Deutsches Institut für Bautechnik

DIBt

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 Regula-
tion (EU) No 305/2011
and member of EOTA
(European Organi-
sation for Technical
Assessment)

European Technical Assessment	ETA-13/0772 of 27 September 2017

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
Product family to which the construction product belongs	Torque controlled expansion anchor for use in non-cracked 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 330232-00-0601

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Specific Part

1 Technical description of the product

The fischer Bolt anchor FXA is an anchor made of zinc plated 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 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 for tension and shear loads in concrete	See Annex C 1 and C 2
Displacements under tension and shear loads	See Annex C 2

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorages satisfy requirements for 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 European Assessment Documents EAD No. 330232-00-0601 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 at Deutsches Institut für Bautechnik.

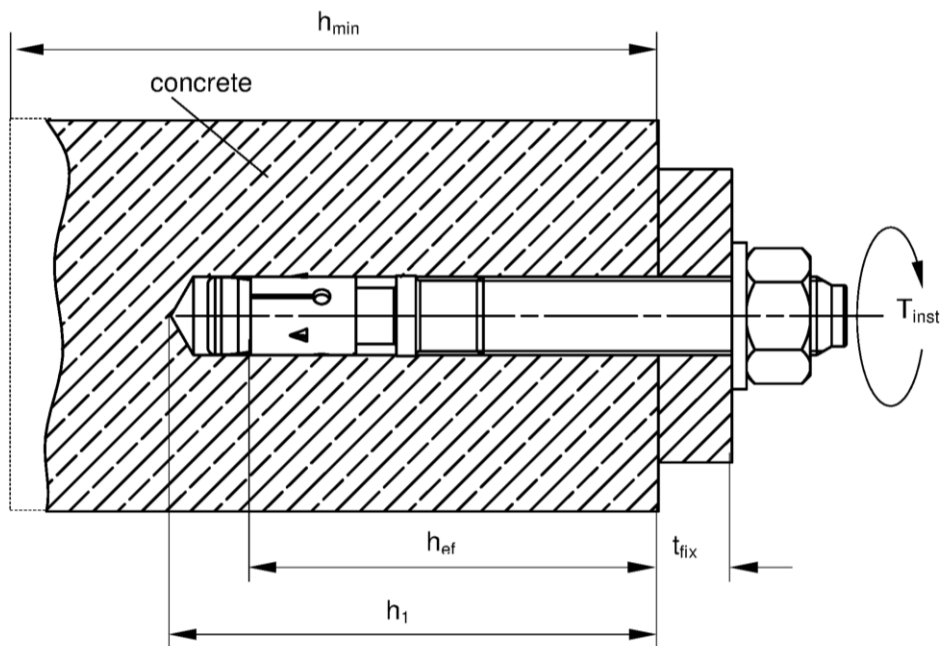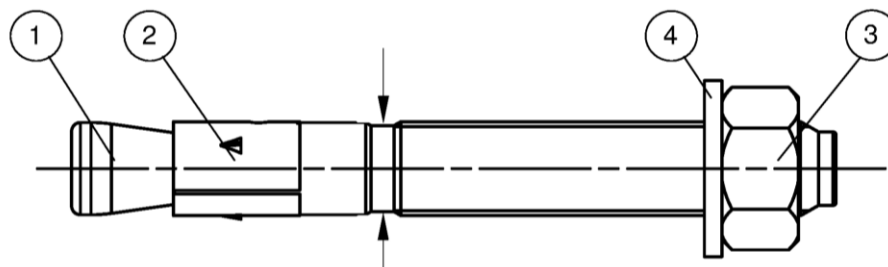Issued in Berlin on 27 September 2017 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow   *beglaubigt:*
Head of Department   Baderschneider

