

Approval body for construction products  
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and  
Laender Governments



## European Technical Assessment

ETA-13/0372  
of 25 May 2018

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 drop-in anchor SA plus

Product family  
to which the construction product belongs

Deformation-controlled expansion anchor of sizes M8,  
M10, M12 and M16 for use in non-cracked concrete

Manufacturer

Apolo MEA Befestigungssysteme GmbH  
Industriestraße 6  
86551 Aichach  
DEUTSCHLAND

Manufacturing plant

Werk 8  
Werk 13

This European Technical Assessment  
contains

14 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 Apolo MEA Drop-In Anchor SA plus in the sizes M8, M10, M12 and M16 is an anchor made of zinc-plated steel which is placed into a drilled hole and anchored by deformation-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 to tension load (static and quasi-static loading)	See Annex C 1
Characteristic resistance to shear load (static and quasi-static loading)	See Annex C 2
Displacements (static and quasi-static loading)	See Annex C 3
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	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 the European Assessment Document 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.

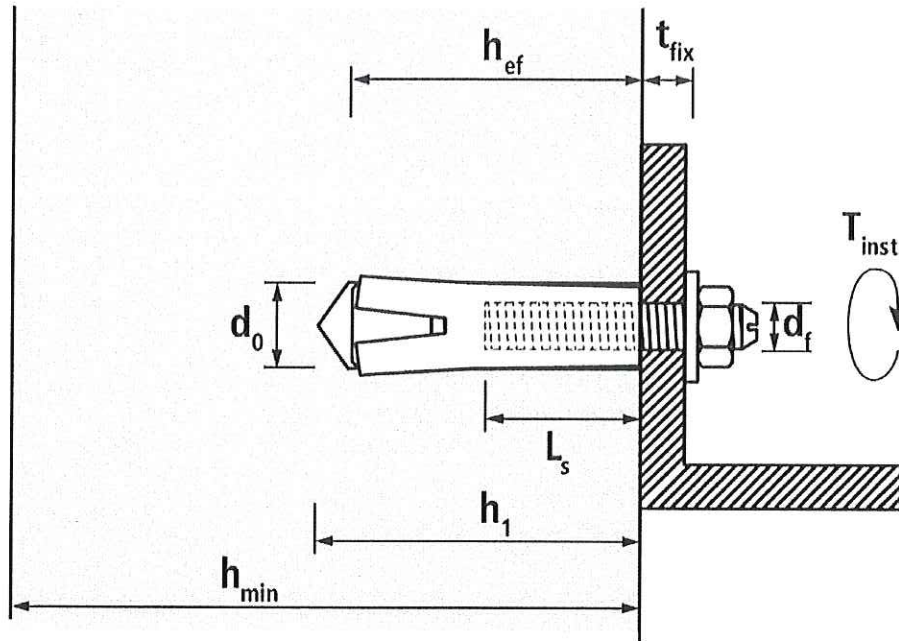
Issued in Berlin on 25 May 2018 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow  
Head of Department

*beglaubigt:*  
Tempel



**Installation situation in uncracked concrete C20/25 – C50/60**



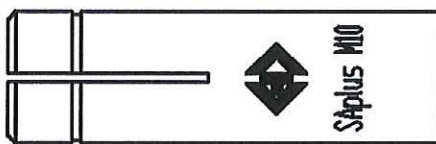
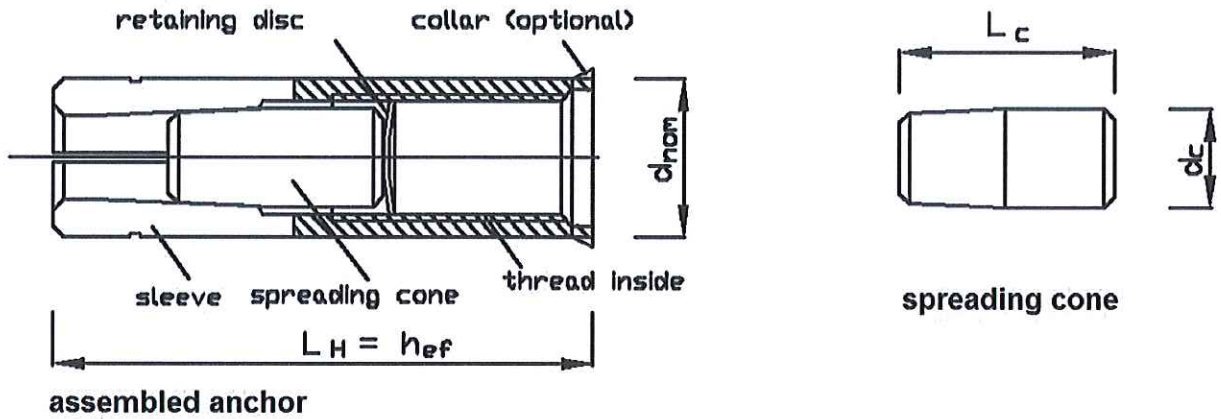
- $h_1$  = depth of drill hole
- $h_{ef}$  = effective anchorage depth
- $t_{fix}$  = thickness of fixture
- $L_s$  = length of thread inside of the anchor
- $T_{inst}$  = max. installation torque

