

Centre Scientifique et
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**European Technical
Assessment**

**ETA-13/0057
of 15/12/2016**

English translation prepared by CSTB - Original version in French language

General Part

Nom commercial <i>Trade name</i>	DM-PRO Drop-in anchor
Famille de produit <i>Product family</i>	Cheville à expansion à déformation contrôlée en acier galvanisé ou inoxydable de dimensions M8, M10, M12 et M16 pour usage dans du béton non fissuré. <i>Deformation controlled expansion anchor, made of galvanized or stainless steel for use in non-cracked concrete: sizes M8, M10, M12 and M16.</i>
Titulaire <i>Manufacturer</i>	DEWALT/ Powers Richard-Klinger-Straße 11 65510 Idstein Germany
Usine de fabrication <i>Manufacturing plant</i>	Plant 3
Cette évaluation contient: <i>This assessment contains :</i>	11 pages incluant 8 annexes qui font partie intégrante de cette évaluation <i>11 pages including 8 annexes which form an integral part of this assessment</i>
Base de l'ETE <i>Basis of ETA</i>	DEE 330232-00-0601 "Ancrages mécaniques dans le béton" EAD 330232-00-0601 "Mechanical fasteners for use in concrete"
Cette évaluation remplace: <i>This assessment replaces:</i>	<i>ETA 13/0057 with validity from 01/02/2013 to 31/01/2018</i>

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Specific Part

1 Technical description of the product

The DM-PRO anchor of sizes M8x30, M10x40, M12x50 and M16x65 is an anchor made of galvanized steel or stainless steel, which is placed into a drilled hole and anchored by deformation-controlled expansion.

The anchor consists of an expansion sleeve and an internal plug.

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.

3 Performance of the product

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic tension resistance acc. EN 1992-4	See Annex C1
Characteristic shear resistance acc. EN 1992-4	See Annex C2
Displacements	See Annex C3

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorage satisfy requirements for Class A1

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 Commission¹, 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

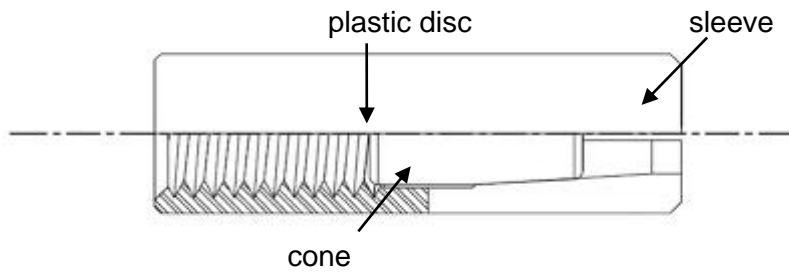
Charles Baloche
Technical Director

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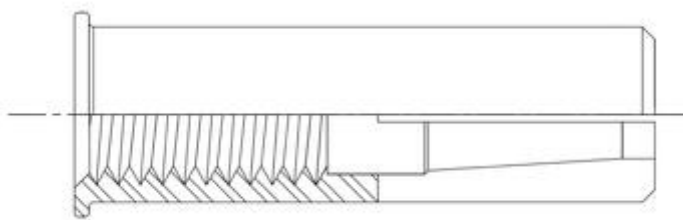
Official Journal of the European Communities L 254 of 08.10.1996

Drop-in anchor DM-PRO:

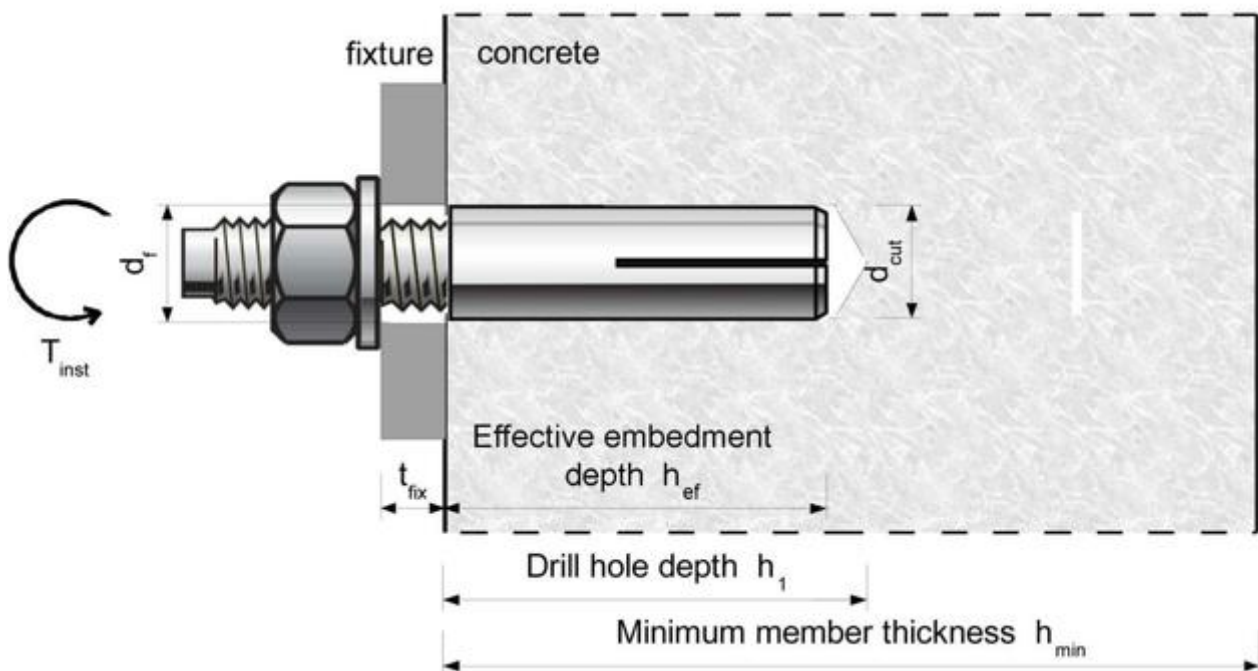
General working principle of a drop in anchor



Marking of the sleeve: e.g. "DM-PRO M8"



Anchor in use:



Drop-in anchor DM-PRO

Product description
 Installation condition

Annex A1

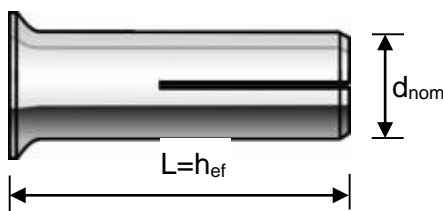
Different anchor versions and different parts of the anchor:

Anchor sleeve

Drop-in anchor



Lipped drop-in anchor



Expansion cone

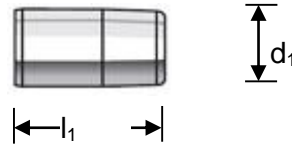


Table 1: Materials

Part	Designation	Product	Material	Protection
1	Anchor sleeves	DM-PRO/ DM-Lip-PRO	Cold formed steel, grade SWRCH8A	Zinc plated 5 μ m
		DM-SS-PRO	Machined steel, grade SS316	-
2	Expansion cones	DM-PRO/ DM-Lip-PRO	Cold formed steel, grade SWRCH8A	Zinc plated 5 μ m
		DM-SS-PRO	Machined steel, grade SS316 (1.4401, 1.4404, 1.4439, 1.4571, A4 steel)	-
3	Screw or threaded rod for fastening	DM-PRO/ DM-Lip-PRO	Steel strength class 4.6, 5.6, 5.8 or 8.8 according to ISO898-1	Zinc plated 5 μ m
		DM-SS-PRO	Steel strength class A4-70 (1.4401, 1.4404, 1.4439, 1.4571)	-

