

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-12/0142
of 8 February 2016

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

Apolo MEA Quick fix anchor BA plus

Product family
to which the construction product belongs

Torque controlled expansion anchor made of zinc coated
steel of sizes M6, M8, M10, M12, M16 and M20 for use in
non-cracked concrete

Manufacturer

Apolo MEA Befestigungssysteme GmbH
Industriestraße 6
86551 Aichach
DEUTSCHLAND

Manufacturing plant

Werk 11
Werk 12

This European Technical Assessment
contains

11 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

Guideline for European technical approval of "Metal
anchors for use in concrete", ETAG 001 Part 2: "Torque
controlled expansion anchors", Edition April 2013,
used as European Assessment Document (EAD)
according to Article 66 Paragraph 3 of Regulation (EU)
No 305/2011.

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Specific Part

1 Technical description of the product

The Apolo MEA Quick fix anchor BA plus in the size of M6, M8, M10, M12, M16 and M20 is an anchor made of galvanised steel which is placed into a drilled hole and anchored by torque-controlled expansion.

Product and 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
Edge distances and spacing	See Annex C 1
Displacements under tension and shear loads	See Annex C 1 and C 2

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorage satisfy requirements for Class A1
Resistance to fire	No performance assessed

3.3 Safety in use (BWR 4)

The essential characteristics regarding Safety in use are included under the Basic Works Requirement Mechanical resistance and stability.

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

In accordance with guideline for European technical approval ETAG 001, April 2013 used as European Assessment Document (EAD) 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

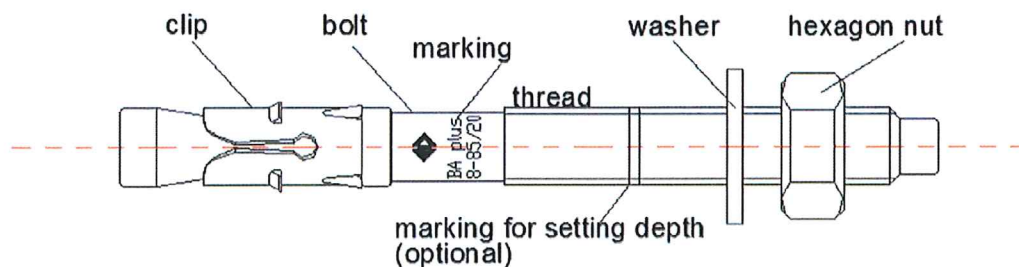
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 8 February 2016 by Deutsches Institut für Bautechnik

Uwe Bender
Head of Department

beglaubigt:
Tempel

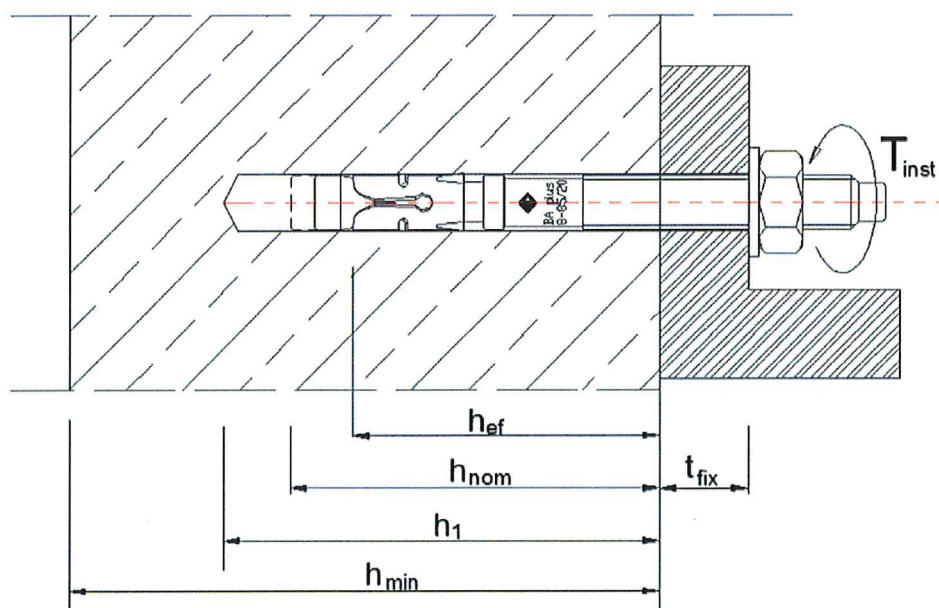
Apolo MEA Quick fix anchor BA plus (assembling)



