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European Technical Assessment

ETA-13/0054 of 19/11/2018

English translation prepared by CSTB - Original version in French language

General Part

Nom commercial: *Trade name*	**Snake-PRO**
Famille de produit: *Product family*	**Vis à béton M8 et M10 pour usage dans du béton non fissuré et fissuré.** ***Concrete screw for use in concrete for use in uncracked and cracked concrete: sizes M8 and M10***
Titulaire: *Manufacturer*	DEWALT / Powers Richard-Klinger-Str. 11 65510 Idstein Germany
Usine de fabrication: *Manufacturing plants*	Plant 6
Cette évaluation contient: *This assessment contains*	12 pages incluant 9 pages d'annexes qui font partie intégrante de cette évaluation 12 *pages including 9 pages of annexes which form an integral part of this assessment*
Base de l'ETE: *Basis of ETA*	EAD 330232-00-0601, Version Octobre 2016 *EAD* 330232-00-0601, *Version October 2016*
Cette évaluation remplace: *This assessment replaces*	ETE-13/0054 délivrée le 22/12/2016 *ETA-13/0054 issued on 22/12//2018*

Specific Part

1 Technical description of the product

The Snake-Pro anchor is an anchor made of zinc electroplated steel. It is an internally threaded self tapping anchor which is installed by drilling a hole with a standard or hollow drill bit (ANSI), and screwing the anchor into the hole with a hex driver setting tool fitted on an impact driver.

The illustration and the description of the product are given in Annexes A.

2 Specification of the intended use

The performances given in Section 3 are only valid if the anchor is used in compliance with the specifications and conditions given in Annexes B.

The provisions made in this European technical assessment are based on an assumed working life of the anchor of 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. Performance of the product.

3 Performance of the product

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance according to EN 1992-4	See Annex C 1
Characteristic resistance under seismic action according to EN 1992-4	See Annex C 2
Displacements	See Annex C 3

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorages satisfy requirements for Class A1
Characterisitc resistance under fire according to EN 1992-4	See Annex C4

3.3 Hygiene, health and the environment (BWR 3)

Regarding dangerous substances contained in this European technical approval, there may be requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Directive, these requirements need also to be complied with, when and where they apply.

3.4 Safety in use (BWR 4)

For Basic Requirement Safety in use the same criteria are valid as for Basic Requirement Mechanical resistance and stability.

3.5 Protection against noise (BWR 5)

Not relevant.

3.6 Energy economy and heat retention (BWR 6)

Not relevant.

3.7 Sustainable use of natural resources (BWR 7)

For the sustainable use of natural resources no performance was determined for this product.

3.8 General aspects relating to fitness for use

Durability and Serviceability are only ensured if the specifications of intended use according to Annex B1 are kept.

4 Assessment and verification of constancy of performance (AVCP)

According to the Decision 96/582/EC of the European Commission[1], as amended, the system of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) given in the following table apply.

Product	Intended use	Level or class	System
Metal anchors for use in concrete	For fixing and/or supporting to concrete, structural elements (which contributes to the stability of the works) or heavy units	—	1

5 Technical details necessary for the implementation of the AVCP system

Technical details necessary for the implementation of the Assessment and verification of constancy of performance (AVCP) system are laid down in the control plan deposited at Centre Scientifique et Technique du Bâtiment.

The manufacturer shall, on the basis of a contract, involve a notified body approved in the field of anchors for issuing the certificate of conformity CE based on the control plan.

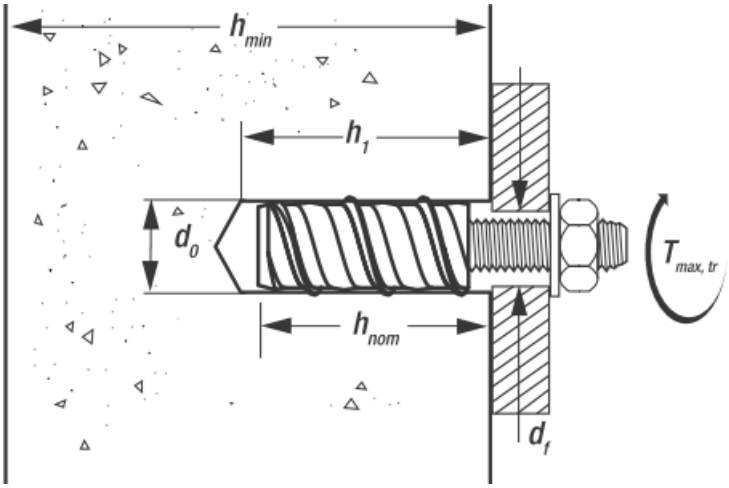
The original French version is signed by

