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European Technical Assessment

ETA-13/0060 of 15/09/2017

English translation prepared by CSTB - Original version in French language

Partie générale

Nom commercial: *Trade name*	**PB-PRO & PB-SS-PRO**
Famille de produit: *Product family*	**Cheville métallique à expansion par vissage à couple contrôlé, de fixation dans le béton fissuré et non fissuré diamètres M8, M10, M12 et M16** ***Torque-controlled expansion anchor for use in cracked and uncracked concrete: sizes M8, M10, M12 and M16***
Titulaire: *Manufacturer*	DEWALT / Powers Richard-Klinger-Str. 11 65510 Idstein Germany
Usine de fabrication : *Manufacturing plants*	Plant 7
Cette evaluation contient: *This Assessment contains*	19 pages incluant 16 pages d'annexes qui font partie intégrante de cette évaluation 19 *pages including* 16 *pages of annexes which form an integral part of this assessment*
Base de l'été: *Basis of ETA*	EAD 330232-00-0601, Version Octobre 2016 *EAD 330232-00-0601, Edition October 2016*
Cette évaluation remplace: *This Assessment replaces*	ETE-13/0060 délivrée le 06/01/2014 *ETA*-13/0060 *issued on 06/01/2014* ATE-13/0059 délivrée le 01/02/2013 *ETA-13/0059 issued on 01/02/2013* ATE-12/0305 délivrée le 01/06/2012 *ETA-12/0305 issued on 01/06/2012* ETE-12/0174 délivrée le 04/03/2014 *ETA-12/0174 issued on 04/03/2014*

1 Technical description of the product

The PB-PRO anchor is an anchor made of zinc electroplated steel which is placed into a drilled hole and anchored by torque-controlled expansion.

The PB-SS-PRO anchor is an anchor made of stainless steel which is placed into a drilled hole and anchored by torque-controlled expansion.

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 (ER 1)

Essential characteristic	Performance
Characteristic tension resistance	See Annex C1
Characteristic shear resistance	See Annex C3
Characteristic resistance under seismic action	See Annex C9
Displacements	See Annex C10

3.2 Safety in case of fire (ER 2)

Essential characteristic	Performance
Reaction to fire	Anchorages satisfy requirements for Class A1
Characteristic tension resistance under fire	See Annex C5
Characteristic shear resistance under fire	See Annex C7

3.3 Hygiene, health and the environment (ER 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 (ER 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 (ER 5)

Not relevant.

3.6 Energy economy and heat retention (ER 6)

Not relevant.

3.7 General aspects relating to fitness for use

Durability and Serviceability are only ensured if the specifications of intended use according to Annex B 1 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.

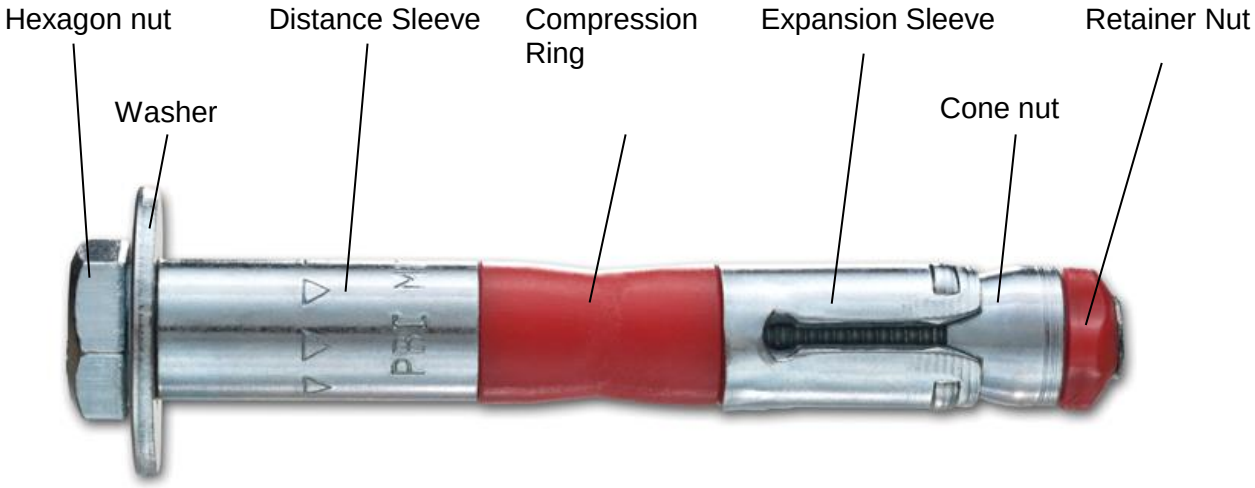
Issued in Marne La Vallée on 15/09/2017 by

