Deutsches Institut für Bautechnik

Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

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European Technical Assessment

ETA-13/0772 of 14 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	fischer Bolt Anchor FXA, FXA R
Product family to which the construction product belongs	Mechanical fastener for use in concrete
Manufacturer	fischerwerke GmbH & Co. KG Klaus-Fischer-Straße 1 72178 Waldachtal DEUTSCHLAND
Manufacturing plant	fischerwerke
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 330232-01-0601, Edition 12/2019
This version replaces	ETA-13/0772 issued on 27 September 2017

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Specific Part

1 Technical description of the product

The fischer Bolt anchor FXA and FXA R is an anchor made of zinc plate or stainless 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 resistance to tension load (static and quasi-static loading)	See Annex C 1 and C2
Characteristic resistance to shear load (static and quasi-static loading)	See Annex C 2
Displacements (static and quasi-static loading)	See Annex C 2
Characteristic resistance and displacements for seismic performance categories C1 and C2	No performance assessed
Durability	See Annex B 1

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	No performance assessed

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 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.

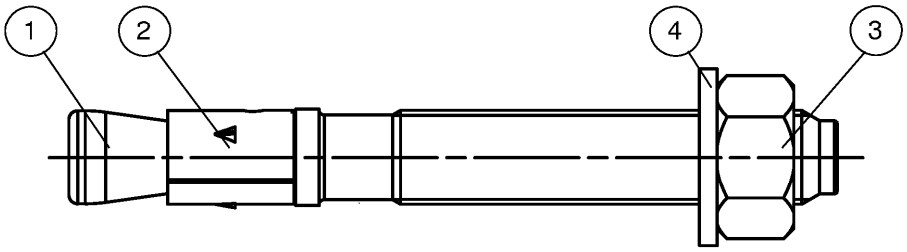
Issued in Berlin on 14 July 2020 by Deutsches Institut für Bautechnik

Dr.-Ing. Lars Eckfeldt
p.p. Head of Department

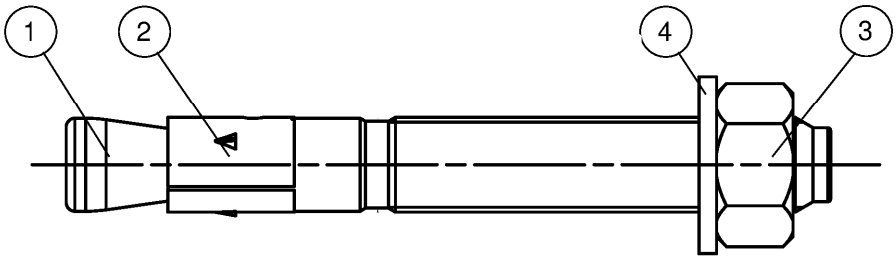
beglaubigt:
Baderschneider

Deutsches Institut für Bautechnik DIBt

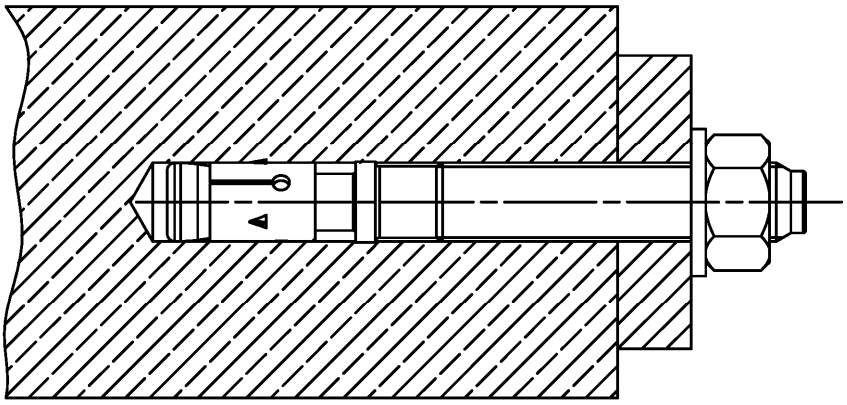
Cone bolt manufactured by cold - forming:



Cone bolt manufactured by turning:



① Cone bolt (cold – formed or turned)
② Expansion sleeve
③ Hexagon nut
④ Washer

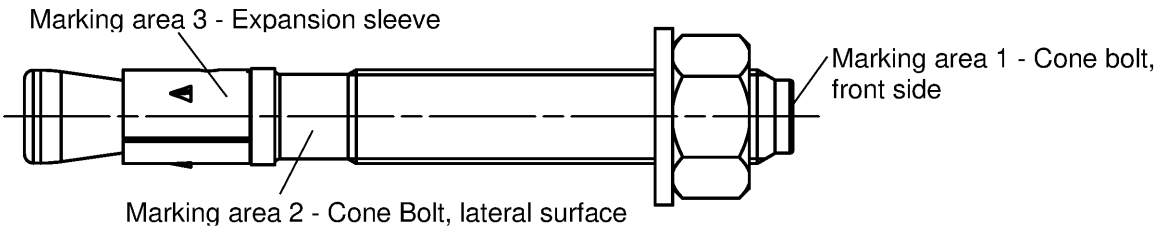


(Fig. not to scale)

fischer Bolt Anchor FXA, FXA R

Product description
Installed condition

Annex A 1



Product label, example: FXA 12/10 R

Brand | type of anchor placed on marking area 2 or marking area 3

thread size / thickness of fixture (t_{fix})
identification R
placed on 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

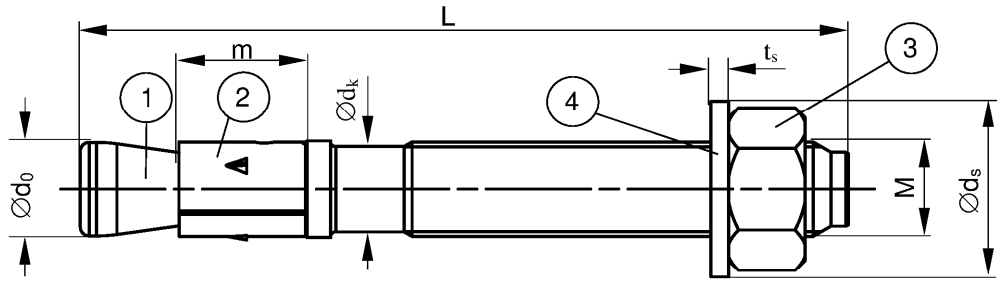


Table A2.2: Anchor dimensions [mm]

Part	Designation			FXA, FXA R			
				M8	**M10**	**M12**	**M16**
1	Cone bolt	M	=	8	10	12	16
		$\varnothing d_0$	=	7,9	9,9	11,9	15,9
		$\varnothing d_k$	=	7,1	8,9	10,8	14,5
2	Expansion sleeve	m	=	11,5	13,5	16,5	21,5
3	Hexagon nut	SW	=	13	17	19	24
4	Washer	t_S	≥	1,4	1,8	2,3	2,7
		$\varnothing d_s$	≥	15	19	23	29
Thickness of fixture		t_{fix}	≥	0			
			≤	200	250	300	400
Length of anchor		L_{min}	=	56	71	86	120
		L_{max}	=	261	316	396	520

(Fig. not to scale)

fischer Bolt Anchor FXA, FXA R

Annex A 2

Product description
Product label and letter code and anchor dimensions

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Table A3.1: Materials FXA (zinc plated ≥ 5µm, DIN EN ISO 4042:2018)

Part	Designation	Material
1	Cone bolt	Cold form steel or free cutting steel
2	Expansion sleeve	Cold strip, EN 10139:2016 [1)]
3	Hexagon nut	Steel, property class min. 8, EN ISO 898-2:2012
4	Washer	Cold strip, EN 10139:2013

[1)] Optional stainless steel EN 10088:2014

Table A3.2: Materials FXA R

Part	Designation	Material
1	Cone bolt	Stainless steel EN 10088:2014
2	Expansion sleeve	
3	Hexagon nut	Stainless steel EN 10088:2014 ISO 3506-2: 2009; property class min. 70
4	Washer	Stainless steel EN 10088:2014

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Specifications of intended use

fischer Bolt Anchor FXA, FXA R			M8	M10	M12	M16
Material	Steel	Zinc plated	✓	✓	✓	✓
	Stainless steel	R	✓	✓	✓	✓
Static and quasi-static loads			✓	✓	✓	✓
Uncracked concrete			✓	✓	✓	✓

