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Member of EOTA
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European Technical Assessment

ETA 20/0083 of 28/01/2020

Technical Assessment Body issuing the ETA: Technical and Test Institute for Construction Prague	
Trade name of the construction product	EPOXY+
Product family to which the construction product belongs	Product area code: 33 Bonded injection type anchor for use in uncracked concrete
Manufacturer	Mayorista de Anclajes y Soportación SL Parroquia de Moruxo, Parcela I-18, 15165 Bergondo (A Coruña) Spain
Manufacturing plant	Plant 1
This European Technical Assessment contains	14 pages including 11 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 330499-01-0601

1. Technical description of the product

The EPOXY+ with steel elements is bonded anchor (injection type).

Steel elements can be galvanized or stainless steel.

Steel element is placed into a drilled hole filled with injection mortar. The steel element is anchored via the bond between metal part, injection mortar and concrete. The anchor is intended to be used with embedment depth from 8 diameters to 12 diameters.

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

2. Specification of the intended use in accordance with the applicable 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 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 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
Resistance to steel failure (tension)	See Annex C1
Resistance to combined pull-out and concrete failure	See Annex C1
Resistance to concrete cone failure	See Annex C1
Edge distance to prevent splitting under load	See Annex C1
Robustness	See Annex C1
Maximum setting torque moment	See Annex B4
Minimum edge distance and spacing	See Annex B4
Resistance to steel failure (shear)	See Annex C2
Resistance to pry-out failure	See Annex C2
Resistance to concrete edge failure	See Annex C2
Displacements under short term and long term loading	See Annex C3
Durability of metal parts	See Annex A3

3.2 Hygiene, health and environment (BWR 3)

No performance determined.

3.3 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) system applied with reference to its legal base

According to the Decision 96/582/EC of the European Commission[1] the system of assessment 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

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

5. Technical details necessary for the implementation of the AVCP system, as provided in the applicable EAD

5.1 Tasks of the manufacturer

The manufacturer may only use raw materials stated in the technical documentation of this European Technical Assessment.

The factory production control shall be in accordance with the control plan which is a part of the technical documentation of this European Technical Assessment. The control plan is laid down in the context of the factory production control system operated by the manufacturer and deposited at Technický a zkušební ústav stavební Praha, s.p.[2] The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

5.2 Tasks of the notified bodies

The notified body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report.

The notified certification body involved by the manufacturer shall issue an certificate of constancy of performance of the product stating the conformity with the provisions of this European Technical Assessment.

In cases where the provisions of the European Technical Assessment and its control plan are no longer fulfilled the notified body shall withdraw the certificate of constancy of performance and inform Technical and Test Institute for Construction Prague without delay.

