

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-15/0508
of 23 September 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

Sleeve anchor DNBOLT

Product family
to which the construction product belongs

Torque-controlled expansion anchor in size 8, 10, 12 mm
for use in non-cracked concrete

Manufacturer

Apolo MEA Befestigungssysteme GmbH
Industriestraße 6
86551 Aichach
DEUTSCHLAND

Manufacturing plant

Werk 13

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 sleeve anchor DNBOLT 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 determined (NPD)

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

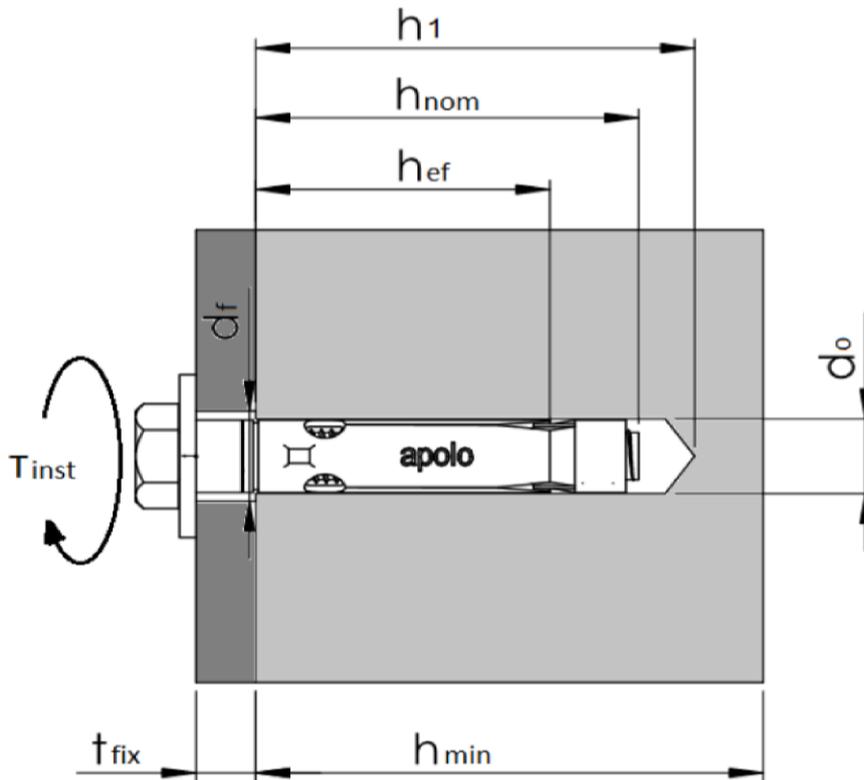
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 23 September 2015 by Deutsches Institut für Bautechnik

Andreas Kummerow
p. p. Head of Department

beglaubigt:
Tempel

sleeve anchor DNBOLT (after installation)



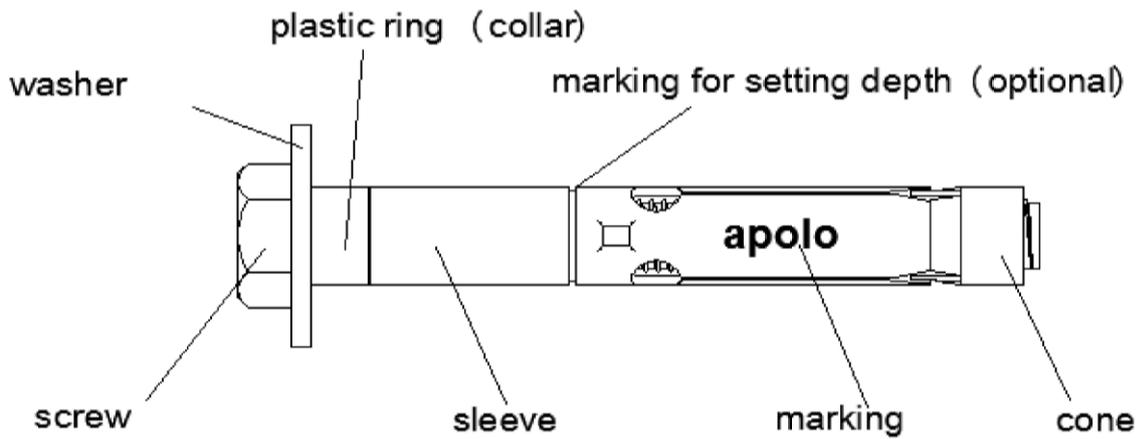
- h_{nom} = Setting depth
- h_1 = Depth of the drill hole (deepest point)
- h_{min} = Min. thickness of concrete member
- t_{fix} = Thickness of fixture
- h_{ef} = Effective anchorage depth
- d_0 = Drill hole diameter
- d_f = Diameter of clearance hole in the fixture
- T_{inst} = Installation torque moment

sleeve anchor DNBOLT

Product description
Installation conditions

Annex A 1

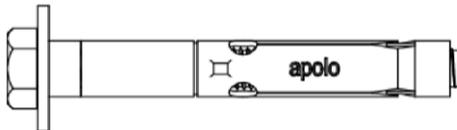
sleeve anchor DNBOLT (assembled)



