INSTYTUT TECHNIKI BUDOWLANEJ

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European Technical Assessment

ETA-23/0887 of 29/12/2023

General Part

Technical Assessment Body issuing the European Technical Assessment	Instytut Techniki Budowlanej
Trade name of the construction product	R-XPTIII
Product family to which the construction product belongs	Torque controlled expansion fasteners of sizes M8, M10, M12, M16 and M20 for use in uncracked concrete
Manufacturer	RAWLPLUG S.A. ul. Kwidzyńska 6 PL 51-416 Wrocław Poland
Manufacturing plant	Manufacturing plant no 2
This European Technical Assessment contains	14 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	European Assessment Document (EAD) 330232-01-0601-v01 “Torque-controlled expansion fasteners for use in concrete with variable working life up to 50 years”

Specific Part

1 Technical description of the product

The R-XPTIII torque controlled expansion anchors of sizes M8, M10, M12, M16 and M20 are fasteners made of carbon steel (R-XPTIII-ZP) or hot dip galvanized steel (R-XPTIII-HD).

The R-XPTIII torque controlled expansion anchors of sizes M8, M10, M12 and M16 are fasteners made of stainless steel (R-XPTIII-A4).

The anchor is placed into a drill 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 (EAD)

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 provisions made in this European Technical Assessment are based on an assumed working life of the anchor, which is varied depending on the corrosion protection and the environmental conditions, but not exceeding 50 years, according to Annex B1. The indications given on the working life cannot be interpreted as a guarantee given by the producer or Technical Assessment Body, 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 Performance of the product

3.1.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance to tension load (static and quasi-static loading)	Annex C1, C3
Characteristic resistance to shear load (static and quasi-static loading)	Annex C2, C4
Displacements	Annex C1 to C4

3.1.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	No performance assessed

3.1.3 Aspects of durability

Essential characteristic	Performance
Durability	Annex B1

3.2 Methods used for the assessment

The assessment has been made in accordance with EAD 330232-01-0601-v01.

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

According to Decision 96/582/EC of the European Commission the system 1 of assessment and verification of constancy of performance applies (see Annex V to regulation (EU) No 305/2011).

5 Technical details necessary for the implementation of the AVCP system, as provided in the applicable European Assessment Document (EAD)

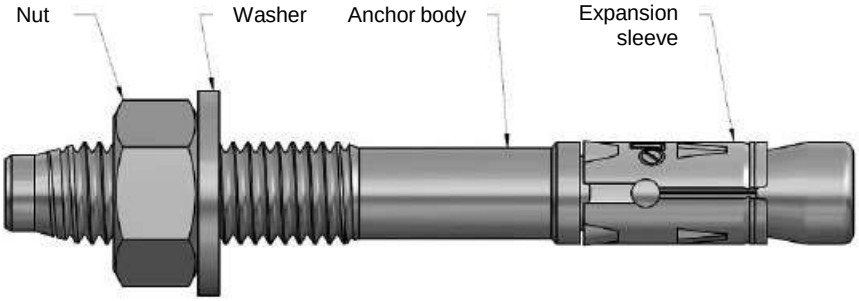
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited in Instytut Techniki Budowlanej.

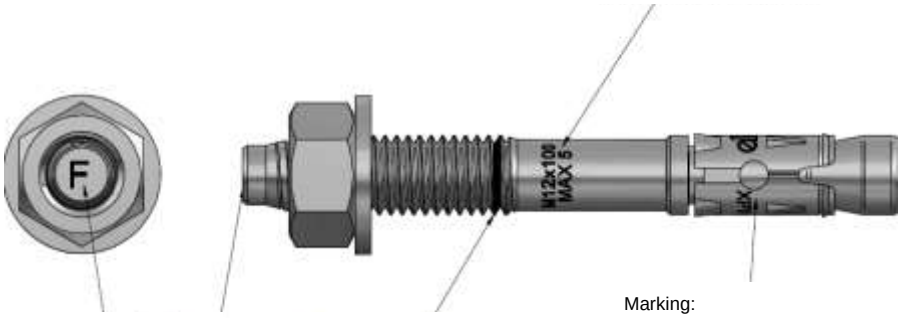
For type testing the results of the tests performed as part of the assessment for the European Technical Assessment shall be used unless there are changes in the production line or plant. In such cases the necessary type testing has to be agreed between Instytut Techniki Budowlanej and the notified body.