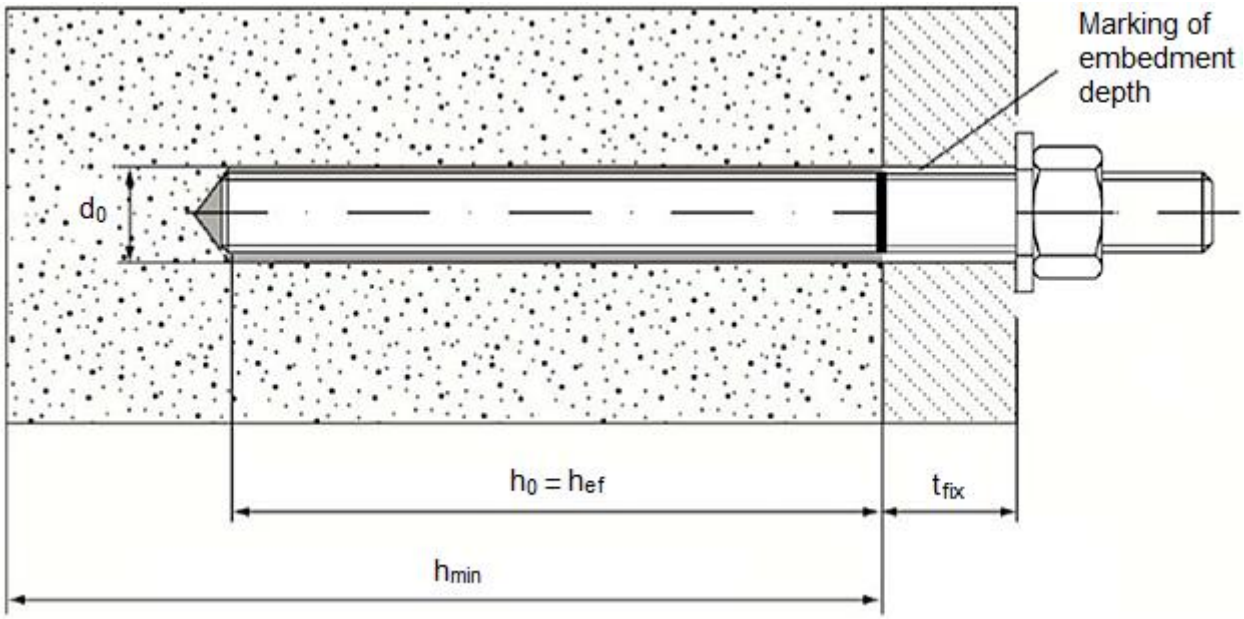
Issued in Prague on 28.01.2020

By

Ing. Mária Schaan
Head of the Technical Assessment Body

[2] The control plan is a confidential part of the documentation of the European Technical Assessment, but not published together with the ETA and only handed over to the approved body involved in the procedure of AVCP.

Threaded rod



d_0 = nominal drill hole diameter
t_{fix} = thickness of fixture
h_{ef} = effective anchorage depth
h_0 = depth of drill hole

EPOXY+	**Annex A 1**
Product description Installed conditions	

Cartridges

150 ml, 380 ml to 420 ml cartridge (Type: coaxial)

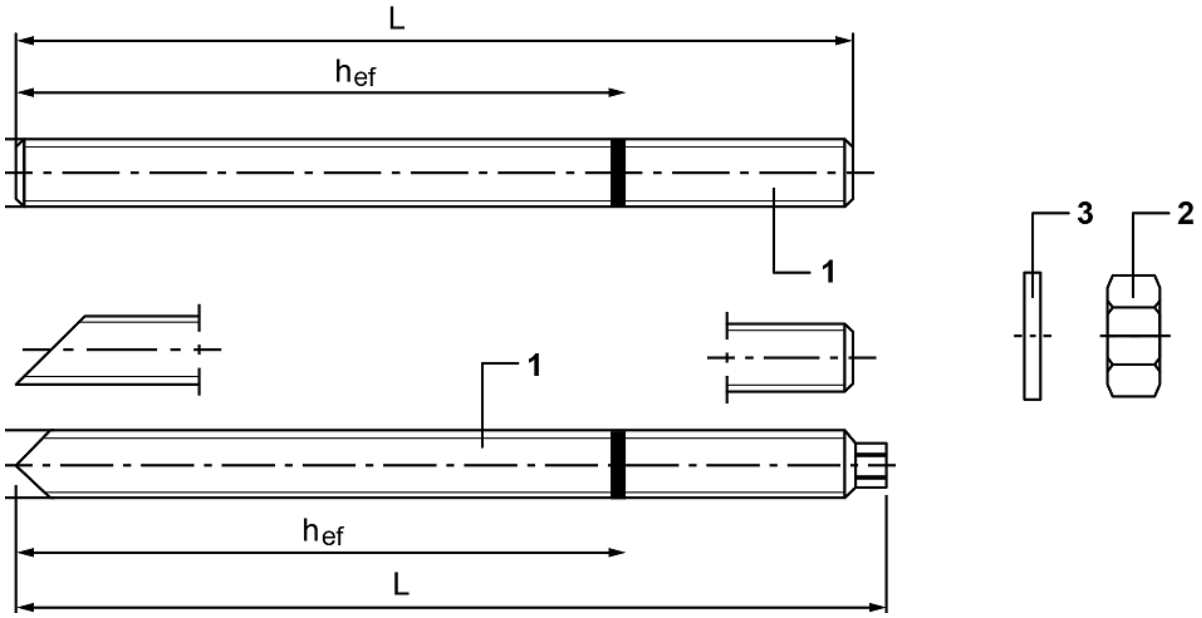
165 ml and 300 ml cartridge (Type: “foil tube”)

Cartridge label: EPOXY+, processing notes, charge-code, shelf life hazard-code, curing- and processing time (depending on the temperature), with as well as without travel scale

Mixer nozzle

EPOXY+	**Annex A 2**
Product description Injection system	

Threaded rod M8, M10, M12, M16, M20, M24



Commercial standard rod with:

- Materials, dimensions and mechanical properties acc. Table A1
- Inspection certificate 3.1 acc. to EN 10204:2004
- Marking of embedment depth

