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-20/0486 of 28 July 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	Fixanchor W-FAZ PRO dynamic
Product family to which the construction product belongs	Post-installed fasteners in concrete under fatigue cyclic loading
Manufacturer	Adolf Würth GmbH & Co. KG Reinhold-Würth-Straße 12-17 74653 Künzelsau DEUTSCHLAND
Manufacturing plant	Werk W1
This European Technical Assessment contains	12 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 330250-00-0601, Edition 09/2019

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Specific Part

1 Technical description of the product

The Fixanchor W-FAZ PRO dynamic is a fastener made of zinc plated steel which is placed into a drilled hole and anchored by torque-controlled expansion.

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)

Essential characteristic	Performance
Characteristic fatigue resistance under cyclic tension loading (Assessment method B)	
Characteristic steel fatigue resistance	See Annex C1
Characteristic concrete cone, pull-out, splitting and blow out fatigue resistance	
Characteristic fatigue resistance under cyclic shear loading (Assessment method B)	
Characteristic steel fatigue resistance	See Annex C1
Characteristic concrete edge fatigue resistance	
Characteristic concrete pry out fatigue resistance	
Characteristic fatigue resistance under cyclic combined tension and shear loading (Assessment method B)	
Characteristic steel fatigue resistance	See Annex C1
Load transfer factor for cyclic tension and shear loading	
Load transfer factor	See Annex C1

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 330250-00-0601 the applicable European legal act is: 1996/582/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 European Assessment Document

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 28 July 2020 by Deutsches Institut für Bautechnik

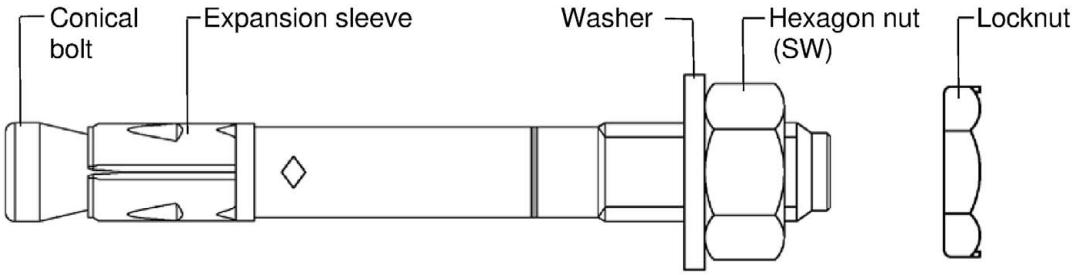
BD Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Baderschneider

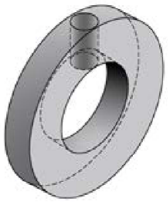
Deutsches Institut für Bautechnik DIBt

Wedge anchor Fixanchor W-FAZ PRO dynamic

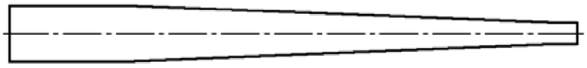
Fixanchor W-FAZ PRO dynamic M10, M12, M16



