

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

English translation prepared by DIBt

**5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document**

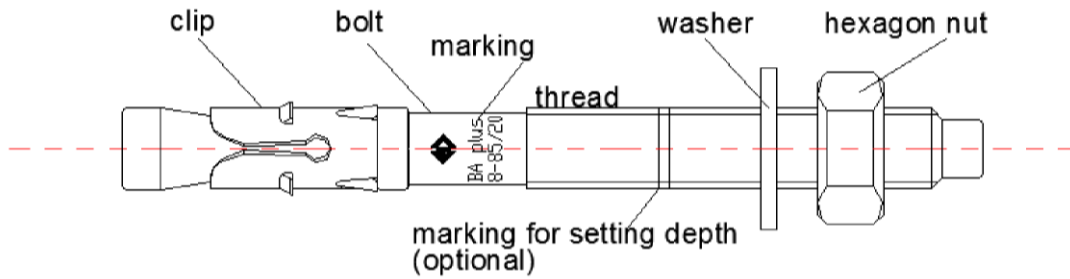
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

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

Uwe Bender  
Head of Department

*beglaubigt:*  
Tempel

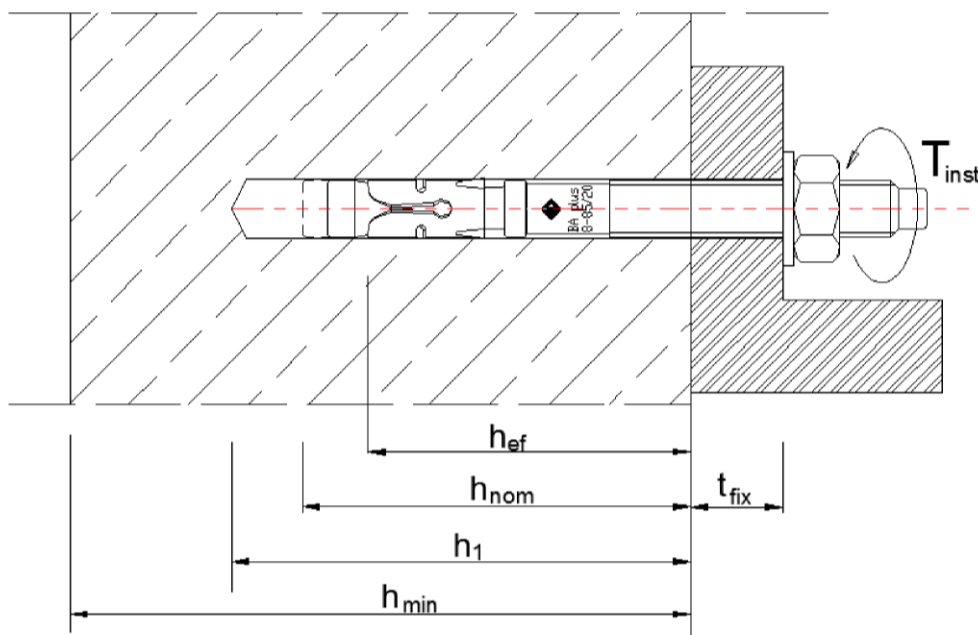
**Apolo MEA Quick fix anchor BA plus (assembling)**



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)**

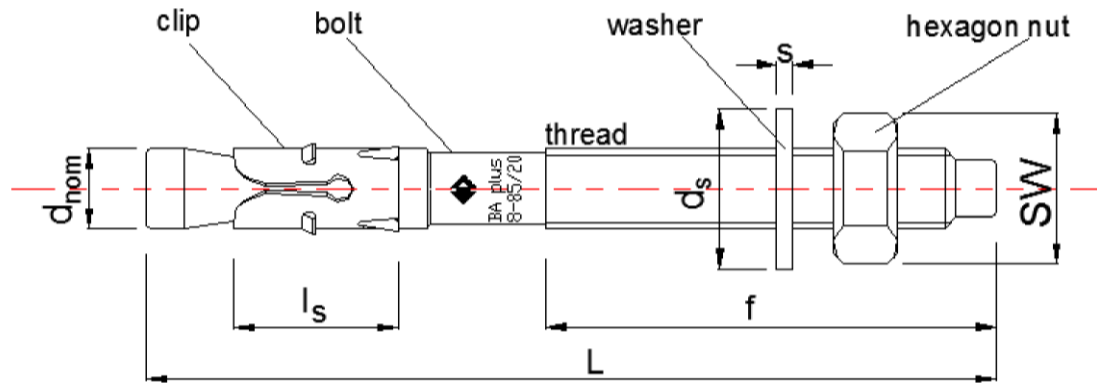


$h_{nom}$	=	setting depth
$h_1$	=	depth of drill hole (deepest point)
$h_{min}$	=	min. thickness of concrete member
$t_{fix}$	=	thickness of fixture
$h_{ef}$	=	effective anchorage depth