Charles Baloche
Technical Director

[1] Official Journal of the European Communities L 254 of 08.10.1996

Anchor:

Anchor in use:



Snake-PRO	
Product description Installed condition	**Annex A1**

Table 1: Materials

Part	Version	Material	Protection
1	Snake-PRO C-Steel Version	C-Steel, special hardened	Zinc plated > 5 μm
1	Snake-PRO MG Mechanically Galv. Version	C-Steel, special hardened	Mechanically galvanized > 50 μm

Table 2: Steel strength

			M8	M10
Tensile strength	$f_{u,k}$	**[MPa]**	420	
Yield strength	$f_{y,k}$	**[MPa]**	340	

Specifications of intended use

Anchorages subject to:

- Static, quasi-static, seismic loads and fire exposure.

Base materials:

- Reinforced or unreinforced normal weight concrete according to EN 206:2013
- Strength classes C20/25 to C50/60 according to EN 206:2013.
- Cracked concrete and uncracked concrete.

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions.

Design:

- The anchorages are designed in accordance with EN 1992-4 under the responsibility of an engineer experienced in anchorages and concrete work.
- For seismic application the anchorages are designed in accordance with EN 1992-4.
- For application with resistance under fire exposure the anchorages are designed in accordance with method given in EN 1992-4.
- 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.

Installation:

- Anchor installation carried out by appropriately qualified personnel 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.
- Effective anchorage depth, edge distances and spacing not less than the specified values without minus tolerances.
- Hole drilling by hammer drill with standard or hollow drill bit.
- Cleaning of the hole of drilling dust. This step can be omitted if a hollow drill bit has been used.
- The anchor is suited for installation with a torque wrench by hand and for installation with a suitable impact wrench.
- In case of aborted hole, drilling of new hole at a minimum distance of twice the depth of the aborted hole, or smaller distance provided the aborted drill hole is filled with high strength mortar and no shear or oblique tension loads in the direction of aborted hole.

Table 4: Anchor dimensions

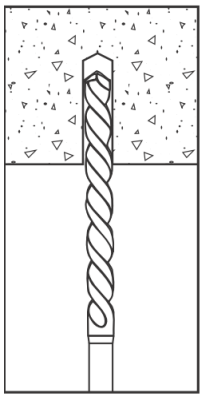
			M8	M10
Length of the anchor	**ℓ**	**[mm]**	31	31
Diameter of the shaft	**d_k**	**[mm]**	12,7	12,7
Diameter of the thread	**d_0**	**[mm]**	14,7	14,7
Width hex setting tool	**SW**	**[mm]**	6,9	6,3
Stressed cross section	**A_S**	**[mm^2]**	36,6	58,0

Table 5: Installation data

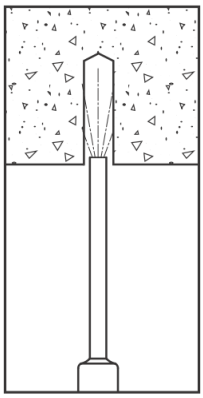
			M8	M10
Drill hole diameter	**d_{cut}**	**[mm]**	12,7 1/2 (ANSI)	12,7 1/2 (ANSI)
Drill hole depth	**h_1**	**[mm]**	50	50
Nominal embedment depth	**h_{nom}**	**[mm]**	41	41
Embedment depth	**h_{ef}**	**[mm]**	30	30
Maximum installation torque	**$T_{inst,max}$**	**[Nm]**	10	10
Maximum impact wrench torque	**$T_{imp,max}$**	**[Nm]**	203	488
Minimum member thickness	**h_{min}**	**[mm]**	100	100
Minimum edge distance	**c_{min}**	**[mm]**	80	80
Minimum spacing	**s_{min}**	**[mm]**	80	80

Installation: Snake-PRO

Standard Drill Bit

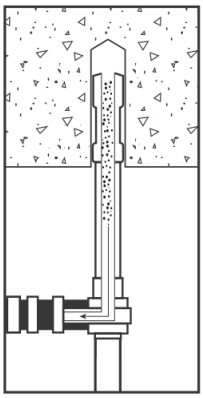


1.) Using the proper drill bit size, drill a hole into the base material to the required depth.