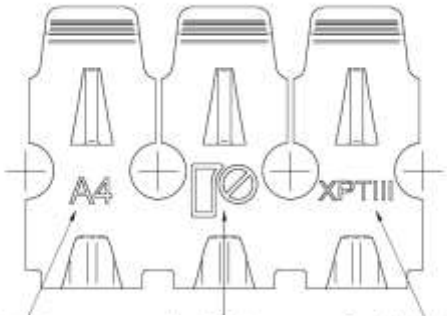
Issued in Warsaw on 29/12/2023 by Instytut Techniki Budowlanej

Anna Panek, MSc

Deputy Director of ITB







Marking:

- expansion sleeve: ZP, HD, A4 (marking identifying the product)
- anchor body: marking of size, length and t_{fix}
- one letter marking on the tip of the anchor body, according to Table A2

R-XPTIII	**Annex A1** of European Technical Assessment ETA-23/0887
Product description Dimensions and marking	

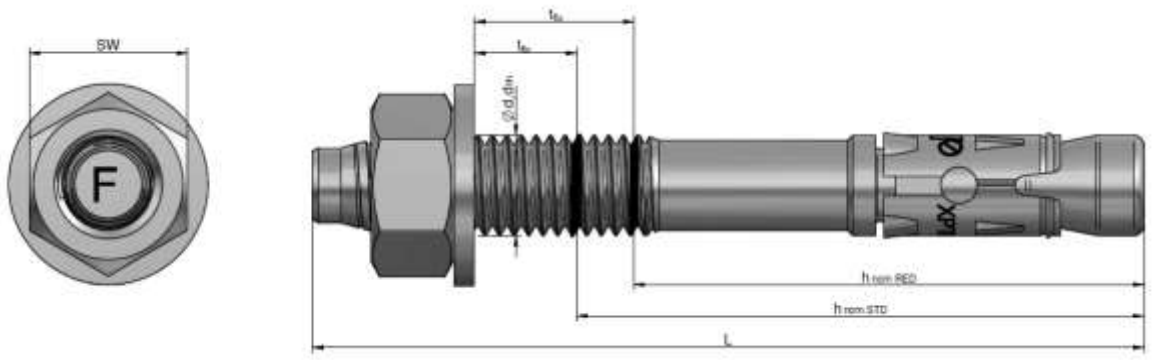


Table A1: R-XPTIII-ZP, R-XPTIII-HD and R-XPTIII-A4 anchors dimensions

Type of anchor				d [3] [mm]	d_{th} [4] [mm]	L [5] [mm]	L_{sleeve} [mm]	SW [6] [mm]
Size	Marking	$t_{fix,STD}$ [1] [mm]	$t_{fix,RED}$ [2] [mm]					
M8	according to Table A2	1 – 120	1 – 135	8	8	50 – 185	14,25	13
M10		1 – 130	1 – 140	10	10	60 – 200	17,25	17
M12		1 – 205	1 – 225	12	12	75 – 300	21,25	19
M16		1 – 180	1 – 200	16	16	100 – 300	23,25	24
M20 [7]		1 – 160	1 – 180	20	20	125 – 300	27,25	30

[1] thickness of the fixture for standard effective embedment depth
[2] thickness of the fixture for reduced effective embedment depth
[3] nominal diameter
[4] thread diameter
[5] length of anchor
[6] torque wrench width
[7] only for R-XPTIII-ZP and R-XPTIII-HD

Table A2. Marking of anchors

Bolt length	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120
Marking	A	a	B	b	#	c	D	d	E	e	F	f	G	g	H

Bolt length	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195
Marking	h	J	j	K	k	L	2	M	m	N	n	P	o	W	z

Bolt length	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270
Marking	R	r	3	4	S	6	7	8	T	t	U	aa	VV	bb	CC

Bolt length	275	280	285	290	295	300
Marking	dd	X	ee	FF	ff	Y

R-XPTIII	**Annex A2** of European Technical Assessment ETA-23/0887
Product description Dimensions and marking	

