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-15/0842 of 13 April 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	BeCoFix
Product family to which the construction product belongs	Torque controlled expansion fastener for use in uncracked concrete
Manufacturer	Joh. Friedrich Behrens AG Bogenstraße 43-45 22926 Ahrensburg DEUTSCHLAND
Manufacturing plant	BeA Plant 22
This European Technical Assessment contains	11 pages including 3 annexes
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	European Assessment Document (EAD) 330232-00-0601

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Specific Part

1 Technical description of the product

The BeCoFix Bolt Anchor is a fastener made of galvanised steel which is placed into a drilled hole and fastened 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 (static and quasi-static loading) and displacements	See Annex C 1 to C 2
Characteristic resistance and displacements for seismic performance categories C1 and C2	No performance assessed

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 EAD 330232-00-0601 according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011 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 13 April 2017 by Deutsches Institut für Bautechnik

Andreas Kummerow
p. p. Head of Department

beglaubigt:
Lange

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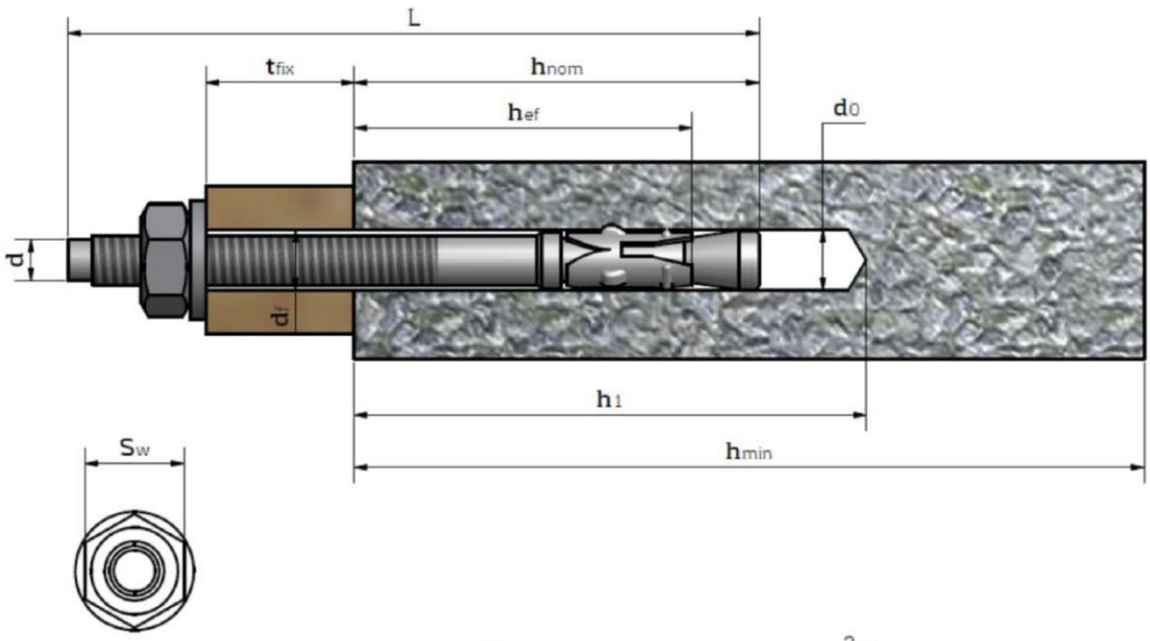
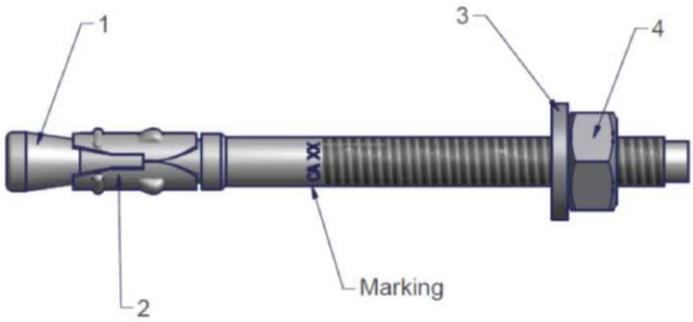
Installed condition

Metal expansion anchor BeCoFix





1. Bolt
2. Expansion clip
3. Washer
4. Nut

Marking:

CA (Product name)
XX = fixture thickness

BeCoFix Bolt Anchor	**Annex A 1**
Product description Installed condition and marking	

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Table A1: Dimensions

				M6	M8	M10	M12	M16
Length cone bolt	Minimum	L	[mm]	65	65	75	100	125
	Maximum		[mm]	100	150	220	220	200
Fixture thickness	Minimum	t_{fix}	[mm]	15	7	5	10	10
	Maximum		[mm]	50	90	150	130	80