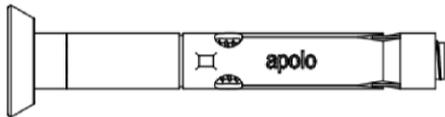
Marking: brand or logo, diameter - optional length - clamping size

Example for marking: apolo 10-80/30 or 10-30

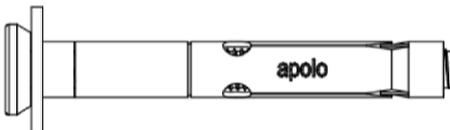
Anchor types:



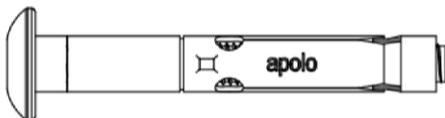
Type DT - DIN 933 screw and washer



Type DV - Countersunk screw



Type ARPHO - Countersunk screw and washer



Type DB - Button screw

sleeve anchor DNBOLT

Product description
Assembling, marking, anchor types

Annex A 2

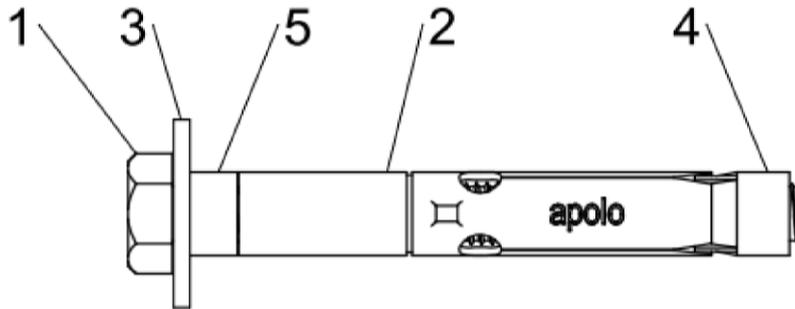


Table 1: Components and materials

Item	Designation	Material
1	Screw	Steel, acc. DIN EN ISO 898-1, class 6.8 or 8.8
2	Sleeve	Carbon steel, hardness 90-150 Hv
3	Washer	Carbon steel, hardness > 90 Hv
4	Cone	Carbon steel, hardness > 150 Hv
5	Collar	Plastic

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

Table 2: Dimensions

Anchor	d_o	Collar length	Washer	\varnothing screw	Sleeve length	Screw length	SW
	[mm]	[mm]		[mm]	[mm]	[mm]	[mm]
DNBOLT 8	8	4,5	DIN 9021 or ISO 7093	M6	$\geq 30,5$	≥ 45	10
DNBOLT 10	10	5,5	DIN 9021 or ISO 7093	M8	$\geq 40,5$	≥ 60	13
DNBOLT 12	12	6,5	DIN 9021 or ISO 7093	M10	≥ 47	≥ 70	17

sleeve anchor DNBOLT

Product description
Components, 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 - 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:

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

sleeve anchor DNBOLT

Intended use
Specifications

Annex B 1

Table 3: Installation parameters

sleeve anchor DNBOLT			Size		
			DNBOLT 8	DNBOLT 10	DNBOLT 12
Nominal drill hole diameter	d_o	[mm]	8	10	12
Max. cutting diameter of drill bit	$d_{cut,max}$	[mm]	8,45	10,45	12,50
Depth of drill hole	$h_1 \geq$	[mm]	45	55	65
Effective anchorage depth	$h_{ef} \geq$	[mm]	30	37	43
Setting depth	$h_{nom} \geq$	[mm]	40	50	60
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	9	12	14
Thickness of fixture	t_{fix}	[mm]	5...250	5...300	10...300
Wrench size	SW	[mm]	10	13	17
Installation torque moment	T_{inst}	[Nm]	10	15	30

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

sleeve anchor DNBOLT			Size		
			DNBOLT 8	DNBOLT 10	DNBOLT 12
Minimum thickness of member	h_{min}	[mm]	100	100	110
Minimum spacing	s_{min}	[mm]	40	50	60
Minimum edge distance	c_{min}	[mm]	40	50	60