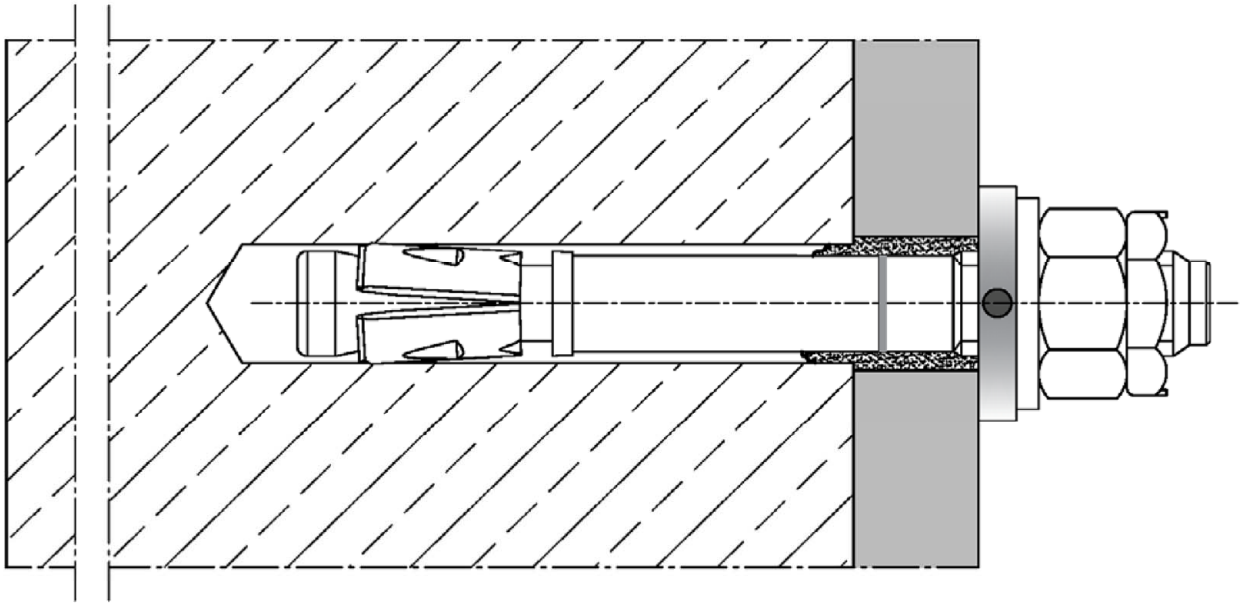
Filling washer WIT-SHB



Reducing adapter



Installation condition



Fixanchor W-FAZ PRO dynamic	
Product description Product, Installation condition	**Annex A1**

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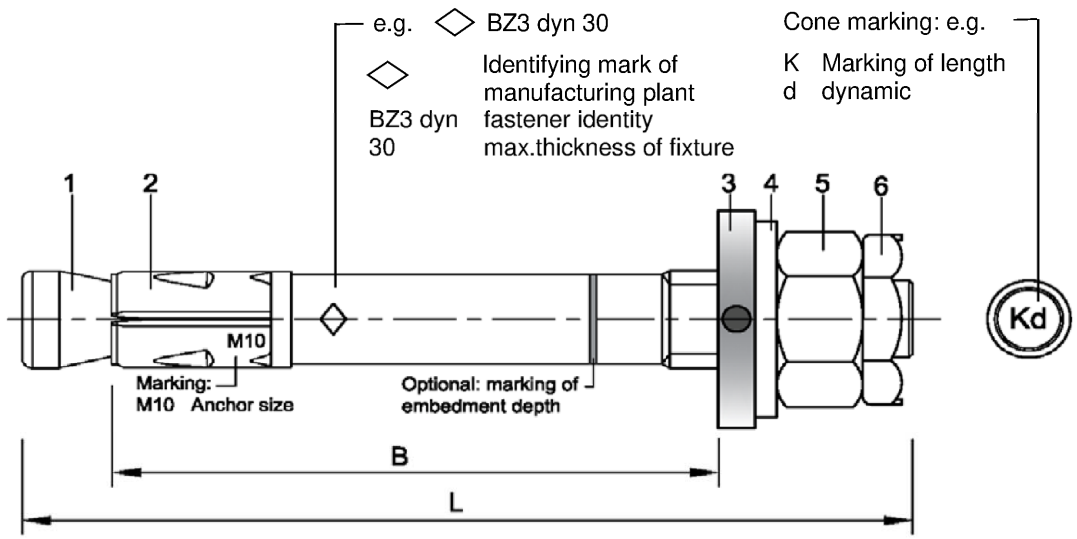
Marking



Usable length: $B = h_{ef} + t_{fix}$

h_{ef}: (existing) effective anchorage depth

t_{fix}: fixture thickness

Table A1: Length identification

Length identifier		G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
Usable length B	≥	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135

