

Approval body for construction products  
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and  
Laender Governments



## European Technical Assessment

**ETA-15/0356**  
**of 8 July 2015**

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

Forced expansion anchor ZA

Product family  
to which the construction product belongs

Torque controlled expansion anchor for use in non-  
cracked concrete

Manufacturer

Apolo MEA Befestigungssysteme GmbH  
Industriestraße 6  
86551 Aichach  
DEUTSCHLAND

Manufacturing plant

Werk 11

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

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 Forced expansion anchor ZA 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 as well as bending moments 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 determined (NPD)

#### 3.3 Hygiene, health and the environment (BWR 3)

Not applicable.

#### 3.4 Safety in use (BWR 4)

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

#### 3.5 Protection against noise (BWR 5)

Not applicable.

#### 3.6 Energy economy and heat retention (BWR 6)

Not applicable.

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**3.7 Sustainable use of natural resources (BWR 7)**

The sustainable use of natural resources was not investigated.

**3.8 General aspects**

The verification of durability is part of testing the essential characteristics. Durability is only ensured if the specifications of intended use according to Annex B are taken into account.

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

According to Decision of the Commission of 24 June 1996 (96/582/EC) (OJ L 254 of 08.10.96 p. 62-65), the system of assessment and verification of constancy of performance (see Annex V and Article 65 Paragraph 2 to Regulation (EU) No 305/2011) given in the following table applies.

Product	Intended use(s)	Level or class	System
Metal anchors for use in concrete (heavy-duty type)	For fixing and/or supporting concrete structural elements or heavy units such as cladding and suspended ceilings	—	1

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

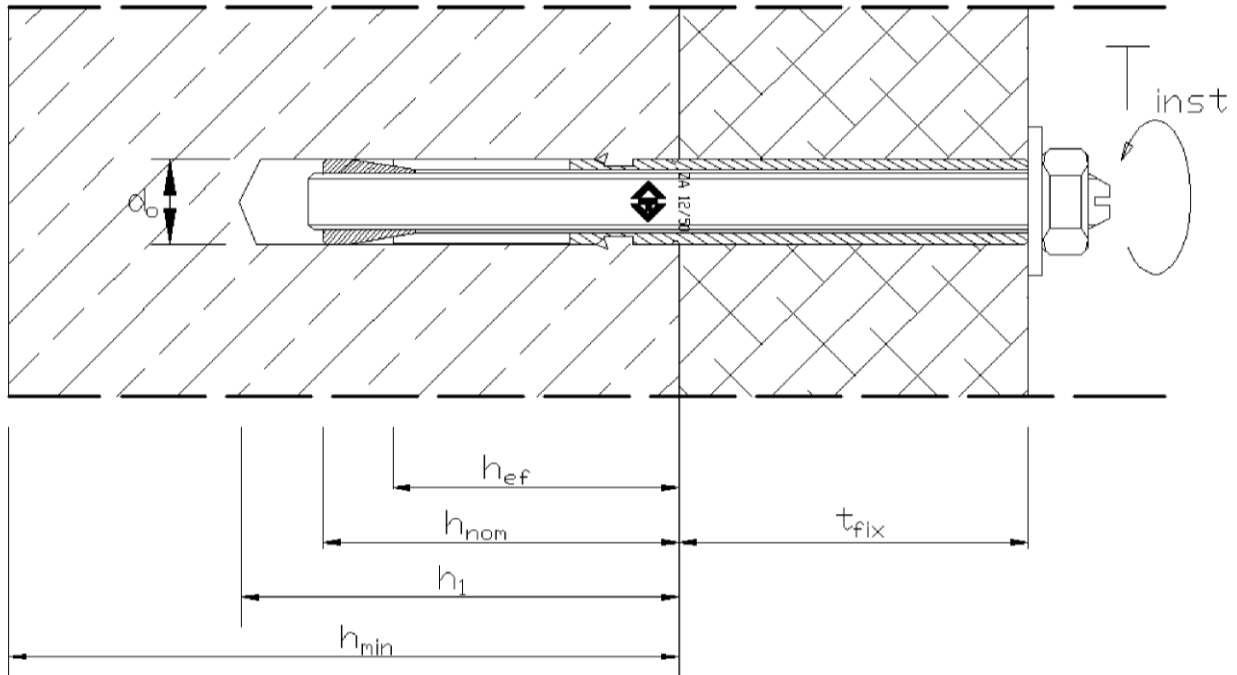
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 8 July 2015 by Deutsches Institut für Bautechnik

