ [mm]
Characteristic resistance and displacements for seismic performance categories C1 and C2:		
12	Resistance to tension load, displacements, category C1:	$N_{Rk,s,C1}$, $N_{Rk,p,C1}$ [kN]
	Resistance to tension load, displacements, category C2:	$N_{Rk,s,C2}$, $N_{Rk,p,C2}$ [kN], $\delta_{N,C2}$ [mm]
13	Resistance to shear load, displacements, category C1:	$V_{Rk,s,C1}$ [kN]
	Resistance to shear load, displacements, category C2:	$V_{Rk,s,C2}$ [kN], $\delta_{V,C2}$ [mm]
14	Factor for annular gap:	α_{gap} [-]
Safety in case of fire (BWR 2)		
15	Reaction to fire:	Class
Resistance to fire:		
16	Fire resistance to steel failure (tension load):	$N_{Rk,s,fi}$ [kN]
17	Fire resistance to pull-out failure (tension load):	$N_{Rk,p,fi}$ [kN]
18	Fire resistance to steel failure (shear load):	$V_{Rk,s,fi}$ [kN], $M^0_{Rk,s,fi}$ [Nm]
Durability:		
19	Durability:	Description/Level

II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of product

The FWA Plus is a torque-controlled expansion anchor made of galvanised steel. It is available in the sizes M8, M10, M12 and M16. The expansion is achieved by torque acting on the bolt. As the anchor is prestressed, the cone is pulled into the expansion sleeve and the load applied to the anchor is transferred to the concrete mainly by friction. The anchor body of sizes M8 to M16 is cold-formed. The FWA Plus is suitable for use in uncracked concrete of strength classes C20/25 to C50/60

The product description is given in Annex A and the intended use specifications of the product are detailed in Annex B.

2 Specification of the intended use(s) in accordance with the applicable European Assessment Document (hereinafter EAD)

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 provisions made in this European Technical Assessment are based on an assumed intended working life of the anchor of 50 years.

The indications given on the working life cannot be interpreted as a guarantee given by the producer or Assessment Body, 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

Characteristic	Assessment of characteristic
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3.1 Mechanical resistance and stability (BWR1)

Characteristic resistance to tension load (static and quasi-static loading) Method A

Resistance to steel failure	Annex C1
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Resistance to pull-out failure	Annex C1
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Resistance to concrete cone failure	Annex C1
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Robustness	Annex B
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Minimum edge distance and spacing	Annex C2
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Edge distance to prevent splitting under load	Annex C1
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Characteristic resistance to shear load (static and quasi-static loading)

Resistance to steel failure under shear load	Annex C2
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Resistance to pry-out failure	Annex C2
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Characteristic resistance for simplified design

Method B	Not relevant
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Method C	Not relevant
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Displacements

Displacements under static and quasi-static loading	Annex C2
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Characteristic resistance and displacements for seismic performance categories C1 and C2

Resistance to tension load, displacements	No performance assessed
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Resistance to shear load, displacements	No performance assessed
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Factor for annual gap	No performance assessed
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Characteristic

Assessment of characteristic

3.2 Safety in case of fire (BWR2)

Reaction to fire

The anchors are made from steel classified as performance **class A1** of the characteristic reaction to fire, in accordance with the provisions of EC decision 96/603/EC, amended by EC Decision 2000/605/EC.

Resistance to fire

Fire resistance to steel failure (tension load)

No performance assessed

Fire resistance to pull-out failure (tension load)

No performance assessed

Fire resistance to steel failure (shear load)

No performance assessed

3.3 Aspects of durability

Durability

Annex B

See additional information in section 3.9

3.9 General aspects related to the performance of the product

The European Technical Assessment is issued for the product on the basis of agreed data/information, deposited with ETA-Danmark, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to ETA-Danmark before the changes are introduced. ETA-Danmark will decide whether or not such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA and if so whether further assessment or alterations to the ETA, shall be necessary.