Charles Baloche *The original French version is signed*

Directeur technique

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

Assembled anchor:



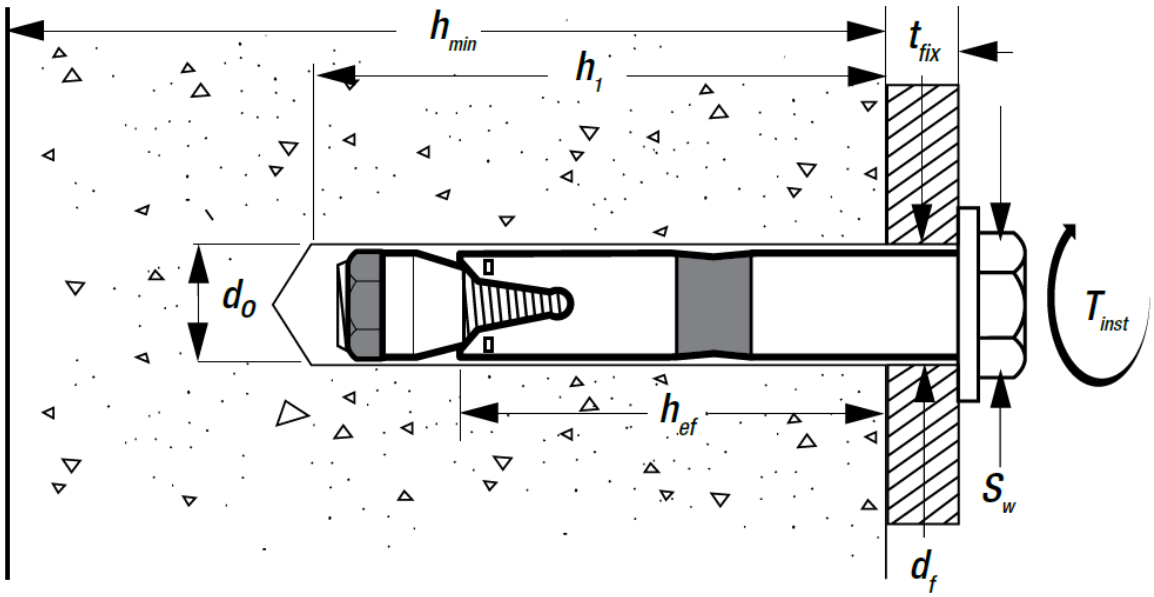
Marking on the bolt:

PB1 (product name)

followed by MX/Y-Z where

MX	=	thread diameter
Y	=	nominal drill diameter
Z	=	fixture thickness

Anchor in use:



Heavy duty anchors PB-PRO & PB-SS-PRO	
Product description Installation condition	**Annex A1**

Different parts of the anchor:

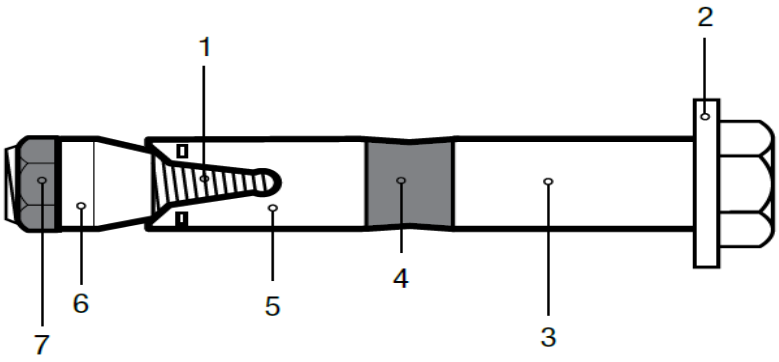


Table 1: Materials, PB-PRO

Part	Designation	Material	Protection
1	Threaded bolt	C-Steel $f_{uk} \geq 800 N/mm^2$	Zinc plated > 5 µm
2	Washer	Steel property class 8.8 acc. to EN ISO 7093	Zinc plated > 5 µm
3	Distance sleeve	C-steel	Zinc plated > 5 µm
4	Compression ring	Plastic element, HDPE	-
5	Expansion sleeve	C-steel	Zinc plated > 5 µm
6	Cone nut	C-steel	Zinc plated > 5 µm
7	Retainer nut	Plastic element, HDPE	-