Length identifier		V	W	X	Y	Z
Usable length B	≥	140	145	150	160	170

Dimensions in mm

Table A2: Material

Part	Designation	Steel, zinc plated
1	Conical bolt	Steel, galvanized ≥ 5 µm, fracture elongation A_5 ≥ 8%
2	Expansion sleeve	Stainless steel
3	Filling washer	Steel, galvanized ≥ 5 µm
4	Washer	
5	Hexagon nut	
6	Locknut	
7	Filling mortar	e.g. Würth Injection mortar WIT-VM 250, WIT-UH 300, WIT-VIZ

Fixanchor W-FAZ PRO dynamic

Product description
Marking,Length idendification, Material

Annex A2

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Specifications of intended use

Anchorages subject to:

- Fatigue cyclic loading
  Static and quasi-static action, fire exposure and seismic performance according to ETA-20/0229

Base materials:

- Cracked or uncracked concrete
- Reinforced or unreinforced normal weight concrete without fibers according to EN 206: 2013 + A1:2016
- 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:

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are 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 method EN 1992-4:2018 and TR 061 (design method II)

Installation:

- Hole drilling by hammer drill bit or vacuum drill bit
- Use of the fastener only as supplied by the manufacturer without exchanging the components of the fastener
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.

Fixanchor W-FAZ PRO dynamic	
Intended use Specifications of intended use	**Annex B1**

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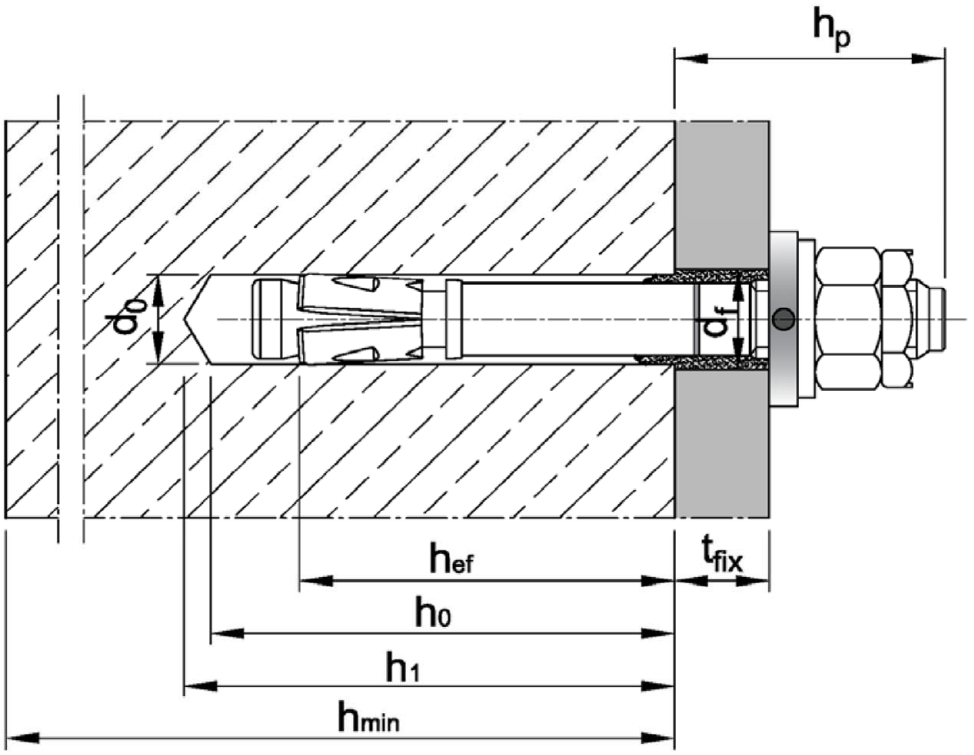
Table B1: Installation parameters