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

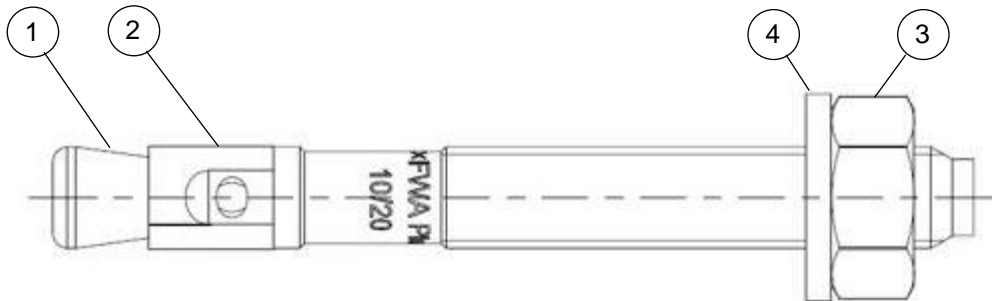
4.1 AVCP system

According to the decision 1996/582/EC of the European Commission, the system(s) of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No. 305/2011) is 1.

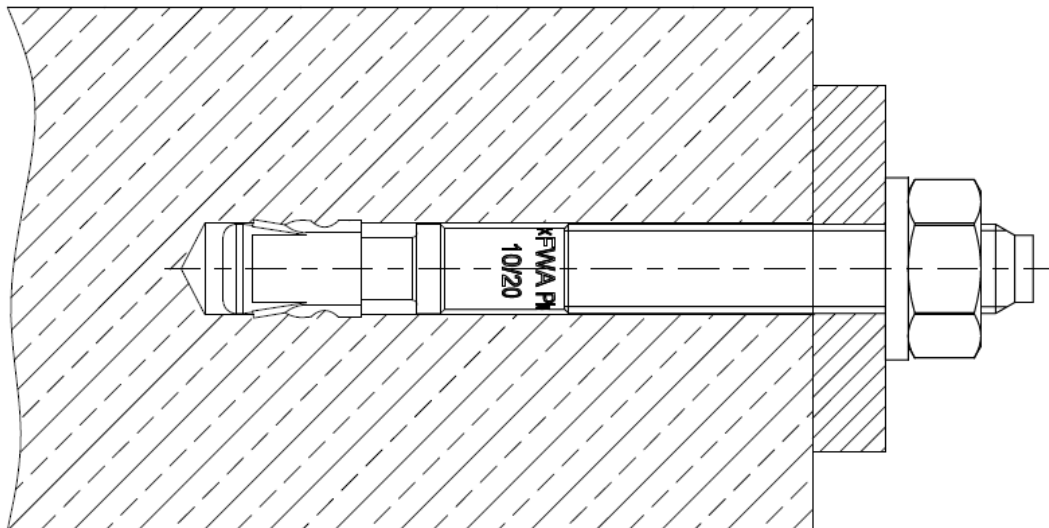
5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at ETA-Danmark prior to CE marking

Cone bolt manufactured by cold - forming:



- ① Cone bolt (cold formed)
- ② Expansion sleeve
- ③ Hexagon nut
- ④ Washer



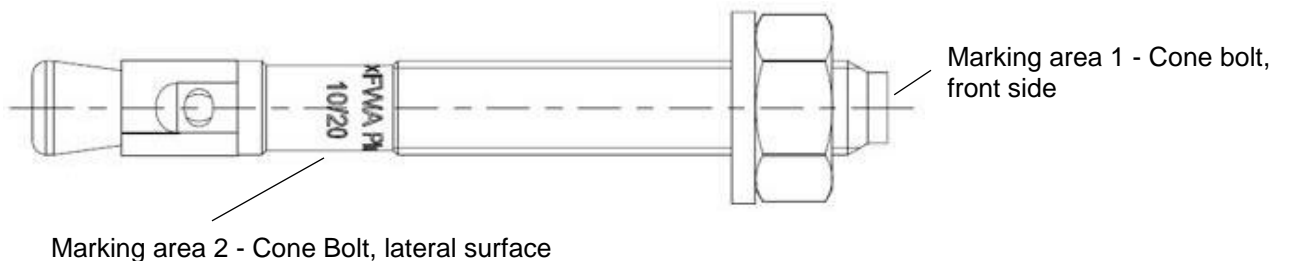
(Fig. not to scale)

fischer Bolt Anchor FWA Plus

Product description
Installed condition

Annex A1

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Product marking, example: **FWA Plus 10/20x94**