Table 2: Materials, PB-SS-PRO

Part	Designation	Material	Protection
1	Threaded bolt	Stainless steel A4 (1.4401, 1.4404, 1.4571) acc. to EN 10088	-
2	Washer	Stainless steel A4 (1.4401, 1.4404, 1.4571) acc. to EN 10088	-
3	Distance sleeve	Stainless steel A4	-
4	Compression ring	Plastic element, HDPE	-
5	Expansion sleeve	Stainless steel A4	-
6	Cone nut	Stainless steel A4	Coating
7	Retainer nut	Plastic element, HDPE	-

Specifications of intended use

Anchorages subject to:

- PB-PRO: Static, quasi-static, seismic loads and fire.
- PB-SS-PRO: Static, quasi-static and fire.

Base materials:

- Cracked concrete and uncracked concrete
- Reinforced or unreinforced normal weight concrete of strength classes C20/25 at least to C50/60 at most according to EN 206: 2000-12.

Use conditions (Environmental conditions):

- PB-PRO: Structures subject to dry internal conditions.
- PB-SS-PRO: Structures subject to external atmospheric exposure (including industrial and marine environment, or exposure in permanent damped internal condition)

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 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.
- 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 with conventional carbide bit or hollow drill bit.
- Cleaning of the hole of drilling dust. This step can be omitted if a hollow drill bit has been used.
- 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.

Heavy duty anchors PB-PRO	**Annex B1**
Intended Use Specifications	

Table 3: Anchor dimensions

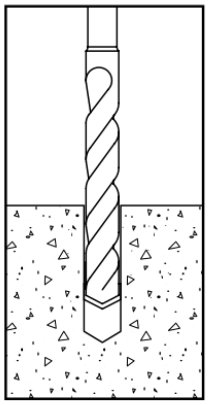
				PB-SS-PRO M8/12	PB-PRO M8/12	PB-PRO M10/15	PB-PRO M12/18	PB-PRO M16/24
Length of the anchor	**Min.**	**L**	**[mm]**	72	77	91	86	130
	Max.		**[mm]**	185	176	200	201	229
Fixture thickness	**Min.**	t_{fix}	**[mm]**	1	1	1	1	1
	Max.		**[mm]**	100	100	100	100	100
Length expansion sleeve		l_{clip}	**[mm]**	22	22	27	33	44
Width torque wrench		**SW**	**[mm]**	13	13	17	19	24

Table 4: Installation data

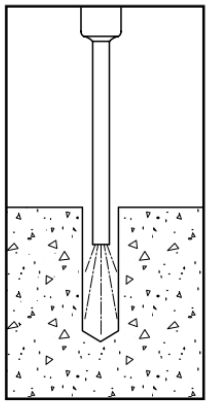
			PB-SS-PRO M8/12	PB-PRO M8/12	PB-PRO M10/15	PB-PRO M12/18	PB-PRO M16/24
Drill hole diameter	d_{cut}	**[mm]**	≤ 12,50	≤ 12,50	≤ 15,50	≤ 18,50	≤ 24,55
Drill hole depth	h_1	**[mm]**	80	80	95	110	135
Embedment depth	h_{ef}	**[mm]**	60	60	70	80	100
Installation torque	T_{inst}	**[Nm]**	30	30	45	90	130
Diameter through hole fixture	d_f	**[mm]**	14	14	17	20	26
Min. member thickness	h_{min}	**[mm]**	120	120	140	160	200
Minimum edge distance	c_{min}	**[mm]**	50	80	100	120	140
Corresponding spacing	**s ≥**	**[mm]**	90	140	180	220	230
Minimum spacing	s_{min}	**[mm]**	50	65	65	100	130
Corresponding edge distance	**c ≥**	**[mm]**	90	140	150	220	240

Installation : PB-PRO and PB-SS-PRO

Standard Drill Bit

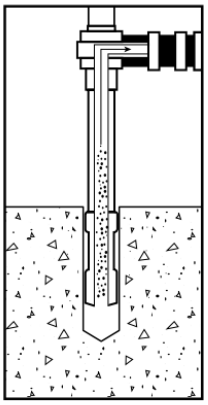


1.) Using the proper drill bit size, drill a hole into the base material to the required depth.