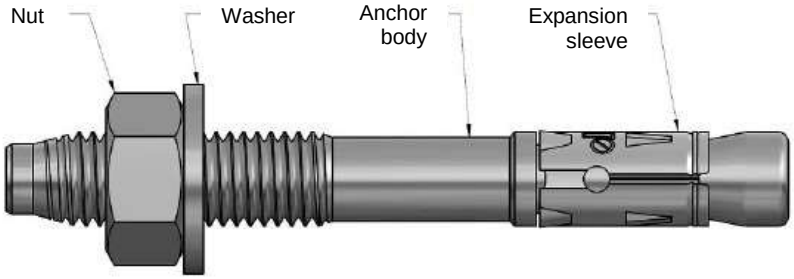


Table A3.1: Materials – R-XPTIII-ZP

Designation	Material	Coating
Anchor body	Carbon steel according to ISO 898-1; rupture elongation A_5 > 8%	galvanized ≥ 5 µm ISO 1461
Expansion sleeve	Carbon steel according to ISO 898-1	
Washer	Carbon steel according to ISO 7089 (DIN 125-A) or ISO 7093 (DIN 9021)	
Nut	Carbon steel according to DIN 934	

Table A3.2: Materials – R-XPTIII-HD

Designation	Material	Coating
Anchor body	Carbon steel according to ISO 898-1; rupture elongation A_5 > 8%	hot dip galvanized ≥ 50 µm [1] ISO 10684 and ISO 1461
Expansion sleeve	Stainless steel grade 1.4401 or 1.4404 according to EN 10088-2	
Washer	Carbon steel according to ISO 7089 (DIN 125-A) or ISO 7093 (DIN 9021)	
Nut	Carbon steel according to DIN 934	

[1] mean thickness of minimum 50 µm according to ISO 10684

Table A3.3: Materials – R-XPTIII-A4

Designation	Material	Coating
Anchor body	Stainless steel A4, rupture elongation A_5 > 8%	-
Expansion sleeve	Stainless steel grade 1.4401 or 1.4404 according to EN 10088-2	
Washer	Stainless steel according to ISO 7089 (DIN 125-A) or ISO 7093 (DIN 9021)	
Nut	Stainless steel according to DIN 934	

Specification of intended use

Anchorages subject to:
- Static and quasi-static loads.

Base material:
- Uncracked concrete.
- Reinforced or unreinforced normal weight concrete (without fibres) of strength classes C20/25 to C50/60 according to EN 206.

Use conditions (environmental conditions):
- Structures subject to dry internal conditions: all anchors.
- For all other conditions according to EN 1993-1-4:2006+A1:2015 corresponding to corrosion resistance class CRC III: elements made of stainless steel.
- In accordance with EN ISO 9224, durability of hot dip galvanized coatings according to EN ISO 10684 for coatings with mean thickness of minimum 50 µm is:

Corrosivity category	Corrosivity	Durability
		Thickness according to chapter 8.3 ≥ 50 µm in average Durability [years]
C1	Very low	500 [1)]
C2	Low	75 [1)]
C3	Medium	25
C4	High	12,5
C5	Very high	5
CX	Extreme	2
[1)] working life of anchor not exceeding 50 years		

Design:
- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- The position of the anchor is indicated on the design drawings (e.g. position of the anchor relative to reinforcement or to supports, etc.).
- Verifiable calculation notes and drawings are taking account of the loads to be transmitted.
- Anchorages under static and quasi-static loads are designed in accordance with EN 1992-4:2018.

Installation of anchors:
- 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 any component of the anchor.
- Anchor installation in accordance with the manufacturer's specification and drawings and using the appropriate tools.
- Checks before placing the anchor to ensure that the strength class of the concrete in which the anchor is to be placed is in the range given and is not lower than that of the concrete to which the characteristic loads apply.
- Check of concrete being well compacted, e.g. without significant voids.
- Effective anchorage depth, edge distances and spacings not less than the specified values without minus tolerances.
- Positioning of the drill holes without damaging the reinforcement.
- Hole drilling by hammer drill.
- Cleaning of the hole of drilling dust.
- Application of the torque moment using a calibrated torque wrench.
- In case of aborted hole: new drilling at a minimum distance away of twice the depth of the aborted hole or smaller distance if the aborted drill hole is filled with high strength mortar and if under shear or oblique tension load it is not in the direction of load application.