Brand | type of fastener placed at marking area 2 Thread size / max. thickness of fixture (t_{fix}) x fastener length (L) placed at marking area 2

Table A2.1: Letter-code on marking area 1 and maximum thickness of fixture t_{fix} :

Marking	A	B	C	D	E	F	G	H	I	K	L	M	N	O	P	R	S	T	U	V	W	X	Y	Z
Max. t_{fix}	5	10	15	20	25	30	35	40	45	50	60	70	80	90	100	120	140	160	180	200	250	300	350	400

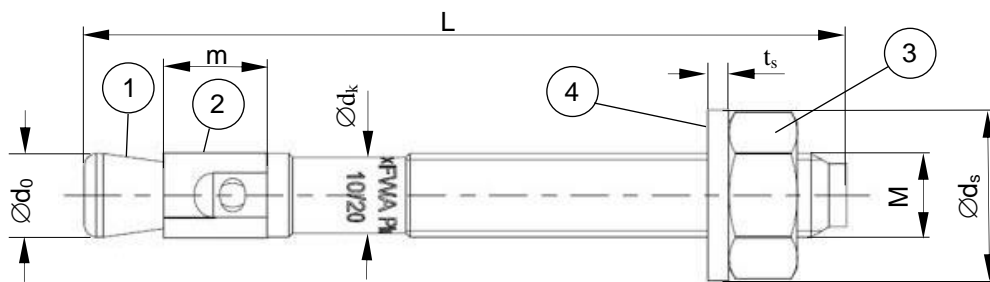


Table A2.2: Fastener dimensions [mm]

Part	Designation	FWA Plus				
		M8	M10	M12	M16	
1	Cone bolt	M	8	10	12	16
		$\frac{\text{Ø } d_0}{\text{Ø } d_k} =$	7,8	9,8	11,8	15
			7,1	8,9	10,7	14,6
2	Expansion sleeve	m =	10,0	12,0	14,0	20,0
3	Hexagon nut	SW =	13	17	19	24
4	Washer	$\frac{t_s}{\text{Ø } d_s} \geq$	1,6	2,0	2,5	3,0
			16	20	24	30
Thickness of fixture		$\frac{t_{fix}}{\text{Ø } d_s} \geq$	0			
		\leq	100	200	200	300
Length of fastener	$\frac{L_{min}}{L_{max}} =$		71	84	108	144
			166	274	202	421

(Fig. not to scale)

fischer Bolt Anchor FWA Plus

Product description
Product marking, letter code and fastener dimensions

Annex A2
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Table A3.1: Materials FWA Plus (zinc plated $\geq 5\mu\text{m}$, ISO 4042:2022)

Part	Designation	Material
1	Cone bolt	Cold form steel
2	Expansion sleeve	Cold strip
3	Hexagon nut	Steel, property class min. 8
4	Washer	Cold strip