**Apolo MEA Drop In anchor SA plus**

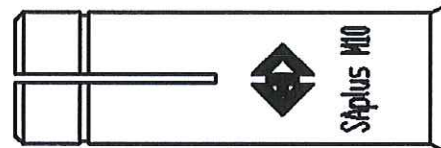
**Product description**  
 Installed condition

**Annex A1**

**Apolo MEA Drop in anchor SA plus**



SA plus without collar



SA plus with collar

marking:

brand marking  
type  
size

Logo or company  
SA plus  
M ... (i.e. M10)

Example:

 SA plus M10

**Table A2: Dimensions of the anchor**

Anchor	Sleeve		Cone		
	Thread inside	Length	Outer- $\phi$ sleeve	Length	
type		$L_H$	$d_{nom}$	$L_c$	Outer- $\phi$ sleeve
SA plus		[mm]	[mm]	[mm]	[mm]
M 8 x 30	M8	30	10	12	6
M10 x 40	M10	40	12	16	7,5
M12 x 50	M12	50	15	21	9,5
M16 x 65	M16	65	20	26	13

Apolo MEA Drop in anchor SA plus

Product description  
Product, marking and dimensions

Annex A2

**Table A3.1: Designation and materials**

Designation	Material
<p><b>Sleeve</b></p> <p>M8 M10 M12 M16</p>	<p>Steel for cold forming</p> <p>C1008-C1012 or EN 10277 C1015 or EN 10277 C1008-C1012 or EN 10277 C1008-C1012 or EN 10277</p>
<p><b>Spreading cone</b></p>	<p>Steel for cold forming C1006-1008</p>
<p><b>Retaining disc</b></p>	<p>Paper or plastics</p>

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

**Table A3.2: Strength of the sleeve**

Apolo MEA Drop in anchor SA plus			Size			
			M8	M10	M12	M16
Nominal characteristic steel ultimate strength	$f_{uk}$	[N/mm <sup>2</sup> ]	535	535	430	430
Nominal characteristic steel yield strength	$f_{yk}$	[N/mm <sup>2</sup> ]	485	485	390	390

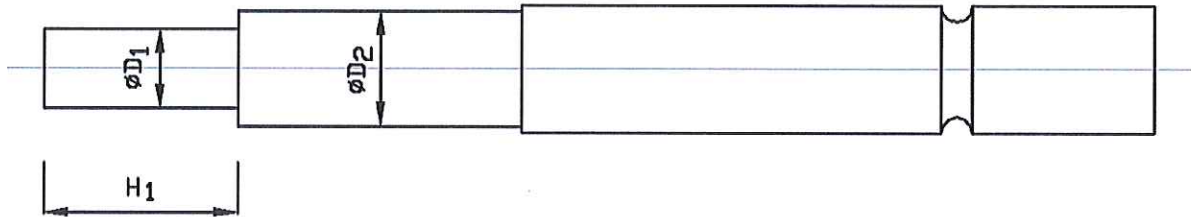
**Apolo MEA Drop in anchor SA plus**

**Product description**  
Materials

**Annex A3**

### Handsetting tool

Optional: setting tool with size marking and/or rubber grip possible



**Table A4: Geometry of the setting tool**

Setting tool	Setting pin		
Steel HRc 38-42	Dimension		
Type	D <sub>1</sub> [mm]	D <sub>2</sub> [mm]	H <sub>1</sub> [mm]
<b>ESW 8</b>	6,6	9,5	17,5
<b>ESW 10</b>	8,3	12	23,5
<b>ESW 12</b>	10,2	14	29
<b>ESW 16</b>	13,9	19	39

Apolo MEA Drop in anchor SA plus

Product description  
Setting tools

Annex A4



### **Specifications of Intended use**

#### **Anchorage subject to:**

- Static and quasi-static loading,

#### **Base materials:**

- Reinforced or unreinforced normal weight concrete according to EN 206-1:2000.
- Strength classes C20/25 to C50/60 according to EN 206-1:2000.
- Only uncracked 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 are to be designed in accordance with 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.
- Create drill hole with hammer drill only.
- 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 drill hole is filled with high strength mortar and only if the hole is not in the direction of the oblique tensile or shear load.
- Anchor installation in accordance with the manufacturer's specifications and drawings and using the appropriate tools.