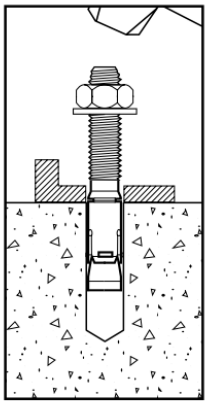


2.) Remove dust and debris from the hole using a hand pump or compressed air.

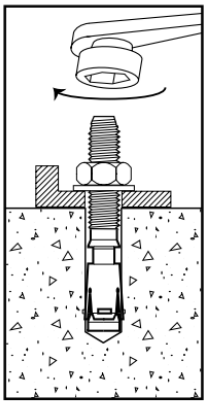
Hollow Drill Bit



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.) Drive the anchor into the hole at least to the minimum required embedment depth.



4.) Tighten the anchor with a torque wrench by applying the required installation torque T_{inst}.

Heavy duty anchors PB-PRO & PB-SS-PRO	
Intended Use Installation instructions	**Annex B3**

Table 5: Characteristic values for tension loads in case of static and quasi static loading

				PB-PRO M8/12	PB-PRO M10/15	PB-PRO M12/18	PB-PRO M16/24
Steel failure							
Characteristic resistance		$N_{Rk,s}$	[kN]	29,3	46,4	67,4	125,6
Partial safety factor		γ_{Ms} [1)]	[-]	1,5			
Pullout failure $N_{Rk,p} = \Psi_c \times N^0_{Rk,p}$							
Char. resistance in concrete C20/25	cracked	$N^0_{Rk,p}$	[kN]	12	16	20	30
	uncracked	$N^0_{Rk,p}$	[kN]	12	25	30	35
Partial safety factor for cracked or uncracked concrete		γ_{inst}	[-]	1,0			
Increasing factor for N_{RK}	concrete C30/37	Ψ_c	[-]	1,22			
	concrete C40/50		[-]	1,41			
	concrete C50/60		[-]	1,55			
Concrete cone failure and splitting failure							
Effective embedment depth		h_{ef}	[mm]	60	70	80	100
Factor for determination of the resistance to concrete cone failure		$k_1=k_{cr,N}$	[-]	7,7			
		$k_1=k_{ucr,N}$	[-]	11,0			
Partial safety factor for craked or uncracked concrete		γ_{inst}	[-]	1,0			
Increasing factor for N_{RK}	concrete C30/37	Ψ_c	[-]	1,22			
	concrete C40/50		[-]	1,41			
	concrete C50/60		[-]	1,55			
Char. spacing	concrete cone failure	$s_{cr,N}$	[mm]	180	210	240	300
	splitting failure	$s_{cr,sp}$	[mm]	300	350	400	500
Char. edge distance	concrete cone failure	$c_{cr,N}$	[mm]	90	105	120	150
	splitting failure	$c_{cr,sp}$	[mm]	150	175	200	250

[1)] In absence of other national regulations

Heavy duty anchors PB-PRO

Design according to EN 1992-4

Characteristic resistance under tension loads

Annex C1

Table 6: Characteristic values for tension loads in case of static and quasi static loading

				PB-SS-PRO M8/12
Steel failure				
Characteristic resistance		$N_{Rk,s}$	[kN]	25,6
Partial safety factor		γ_{Ms} [1)]	[-]	1,87
Pullout failure $N_{Rk,p} = \Psi_c \times N^0_{Rk,p}$				
Char. resistance in concrete C20/25	cracked	$N^0_{Rk,p}$	[kN]	12
	uncracked	$N^0_{Rk,p}$	[kN]	16
Partial safety factor	cracked	γ_{inst}	[-]	1,2
	uncracked	γ_{inst}	[-]	1,0
Increasing factor for N_{RK}	concrete C30/37	Ψ_c	[-]	1,22
	concrete C40/50		[-]	1,41
	concrete C50/60		[-]	1,55
Concrete cone failure and splitting failure				
Effective embedment depth		h_{ef}	[mm]	60
Factor for determination of the resistance to concrete cone failure		$k_1=k_{cr,N}$	[-]	7,7
		$k_1=k_{ucr,N}$	[-]	11,0
Partial safety factor	cracked	γ_{inst}	[-]	1,2
	uncracked	γ_{inst}	[-]	1,0
Increasing factor for N_{RK}	concrete C30/37	Ψ_c	[-]	1,22
	concrete C40/50		[-]	1,41
	concrete C50/60		[-]	1,55
Char. spacing	concrete cone failure	$s_{cr,N}$	[mm]	180
	splitting failure	$s_{cr,sp}$	[mm]	300
Char. edge distance	concrete cone failure	$c_{cr,N}$	[mm]	90
	splitting failure	$c_{cr,sp}$	[mm]	150