Anchor size				M10	M12	M16
Nominal drill hole diameter		d_0 =	[mm]	10	12	16
Cutting diameter of drill bit		$d_{cut} \leq$	[mm]	10,45	12,5	16,5
Effective anchorage depth[1)]		$h_{ef} \geq$	[mm]	60	70	85
Depth of drill hole		$h_0 \geq$	[mm]	h_{ef} + 9	h_{ef} + 10	h_{ef} + 14
		$h_1 \geq$	[mm]	h_{ef} + 11	h_{ef} + 13	h_{ef} + 17
Diameter of clearance hole in the fixture		d_f =	[mm]	12	14	18
Minimum fixture thickness		$t_{fix,min}$ =	[mm]	5	6	8
Installation torque		T_{inst} =	[Nm]	40	60	110
Overstand		$h_p \leq$	[mm]	21,5 + t_{fix}	25,5 + t_{fix}	29,5 + t_{fix}
Length of fastener		L	[mm]	h_{ef} + t_{fix} + 30,5	h_{ef} + t_{fix} + 35,5	h_{ef} + t_{fix} + 43
Hexagon nut	width across nut	SW	[mm]	17	19	24
Locknut	width across nut	SW	[mm]	17	19	24

[1)] End of thread must be above the concrete surface



Fixanchor W-FAZ PRO dynamic

Intended use
Installation parameters

Annex B2

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Table B2: Minimum thickness of concrete member, minimum spacings, edge distances and required area

Anchor size				**M10**	**M12**	**M16**
Minimum member thickness depending on h_{ef}		$h_{min} \geq$	[mm]	$1{,}5 \cdot h_{ef}$		
Minimum edge distances and spacings						
Minimum edge distance		c_{min}	[mm]	45	55	65
Minimum spacings		s_{min}	[mm]	40	50	65
Projected required area $A_{pr,req}$						
Projected required area	cracked concrete	$A_{pr,req}$	[mm²]	23 700	31 500	42 300
	uncracked concrete	$A_{pr,req}$	[mm²]	34 700	41 300	50 200
The edge distances and spacings shall be selected in steps of 5 mm. In combination with variable anchorage depths and member thicknesses, the following equation must be fulfilled:						
$A_{pr,req} \leq A_{pr,ef}$				$A_{pr,req}$ Projected required area $A_{pr,ef}$ Projected effective area (acc. to Table B4)		

Table B3: Applicable concrete thickness h_{sp} and area A_{sp} to determine characteristic edge distance $c_{cr,sp}$

Anchor size			**M10**	**M12**	**M16**
Applicable concrete thickness	h_{sp}	[mm]	$\min(h\,;\ h_{ef} + 1{,}5 \cdot c \cdot \sqrt{2})$		
Area to determine $c_{cr,sp}$ [1)]	A_{sp}	[mm²]	$\frac{N^0_{Rk,sp} + 2{,}040}{0{,}000693}$	$\frac{N^0_{Rk,sp} + 3{,}685}{0{,}000692}$	$\frac{N^0_{Rk,sp} + 3{,}738}{0{,}000875}$

[1)] with $N^0_{Rk,sp}$ in kN according ETA-20/0229

Fixanchor W-FAZ PRO dynamic

Intended use
Minimum spacings and edge distances
Required area and applicable concrete thickness

Annex B3

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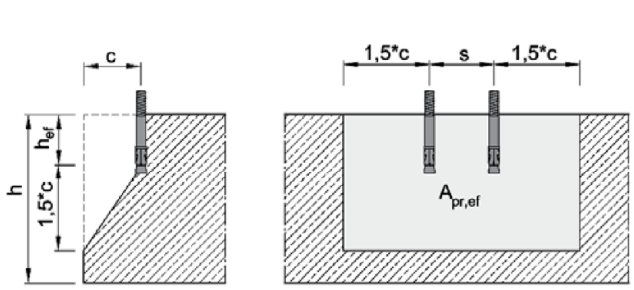
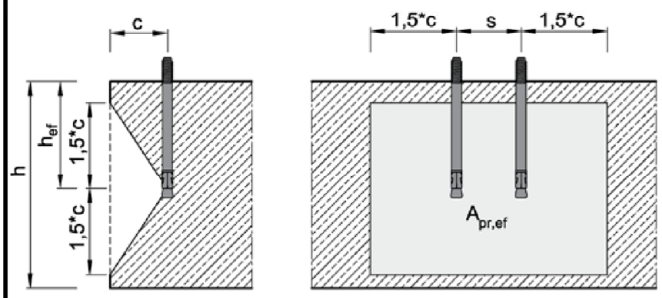
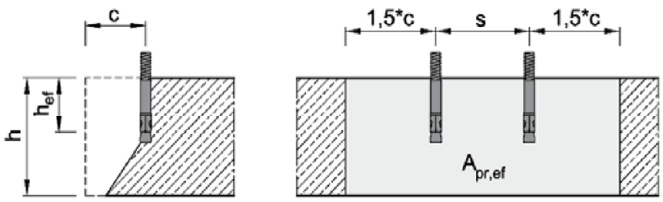
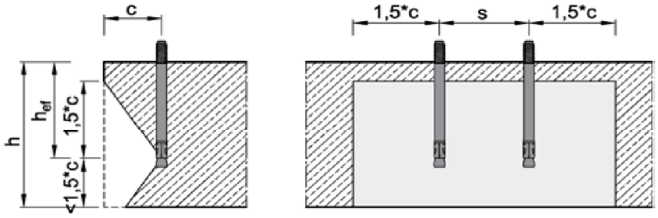
Table B4: Projected effective area $A_{pr,ef}$ to determine spacings and edge distances