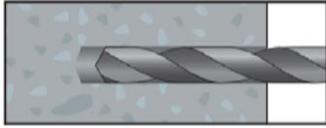
sleeve anchor DNBOLT

Intended use

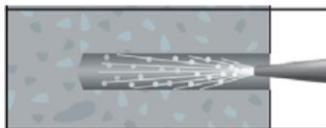
Installation parameters, minimum thickness, min. spacing and edge distance

Annex B 2

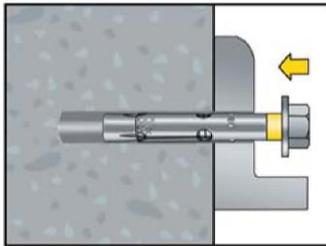
Installation instructions of sleeve anchor DNBOLT



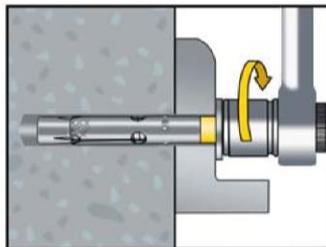
1. Drill the hole with a hammer drill



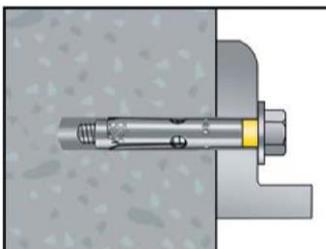
2. Clean the borehole



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



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



5. After installation

electronic copy of the eta by dibt: eta-15/0508

sleeve anchor DNBOLT

Intended use
Installation instruction

Annex B 3

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

sleeve anchor DNBOLT			Size		
			DNBOLT 8	DNBOLT 10	DNBOLT 12
Steel failure class 6.8					
Characteristic resistance	$N_{Rk,s}$	[kN]	12,1	22,0	34,8
Steel failure class 8.8					
Characteristic resistance	$N_{Rk,s}$	[kN]	16,1	29,3	46,4
Pull out failure					
Characteristic resistance in non-cracked concrete \geq C20/25	$N_{Rk,p}$	[kN]	6,0	7,5	12,0
Installation safety factor	γ_2	[-]	1,0	1,0	1,2
Concrete cone and splitting failure					
Effective anchorage depth	h_{ef}	[mm]	30	37	43
Char. spacing	$s_{cr,N}$	[mm]	3 h_{ef}		
Char. edge distance	$c_{cr,N}$	[mm]	1,5 h_{ef}		
Spacing (splitting)	$s_{cr,sp}$	[mm]	180	200	240
Edge distance (splitting)	$c_{cr,sp}$	[mm]	90	100	120
Installation safety factor	γ_2	[-]	1,0	1,0	1,2

Table 6: Displacement under tension loads

sleeve anchor DNBOLT			Size		
			DNBOLT 8	DNBOLT 10	DNBOLT 12
Tension load	N	[kN]	2,5	3,3	5,7
Displacements	δ_{N_0}	[mm]	0,35	0,33	0,39
Displacements	δ_{N_∞}	[mm]	2,15		

sleeve anchor DNBOLT

Performances

Characteristic tension load values, displacement under tension load

Annex C 1

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

sleeve anchor DNBOLT			Size		
			DNBOLT 8	DNBOLT 10	DNBOLT 12
Steel failure without lever arm class 6.8					
Characteristic resistance	$V_{Rk,s}$	[kN]	6,0	11,0	17,4
Steel failure without lever arm class 8.8					
Characteristic resistance	$V_{Rk,s}$	[kN]	8,0	14,6	23,2
Steel failure with lever arm class 6.8					
Characteristic bending moment	$M_{Rk,s}$	[Nm]	9,2	22,5	44,9
Steel failure with lever arm class 8.8					
Characteristic bending moment	$M_{Rk,s}$	[Nm]	12,2	30,0	59,8
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
Installation safety factor	γ_2	[-]	1,0		
Concrete edge failure					
Effective length of anchor under shear load	l_f	[mm]	30	37	43
Diameter	d_{nom}	[mm]	6	8	10
Installation safety factor	γ_2	[-]	1,0		

The plastic ring may not be used for the load transmission.

Table 8: Displacement under shear loads

sleeve anchor DNBOLT			Size		
			DNBOLT 8	DNBOLT 10	DNBOLT 12
Shear load	V	[kN]	2,9	5,2	6,9
Displacements	δ_{V0}	[mm]	0,17	0,56	0,53
Displacements	$\delta_{V\infty}$	[mm]	0,26	0,84	0,80

sleeve anchor DNBOLT

Performances

Characteristic shear load values, displacement under shear load

Annex C 2