Andreas Kummerow  
p. p. Head of Department

*beglaubigt:*  
Tempel

**Apolo MEA forced expansion anchor ZA 12 (after installation in concrete)**



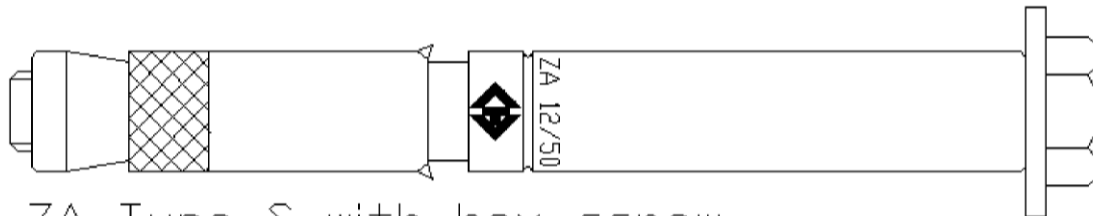
- $h_{nom}$  = Setting depth
- $h_1$  = Depth of the drill hole (deepest point)
- $h_{min}$  = Min. thickness of concrete member
- $t_{fix}$  = Thickness of fixture
- $h_{ef}$  = Effective anchorage depth
- $d_o$  = Drill hole diameter
- $T_{inst}$  = Installation torque

**Apolo MEA forced expansion anchor ZA 12**

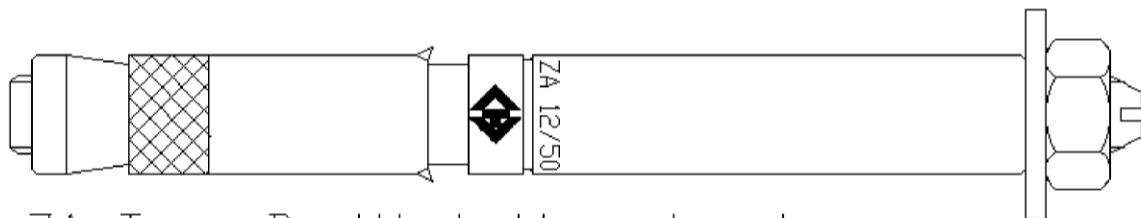
**Product description**  
Installed conditions

**Annex A 1**

**Apolo MEA forced expansion anchor ZA 12 (assembled)**



ZA Type S with hex screw



ZA Type B with bolt and nut

**Marking:**

brand marking	Logo or company name
Type	ZA
Size	12 (= outer diameter)
Max. clamping size	i.e. /50