Marking:	brand marking	Logo or company name
	Type	BA plus
	Size	M ... (i.e. M8)
	Length	L ... (i.e. 85)
	Max. thickness of fixture	t_{fix} (i.e. 20)

Example:  BA plus 8-85/20

Apolo MEA Quick fix anchor BA plus (after installation)



h_{nom}	=	setting depth
h_1	=	depth of drill hole (deepest point)
h_{min}	=	min. thickness of concrete member
t_{fix}	=	thickness of fixture
h_{ef}	=	effective anchorage depth

Apolo MEA Quick fix anchor BA plus

Product description
Marking and installed condition

Annex A1

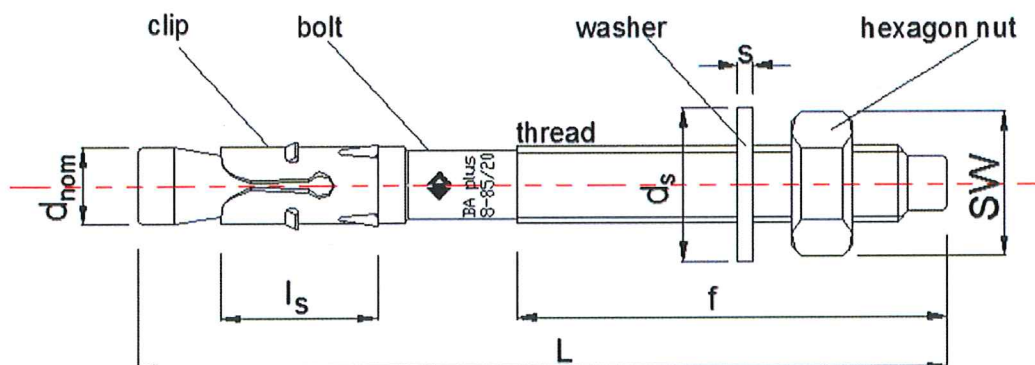


Table 1: designation, materials and strength

Designation	material	strength
bolt	cold form steel or free cutting steel	M6: $f_{uk} \geq 900 \text{ N/mm}^2$, $f_{yk} \geq 720 \text{ N/mm}^2$ M8: $f_{uk} \geq 750 \text{ N/mm}^2$, $f_{yk} \geq 650 \text{ N/mm}^2$ M10: $f_{uk} \geq 670 \text{ N/mm}^2$, $f_{yk} \geq 540 \text{ N/mm}^2$ M12: $f_{uk} \geq 630 \text{ N/mm}^2$, $f_{yk} \geq 500 \text{ N/mm}^2$ M16: $f_{uk} \geq 600 \text{ N/mm}^2$, $f_{yk} \geq 510 \text{ N/mm}^2$ M20: $f_{uk} \geq 510 \text{ N/mm}^2$, $f_{yk} \geq 410 \text{ N/mm}^2$
clip	cold steel strip acc. EN 10130, C490, C1035/C1045	$\geq 128 \text{ HV } 10 \text{ or HV } 1$
washer	cold steel strip	$\geq 140 \text{ HV } 10 \text{ or HV } 1$
nut	steel acc. DIN 934 or EN 4032	class 8 (DIN 267-4)

all parts zinc plated and blue passivated $\geq 5 \mu\text{m}$ acc. EN ISO 4042

Table 2: Dimensions

anchor		length overall	length thread	bolt- ϕ	clip	washer		hex-nut
					length	thickness	outer- ϕ	wrench-size
type	size	L	f	d_{nom}	l_s	s	d_s	SW
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
BA plus	M6	55 - 150	acc. drawing	6	13,3	$\geq 1,4$	≥ 12	10
BA plus	M8	65 - 365	acc. drawing	8	16,4	$\geq 1,4$	≥ 15	13
BA plus	M10	75 - 375	acc. drawing	10	20,5	$\geq 1,7$	≥ 19	17
BA plus	M12	100 - 500	acc. drawing	12	21,4	$\geq 2,2$	≥ 23	19
BA plus	M16	120 - 615	acc. drawing	16	28,2	$\geq 2,7$	≥ 29	24
BA plus	M20	160 - 640	acc. drawing	20	28,8	$\geq 2,7$	≥ 35	30