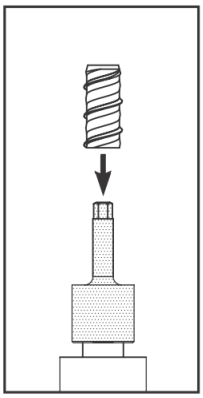


2.) Remove dust and debris from the hole using a hand pump or compressed air.

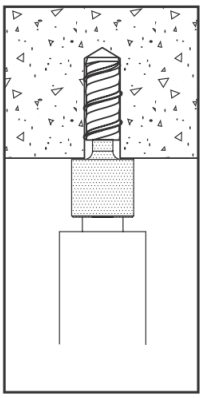
Hollow Drill Bit



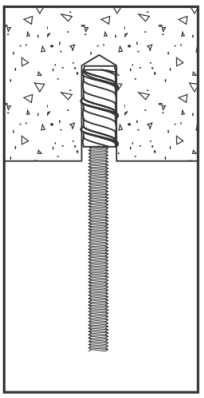
1. & 2.) Connect the hollow drill bit of proper size to a vacuum, and drill a hole into the base material to the required depth while the vac is running. The dust is removed during the drilling process.



3.) Attach the Snake setting tool to an impact wrench, mount the anchor onto the setting tool.



4.) Drive the anchor until the tool comes into contact with the surface of the base material.



5.) Insert threaded rod or bolt.

Table 6: Product performance for static and quasi-static actions

			Snake-PRO M8	**Snake-PRO M10**
Nominal embedment depth	h_{nom}	[mm]	41	41
Steel failure for tension and shear load				
Characteristic resistance tension	$N_{Rk,s}$	[kN]	15,4	24,4
Characteristic resistance shear	$V_{Rk,s}$	[kN]	7,7	12,2
k_7 factor	k_7	[-]	1,0	1,0
Characteristic resistance bending	$M^0_{Rk,s}$	[Nm]	16,0	31,0
Partial safety factor	γ_{Ms}	[-]	1,5	1,5
Pullout failure (tension)				
Characteristic resistance uncracked concrete C20/25	$N_{Rk,p}$	[kN]	5,0	5,0
Characteristic resistance cracked concrete C20/25	$N_{Rk,p}$	[kN]	3,0	3,0
Installation safety factor	γ_{Inst}	[Nm]	1,2	1,2
Increasing factor concrete strength ψ_c	C30/37	[-]	1,22	1,22
	C40/50	[-]	1,41	1,41
	C50/60	[-]	1,58	1,58
Concrete cone and splitting failure				
Effective embedment depth	h_{ef}	[mm]	30	30
Factor cracked concrete	$k_{cr,N}$	[-]	7,7	
Factor uncracked concrete	$k_{ucr,N}$	[-]	11,0	
Characteristic edge distance/spacing concrete cone failure	$c_{cr,N}$	[mm]	45	45
	$s_{cr,N}$	[mm]	90	90
Characteristic edge distance/spacing splitting failure	$c_{cr,sp}$	[mm]	80	80
	$s_{cr,sp}$	[mm]	160	160
Concrete pryout failure				
Factor for determination of resistance to pry-out failure	k_8	[-]	1,0	1,0
Concrete edge failure				
Effective length of anchor	l_f	[mm]	30	30
Outside diameter of anchor	d_{nom}	[mm]	12,7	12,7

Table 7: Product performance for seismic category C1

			Snake-PRO M8	**Snake-PRO M10**
Nominal embedment depth	h_{nom}	[mm]	41	41
Factor for presence of an annular gap	α_{gap}	[-]	0,5	0,5
Steel failure for tension and shear load				
Characteristic resistance tension	$N_{Rk,s,eq}$	[kN]	15,4	24,4
Characteristic resistance shear	$V_{Rk,s,eq}$	[kN]	7,7	12,2
Partial safety factor	γ_{Ms}	[-]	1,5	1,5
Rupture elongation	A_5	[%]	< 12	< 12
Pullout failure (tension)				
Characteristic resistance cracked concrete C20/25	$N_{Rk,p,eq}$	[kN]	3,0	3,0