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Cone bolt manufactured by cold - forming:
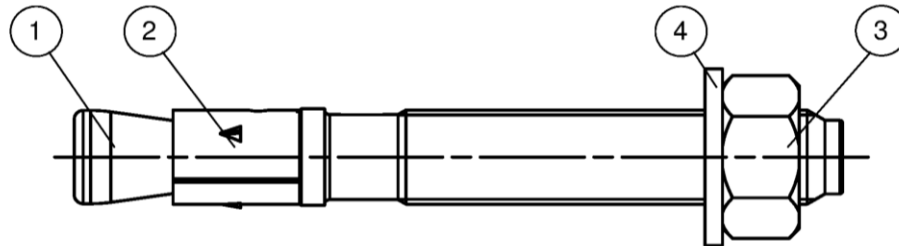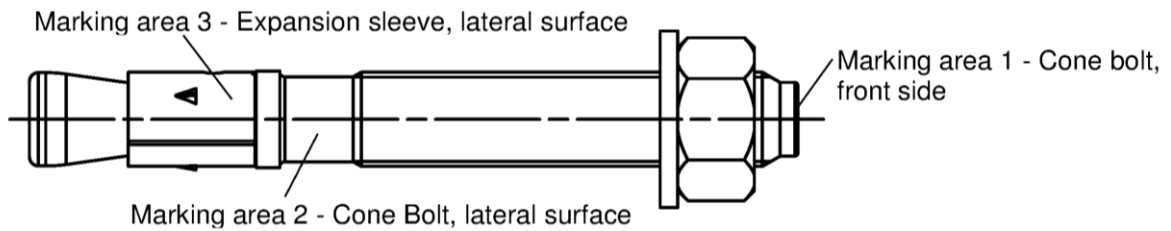

Cone bolt manufactured by turning:

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

h_{ef} = Effective anchorage depth
t_{fix} = Thickness of fixture
h_1 = Drill hole depth
h_{min} = Thickness of concrete member
T_{inst} = Required torque moment

fischer Bolt Anchor FXA, FXA A4

Product description
Installed condition

Annex A 1

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Marking area 3 - Expansion sleeve, lateral surface

Marking area 1 - Cone bolt, front side

Marking area 2 - Cone Bolt, lateral surface

Product marking, example: FXA 12/10 A4

works symbol | type of anchor — placed on marking area 2 or marking area 3

thread size / thickness of fixture (t_{fix}) identification A4 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
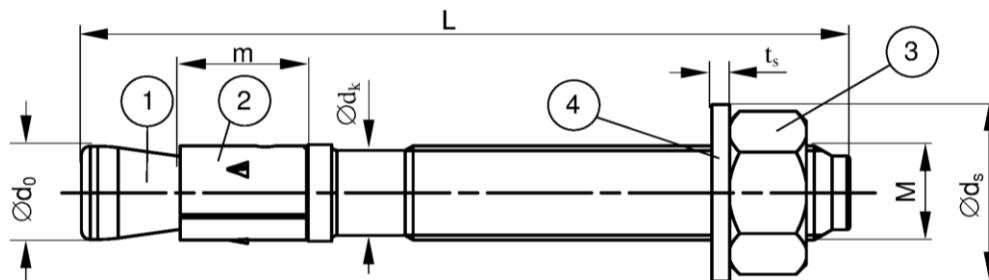
Table A2.2: Anchor dimensions [mm]

Part	Designation			FXA, FXA A4			
				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

fischer Bolt Anchor FXA, FXA A4

Product description
Anchor Types and anchor dimensions

Annex A 2

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Table A3.1: Materials FXA (zinc plated $\geq$ 5µm, DIN EN ISO 4042: 2001-01)

Part	Designation	Material
1	Cone bolt	Cold form steel or free cutting steel
2	Expansion sleeve	Cold strip[1]
3	Hexagon nut	Steel, property class 8
4	Washer	Cold strip