Table 2: Anchor dimensions

			M8	M10	M12	M16
Length sleeve	$L = h_{ef}$	[mm]	30	40	50	65
Nom. diameter	d_{nom}	[mm]	10	12	16	20
Cone diameter	d_1	[mm]	5,7	7,4	9,7	12,8
Cone length	l_1	[mm]	12	16	21	28

Drop-in anchor DM-PRO

Product description
 Materials

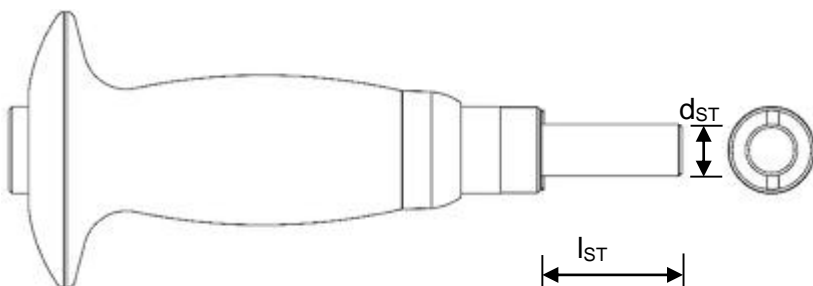
Annex A2

Drop-in anchor setting tool:

Basic version without marking function DM-ST



Version with marking function and safety grip DM-ST-G



The setting tool with marking function produces with correct installation a mark on the collar of the drop in anchor. This mark enables to check after installation the correct expansion of the product.

Table 3: Dimensions setting tool

			M8	M10	M12	M16
Diameter setting tool	d _{ST}	[mm]	6,4	7,9	9,6	13,2
Length setting pin	l _{ST}	[mm]	18	24	29	37

Drop-in anchor DM-PRO

Product description
 Setting tools

Annex A3

Specifications of intended use

Anchorage subject to:

- Static and quasi-static loads.

Base materials:

- Non-cracked concrete
- Reinforced or unreinforced normal weight concrete of strength classes C 20/25 at least to C50/60 at most according to ENV 206: 2000-12.

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions.
- The SS316 version of DM-PRO anchor may be used in concrete subject to dry internal conditions and also in concrete subject to external atmospheric exposure (including industrial and marine environment), or exposure in permanently damp internal conditions, if no particular aggressive conditions exist.

Note: Particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used).

Design:

- The anchorages are designed in accordance with the EN 1992-4 "Design of fastenings for use in concrete" or ETAG001 Annex C "Design Method for Anchorages" 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.

Installation:

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Use of the anchor only as supplied by the manufacturer without exchanging the components of an anchor.
- 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.
- Cleaning of the hole of drilling dust.
- Application of specified torque moment using a calibrated torque 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.

Drop-in anchor DM-PRO

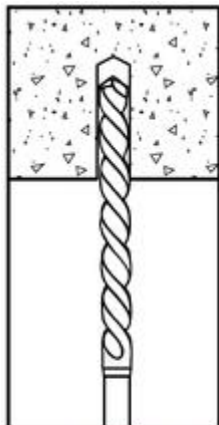
Intended Use
Specifications

Annex B1

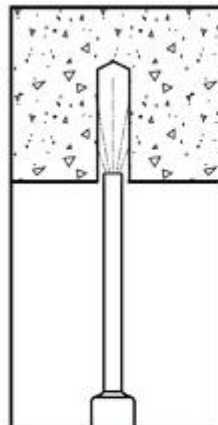
Table 4: Installation data

			M8	M10	M12	M16
Drill hole diameter	d_{cut}	[mm]	≤ 10,45	≤ 12,5	≤ 16,5	≤ 20,5
Drill hole depth	h_1	[mm]	32	42	53	68
Embedment depth	h_{ef}	[mm]	30	40	50	65
Installation torque	T_{inst}	[Nm]	8	15	35	60
Dia. through hole fixture	d_f	[mm]	9	12	14	18
Min. screw in length		[mm]	8	10	12	16
Thread length		[mm]	13	17	22	30
Min. member thickness	h_{min}	[mm]	120	120	130	160
Minimum edge distance	c_{min}	[mm]	100	130	170	200
Minimum spacing	s_{min}	[mm]	70	100	120	160