Table 8: Displacements under tension loading

			Snake-PRO M8	Snake-PRO M10
Tension load in uncracked concrete C20/25 to C50/60		**[kN]**	2,4	2,4
Displacement	δ_{N0}	[mm]	0,1	0,1
	$\delta_{N\infty}$	[mm]	0,7	0,7
Tension load in cracked concrete C20/25 to C50/60		**[kN]**	1,4	1,4
Displacement	δ_{N0}	[mm]	0,4	0,4
	$\delta_{N\infty}$	[mm]	0,7	0,7

Table 9: Displacements under shear loads

			Snake-PRO M8	Snake-PRO M10
Shear load in cracked and uncracked concrete C20/25 to C50/60		**[kN]**	2,4	2,4
Displacement	δ_{V0}	[mm]	1,0	1,0
	$\delta_{V\infty}$	[mm]	1,5	1,5

Additional displacement due to annular gap between anchor and fixture is to be taken into account.

Table 10: Characteristic resistance under fire exposure in cracked and uncracked concrete

			Snake PRO	
			M8	M10
Steel failure				
Characteristic resistance	R30 $N_{Rk,s,fi}$	[kN]	0,37	0,58
	R60 $N_{Rk,s,fi}$	[kN]	0,33	0,52
	R90 $N_{Rk,s,fi}$	[kN]	0,26	0,41
	R120 $N_{Rk,s,fi}$	[kN]	0,18	0,29
Pullout failure (cracked and uncracked concrete)				
Characteristic resistance in concrete ≥ C20/25	R30 $N_{Rk,p,fi}$	[kN]	0,75	0,75
	R60 $N_{Rk,p,fi}$	[kN]	0,75	0,75
	R90 $N_{Rk,p,fi}$	[kN]	0,75	0,75
	R120 $N_{Rk,p,fi}$	[kN]	0,60	0,60
Concrete cone and splitting failure[2] (cracked and uncracked concrete)				
Characteristic resistance in concrete ≥ C20/25	R30 $N^0_{Rk,c,fi}$	[kN]	0,79	0,79
	R60 $N^0_{Rk,c,fi}$	[kN]	0,79	0,79
	R90 $N^0_{Rk,c,fi}$	[kN]	0,79	0,79
	R120 $N^0_{Rk,c,fi}$	[kN]	0,63	0,63
Characteristic spacing	$s_{cr,N,min,fi}$	[mm]	120	120
	$c_{cr,N,max,fi}$	[mm]	60	60
Steel failure without lever arm				
Characteristic resistance	R30 $V_{Rk,s,fi}$	[kN]	0,37	0,58
	R60 $V_{Rk,s,fi}$	[kN]	0,33	0,52
	R90 $V_{Rk,s,fi}$	[kN]	0,26	0,41
	R120 $V_{Rk,s,fi}$	[kN]	0,18	0,29
Steel failure with lever arm				
Characteristic bending resistance	R30 $M^0_{Rk,s,fi}$	[Nm]	375	748
	R60 $M^0_{Rk,s,fi}$	[Nm]	337	673
	R90 $M^0_{Rk,s,fi}$	[Nm]	262	523
	R120 $M^0_{Rk,s,fi}$	[Nm]	187	374
Concrete pry-out failure				
Factor for determination of resistance to pry-out failure	k_8	[-]	1,0	1,0
Characteristic resistance in concrete ≥ C20/25	R30 $V_{Rk,cp,fi}$	[kN]	0,79	0,79
	R60 $V_{Rk,cp,fi}$	[kN]	0,79	0,79
	R90 $V_{Rk,cp,fi}$	[kN]	0,79	0,79
	R120 $V_{Rk,cp,fi}$	[kN]	0,63	0,63
Concrete edge failure				
Effective length under shear loading	$l_{f,max}$	[mm]	30	
Outside diameter of anchor	d_{nom}	[mm]	12,7	
Partial safety factor	γ_{inst}[1]	[-]	1,2	

[1] Design under fire exposure is performed according to the design method given in EN 1992-4. Under fire exposure usually cracked concrete is assumed.

EN 1992-4 covers design for fire exposure from one side. For fire attack from more than one side the edge distance must be increased to $c_{min} \geq 300$ mm and $\geq 2 \cdot h_{ef}$.

Snake-PRO

Annex C4

Design according to EN 1992-4
Characteristic resistance under fire exposure