Base materials:

- Reinforced or unreinforced normal concrete without fibres 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: **FXA**
- For all other conditions according to EN 1993-1-4:2015-10 corresponding to corrosion resistance class CRC III **FXA R**

Design:

- Anchorages are to be 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.)
- Design of fastenings according to EN 1992-4:2018 and TR 055

fischer Bolt Anchor FXA, FXA R	**Annex B 1**
Intended Use Specifications	

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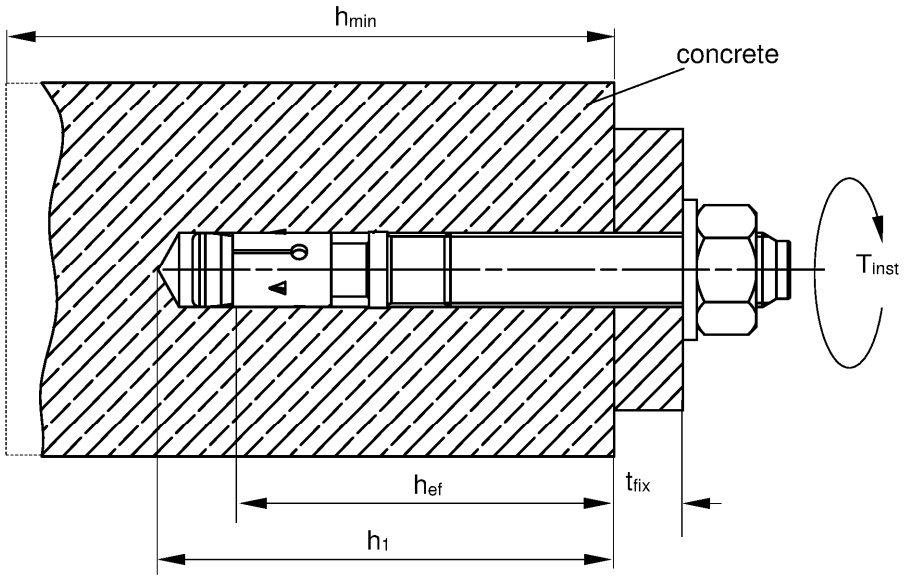
Table B2.1: Installation parameters

Type of anchor / size		FXA, FXA R			
		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 anchorage depth	h_{ef} = [mm]	40	50	65	80
Depth of drill hole in concrete	$h_1 \geq$	56	68	85	104
Diameter of clearance hole in the fixture	$d_f \leq$	9	12	14	18
Required torque moment FXA (zinc plated)	T_{inst} = [Nm]	15	30	50	100
Required torque moment FXA R		10	20	35	80



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 FXA, FXA R

Intended Use
Installation parameters

Annex B 2

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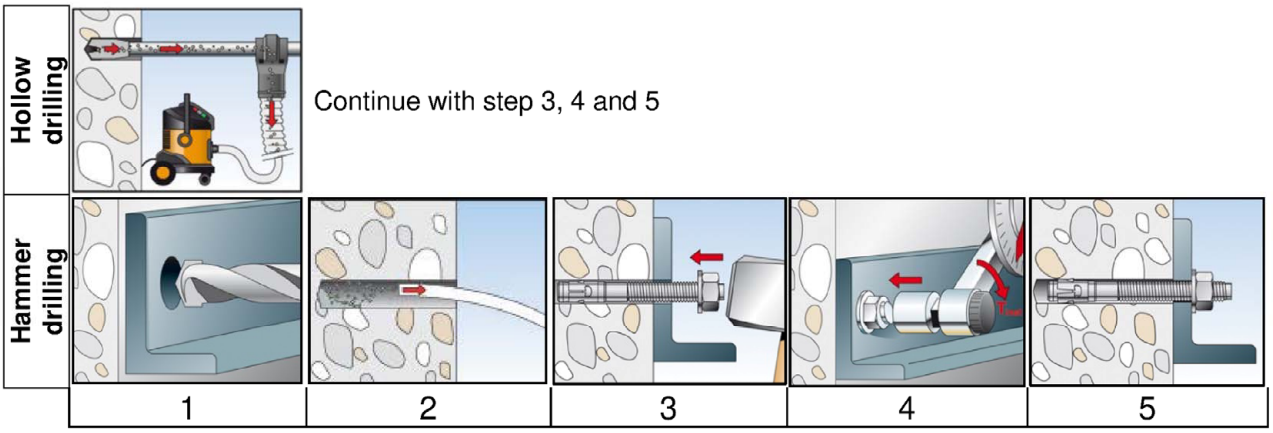
Installation instructions