Example: **◆ ZA 12/50**

**Marking optional with anchor length:**

Anchor length	i.e. -100
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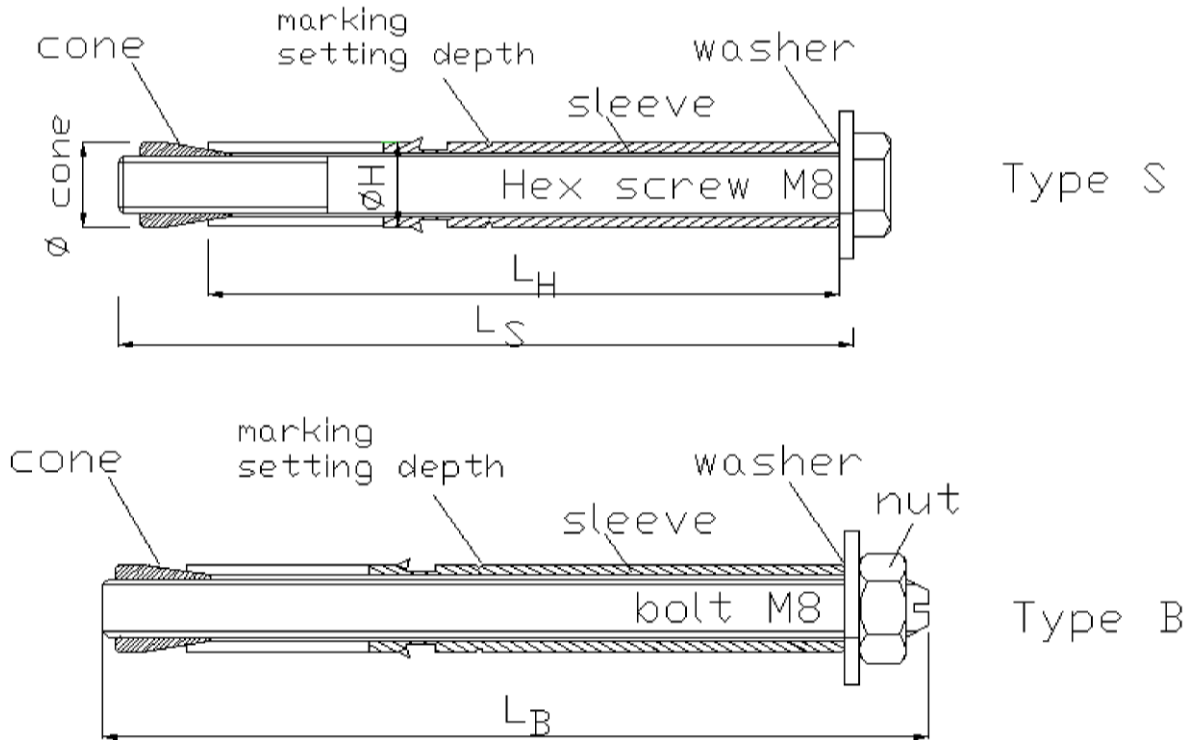
Example: **◆ ZA 12-100/50**

**Apolo MEA forced expansion anchor ZA 12**

**Product description**  
Anchor types and marking

**Annex A 2**

**Table 1: Anchor parts**



**Table 2: Material**

Designation	Material
Hex Screw	Carbon steel quality 8.8, DIN EN ISO 898-1
Anchor stud (Bolt)	Carbon steel, DIN EN ISO 898-1, $f_{uk} \geq 800 \text{ N/mm}^2$ , $f_{yk} \geq 640 \text{ N/mm}^2$
Nut	Carbon steel, quality class 8, DIN EN ISO 898-2
Washer	Carbon steel, DIN EN 10025-2, HV10 = 140 - 250
Cone	Carbon steel, HRc = 42 – 52 or HV10 = 420-550, lubricated
Sleeve	Carbon steel pipe, Hv10 $\geq 128$

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

**Table 3: Dimension**

Anchor	$\varnothing$ H sleeve	$\varnothing$ cone	$\varnothing$ screw	$\varnothing$ bolt	sleeve length $L_H$	screw length $L_S$	bolt length $L_B$	SW
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
ZA 12	12	12	M8	M8	$\geq 45$	$\geq 53$	$\geq 65$	13

**Apollo MEA forced expansion anchor ZA 12**

**Product description**  
Materials and dimensions

**Annex A 3**

### **Specifications 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:**

- Hammer drilling only.
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Positioning of the drill holes without damaging the reinforcement.

**Apolo MEA forced expansion anchor ZA 12**

**Intended use**  
Specifications

**Annex B 1**



**Table 4: Installation data**

Forced expansion anchor ZA			Size
			ZA 12 (M8)
Nominal drill hole diameter	$d_o$	[mm]	12
Max. cutting diameter of drill bit	$d_{cut,max}$	[mm]	12,50
Depth of drill hole	$h_1 \geq$	[mm]	55
Effective anchorage depth	$h_{ef} \geq$	[mm]	40
Setting depth	$h_{nom} \geq$	[mm]	49
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	14
Thickness of fixture	$t_{fix}$	[mm]	0...250
Wrench size	SW	[mm]	13
Required installation torque moment	$T_{inst}$	[Nm]	20

**Table 5: Minimum thickness of concrete member, spacing and edge distance**

Forced expansion anchor ZA			Size
			ZA 12 (M8)
Minimum thickness of member	$h_{min}$	[mm]	120
Minimum spacing	$s_{min}$	[mm]	90
Minimum edge distance	$c_{min}$	[mm]	60

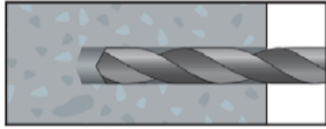
**Apolo MEA forced expansion anchor ZA 12**