[1)] In absence of other national regulations

Table 7: Characteristic values for shear loads in case of static and quasi static loading

			PB-PRO M8/12	PB-PRO M10/15	PB-PRO M12/18	PB-PRO M16/24
Steel failure without lever arm						
Characteristic resistance	$V_{Rk,s}$	[kN]	32,7	53,6	76,6	89,8
Factor considering ductility	k_7	[-]	1,0			
Partial safety factor	γ_{Ms} 1)	[-]	1,25			
Steel failure with lever arm						
Char. bending resistance	$M^0_{Rk,s}$	[Nm]	30,0	59,8	104,8	266,4
Partial safety factor	γ_{Ms} 1)	[-]	1,25			
Concrete pry-out failure						
Factor for determination of resistance to pry-out failure	k_8	[-]	2,0			
Partial safety factor	γ_{inst}	[-]	1,0			
Concrete edge failure						
Effective length of anchor under shear loading	l_f	[mm]	60	70	80	100
Outside diameter of anchor	d_{nom}	[mm]	12	15	18	24
Partial safety factor	γ_{inst} 1)	[-]	1,0			

1) In absence of other national regulations

Table 8: Characteristic values for shear loads in case of static and quasi static loading

			PB-SS-PRO M8/12
Steel failure without lever arm			
Characteristic resistance	$V_{Rk,s}$	[kN]	28,9
Factor considering ductility	k_7	[-]	0,8
Partial safety factor	γ_{Ms} [1)]	[-]	1,56
Steel failure with lever arm			
Char. bending resistance	$M^0_{Rk,s}$	[Nm]	22
Partial safety factor	γ_{Ms} [1)]	[-]	1,56
Concrete pry-out failure			
Factor for determination of resistance to pry-out failure	k_8	[-]	2,0
Partial safety factor	γ_{inst} [1)]	[-]	1,0
Concrete edge failure			
Effective length of anchor under shear loading	l_f	[mm]	60
Outside diameter of anchor	d_{nom}	[mm]	12
Partial safety factor	γ_{inst} [1)]	[-]	1,0

[1)] In absence of other national regulations

Table 9: Characteristic tension resistance in cracked and uncracked concrete under fire exposure[1)]

			PB-PRO M8/12	PB-PRO M10/15	PB-PRO M12/18	PB-PRO M16/24
Steel failure						
Characteristic resistance	R30 $N_{Rk,s,fi}$	[kN]	0,4	0,9	1,7	3,1
	R60 $N_{Rk,s,fi}$	[kN]	0,3	0,8	1,3	2,4
	R90 $N_{Rk,s,fi}$	[kN]	0,3	0,6	1,1	2,0
	R120 $N_{Rk,s,fi}$	[kN]	0,2	0,5	0,8	1,6
Pullout failure (cracked and uncracked concrete)						
Char. resistance in concrete ≥ C20/25	R30 $N_{Rk,p,fi}$	[kN]	3,0	4,0	5,0	7,5
	R60 $N_{Rk,p,fi}$	[kN]	3,0	4,0	5,0	7,5
	R90 $N_{Rk,p,fi}$	[kN]	3,0	4,0	5,0	7,5
	R120 $N_{Rk,p,fi}$	[kN]	2,4	3,2	4,0	6,0
Concrete cone and splitting failure[2)] (cracked and uncracked concrete)						
Char. resistance in concrete ≥ C20/25	R30 $N^0_{Rk,c,fi}$	[kN]	5,0	7,4	10,3	18,0
	R60 $N^0_{Rk,c,fi}$	[kN]	5,0	7,4	10,3	18,0
	R90 $N^0_{Rk,c,fi}$	[kN]	5,0	7,4	10,3	18,0
	R120 $N^0_{Rk,c,fi}$	[kN]	4,0	5,9	8,2	14,4
Characteristic spacing	$s_{cr,N,fi}$	[mm]	240	280	320	400
Characteristic edge distance	$c_{cr,N,fi}$	[mm]	120	140	160	200

[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. The design equations are given in EN 1992-4.