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	$\geq 128 \text{ HV } 10$ or $\text{HV } 1$
washer	cold steel strip	$\geq 140 \text{ HV } 10$ or $\text{HV } 1$
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	size	length overall	length thread	bolt- $\phi$	clip	washer		hex-nut
						length	thickness	outer- $\phi$
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	$\geq 1,4$	$\geq 12$	10
BA plus	M8	65 - 365	acc. drawing	8	16,4	$\geq 1,4$	$\geq 15$	13
BA plus	M10	75 - 375	acc. drawing	10	20,5	$\geq 1,7$	$\geq 19$	17
BA plus	M12	100 - 500	acc. drawing	12	21,4	$\geq 2,2$	$\geq 23$	19
BA plus	M16	120 - 615	acc. drawing	16	28,2	$\geq 2,7$	$\geq 29$	24
BA plus	M20	160 - 640	acc. drawing	20	28,8	$\geq 2,7$	$\geq 35$	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

**Intended use**  
Specification

Annex B1

**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

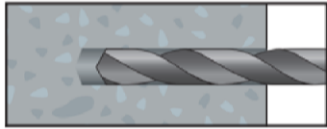
**Intended use**

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

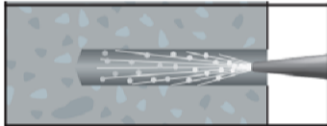
Annex B2



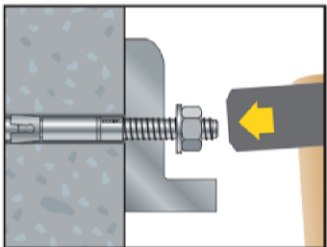
### Installation instruction of the Apolo MEA quick fix anchor BA plus



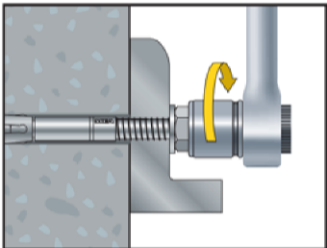
1. Drill the hole with a hammer drill



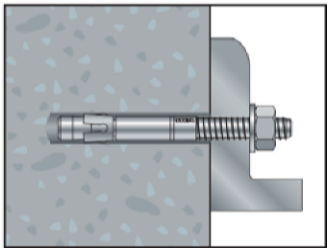
2. Clean the borehole



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
<b>Steel failure</b>								
characteristic resistance	$N_{Rk,s}$	[kN]	12,1	19,5	27,5	40,5	69,5	109,3
partial safety factor	$\gamma_{Ms}$	[ - ]	1,5	1,4	1,49	1,51	1,41	1,5
<b>Pull out failure</b>								
characteristic resistance in uncracked concrete C 20/25	$N_{Rk,p}$	[kN]	7,5	7,5	16	20	25	50
increasing factors for $N_{Rk,p}$	$\psi_c$	C25/30	1,10					
		C30/37	1,22					
		C40/50	1,41					
		C50/60	1,55					
installation safety factor	$\gamma_2$	[ - ]	1,0	1,2	1,0	1,0	1,0	1,2
<b>Concrete cone failure</b>								
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	$\gamma_2$	[ - ]	1,0	1,2	1,0	1,0	1,0	1,2
<b>Concrete splitting failure</b>								
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	$\gamma_2$	[ - ]	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	$\delta_{N0}$	[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
<b>Steel failure with or without lever arm</b>								
characteristic shear load resistance	$V_{Rk,s}$	[kN]	6,4	6,4	19,4	26,6	34,6	50,5
characteristic bending moment	$M_{Rk,s}^0$	[Nm]	9,8	28,1	50,1	82,5	199,2	267,5
partial safety factor	$\gamma_{Ms}$	[-]	1,5	1,5	1,5	1,26	1,5	1,25
<b>Concrete pryout failure</b>								
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	$\gamma_2$	[-]	1,0					
<b>Concrete edge failure</b>								
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	$\gamma_2$	[-]	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	$\delta_{V0}$	[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