**Apolo MEA Drop in anchor SA plus**

**Intended use  
Specifications**

**Annex B1**

**Table B2.1: Installation parameters**

**Fixing screws or anchor rods:**

It can be used the strength categories 4.6, 5.6, 5.8 or 8.8 acc. EN ISO 898-1.

**Minimal screwing depth:**

The length of the fixing screw depends on the thickness  $t_{fix}$  on the fixed part, permissible tolerances and usable thread length  $L_{s,max}$  as well as on the minimal screwing depth  $L_{s,min}$ .

Apolo MEA drop in anchor SA plus			Size			
			M8	M10	M12	M16
Nominal driller diameter	$d_o$	[mm]	10	12	15	20
Cutting diameter of drillbit	$d_{cut} \leq$	[mm]	10,45	12,50	15,50	20,55
Diameter of thread	M	[mm]	8	10	12	16
Depth of drill hole (deepest point)	$h_1 \geq$	[mm]	32	43	54	70
Effective anchorage depth	$h_{ef}$	[mm]	30	40	50	65
Maximum screwing depth	$L_{s,max}$	[mm]	13	16	23	32
Minimum screwing depth	$L_{s,min}$	[mm]	8	10	12	16
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	9	12	14	18
Maximum installation torque moment	$\max T_{inst}$	[Nm]	8	15	35	60

**Table B2.2: Minimum thickness of concrete member, spacing and edge distance**

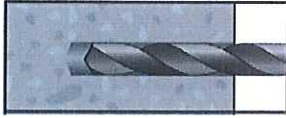
Apolo MEA drop in anchor SA plus			Size			
			M8	M10	M12	M16
Minimum thickness of member	$h_{min}$	[mm]	100	100	120	160
Minimum spacing	$s_{min}$	[mm]	105	105	125	180
Minimum edge distance	$c_{min}$	[mm]	105	140	175	230

Apolo MEA Drop in anchor SA plus

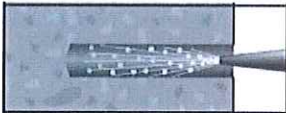
Intended use  
Installation parameters

Annex B2

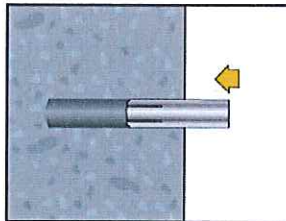
**Installation instruction:**



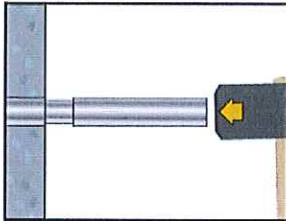
1. Drill the hole with a hammer drill



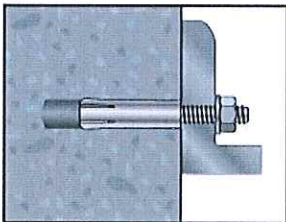
2. Clean the borehole



3. To set the anchor by hand or by hammer blows, anchor should be flush to the concrete edge



4. To spread the anchor with the setting tool. The anchor is installed correctly, if the setting pin is completely inside