R-XPTIII	**Annex B1** of European Technical Assessment ETA-23/0887
Intended use Specifications	

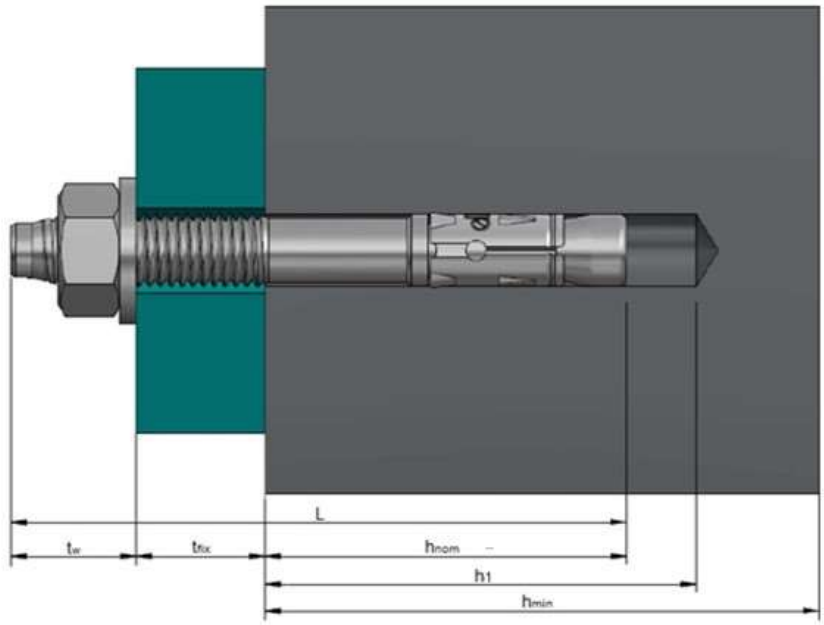


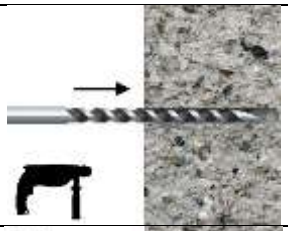
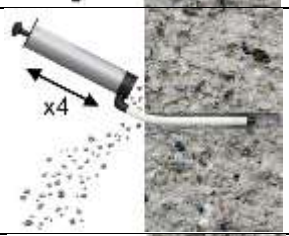
Table B1: Installation parameters

Anchor size		M8	M10	M12	M16	M20
Effective embedment depth (standard)	$h_{ef,STD}$ [mm]	47	50	68	85	100
Effective embedment depth (reduced)	$h_{ef,RED}$ [mm]	32	40	48	65	80
Nominal drill hole diameter	d_o [mm]	8	10	12	16	20
Depth of drill hole to deepest point (standard)	$h_{1,STD}$ [mm]	60	65	90	110	126
Depth of drill hole to deepest point (reduced)	$h_{1,RED}$ [mm]	45	55	70	90	106
Overall embedment depth in concrete (standard)	$h_{nom,STD}$ [mm]	55	60	80	100	116
Overall embedment depth in concrete (reduced)	$h_{nom,RED}$ [mm]	40	50	60	80	96
Diameter of clearance hole in the fixture	$d_f \leq$ [mm]	9	12	14	18	22
Installation torque moment	T_{inst} [Nm]	15	30	50	100	200
Minimum thickness of concrete member (standard)	$h_{min,STD}$ [mm]	100	100	136	170	200
Minimum thickness of concrete member (reduced)	$h_{min,RED}$ [mm]	100	100	100	130	160
Minimum spacing (standard)	$s_{min,STD}$ [mm]	60	65	100	120	150
Minimum spacing (reduced)	$s_{min,RED}$ [mm]	35	50	70	90	120
Minimum edge distance (standard)	$c_{min,STD}$ [mm]	60	65	100	120	150
Minimum edge distance (reduced)	$c_{min,RED}$ [mm]	40	50	70	90	120
Standard thickness of the fixture	$t_{fix,STD}$ [mm]	$t_{fix,STD} = L - h_{nom,STD} - t_w$				
Reduced thickness of the fixture	$t_{fix,RED}$ [mm]	$t_{fix,RED} = L - h_{nom,RED} - t_w$				
	t_w [mm]	10	10	15	20	24

R-XPTIII

Intended use
Installation parameters of anchors

Annex B2
of European Technical Assessment ETA-23/0887

	1. Drill the hole perpendicular to the substrate surface (hammer drill).
	2. Clean the drill hole.
a)  **b)** 	3. Place the anchor in the hole through the fastened element and tap it with a hammer (3a) or impact setting tool SDS+ (e.g. RT-SDSI-MA) (3b) until the intended embedment depth is achieved.
	4. Assemble anchor with apropriate installation torque T_{inst}.
	5. Stop tightening when the required torque is achieved

R-XPTIII	**Annex B3** of European Technical Assessment ETA-23/0887
Intended use Installation instruction	

Table C1.1: Characteristic resistance to tension load (static and quasi-static loading) in uncracked concrete, method A – R-XPTIII-ZP and R-XPTIII-HD