fischer Bolt Anchor FWA Plus

Product description
Materials

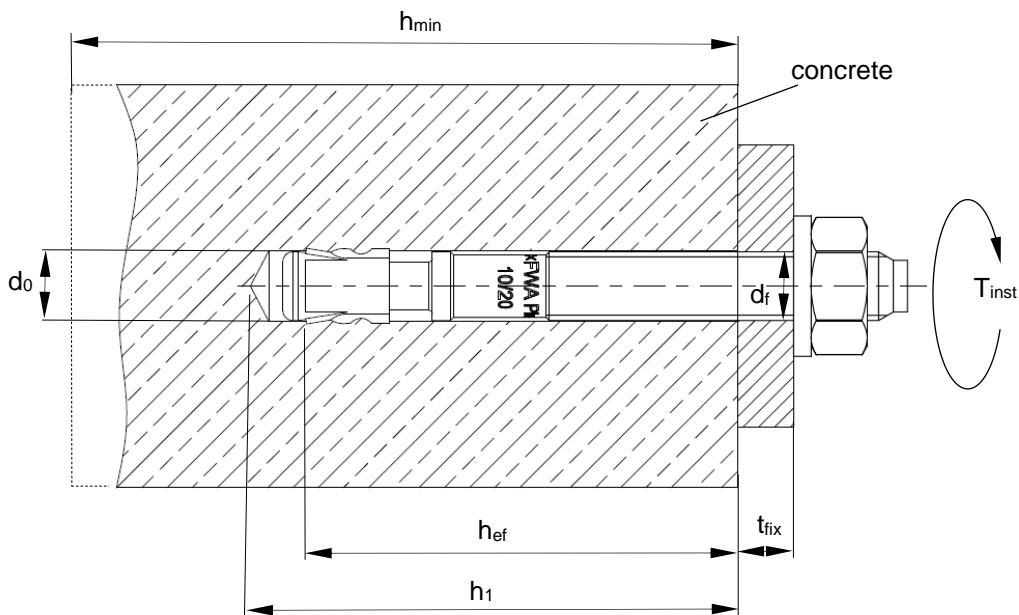
Annex A3

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Specifications of intended use				
fischer Bolt Anchor FWA Plus	M8	M10	M12	M16
Material: steel, zinc plated	✓			
Static and quasi-static loads				
Uncracked concrete				
<p>Base materials:</p> <ul style="list-style-type: none"> Reinforced or unreinforced normal concrete without fibres of strength classes C20/25 to C50/60 according to EN 206:2013+A2:2021 <p>Use conditions (Environmental conditions):</p> <ul style="list-style-type: none"> Structures subject to dry internal conditions. <p>Design:</p> <ul style="list-style-type: none"> The structural design is conducted under responsibility of a designer experienced in the field of fastenings and concrete works. 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 and TR 055:2018. 				
fischer Bolt Anchor FWA Plus			Annex B1 Appendix 8 / 12	
Intended Use Specifications				

Table B2.1: Installation parameters

Type of fastener / size		FWA Plus			
		M8	M10	M12	M16
Nominal drill hole diameter	$d_0 =$	8	10	12	16
Cutting diameter of drill bit	$d_{cut} \leq$	8,45	10,45	12,5	16,5
Effective embedment depth	$h_{ef} \geq$ [mm]	48	50	70	84
Depth of drill hole in concrete	$h_1 \geq$	65	75	100	120
Diameter of clearance hole in the fixture	$d_f \leq$	9	12	14	18
Required setting torque	$T_{inst} =$ [Nm]	10	15	35	110



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

(Fig. not to scale)

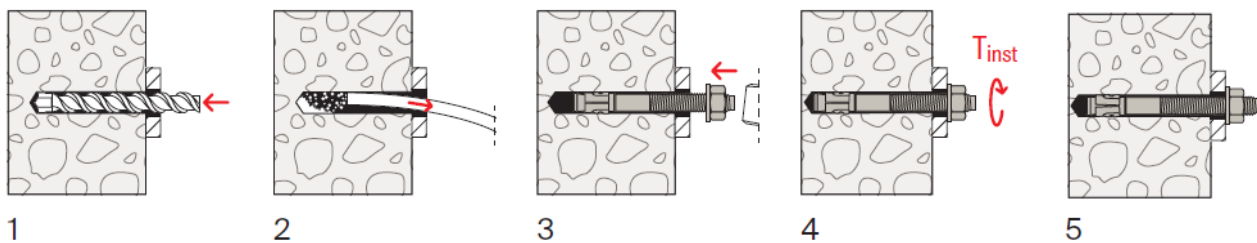
fischer Bolt Anchor FWA Plus

Intended Use
Installation parameters

Annex B2
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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
- Hammer drilling
- 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



No.	Description
1	Drill the hole by hammer drilling.
2	Clean the hole.
3	Set the fastener.
4	Apply required setting torque T_{inst}
5	Installed fastener