[2)] As a rule, splitting failure can be neglected when cracked concrete and reinforcement 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 $\geq 2 \cdot h_{ef}$.

Table 10: Characteristic tension resistance in cracked and uncracked concrete under fire exposure[1)]

			PB-SS-PRO M8/12
Steel failure			
Characteristic resistance	R30 $N_{Rk,s,fi}$	[kN]	0,7
	R60 $N_{Rk,s,fi}$	[kN]	0,6
	R90 $N_{Rk,s,fi}$	[kN]	0,4
	R120 $N_{Rk,s,fi}$	[kN]	0,4
Pullout failure (cracked and uncracked concrete)			
Char. resistance in concrete ≥ C20/25	R30 $N_{Rk,p,fi}$	[kN]	3,0
	R60 $N_{Rk,p,fi}$	[kN]	3,0
	R90 $N_{Rk,p,fi}$	[kN]	3,0
	R120 $N_{Rk,p,fi}$	[kN]	2,4
Concrete cone and splitting failure[2)] (cracked and uncracked concrete)			
Char. resistance in concrete ≥ C20/25	R30 $N^0_{Rk,c,fi}$	[kN]	5,0
	R60 $N^0_{Rk,c,fi}$	[kN]	5,0
	R90 $N^0_{Rk,c,fi}$	[kN]	5,0
	R120 $N^0_{Rk,c,fi}$	[kN]	4,0
Characteristic spacing	$s_{cr,N,fi}$	[mm]	240
Characteristic edge distance	$c_{cr,N,fi}$	[mm]	120

[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. The design equations are given in EN 1992-4.

[2)] As a rule, splitting failure can be neglected when cracked concrete and reinforcement 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 $\geq 2 \cdot h_{ef}$.

Table 11: Characteristic shear resistance in cracked and uncracked concrete under fire exposure[1)]

			PB-PRO M8/12	PB-PRO M10/15	PB-PRO M12/18	PB-PRO M16/24
Steel failure without lever arm						
Characteristic resistance	R30 $V_{Rk,s,fi}$	[kN]	0,4	0,9	1,7	3,1
	R60 $V_{Rk,s,fi}$	[kN]	0,3	0,8	1,3	2,4
	R90 $V_{Rk,s,fi}$	[kN]	0,3	0,6	1,1	2,0
	R120 $V_{Rk,s,fi}$	[kN]	0,2	0,5	0,8	1,6
Steel failure with lever arm						
Characteristic bending moment	R30 $M^0_{Rk,s,fi}$	[Nm]	0,4	1,1	2,6	6,7
	R60 $M^0_{Rk,s,fi}$	[Nm]	0,3	1,0	2,0	5,0
	R90 $M^0_{Rk,s,fi}$	[Nm]	0,3	0,7	1,7	4,3
	R120 $M^0_{Rk,s,fi}$	[Nm]	0,2	0,6	1,3	3,3
Concrete pry-out failure						
Factor for determination of resistance to pry-out failure	k_8	[-]	2,0			
Characteristic resistance	R30 $V_{Rk,cp,fi}$	[kN]	10,0	14,8	20,6	36,0
	R60 $V_{Rk,cp,fi}$	[kN]	10,0	14,8	20,6	36,0
	R90 $V_{Rk,cp,fi}$	[kN]	10,0	14,8	20,6	36,0
	R120 $V_{Rk,cp,fi}$	[kN]	8,0	10,8	16,4	28,8
Concrete edge failure						
Eff. length of anchor under shear loading	l_f	[mm]	60	70	80	100
Outside diameter of anchor	d_{nom}	[mm]	12	15	18	24

[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. The design equations are given in EN 1992-4.

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 $\geq 2 \cdot h_{ef}$.