[1] Optional stainless steel

Table A3.2: Materials FXA A4

Part	Designation	Material
1	Cone bolt	Stainless steel
2	Expansion sleeve	
3	Hexagon nut	Stainless steel, property class $\geq$ 70
4	Washer	Stainless steel

fischer Bolt Anchor FXA, FXA A4

Product description Materials	**Annex A 3**

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Specifications of intended use

fischer Bolt Anchor FXA, FXA A4			M8	M10	M12	M16
Material	Steel	Zinc plated				
	Stainless steel	A4		✓		
Static and quasi-static loads						
Uncracked concrete						

Base materials:
- Reinforced and unreinforced normal weight concrete according to EN 206-1: 2000
- Strength classes C20/25 to C50/60 according to EN 206-1: 2000

Use conditions (Environmental conditions):
- Structures subject to dry internal conditions (FXA, FXA A4)
- Structures subject to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal condition, if no particular aggressive conditions exist (FXA A4)

  Note: Particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e.g. in desulphurization plants or road tunnels where deicing materials are used)

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 FprEN 1992-4: 2016 and EOTA Technical Report TR 055

Installation:
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site
- Hammer or Hollow drilling according to Annex B3

fischer Bolt Anchor FXA, FXA A4	
Intended Use Specifications	**Annex B 1**

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Table B2.1: Installation parameters

Type of anchor / size **FXA, FXA A4**		**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 A4		10	20	35	80
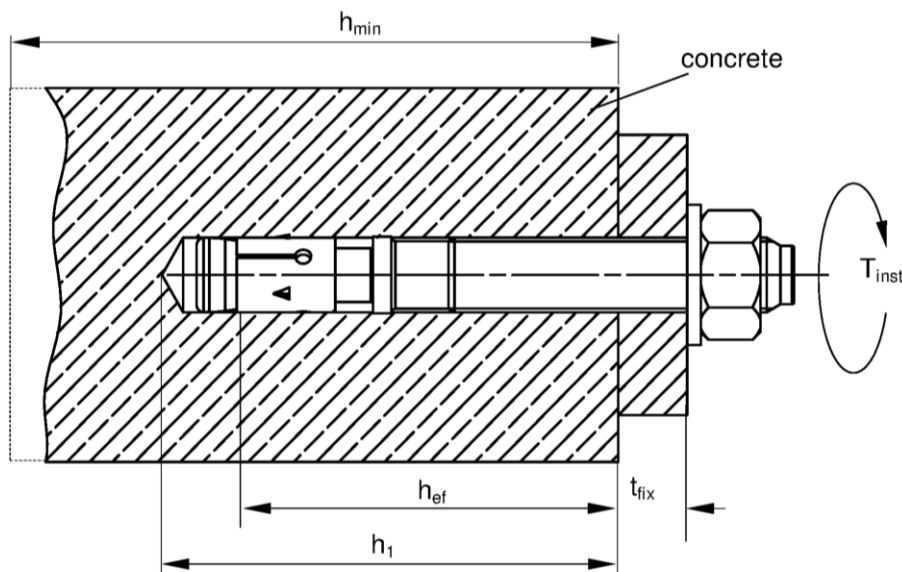
h_{ef} = Effective anchorage depth
t_{fix} = Thickness of fixture
h_1 = Drill hole depth
h_{min} = Thickness of concrete member
T_{inst} = Required torque moment

fischer Bolt Anchor FXA, FXA A4

Intended Use
Installation instructions

Annex B 2

Table B3.1: Minimum thickness of concrete members, minimum spacing and minimum edge distances

Type of anchor / size **FXA, FXA A4**			**M8**	**M10**	**M12**	**M16**
Minimum thickness of member	h_{min}		100		120	160
Minimum spacing	s_{min}	[mm]	40	70		120
Minimum edge distance	c_{min}		45	55	70	90