Table A2: Materials

Part	Designation	Material	Coating
1	Bolt	cold formed steel SWRCH35K acc. to JIS G 3507-1 (2005)	Zinc electroplated
2	Expansion clip	M6: ST12 M8: ST14 M10-M16: DX51D+Z	Zinc electroplated
3	Washer	DIN EN 10263 1.1172	Zinc electroplated
4	Hexagonal nut	DIN EN 10263 1.1172	Zinc electroplated

Table A3: Steel strength

Part	Parameter	Unit		M6	M8	M10	M12	M16
Thread	ultimate steel strength	f_{uk}	[N/mm²]	500	650	650	650	600
	yield steel strength	f_{yk}	[N/mm²]	480	600	600	600	550
Neck	ultimate steel strength	f_{uk}	[N/mm²]	600	800	820	740	740
	yield steel strength	f_{yk}	[N/mm²]	550	700	710	620	620

BeCoFix Bolt Anchor

Product description
Dimensions, materials and steel strengths

Annex A 2

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Intended use

Anchorages subject to:

- Static and quasi-static loads: All sizes.

Base materials:

- Uncracked 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)

- Anchorages 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 anchor is indicated on the design drawings (e. g. position of the anchor relative to reinforcement or to supports, etc.).
- Anchorages under static or quasi-static actions are designed for design method A in accordance with FprEN 1992-4:2016

Installation:

- Hammer drilling only: all sizes.
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- In case of aborted hole: new drilling at a minimum distance away of twice the depth of the aborted hole or smaller distance if the aborted hole is filled with high strength mortar and if under shear or oblique tension load it is not the direction of the load application.
- Use of the anchor only as supplied by the manufacturer without exchanging the components of the anchor.
- The anchor may only be set once.

BeCoFix Bolt Anchor	**Annex B 1**
Intended Use Specifications	

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Table B1: Installation parameters

			M6	M8	M10	M12	M16
Nominal drill hole diameter	d_0	[mm]	6	8	10	12	16
Diameter through hole fixture	d_f	[mm]	7	9	12	14	18
Drill hole diameter	$d_{cut} \leq$	[mm]	6,40	8,45	10,45	12,5	16,5
Drill hole depth	h_1	[mm]	50	60	70	85	115
Thread engagement	h_{nom}	[mm]	41	48	59	71	96
Min. member thickness	h_{min}	[mm]	80	80	100	120	170
Char. spacing	$s_{cr,N}$	[mm]	106	120	150	180	254
Char. edge distance	$c_{cr,N}$	[mm]	53	60	75	90	127
Installation torque	T_{inst}	[Nm]	5	10	28	34	120

Table B2: Minimum thickness, distances and spacing

			M6	M8	M10	M12	M16
Minimum member thickness	h_{min}	[mm]	80	80	100	120	170
Minimum edge distance	c_{min}	[mm]	50	55	70	70	120
	for s	[mm]	50	55	100	140	120
Minimum spacing	s_{min}	[mm]	50	55	70	70	120
	for c	[mm]	50	55	80	90	120

BeCoFix Bolt Anchor

Intended Use
Installation parameters
Minimum thickness, distances and spacing

Annex B 2

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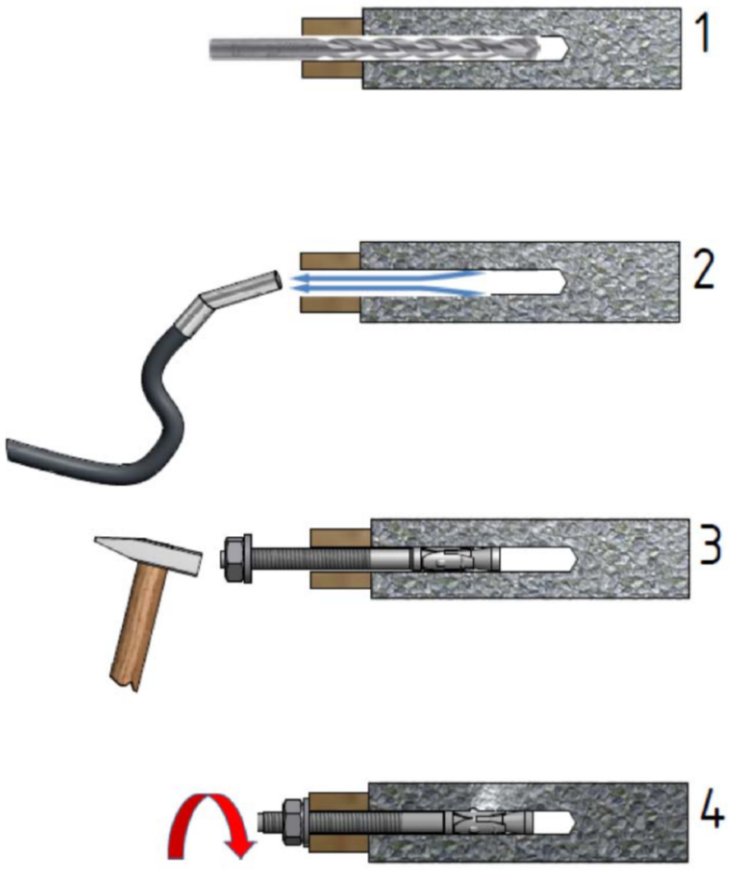
Installation instructions