Heavy duty anchors PB-PRO	
Design according to EN 1992-4 Characteristic shear resistance under fire exposure	**Annex C7**

Table 12: Characteristic shear resistance in cracked and uncracked concrete under fire exposure[1)]

			PB-SS-PRO M8/12
Steel failure without lever arm			
Characteristic resistance	R30 $V_{Rk,s,fi}$	[kN]	0,7
	R60 $V_{Rk,s,fi}$	[kN]	0,6
	R90 $V_{Rk,s,fi}$	[kN]	0,4
	R120 $V_{Rk,s,fi}$	[kN]	0,4
Steel failure with lever arm			
Characteristic bending moment	R30 $M^0_{Rk,s,fi}$	[Nm]	0,7
	R60 $M^0_{Rk,s,fi}$	[Nm]	0,6
	R90 $M^0_{Rk,s,fi}$	[Nm]	0,4
	R120 $M^0_{Rk,s,fi}$	[Nm]	0,4
Concrete pry-out failure			
Factor for determination of resistance to pry-out failure	k_8	[-]	2,0
Characteristic resistance	R30 $V_{Rk,cp,fi}$	[kN]	10,0
	R60 $V_{Rk,cp,fi}$	[kN]	10,0
	R90 $V_{Rk,cp,fi}$	[kN]	10,0
	R120 $V_{Rk,cp,fi}$	[kN]	8,0
Concrete edge failure			
Effective length of anchor under shear loading	l_f	[mm]	60
Outside diameter of anchor	d_{nom}	[mm]	12

[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. The design equations are given in EN 1992-4.

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 $\geq 2 \cdot h_{ef}$.

Table 13: Characteristic resistance under tension load for seismic category C1 in concrete

Size			**PB-PRO M8/12**	**PB-PRO M10/15**	**PB-PRO M12/18**	**PB-PRO M16/24**
Resistance under tension loads						
Steel failure						
Char. resistance	$N_{Rk,s,eq}$	[kN]	29,3	46,4	67,4	125,6
Partial safety factor	$\gamma_{Ms,eq}$	[-]	1,5			
Pullout failure						
Characteristic resistance	$N_{Rk,p,eq}$	[kN]	12,0	16,0	20,0	30,0
Partial safety factor	$\gamma_{Mp,eq}$ [1)]	[-]	1,5[1)]			
Resistance under shear loads						
Steel failure without lever arm						
Characteristic resistance	$V_{Rk,s,eq}$	[kN]	21,7	28,9	45,5	69,6
Partial safety factor	$\gamma_{Ms,eq}$	[-]	1,25			

[1)] In absence of other national regulations

Table 14: Displacements under tension loading

			PB-PRO M8/12	PB-PRO M10/15	PB-PRO M12/18	PB-PRO M16/24
Tension load in uncracked concrete C20/25		[kN]	5,7	11,9	14,3	16,7
Displacement	δ_{N0}	[mm]	0,18	0,40	0,50	0,63
	$\delta_{N\infty}$	[mm]	1,21	1,18	1,37	1,41
Tension load in uncracked concrete C50/60		[kN]	8,9	18,5	22,1	25,8
Displacement	δ_{N0}	[mm]	0,28	0,61	0,77	0,98
	$\delta_{N\infty}$	[mm]	1,21	1,18	1,37	1,41
Tension load in cracked concrete C20/25		[kN]	5,7	7,6	9,5	14,3
Displacement	δ_{N0}	[mm]	0,28	0,34	0,38	0,44
	$\delta_{N\infty}$	[mm]	1,21	1,18	1,37	1,41
Tension load in cracked concrete C50/60		[kN]	8,9	11,8	14,8	22,1
Displacement	δ_{N0}	[mm]	0,44	0,53	0,59	0,68
	$\delta_{N\infty}$	[mm]	1,21	1,18	1,37	1,41

Table 15: Displacements under shear loads

			PB-PRO M8/12	PB-PRO M10/15	PB-PRO M12/18	PB-PRO M16/24
Shear load in cracked and uncracked concrete C20/25 to C50/60		[kN]	18,7	30,6	43,8	31,3
Displacement	δ_{V0}	[mm]	0,01	0,50	1,39	3,23
	$\delta_{V\infty}$	[mm]	0,02	0,74	2,09	4,85

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

Table 16: Displacements under tension loading

			PB-SS-PRO M8/12
Tension load in uncracked concrete C20/25 to C50/60		[kN]	7,6
Displacement	δ_{N0}	[mm]	0,67
	$\delta_{N\infty}$	[mm]	1,21
Tension load in cracked concrete C20/25 to C50/60		[kN]	4,3
Displacement	δ_{N0}	[mm]	0,84
	$\delta_{N\infty}$	[mm]	0,85

Table 17: Displacements under shear loads

			PB-SS-PRO M8/12
Charge de cisaillement en béton fissuré et non fissuré C20/25 à C50/60		[kN]	13,8
Displacement	δ_{V0}	[mm]	16,8
	$\delta_{V\infty}$	[mm]	25,2

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