

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 15 December 2020

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

CELO Sleeve anchor DNBOLT

Product family
to which the construction product belongs

Mechanical fastener for use in concrete

Manufacturer

CELO Befestigungssysteme GmbH
Industriestraße 6
86551 Aichach
DEUTSCHLAND

Manufacturing plant

Plant 11
Plant 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

EAD 330232-00-0601, Edition 10/2016

This version replaces

ETA-15/0508 issued on 23 September 2015

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Specific Part

1 Technical description of the product

The CELO sleeve anchor DNBOLT is an anchor made of galvanised steel which is placed into a drilled hole and anchored by torque-controlled expansion.

The 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 B 2 and 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 1 and C 2 |
| Characteristic resistance and displacements for seismic performance categories C1 and C2 | No performance assessed |
| Durability | See Annex B 1 |

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 European Assessment Documents 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 the applicable European Assessment Document

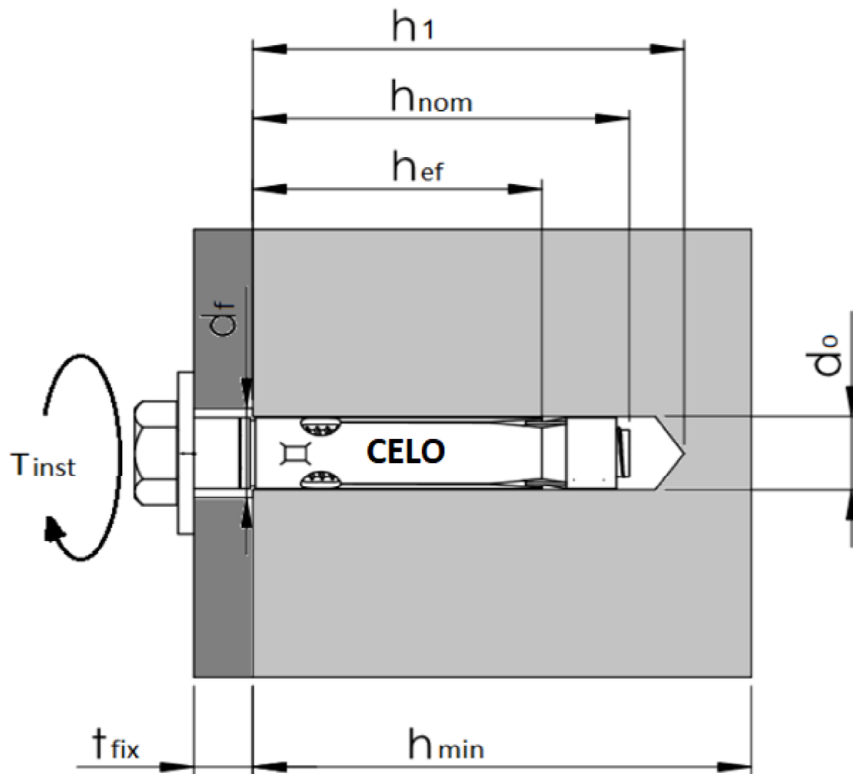
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 15 December 2020 by Deutsches Institut für Bautechnik

Dipl.-Ing. Beatrix Wittstock
Head of Section

beglaubigt:
Baderschneider

CELO sleeve anchor DNBOLT (after installation)



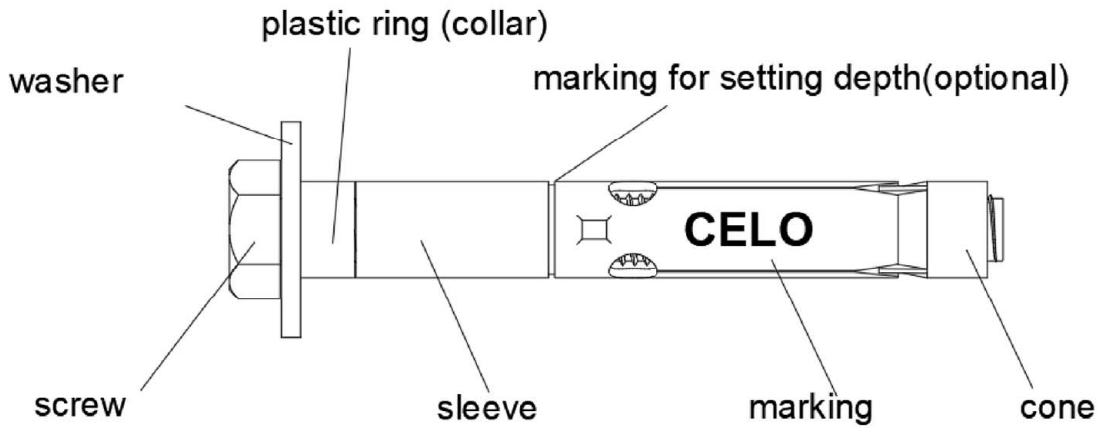
- h_{nom} = Setting depth
- h_1 = Depth of the drill hole (deepest point)
- h_{min} = Min. thickness of concrete member
- t_{fix} = Thickness of fixture
- h_{ef} = Effective embedment depth
- d_o = Drill hole diameter
- d_f = Diameter of clearance hole in the fixture
- T_{inst} = Installation torque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