1: Drill bore hole with hammer drill.
2: Clean bore hole using a vacuum cleaner and a tube.
3: Set anchor.
4: Expand anchor with prescribed installation torque T_{inst}.

BeCoFix Bolt Anchor	**Annex B 3**
Intended Use Installation instruction	

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Table C1: Fastener performance under tension load

Steel failure			**M6**	**M8**	**M10**	**M12**	**M16**
Characteristic resistance	$N_{Rk,s}$	[kN]	8,7[2)]	20,4	34,4	49,2	90,8
Partial safety factor[1)]	γ_{Ms}	[-]	1,40	1,40	1,40	1,43	1,43

Pullout failure (uncracked)							
Characteristic resistance in uncracked concrete C20/25	$N_{Rk,p}$	[kN]	7,5[2)]	12	16	20	35
Installation factor	γ_{inst}	[-]	1,0	1,0	1,0	1,0	1,0
Increasing factor for N_{RK} concrete C30/37	Ψ_c	[-]	1	1	1	1,22	1,12
Increasing factor for N_{RK} concrete C40/50		[-]	1	1	1	1,41	1,23
Increasing factor for N_{RK} concrete C50/60		[-]	1	1	1	1,23	1,30

Concrete cone failure and splitting failure							
Effective embedment depth	h_{ef}	[mm]	35[2)]	40	50	60	85
Factor for uncracked concrete	k_1	[-]	11,0				
Characteristic spacing concrete cone failure	$s_{cr,N}$	[mm]	$3xh_{ef}$				
Characteristic edge distance concrete cone failure	$c_{cr,N}$	[mm]	$1,5xh_{ef}$				
Characteristic resistance for splitting concrete	$N^0_{Rk,sp}$	[kN]	7,5	12	16	20	35
Characteristic spacing splitting failure	$s_{cr,sp}$	[mm]	160	220	240	250	330
Characteristic edge distance splitting failure	$c_{cr,sp}$	[mm]	80	110	120	125	165

Displacements under tension load							
Tension load in uncracked concrete	N	[kN]	3,6	5,7	7,6	9,5	16,7
Short term displacement	δ_{N0}	[mm]	0,7	1,1	1,1	1,2	1,3
Long term displacement	$\delta_{N\infty}$	[mm]	1,1	1,7	1,7	1,9	2,0

[1)] In absence of other national regulations

[2)] Only anchoring in structural components which are statically indeterminate

BeCoFix Bolt Anchor

Performance under tension load

Annex C 1

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Table C2: Fastener performance under shear load

Steel failure without lever arm			**M6**	**M8**	**M10**	**M12**	**M16**
Characteristic resistance	$V^0_{Rk,s}$	[kN]	3,7[2)]	7,9	12,4	18,1	31,1
Ductility factor	k_7	[-]	0,8	0,8	0,8	0,8	0,8
Partial safety factor	γ_{Ms}[1)]	[-]	1,5	1,5	1,5	1,5	1,5

Steel failure with lever arm							
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	7,6[2)]	24,4	48,5	85,2	199,0
Partial safety factor	γ_{Ms}[1)]	[-]	1,5	1,5	1,5	1,5	1,5

Concrete pry-out failure							
Factor	k_8	[-]	1	1	1	2	2
Partial safety factor	γ_{Mc}[1)]	[-]	1,50	1,50	1,50	1,50	1,50

Concrete edge failure							
Effective length of fastener under shear loading	$\ell_{f,min}$	[mm]	35[2)]	40	50	60	85
Outside diameter of fastener	d_{nom}	[mm]	6	8	10	12	16
Factor	k_9	[-]	2,4				
Partial safety factor	γ_{Mc}[1)]	-	1,50	1,50	1,50	1,50	1,50

Displacements under shear load							
Shear load in uncracked concrete	V	[kN]	1,8	3,8	5,9	8,6	14,8
Short term displacement	δ_{V0}	[mm]	0,5	0,7	0,9	1,1	1,5
Long term displacement	$\delta_{V\infty}$	[mm]	0,8	1,1	1,4	1,7	2,3

[1)] In absence of other national regulations

[2)] Only anchoring structural components which are statically indeterminate

BeCoFix Bolt Anchor

Performances under shear load

Annex C 2