- 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
- Hammer or hollow 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	Create drill hole with hammer drill	Create drill hole with hollow drill and vacuum cleaner
2	Clean bore hole	-
3	Set anchor	
4	Expand anchor with prescribed installation torque T_{inst}	
5	Finished installation	

Types of drills

Hammer drill

Hollow drill 

fischer Bolt Anchor FXA, FXA R

Intended Use
Installation instructions

Annex B 3

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

Type of anchor / size			FXA, FXA R			
			M8	**M10**	**M12**	**M16**
Steel failure						
Characteristic resistance	$N_{Rk,s}$	[kN]	16	25	36	67
Partial factor	γ_{Ms} [1)]	[-]	1,4			1,5
Pullout failure						
Characteristic resistance C20/25	$N_{Rk,p}$	[kN]	12	16	25	35
Increasing factors for $N_{Rk,p}$	ψ_c	C25/30	1,12			
		C30/37	1,23			
		C35/45	1,32			
		C40/50	1,41			
		C45/55	1,50			
		C50/60	1,58			
Installation sensitivity factor	γ_{inst}	[-]	1,2			1,0
Concrete cone and splitting failure						
Effective anchorage depth	h_{ef}	[mm]	40	50	65	80
Factor for uncracked concrete	$k_{ucr,N}$	[-]	11,0 [2)]			
Characteristic spacing	$s_{cr,N}$	[mm]	3 h_{ef}			
Characteristic edge distance	$c_{cr,N}$		1,5 h_{ef}			
Spacing (splitting failure)	$s_{cr,sp}$		190	200	290	350
Edge distance (splitting failure)	$c_{cr,sp}$		95	100	145	175
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 FXA, FXA R

Performances
Characteristic values of tension resistance

Annex C 1

Deutsches Institut für Bautechnik DIBt

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

Type of anchor / size			FXA, FXA R			
			M8	**M10**	**M12**	**M16**
Installation factor	γ_{inst}	[-]	1,2			1,0
Steel failure without lever arm						
Characteristic resistance	$V^0_{Rk,s}$	[kN]	11	17	25	47
Partial factor for steel failure	γ_{Ms} [1)]	[-]	1,25			
Steel failure with lever arm and concrete pryout failure						
Characteristic bending moment	$M^0_{Rk,s}$	[Nm]	23	45	79	200
Partial factor for steel failure	γ_{Ms} [1)]	[-]	1,25			
Factor for ductility	k_7	[-]	1,0			
Factor for pryout	k_8	[-]	1		2	
Concrete edge failure						
Effective length of anchor	l_f	[mm]	40	50	65	80
Effective diameter of anchor	d_{nom}	[mm]	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 anchor / size			FXA, FXA R			
			M8	**M10**	**M12**	**M16**
Minimum thickness of member	h_{min}	[mm]	100		120	160
Minimum spacing	s_{min}	[mm]	40	70		120
Minimum edge distance	c_{min}	[mm]	45	55	70	90

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

Type of anchor / size			FXA, FXA R			
			M8	**M10**	**M12**	**M16**
Tension load	N	[kN]	4,7	6,3	9,9	16,5
Displacements	δ_{N0}	[mm]	0,6	0,9	1,9	1,8
	$\delta_{N\infty}$	[mm]	3,1			

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

Type of anchor / size			FXA, FXA R			
			M8	**M10**	**M12**	**M16**
Shear load	V	[kN]	6,3	9,5	14,3	26,8
Displacements	δ_{V0}	[mm]	1,8	2,4		2,6
	$\delta_{V\infty}$	[mm]	2,7	3,6		3,9

fischer Bolt Anchor FXA, FXA R

Performances
Characteristic values of shear resistance, Minimum thickness of concrete members, minimum spacing and edge distance, Displacements due to tension and shear loads

Annex C 2