**Intended use**

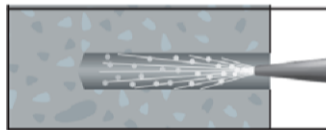
Installation data, minimum thickness spacing and edge distance

**Annex B 2**

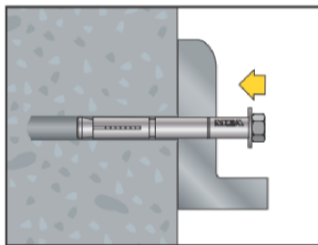
### Installation instruction



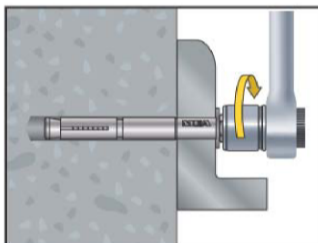
1. Drill the hole with a hammer drill



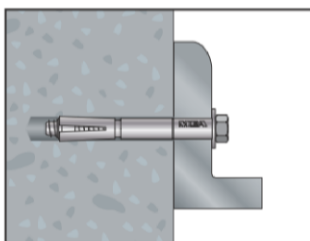
2. Clean the borehole



3. Hammer in the anchor (pay attention to the defined setting depth)



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



5. After installation

**Apolo MEA forced expansion anchor ZA 12**

**Intended use**  
Installation instruction

**Annex B 3**

**Table 6: Design method A - Characteristic values for tension load**

Forced expansion anchor ZA			Size
			ZA 12 (M8)
<b>Steel failure class 8.8 (bolt or screw)</b>			
Characteristic resistance	$N_{Rk,s}$	[kN]	29,3
<b>Pull out failure</b>			
Characteristic resistance in uncracked concrete C20/25	$N_{Rk,p}$	[kN]	12
increasing factors for $N_{Rk,p}$	$\psi_c$	C25/30	1,1
		C30/37	1,22
		C40/50	1,41
		C50/60	1,55
Installation safety factor	$\gamma_2$	[-]	1,0
<b>Concrete cone and splitting failure</b>			
Effective anchorage depth	$h_{ef}$	[mm]	40
Spacing	$s_{cr,N}$	[mm]	120
Edge distance	$c_{cr,N}$	[mm]	60
Spacing (splitting)	$s_{cr,sp}$	[mm]	160
Edge distance (splitting)	$c_{cr,sp}$	[mm]	80
Installation safety factor	$\gamma_2$	[-]	1,0

**Table 7: Displacements under tension load**

Forced expansion anchor ZA			Size
			ZA 12 (M8)
Tension load	N	[kN]	6,4
Displacements	$\delta_{N_0}$	[mm]	1,4
Displacements	$\delta_{N_\infty}$	[mm]	1,7

**Apolo MEA forced expansion anchor ZA 12**

**Performances**

Characteristic tension load values, displacements under tension load

**Annex C 1**

**Table 8: Design method A - Characteristic values for shear load**

Forced expansion anchor ZA			Size
			ZA 12 (M8)
<b>Steel failure without lever arm (screw or bolt)</b>			
Characteristic resistance	$V_{Rk,s}$	[kN]	14,6
<b>Steel failure with lever arm (screw or bolt)</b>			
Characteristic bending moment	$M_{Rk,s}^o$	[Nm]	30,0
<b>Concrete pryout failure</b>			
Factor in equation (5.6) of the Guideline ETAG 001, Annex C, 5.2.3.3	k	[ - ]	1,0
Installation safety factor	$\gamma_2$	[ - ]	1,0
<b>Concrete edge failure</b>			
Effective length of anchor under shear load	$l_f$	[mm]	40
diameter	$d_{nom}$	[mm]	8
Installation safety factor	$\gamma_2$	[ - ]	1,0

**Table 9: Displacements under shear load**

Forced expansion anchor ZA			Size
			ZA 12 (M8)
Shear load	V	[kN]	10,6
Displacements	$\delta_{v_0}$	[mm]	1,4
Displacements	$\delta_{v_\infty}$	[mm]	2,0

**Apolo MEA forced expansion anchor ZA 12**

**Performances**

Characteristic shear load values, displacements under shear load

**Annex C 2**