Apolo MEA Quick fix anchor BA plus

Product description
Designation, materials and anchor dimensions

Annex A2

Specification of intended use

Anchorage subject to:

- Static and quasi-static loads.

Base materials:

- Reinforced or unreinforced normal weight concrete according to EN 206-1:2000-12.
- Strength classes C20/25 to C50/60 according to EN 206-1:2000-12.
- Non-cracked concrete.

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 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 in accordance with ETAG 001, Annex C, design method A, Edition August 2010.

Installation:

- Anchor installation carried out by appropriately qualified personal and under the supervision of the person responsible for technical matters of the site.
- Anchor installation in accordance with the manufacturer's specifications and drawings and using the appropriate tools.
- Hole drilling by hammer drilling only.
- Positioning of the drill holes without damaging the reinforcement.

Apolo MEA Quick fix anchor BA plus	Annex B1
Intended use Specification	

Table 3: Installation data

Apolo MEA Quick fix anchor BA plus			size	size	size	size	size	size
			M6	M8	M10	M12	M16	M20
nominal driller diameter	d_0	[mm]	6	8	10	12	16	20
max. cutting diameter of drill bit	$d_{cut,max} \leq$	[mm]	6,40	8,45	10,45	12,50	16,50	20,55
depth of drill hole (deepest point)	$h_1 \geq$	[mm]	48	60	65	90	110	130
effective anchorage depth	$h_{ef} \geq$	[mm]	35	45	50	70	85	100
setting depth	$h_{nom} \geq$	[mm]	40	53	59	82	99	114
diameter of clearance hole in the fixture	$d_f \leq$	[mm]	7	9	12	14	18	22
thickness of fixture	$t_{fix,min...max}$	[mm]	0...100	0...300	0...300	0...400	0...500	0...500
wrench size of the nut	SW	[mm]	10	13	17	19	24	30
Required installation torque moment	T_{inst}	[Nm]	8	15	30	50	90	180

Table 4: Minimum thickness of concrete member, min. spacing and edge distance

Apolo MEA Quick fix anchor BA plus			size	size	size	size	size	size
			M6	M8	M10	M12	M16	M20
minimum thickness of member	h_{min}	[mm]	100	100	120	140	200	200
minimum spacing	s_{min}	[mm]	50	50	120	100	140	160
minimum edge distance	c_{min}	[mm]	50	50	90	100	125	150

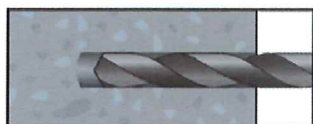
Apolo MEA Quick fix anchor BA plus

Intended use

Installation data, minimum thickness, min. spacing and edge distance

Annex B2

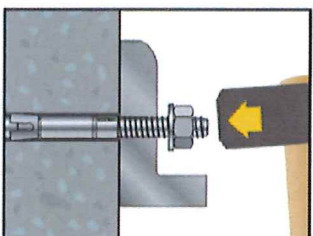
Installation instruction of the Apolo MEA quick fix anchor BA plus