CELO sleeve anchor DNBOLT

Product description
Installation conditions

Annex A 1

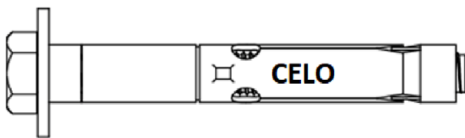
CELO sleeve anchor DNBOLT (assembled)



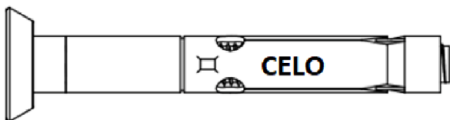
Marking: company name (CELO) or Logo, name of the anchor,
diameter – length (optional) / clamping size

Example for marking: CELO Dnbolt 10-80/30 or 10/30

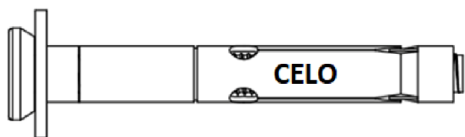
Anchor types:



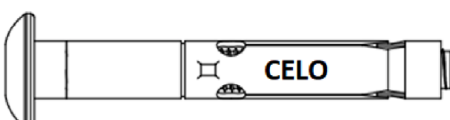
Type DT - screw according to DIN 933:1987-09
or EN ISO 4017:204 and washer



Type DV - Countersunk screw



Type ARPHO - Countersunk screw and washer



Type DB - Button screw

CELO sleeve anchor DNBOLT

Product description
Assembling, marking, anchor types

Annex A 2

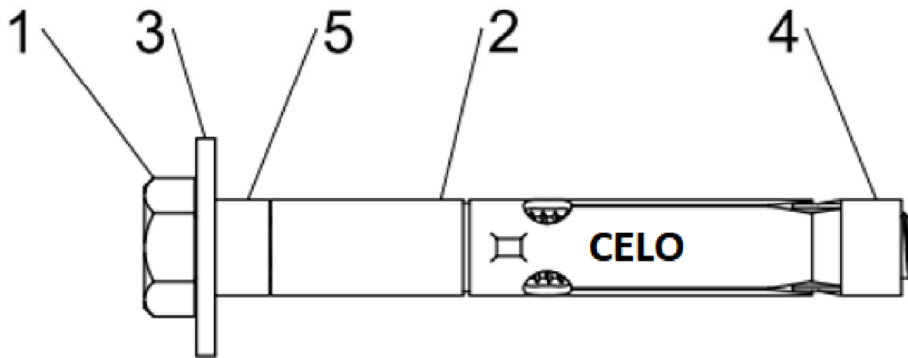


Table A1: Components and materials

| Item | Designation | Material |
|------|-------------|--|
| 1 | Screw | Steel, according EN ISO 898-1:2012, 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. EN ISO 4042:2018

Table A2: 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 9021:1990-03 or EN ISO 7093:2000 | M6 | $\geq 30,5$ | ≥ 45 | 10 |
| DNBOLT 10 | 10 | 5,5 | DIN 9021:1990-03 or EN ISO 7093:2000 | M8 | $\geq 40,5$ | ≥ 60 | 13 |
| DNBOLT 12 | 12 | 6,5 | DIN 9021:1990-03 or EN ISO 7093:2000 | M10 | ≥ 47 | ≥ 70 | 17 |

CELO 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:

- Compacted, reinforced or unreinforced normal weight concrete without fibres according to EN 206:2013 + A1:2016.
- Strength classes C20/25 - C50/60 according to EN 206:2013 + A1:2016
- 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.).
- The anchorages are designed in accordance to EN 1992-4:2018 and Technical Report TR 055, Edition February 2018
- For effective embedment depth $h_{ef} < 40$ mm only statically indeterminate fixings (e.g. light-weight suspended ceilings with internal exposure) are covered by the ETA

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.

CELO sleeve anchor DNBOLT

Intended use
Specifications

Annex B 1

Table B1: Installation parameters

| CELO 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 embedment 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 B2: Minimum thickness of concrete member, spacing and edge distance