Anchor size			M8	M10	M12	M16	M20
Steel failure							
Characteristic resistance [1]		$N_{Rk,s}$ [kN]	17,5	27,6	40,0	71,1	108,1
Partial safety factor		γ_{Ms} [2]	1,5				
Pull-out failure							
Characteristic resistance in uncracked concrete C20/25 (standard)		$N_{Rk,p,STD}$ [kN]	14,0	17,4	27,6	38,6	49,2
Characteristic resistance in uncracked concrete C20/25 (reduced)		$N_{Rk,p,RED}$ [kN]	8,9	12,4	16,4	25,8	35,2
Installation safety factor		γ_{inst}	1,0	1,0	1,0	1,0	1,0
Increasing factor for concrete C30/37		ψ_c	1,22	1,22	1,22	1,22	1,22
Increasing factor for concrete C40/50			1,41	1,41	1,41	1,41	1,41
Increasing factor for concrete C50/60			1,56	1,56	1,56	1,56	1,56
Concrete cone failure and splitting failure							
Effective embedment depth (standard)		$h_{ef,STD}$ [mm]	47	50	68	85	100
Effective embedment depth (reduced)		$h_{ef,RED}$ [mm]	32	40	48	65	80
Factor for uncracked concrete		$k_{ucr,N}$	11,0				
Installation safety factor		γ_{inst}	1,0	1,0	1,0	1,0	1,0
Characteristic spacing	concrete cone failure	$s_{cr,N}$ [mm]	3 x h_{ef}				
	splitting failure (standard)	$s_{cr,sp,STD}$ [mm]	250	265	345	445	530
	splitting failure (reduced)	$s_{cr,sp,RED}$ [mm]	170	210	250	340	420
Characteristic edge distance	concrete cone failure	$c_{cr,N}$ [mm]	1,5 x h_{ef}				
	splitting failure (standard)	$c_{cr,sp,STD}$ [mm]	125	132	177	222	265
	splitting failure (reduced)	$c_{cr,sp,RED}$ [mm]	85	105	125	170	210

[1] for cross-section under expansion sleeve
[2] in the absence of other national regulations

Table C1.2: Displacements under tension loading – R-XPTIII-ZP and R-XPTIII-HD

Anchor size		M8	M10	M12	M16	M20
Tension load	N [kN]	7,1	11,3	15,7	23,7	49,7
Displacement	δ_{NO} [mm]	1,6	1,9	2,0	2,1	2,7
	$\delta_{N\infty}$ [mm]	2,7	2,7	2,7	2,7	2,7

Table C2.1: Characteristic resistance to shear load (static and quasi-static loading) in uncracked concrete, method A – R-XPTIII-ZP and R-XPTIII-HD

Anchor size		M8	M10	M12	M16	M20
Steel failure without lever arm						
Characteristic resistance	$V^0_{Rk,s}$ [kN]	10,9	17,4	20,4	42,0	73,5
Ductility factor	k_7	1,0	1,0	1,0	1,0	1,0
Partial safety factor	γ_{Ms} 1)	1,5				
Steel failure with lever arm						
Characteristic bending moment	$M^0_{Rk,s}$ [Nm]	33,5	66,5	116,1	278,8	548,7
Partial safety factor	γ_{Ms} 1)	1,5				
Concrete pry-out failure						
Concrete pry-out failure factor (standard)	$k_{8,STD}$	1,0	1,0	2,0	2,0	2,0
Concrete pry-out failure factor (reduced)	$k_{8,RED}$	1,0	1,0	1,0	2,0	2,0
Installation safety factor	γ_{ins}	2,0				
Concrete edge failure						
Effective length of anchor under shear loading (standard)	$l_{f,STD}$ [mm]	47	50	68	85	100
Effective length of anchor under shear loading (reduced)	$l_{f,RED}$ [mm]	32	40	48	65	80
Outside diameter of anchor	d_{nom} [mm]	8	10	12	16	20
Installation safety factor	γ_{ins}	1,0				

1) in the absence of other national regulations

Table C2.2: Displacements under shear loading – R-XPTIII-ZP and R-XPTIII-HD

Anchor size		M8	M10	M12	M16	M20
Shear load	V [kN]	7,3	11,6	13,6	28,0	49,0
Displacement	δ_{V0} [mm]	1,1	1,6	1,8	2,2	2,2
	$\delta_{V\infty}$ [mm]	1,7	2,3	2,7	3,3	3,3