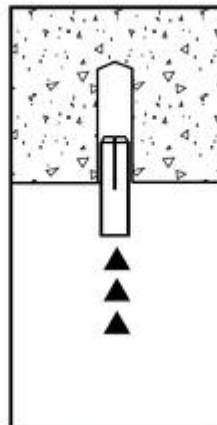
Installation instructions



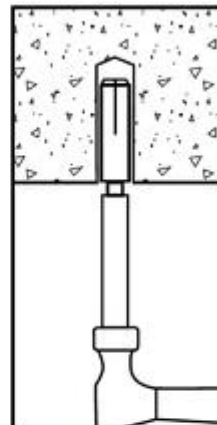
1.) Using the proper drill bit size, drill a hole into the base material to the required depth.



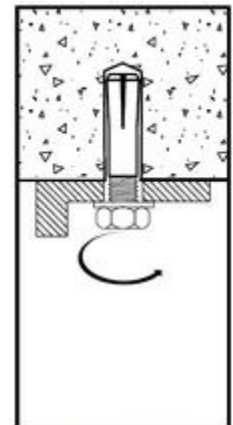
2.) Remove dust and debris from the hole using a hand pump or compressed air.



3.) Insert drop in anchor in to drilled hole.



4.) Expand anchor by hammering on setting tool until the collar of the setting tool touches the fixture.



5.) Insert threaded rod and prestress with defined torque.

Drop-in anchor DM-PRO

Intended Use
 Installation instructions

Annex B2

Table 5: Product Performance for static and quasi-static actions, tension loading

			M8 ^{*)}	M10	M12	M16
Steel failure						
Characteristic resistance, steel grade 4.6	$N_{Rk,s}$	[kN]	14,6	14,7	33,7	62,7
Partial safety factor	$\gamma_{Ms,N}^{1)}$	[-]	2,0	1,5	2,0	2,0
Characteristic resistance steel grade 5.6	$N_{Rk,s}$	[kN]	11,6	14,7	42,1	47,3
Partial safety factor	$\gamma_{Ms,N}^{1)}$	[-]	1,5	1,5	2,0	1,5
Characteristic resistance steel grade 8.8	$N_{Rk,s}$	[kN]	11,6	14,7	36,0	47,3
Partial safety factor	$\gamma_{Ms,N}^{1)}$	[-]	1,5	1,5	1,5	1,5
Characteristic resistance steel grade A4-70	$N_{Rk,s}$	[kN]	15,7	19,9	48,6	63,9
Partial safety factor	$\gamma_{Ms,N}^{1)}$	[-]	1,89			

Pullout failure						
Char. resistance in non-cracked concrete C20/25	$N_{Rk,p}$	[kN]	- ²⁾	9	12	12
Increasing factor for N_{Rk} concrete C30/37	Ψ_c	[-]	1,22			
Increasing factor for N_{Rk} concrete C40/50		[-]	1,41			
Increasing factor for N_{Rk} concrete C50/60		[-]	1,55			

Concrete cone failure and splitting failure						
Effective embedment depth	h_{ef}	[mm]	30	40	50	65
Factor non- cracked concrete	$k_{ucr,N}$	[-]	10,1			
Increasing factor for N_{Rk} concrete C30/37	Ψ_c	[-]	1,22			
Increasing factor for N_{Rk} concrete C40/50		[-]	1,41			
Increasing factor for N_{Rk} concrete C50/60		[-]	1,55			
Char. spacing concrete cone failure	$s_{cr,N}$	[mm]	90	120	150	195
Char. spacing splitting failure	$s_{cr,sp}$	[mm]	180	240	300	390
Char. edge distance concrete cone failure	$c_{cr,N}$	[mm]	45	60	75	97,5
Char. edge distance splitting failure	$c_{cr,sp}$	[mm]	90	120	150	195
Installation safety factor	$\gamma_2 = \gamma_{Inst}$	[-]	1,0	1,2	1,4	1,4

*) For application with statically indeterminate structural component only.