| CELO 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 |

CELO sleeve anchor DNBOLT

Intended use

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

Annex B 2

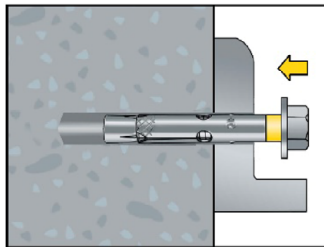
Installation instructions



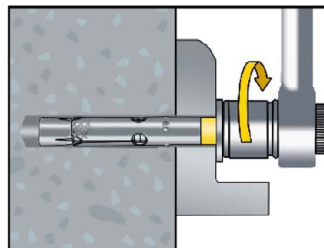
1. Drill the hole with a hammer drill



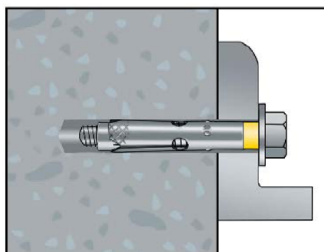
2. Clean the borehole



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

CELO sleeve anchor DNBOLT

Intended use
Installation instruction

Annex B 3

Table C1: Characteristic values under tension loads

| CELO 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 |
| Partial factor | $\gamma_{Ms,N}$ | [-] | 1,5 | | |
| Steel failure class 8.8 | | | | | |
| Characteristic resistance | $N_{Rk,s}$ | [kN] | 16,1 | 29,3 | 46,4 |
| Partial factor | $\gamma_{Ms,N}$ | [-] | 1,5 | | |
| Pull out failure | | | | | |
| Characteristic resistance in non-cracked concrete $\geq C20/25$ | $N_{Rk,p}$ | [kN] | 6,0 | 7,5 | 12,0 |
| Increasing factor for concrete | ψ_c | [-] | 1,0 | | |
| Installation factor | γ_{inst} | [-] | 1,0 | 1,0 | 1,2 |
| Concrete cone failure | | | | | |
| Factor for cracked concrete | k_{cr} | [-] | No performance assessed | | |
| Factor for uncracked concrete | k_{ucr} | [-] | 11,0 | | |
| Effective anchorage depth | h_{ef} | [mm] | 30 | 37 | 43 |
| Characteristic spacing | $s_{cr,N}$ | [mm] | 3 h_{ef} | | |
| Characteristic edge distance | $c_{cr,N}$ | [mm] | 1,5 h_{ef} | | |
| Splitting failure | | | | | |
| Characteristic resistance | $N_{Rk,sp}^0$ | [kN] | $N_{Rk,sp}^0 = \min(N_{Rk,p}; N_{Rk,c}^0)^{1)}$ | | |
| Spacing (splitting) | $s_{cr,sp}$ | [mm] | 180 | 200 | 240 |
| Edge distance (splitting) | $c_{cr,sp}$ | [mm] | 90 | 100 | 120 |
| Installation factor | γ_{inst} | [-] | 1,0 | 1,0 | 1,2 |

¹⁾ $N_{Rk,c}^0$ according to EN 1998-4:2018

Table C2: Displacement under tension loads

| CELO 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 | | |

CELO sleeve anchor DNBOLT

Performances
Characteristic values under tension load
Displacement under tension load

Annex C 1

Table C3: Characteristic values under shear loads

| CELO sleeve anchor DNBOLT | | | Size | | |
|--|-----------------|------|----------|-----------|-----------|
| | | | DNBOLT 8 | DNBOLT 10 | DNBOLT 12 |
| Steel failure without lever arm class 6.8 | | | | | |
| Characteristic resistance | $V_{Rk,s}^0$ | [kN] | 6,0 | 11,0 | 17,4 |
| Partial factor | $\gamma_{Ms,V}$ | [-] | 1,25 | | |
| Steel failure without lever arm class 8.8 | | | | | |
| Characteristic resistance | $V_{Rk,s}^0$ | [kN] | 8,0 | 14,6 | 23,2 |
| Partial factor | $\gamma_{Ms,V}$ | [-] | 1,25 | | |
| Steel failure with lever arm class 6.8 | | | | | |
| Characteristic bending moment | $M_{Rk,s}^0$ | [Nm] | 9,2 | 22,5 | 44,9 |
| Partial factor | $\gamma_{Ms,V}$ | [-] | 1,25 | | |
| Steel failure with lever arm class 8.8 | | | | | |
| Characteristic bending moment | $M_{Rk,s}^0$ | [Nm] | 12,2 | 30,0 | 59,8 |
| Partial factor | $\gamma_{Ms,V}$ | [-] | 1,25 | | |
| Ductility factor | k_7 | [-] | 0,8 | | |
| Concrete pryout failure | | | | | |
| k-Factor | k_8 | [-] | 1,0 | 1,0 | 1,0 |
| Installation factor | γ_{inst} | [-] | 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 factor | γ_{inst} | [-] | 1,0 | | |

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

Table C4: Displacement under shear loads

| CELO sleeve anchor DNBOLT | | | Size | | |
|---------------------------|---------------------|------|----------|-----------|-----------|
| | | | DNBOLT 8 | DNBOLT 10 | DNBOLT 12 |
| Shear load | V | [kN] | 2,9 | 5,2 | 6,9 |
| Displacements | δ_{V_0} | [mm] | 0,17 | 0,56 | 0,53 |
| Displacements | δ_{V_∞} | [mm] | 0,26 | 0,84 | 0,80 |

CELO sleeve anchor DNBOLT

Performances

Characteristic values under shear load
Displacement under shear load

Annex C 2