Table C3.1: Characteristic resistance to tension load (static and quasi-static loading) in uncracked concrete, method A – R-XPTIII-A4

Anchor size			M8	M10	M12	M16
Steel failure						
Characteristic resistance [1]		$N_{Rk,s}$ [kN]	21,2	33,6	44,8	82,6
Partial safety factor		γ_{Ms} [2]	1,5			
Pull-out failure						
Characteristic resistance in uncracked concrete C20/25 (standard)		$N_{Rk,p,STD}$ [kN]	15,9	17,4	27,6	38,6
Characteristic resistance in uncracked concrete C20/25 (reduced)		$N_{Rk,p,RED}$ [kN]	8,0	12,4	16,4	25,8
Installation safety factor		γ_{inst}	1,2	1,2	1,2	1,2
Increasing factor for concrete C30/37	(standard)	ψ_c	1,06	1,08	1,02	1,11
	(reduced)		1,10	1,13	1,08	1,15
Increasing factor for concrete C40/50	(standard)		1,11	1,16	1,04	1,23
	(reduced)		1,20	1,27	1,15	1,30
Increasing factor for concrete C50/60	(standard)		1,17	1,24	1,07	1,34
	(reduced)		1,29	1,40	1,23	1,46
Concrete cone failure and splitting failure						
Effective embedment depth (standard)		$h_{ef,STD}$ [mm]	47	50	68	85
Effective embedment depth (reduced)		$h_{ef,RED}$ [mm]	32	40	48	65
Factor for uncracked concrete		$k_{ucr,N}$	11,0			
Installation safety factor		γ_{inst}	1,2	1,2	1,2	1,2
Characteristic spacing	concrete cone failure	$s_{cr,N}$ [mm]	3 x h_{ef}			
	splitting failure (standard)	$s_{cr,sp,STD}$ [mm]	250	265	345	445
	splitting failure (reduced)	$s_{cr,sp,RED}$ [mm]	170	210	250	340
Characteristic edge distance	concrete cone failure	$c_{cr,N}$ [mm]	1,5 x h_{ef}			
	splitting failure (standard)	$c_{cr,sp,STD}$ [mm]	125	132	177	222
	splitting failure (reduced)	$c_{cr,sp,RED}$ [mm]	85	105	125	170

[1] for cross-section under expansion sleeve
[2] in the absence of other national regulations

Table C3.2: Displacements under tension loading – R-XPTIII-A4

Anchor size		M8	M10	M12	M16
Tension load	N [kN]	4,8	6,9	9,1	14,3
Displacement	δ_{NO} [mm]	1,3	1,4	1,4	1,6
	$\delta_{N\infty}$ [mm]	2,3	2,3	2,3	2,3

Table C4.1: Characteristic resistance to shear load (static and quasi-static loading) in uncracked concrete, method A – R-XPTIII-A4

Anchor size		M8	M10	M12	M16
Steel failure without lever arm					
Characteristic resistance	$V^0_{Rk,s}$ [kN]	11,0	17,4	25,3	40,8
Ductility factor	k_7	1,0	1,0	1,0	1,0
Partial safety factor	γ_{Ms} 1)	1,25			
Steel failure with lever arm					
Characteristic bending moment	$M^0_{Rk,s}$ [Nm]	33,5	66,5	116,1	278,8
Partial safety factor	γ_{Ms} 1)	1,25			
Concrete pry-out failure					
Concrete pry-out failure factor (standard)	$k_{8,STD}$	1,0	1,0	2,0	2,0
Concrete pry-out failure factor (reduced)	$k_{8,RED}$	1,0	1,0	1,0	2,0
Installation safety factor	γ_{ins}	1,0			
Concrete edge failure					
Effective length of anchor under shear loading (standard)	$l_{f,STD}$ [mm]	47	50	68	85
Effective length of anchor under shear loading (reduced)	$l_{f,RED}$ [mm]	32	40	48	65
Outside diameter of anchor	d_{nom} [mm]	8	10	12	16
Installation safety factor	γ_{ins}	1,0			
1) in the absence of other national regulations					

Table C4.2: Displacements under shear loading – R-XPTIII-A4

Anchor size		M8	M10	M12	M16
Shear load	V [kN]	5,6	8,9	12,9	22,7
Displacement	δ_{VO} [mm]	1,1	1,7	1,8	1,8
	$\delta_{V\infty}$ [mm]	1,7	2,6	2,8	2,7