¹⁾ In absence of other national regulations

²⁾ Pullout failure is not decisive

Drop-in anchor DM-PRO

Design

Characteristic resistance in tension loading

Annex C1

Table 6: Product Performance for static and quasi-static actions, shear loading

			M8 ^{*)}	M10	M12	M16
Steel failure, without lever arm						
Characteristic resistance, steel grade 4.6	$V_{Rk,s}$	[kN]	7,3	7,4	16,9	31,4
Partial safety factor	$\gamma_{Ms,V}$	[-]	1,67	1,25	1,67	1,67
Characteristic resistance steel grade 5.6	$V_{Rk,s}$	[kN]	5,8	7,4	21,1	23,6
Partial safety factor	$\gamma_{Ms,V}$	[-]	1,25	1,25	1,67	1,25
Characteristic resistance steel grade 8.8	$V_{Rk,s}$	[kN]	5,8	7,4	18,0	23,6
Partial safety factor	$\gamma_{Ms,V}$	[-]	1,25			
Characteristic resistance steel grade A4-70	$V_{Rk,s}$	[kN]	7,8	10,0	24,3	31,9
Partial safety factor	$\gamma_{Ms,V}$	[-]	1,58	1,58	1,58	1,58
k_7 Factor	k_7	[-]	0,8	0,8	0,8	0,8
Steel failure, with lever arm						
Characteristic resistance, steel grade 4.6	$M^0_{Rk,s}$	[Nm]	14,9	29,9	52,4	132,8
Partial safety factor	$\gamma_{Ms,V}$	[-]	1,67			
Characteristic resistance steel grade 5.6	$M^0_{Rk,s}$	[Nm]	18,7	37,3	65,5	166,5
Partial safety factor	$\gamma_{Ms,V}$	[-]	1,67			
Characteristic resistance steel grade 8.8	$M^0_{Rk,s}$	[Nm]	27,3	43,0	104,8	224,9
Partial safety factor	$\gamma_{Ms,V}$	[-]	1,25			
Characteristic resistance steel grade A4-70	$M^0_{Rk,s}$	[Nm]	26,2	52,3	91,6	233,1
Partial safety factor	$\gamma_{Ms,V}$	[-]	1,56			
Concrete pryout failure						
k_8 factor	k_8	[-]	1	1	1	2
Concrete edge failure						
Effective length of anchor	$l_f = h_{ef}$	[mm]	30	40	50	65
Outside diameter of anchor	d_{nom}	[mm]	10	12	16	20

*) For application with statically indeterminate structural component only.

Drop-in anchor DM-PRO	Annex C2
Design Characteristic resistance in shear loading	

Table 7: Displacements under tension loads

		M8	M10	M12	M16
Tension load in non-cracked concrete C20/25 [kN]		3,6	3,6	4,1	4,1
Displacement	δ_{N0} [mm]	0,30	0,10	0,05	0,05
	$\delta_{N\infty}$ [mm]	0,30	0,27	0,27	0,27

Table 8: Displacements under shear loads

		M8	M10	M12	M16
Shear load in non-cracked concrete C20/25 [kN]		3,3	4,2	10,3	13,5
Displacement	δ_{V0} [mm]	4,4	3,8	3,1	1,9
	$\delta_{V\infty}$ [mm]	6,6	5,7	4,7	2,8

Displacement under shear loading: additional displacements due to through hole in the fixture shall be considered

Drop-in anchor DM-PRO

Design
 Displacements

Annex C3