Member thickness: $h > h_{ef} + 1{,}5 \cdot c$	
Effective anchorage depth $h_{ef} < 1{,}5 \cdot c$	Effective anchorage depth $h_{ef} \geq 1{,}5 \cdot c$
Anchor group with $s \geq 3 \cdot c$ or single anchor	
$A_{pr,ef} = 2 \cdot (3 \cdot c) \cdot (1{,}5 \cdot c + h_{ef})$ [mm²]	$A_{pr,ef} = 2 \cdot (3 \cdot c) \cdot (3 \cdot c)$ [mm²]
Anchor group ($s < 3 \cdot c$)	
$A_{pr,ef} = (3 \cdot c + s) \cdot (1{,}5 \cdot c + h_{ef})$ [mm²]	$A_{pr,ef} = (3 \cdot c + s) \cdot (3 \cdot c)$ [mm²]
	
Member thickness: $h \leq h_{ef} + 1{,}5 \cdot c$	
Effective anchorage depth $h_{ef} \leq 1{,}5 \cdot c$	Effective anchorage depth $h_{ef} > 1{,}5 \cdot c$
Anchor group with $s \geq 3 \cdot c$ or single anchor	
$A_{pr,ef} = 2 \cdot (3 \cdot c) \cdot h$ [mm²]	$A_{pr,ef} = 2 \cdot (3 \cdot c) \cdot (h - h_{ef} + 1{,}5 \cdot c)$ [mm²]
Anchor group ($s < 3 \cdot c$)	
$A_{pr,ef} = (3 \cdot c + s) \cdot h$ [mm²]	$A_{pr,ef} = (3 \cdot c + s) \cdot (h - h_{ef} + 1{,}5 \cdot c)$ [mm²]
	
If the area $A_{pr,ef}$ is trimmed by lateral edges ($c_2 < 1{,}5 \cdot c$), calculate the area actually present. The spacings and edge distances shall be rounded to 5 mm	