Installation instructions

Hollow drilling

Continue with step 3, 4 and 5

Hammer drilling

| 1 | 2 | 3 | 4 | 5 |
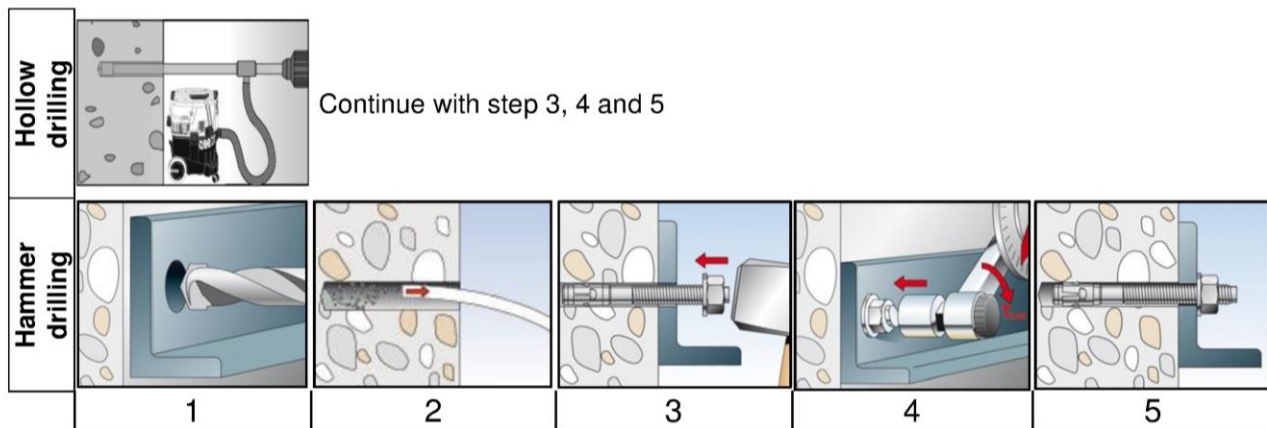
No.	Description	
1	Create drill hole with hammer drill	Create drill hole with hollow drill and vacuum cleaner
2	Clean bore hole	-
3	Set anchor	
4	Expand anchor with prescribed installation torque T_{inst}	
5	Finished installation	

Types of drills

Hammer drill

Hollow drill

fischer Bolt Anchor FXA, FXA A4

Intended Use
Minimum spacing and edge distance
Installation instructions

Annex B 3

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Table C1.1: Characteristic values of **tension** resistance

Type of anchor / size **for FXA and FXA A4**			M8	M10	M12	M16
Steel failure						
Characteristic resistance	$N_{Rk,s}$	[kN]	16	25	36	67
Partial factor for steel failure	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 k_1 for uncracked concrete	$k_{ucr,N}$	[-]		11,0		
Spacing	$s_{cr,N}$			$3\,h_{ef}$		
Edge distance	$c_{cr,N}$			$1,5\,h_{ef}$		
Spacing (splitting failure)	$s_{cr,sp}$	[mm]	190	200	290	350
Edge distance (splitting failure)	$c_{cr,sp}$		95	100	145	175

[1] In absence of other national regulations

fischer Bolt Anchor FXA, FXA A4	
Performances Characteristic values of tension resistance	**Annex C 1**

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Table C2.1: Characteristic values of **shear** resistance

Type of anchor / size			FXA, FXA A4			
			M8	M10	M12	M16
Steel failure without lever arm						
Characteristic resistance	$V_{Rk,s}$	[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 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}		8	10	12	16

[1] In absence of other national regulations

Table C2.2: Displacements due to **tension** loads

Type of anchor / size **FXA, FXA A4**			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
	$\delta_{N\infty}$			3,1		

Table C2.3: Displacements due to **shear** loads

Type of anchor / size **FXA, FXA A4**			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
	$\delta_{V\infty}$		2,7	3,6		3,9

fischer Bolt Anchor FXA, FXA A4

Performances
Characteristic values of shear resistance
Displacement under tension and shear loads

Annex C 2