(Fig. not to scale)

fischer Bolt Anchor FWA Plus

Intended Use
Installation instructions

Annex B3
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Table C1.1: Characteristic values of **tension** resistance under static and quasi-static action

Type of fastener / size			FWA Plus			
			M8	M10	M12	M16
Steel failure						
Characteristic resistance	$N_{Rk,s}$	[kN]	15,5	24,3	35,2	67,5
Partial factor	$\gamma_{Ms}^{1)}$	[-]	1,50			
Pullout failure						
Characteristic resistance in uncracked concrete C20/25	$N_{Rk,p}$	[kN]	12,4	16,5	28,2	34,9
Increasing factors ψ_c for $N_{Rk,p}$ $N_{Rk,p} = \psi_c \cdot N_{Rk,p} (C20/25)$	ψ_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 sensitivity factor	γ_{inst}	[-]	1,0			
Concrete cone and splitting failure						
Effective embedment depth	h_{ef}	[mm]	48	50	70	84
Factor for uncracked concrete	$k_{ucr,N}$	[-]	11,0 ²⁾			
Characteristic spacing	$s_{cr,N}$		3 h_{ef}			
Characteristic edge distance	$c_{cr,N}$		1,5 h_{ef}			
Characteristic spacing for splitting failure	$s_{cr,sp}$	[mm]	192	250	350	504
Characteristic distance for splitting failure	$c_{cr,sp}$		96	125	175	252
Characteristic resistance to splitting	$N^0_{Rk,sp}$	[kN]	min $\{N^0_{Rk,c}, N_{Rk,p}\}^{3)}$			
¹⁾ In absence of other national regulations ²⁾ Based on concrete strength as cylinder strength ³⁾ $N^0_{Rk,c}$ according to EN 1992-4:2018						
fischer Bolt Anchor FWA Plus					Annex C1 Appendix 11 / 12	
Performance Characteristic values of tension resistance under static and quasi-static action						

Table C2.1: Characteristic values of **shear** resistance under static and quasi-static action

Type of fastener / size	FWA Plus			
	M8	M10	M12	M16
Installation factor γ_{inst} [-]	1,0			
Steel failure without lever arm				
Characteristic resistance $V_{Rk,s}^0$ [kN]	11	17,4	25,3	40
Partial factor for steel failure $\gamma_{Ms}^{1)}$ [-]	1,25			
Steel failure with lever arm and concrete pryout failure				
Characteristic bending moment $M_{Rk,s}^0$ [Nm]	22,5	44,8	78,6	199
Partial factor for steel failure $\gamma_{Ms}^{1)}$	1,25			
Factor for ductility k_7 [-]	0,8			
Factor for pryout k_8	1		2	
Concrete edge failure				
Effective length of fastener l_f [mm]	48	50	70	84
Effective diameter of fastener d_{nom}	8	10	12	16

¹⁾ In absence of other national regulations

Table C2.2: Minimum thickness of concrete members, minimum spacing and minimum edge distances

Type of fastener / size	FWA Plus			
	M8	M10	M12	M16
Minimum thickness of member h_{min}	100	120	140	170
Minimum spacing s_{min} [mm]	65	95	100	115
Minimum edge distance c_{min}	65	95	100	115

Table C2.3: Displacements under static and quasi static **tension** action

Type of fastener / size	FWA Plus			
	M8	M10	M12	M16
Tension load N [kN]	5,7	7,6	18,3	16,2
Displacements $\frac{\delta_{N0}}{\delta_{N\infty}}$ [mm]	0,8	1,0	1,2	1,3
	1,2	1,5	1,8	2,0

Table C2.4: Displacements under static and quasi static **shear** action

Type of fastener / size	FWA Plus			
	M8	M10	M12	M16
Shear load V [kN]	6,3	9,9	14,5	22,9
Displacements $\frac{\delta_{V0}}{\delta_{V\infty}}$ [mm]	1,9	2,7	3,5	3,5
	2,9	4,1	5,3	3,5

fischer Bolt Anchor FWA Plus

Performance

Characteristic values of shear resistance, minimum thickness of concrete members, minimum spacing and edge distance, displacements due to tension and shear action

Annex C2

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