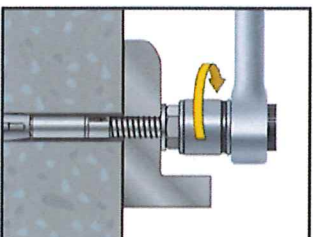
1. Drill the hole with a hammer drill



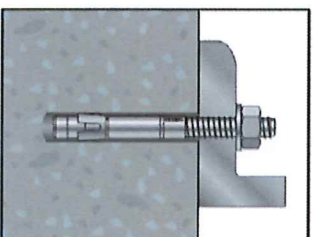
2. Clean the borehole



3. Hammer in the anchor (consider the defined setting depth)



4. Apply the required installation torque T_{inst} by using a torque wrench



5. After installation

Apolo MEA Quick fix anchor BA plus

Intended use
Installation instruction

Annex B3

Table 5: Design method A - Characteristic values for tension loads

Apolo MEA Quick fix anchor BA plus			size	size	size	size	size	size
			M6	M8	M10	M12	M16	M20
Steel failure								
characteristic resistance	$N_{Rk,s}$	[kN]	12,1	19,5	27,5	40,5	69,5	109,3
partial safety factor	γ_{Ms}	[-]	1,5	1,4	1,49	1,51	1,41	1,5
Pull out failure								
characteristic resistance in uncracked concrete C 20/25	$N_{Rk,p}$	[kN]	7,5	7,5	16	20	25	50
increasing factors for $N_{Rk,p}$	ψ_c	C25/30	1,10					
		C30/37	1,22					
		C40/50	1,41					
		C50/60	1,55					
installation safety factor	γ_2	[-]	1,0	1,2	1,0	1,0	1,0	1,2
Concrete cone failure								
effective anchorage depth	h_{ef}	[mm]	35	45	50	70	85	100
spacing	$s_{cr,N}$	[mm]	3 h_{ef}					
edge distance	$c_{cr,N}$	[mm]	1,5 h_{ef}					
installation safety factor	γ_2	[-]	1,0	1,2	1,0	1,0	1,0	1,2
Concrete splitting failure								
spacing (splitting)	$s_{cr,sp}$	[mm]	190	190	240	390	400	450
edge distance (splitting)	$c_{cr,sp}$	[mm]	95	95	120	195	200	225
installation safety factor	γ_2	[-]	1,0	1,2	1,0	1,0	1,0	1,2

Table 6: Displacements under tension loads

Apolo MEA Quick fix anchor BA plus			size	size	size	size	size	size
			M6	M8	M10	M12	M16	M20
tension load	N	[kN]	3,6	3,0	6,3	9,5	11,9	21,5
displacements	δ_{N0}	[mm]	0,2	0,6	1,3	1,1	0,5	0,4
displacements	$\delta_{N\infty}$	[mm]	0,6	0,8	1,9	1,9	1,9	1,5

Apolo MEA Quick fix anchor BA plus

Performances

Characteristic values of tension load resistance, displacement

Annex C1

Table 7: Design method A - Characteristic values for shear loads

Apolo MEA Quick fix anchor BA plus			size	size	size	size	size	size
			M6	M8	M10	M12	M16	M20
Steel failure with or without lever arm								
characteristic shear load resistance	$V_{Rk,s}$	[kN]	6,4	6,4	19,4	26,6	34,6	50,5
characteristic bending moment	$M^0_{Rk,s}$	[Nm]	9,8	28,1	50,1	82,5	199,2	267,5
partial safety factor	γ_{Ms}	[-]	1,5	1,5	1,5	1,26	1,5	1,25
Concrete pryout failure								
factor in equation (5.6) of the Guideline ETAG 001, Annex C, 5.2.3.3	k	[-]	1,0	1,0	1,0	2,0	2,0	2,0
installation safety factor	γ_2	[-]	1,0					
Concrete edge failure								
effective length of anchor under shear load	l_f	[mm]	35	45	50	70	85	100
effective external diameter of anchor	d_{nom}	[mm]	6	8	10	12	16	20
installation safety factor	γ_2	[-]	1,0					

Table 8: Displacements under shear loads

Apolo MEA Quick fix anchor BA plus			size	size	size	size	size	size
			M6	M8	M10	M12	M16	M20
shear load	V	[kN]	3,1	3,8	9,2	15,1	16,5	24,0
displacements	δ_{V0}	[mm]	0,7	0,7	1,9	3,2	3,3	1,0
displacements	$\delta_{V\infty}$	[mm]	1,1	1,4	2,9	4,8	5,0	1,5

Apolo MEA Quick fix anchor BA plus

Performances

Characteristic values of shear load resistance, displacement

Annex C2