Fixanchor W-FAZ PRO dynamic

Intended use
Projected effective area to determine spacings and edge distances

Annex B4

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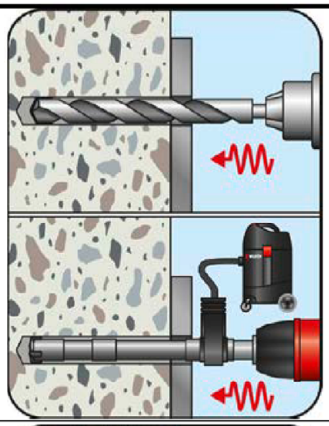
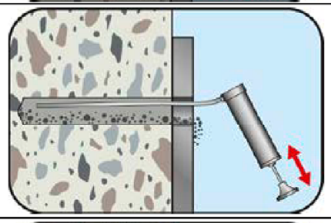
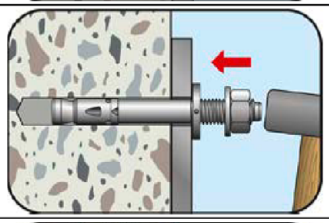
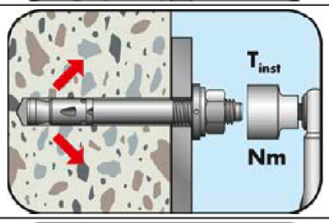
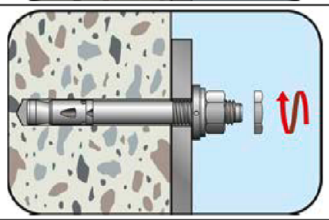
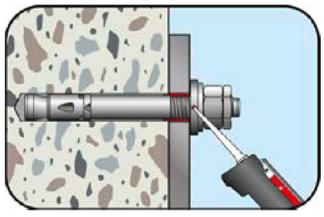
Installation instructions

1		Drill hole perpendicular to concrete surface. If using a vacuum drill bit, proceed with step 3.
2		Blow out dust. Alternatively vacuum clean down to the bottom of the hole.
3		Drive in fastener with filling washer WIT-SHB until effective anchorage depth is reached. End of thread must be above the concrete surface.
4		Apply installation torque T_{inst} according to Table B1 by using torque wrench.
5		Screw on locknut until hand tight then tighten ¼ to ½ turn using a screw wrench.
6		Fill the annular gap between anchor and fixture with mortar (compressive strength ≥ 40 N/mm², e.g. Würth Injection mortar WIT-VM 250, WIT-UH 300, WIT-VIZ) Use enclosed reducing adapter. Observe the processing information of the mortar! The annular gap is completely filled, when excess mortar seeps out.

Fixanchor W-FAZ PRO dynamic

Intended use
Installation instructions

Annex B5

Deutsches Institut für Bautechnik DIBt

Table C1: Characteristic values of fatigue resistance

Anchor size			M10	M12	M16
Tension load					
Steel failure					
Characteristic fatigue resistance	$\Delta N_{Rk,s,0,\infty}$	[kN]	4,6	6,2	9,7
Exponent for combined loading	α_s	[-]	0,5	0,5	0,7
Load-transfer factor for fastener groups	ψ_{FN}	[-]	0,5		
Pull-out					
Characteristic fatigue resistance	$\Delta N_{Rk,p,0,\infty}$	[kN]	0,5 $N_{Rk,p}$ [1)]		
Concrete cone and splitting failure					
Characteristic fatigue resistance	$\Delta N_{Rk,c,0,\infty}$	[kN]	0,5 $N_{Rk,c}$ [1)]		
	$\Delta N_{Rk,sp,0,\infty}$	[kN]	0,5 $N_{Rk,sp}$ [1)]		
Effective anchorage depth	h_{ef}	[mm]	60	70	85
Shear load					
Steel failure without lever arm					
Characteristic fatigue resistance	$\Delta V_{Rk,s,0,\infty}$	[kN]	2,5	4,0	7,5
Exponent for combined loading	α_s	[-]	0,5	0,5	0,7
Load-transfer factor for fastener groups	ψ_{FV}	[-]	0,5		
Concrete pry-out failure					
Characteristic fatigue resistance	$\Delta V_{Rk,cp,0,\infty}$	[kN]	0,5 $V_{Rk,cp}$ [1)]		
Concrete edge failure					
Characteristic fatigue resistance	$\Delta V_{Rk,c,0,\infty}$	[kN]	0,5 $V_{Rk,c}$ [1)]		
Effective length of anchor	l_f	[mm]	60	70	85
Diameter of anchor	d_{nom}	[mm]	10	12	16

[1)] $N_{Rk,c}$, $N_{Rk,p}$, $N_{Rk,sp}$, $V_{Rk,c}$ and $V_{Rk,cp}$ – Characteristic values of resistance under static or quasi-static actions according to ETA-20/0229 and EN 1992-4:2018

Fixanchor W-FAZ PRO dynamic

Performance
Characteristic values of fatigue resistance

Annex C1