5. To fix the fixture, not allowed to pass over the max. installation torque  $T_{inst}$

**Apolo MEA Drop in anchor SA plus**

**Intended use**  
Installation instruction

**Annex B3**



**Table C1: Design method A - Characteristic values for tension loads**

Apolo MEA drop in anchor SA plus				size			
Steel failure				M8	M10	M12	M16
Characteristic resistance	$N_{Rk,s}$	[kN]	steel 4.6	14,6	23,2	33,7	62,7
Partial safety factor	$\gamma_{Ms}$	[-]		2,0			
Characteristic resistance	$N_{Rk,s}$	[kN]	steel 5.6	18,3	29,0	42,1	78,3
Partial safety factor	$\gamma_{Ms}$	[-]		2,0			
Characteristic resistance	$N_{Rk,s}$	[kN]	steel 5.8	18,3	22,5	30,8	51,5
Partial safety factor	$\gamma_{Ms}$	[-]		1,5			
Characteristic resistance	$N_{Rk,s}$	[kN]	steel 8.8	17,8	22,5	30,8	51,5
Partial safety factor	$\gamma_{Ms}$	[-]		1,5			
Pull out failure							
Characteristic resistance in uncracked concrete C 20/25	$N_{Rk,p}$	[kN]		7,5	12	16	30
Increasing factors for $N_{Rk,p}$	$\psi_C$	C30/37		1,22	1,11	1,22	
		C40/50		1,41	1,21	1,41	
		C50/60		1,58	1,28	1,58	
Installation safety factor	$\gamma_{inst}$	[-]		1,0	1,2		
Concrete cone failure							
Effective anchorage depth	$h_{ef}$	[mm]		30	40	50	65
Factor $k_1$	$k_{ucr,N}$	[-]		11,0			
Spacing	$s_{cr,N}$	[mm]		$3 \times h_{ef}$			
Edge distance	$c_{cr,N}$	[mm]		$1,5 \times h_{ef}$			
Installation safety factor	$\gamma_{inst}$	[-]		1,0	1,2		
Concrete splitting failure							
Spacing (splitting)	$s_{cr,sp}$	[mm]		210	280	350	460
Edge distance (splitting)	$c_{cr,sp}$	[mm]		105	140	175	230
Installation safety factor	$\gamma_{inst}$	[-]		1,0	1,2		

Apolo MEA Drop In anchor SA plus

**Performances**

Design method A, characteristic values for tension loads

**Annex C1**



**Table C2: Design method A - Characteristic values for shear load**

Apolo MEA drop in anchor SA plus				size			
Steel failure without lever arm				M8	M10	M12	M16
Characteristic shear load resistance	$V_{RK,s}$	[kN]	steel 4.6	7,3	9,5	15,4	25,7
Partial safety factor	$\gamma_{Ms}$	[-]		1,67	1,5		
Characteristic shear load resistance	$V_{RK,s}$	[kN]	steel 5.6	8,9	9,5	15,4	25,7
Partial safety factor	$\gamma_{Ms}$	[-]		1,5			
Characteristic shear load resistance	$V_{RK,s}$	[kN]	steel 5.8	8,9	9,5	15,4	25,7
Partial safety factor	$\gamma_{Ms}$	[-]		1,5			
Characteristic shear load resistance	$V_{RK,s}$	[kN]	steel 8.8	8,9	9,5	15,4	25,7
Partial safety factor	$\gamma_{Ms}$	[-]		1,5			
Steel failure with lever arm							
Characteristic bending moment	$M_{RK,s}^0$	[Nm]	steel 4.6	15,0	29,9	52,4	132,8
Partial safety factor	$\gamma_{Ms}$	[-]		1,67			
Characteristic bending moment	$M_{RK,s}^0$	[Nm]	steel 5.6	18,7	37,4	65,5	165,9
Partial safety factor	$\gamma_{Ms}$	[-]		1,67			
Characteristic bending moment	$M_{RK,s}^0$	[Nm]	steel 5.8	18,7	37,4	65,5	165,9
Partial safety factor	$\gamma_{Ms}$	[-]		1,25			
Characteristic bending moment	$M_{RK,s}^0$	[Nm]	steel 8.8	30,0	59,8	104,7	265,5
Partial safety factor	$\gamma_{Ms}$	[-]		1,25			
Concrete pryout failure							
Factor	$k_B$	[-]		1,0			2,0
Installation safety factor	$\gamma_{Inst}$	[-]		1,0			
Concrete edge failure							
Effective anchor length under shear load	$l_f$	[mm]		30	40	50	65
Effective external diameter of anchor	$d_{nom}$	[mm]		10	12	15	20
Installation safety factor	$\gamma_{Inst}$	[-]		1,0			

Apolo MEA Drop in anchor SA plus

**Performances**  
Design method A, Characteristic values for shear load

**Annex C2**

**Table C3.1: Displacements of the anchors under tension loads**

Apolo MEA drop in anchor SA plus			M8	M10	M12	M16
Tension load	N	[kN]	3,5	4,8	6,3	11,9
Displacements	$\delta_{N_0}$	[mm]	0,2			
Displacements	$\delta_{N_\infty}$	[mm]	1,3			

**Table C3.2: Displacements under shear loads**

Apolo MEA drop in anchor SA plus			M8	M10	M12	M16
Shear load	V	[kN]	4,2	4,5	7,3	12,2
Displacements	$\delta_{V_0}$	[mm]	1,4	1,6	2,3	1,0
Displacements	$\delta_{V_\infty}$	[mm]	2,1	2,4	3,5	1,5

Apolo MEA Drop in anchor SA plus

**Performances**

Displacement under tension and shear loads

**Annex C3**