EPOXY+	**Annex A 3**
Product description Threaded rod and materials	

Table A1: Materials

Part	Designation	Material
Steel, zinc plated ≥ 5 µm acc. to EN ISO 4042:2009 or Steel, hot-dip galvanised ≥ 40 µm acc. to EN ISO 10684:2004+AC:2009 or Steel, zinc diffusion coating ≥ 15 µm acc. to EN 13811		
1	Anchor rod	Steel, EN 10087:1998 or EN 10263:2001 Property class 5.8, 8.8, EN 1993-1-8:2005+AC:2009 A_5 > 8% fracture elongation
2	Hexagon nut, EN ISO 4032:2012	Steel acc. to EN 10087:1998 or EN 10263:2001 Property class 5 (for class 5.8 rod) EN ISO 898-2:2012, Property class 8 (for class 8.8 rod) EN ISO 898-2:2012
3	Washer, EN ISO 887:2006, EN ISO 7089:2000, EN ISO 7093:2000 or EN ISO 7094:2000	Steel, zinc plated or hot-dip galvanised
Stainless steel		
1	Anchor rod	Material: A2-70, A4-70, A4-80, EN ISO 3506
2	Hexagon nut EN ISO 4032	According to threaded rod
3	Washer EN ISO 887, EN ISO 7089, EN ISO 7093 or EN ISO 7094	According to threaded rod
High corrosion resistant steel		
1	Anchor rod	Material: 1.4529, 1.4565, EN 10088-1
2	Hexagon nut EN ISO 4032	According to threaded rod
3	Washer EN ISO 887, EN ISO 7089, EN ISO 7093 or EN ISO 7094	According to threaded rod

Specifications of intended use

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

Base materials
- Uncracked concrete.
- Reinforced or unreinforced normal weight concrete of strength class C20/25 at minimum and C50/60 at maximum according EN 206-1:2000-12.

Temperature range:
- I: -40°C to +40°C (max long term temperature +24°C and max short term temperature +40°C)
- II: -40°C to +80°C (max long term temperature +50°C and max short term temperature +80°C)

Use conditions (Environmental conditions)
- (X1) Structures subject to dry internal conditions (zinc coated steel, stainless steel, high corrosion resistance steel).
- (X2) Structures subject to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal condition, if no particular aggressive conditions exist (stainless steel A4, high corrosion resistant steel).
- (X3) Structures subject to external atmospheric exposure and to permanently damp internal condition, if other particular aggressive conditions exist (high corrosion resistant steel).

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).

Concrete conditions:
- I1 – installation in dry or wet (water saturated) concrete and use in service in dry or wet concrete.
- I2 – installation in water-filled (not sea water) and use in service in dry or wet concrete

Design:
- The anchorages are designed in accordance with the EN 1992-4 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:
- Hole drilling by hammer drill mode.
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.

Installation direction:
- D3 – downward and horizontal and upwards (e.g. overhead) installation

EPOXY+	**Annex B 1**
Intended use Specifications	

Table B1: Installation parameters

Anchor size		M8	M10	M12	M16	M20	M24
Nominal drill hole diameter	d_0 [mm] =	10	12	14	18	22	26
Effective anchorage depth	$h_{ef,min}$ [mm] =	64	80	96	128	160	192
	$h_{ef,max}$ [mm] =	96	120	144	192	240	288
Diameter of clearance hole in the fixture	d_f [mm] ≤	9	12	14	18	22	26
Diameter of the steel brush	d_b [mm] ≥	12	14	16	20	26	30
Torque moment	max T_{inst} [Nm] ≤	10	20	40	80	150	200
Thickness of fixture	$t_{fix,min}$ [mm] >	0					
	$t_{fix,max}$ [mm] <	1500					
Minimum thickness of member	h_{min} [mm]	h_{ef} + 30 mm ≥ 100 mm				h_{ef} + $2d_0$	
Minimum spacing	s_{min} [mm]	35	40	50	65	80	96
Minimum edge distance	c_{min} [mm]	35	40	50	65	80	96

Table B2: Parameters for cleaning and setting tools

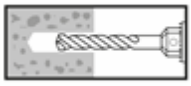
Anchor	Size (mm)	Nominal drill bit diameter d_o (mm)	Steel Brush d_b (mm)	Steel Brush (min brush diameter) $d_{b,min}$ (mm)
				
Threaded Rod 	M8	10	12	10.5
	M10	12	14	12.5
	M12	14	16	14.5
	M16	18	20	18.5
	M20	22	26	22.5
	M24	26	30	26.5

Hand pump (volume 750 ml)
Drill bit diameter (d_0): 10 mm to 20 mm

Compressed air tool (min 6 bar)
Drill bit diameter (d_0): 10 mm to 40 mm

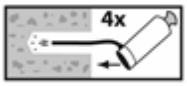
EPOXY+	Annex B 2
Intended use Installation parameters	

Assembly instructions



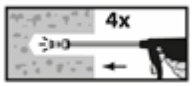
1 Drill with hammer drill a hole into the base material to the size and embedment depth required by the selected anchor (Table B1). In case of aborted drill hole: the drill hole shall be filled with mortar.

Attention! Standing water in the borehole must be removed before cleaning

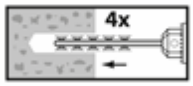


2a Starting from the bottom or back of the bore hole, blow the hole clean with compressed air or a hand pump (Annex B 2) a minimum of four times. If the bore hole ground is not reached an extension shall be used.

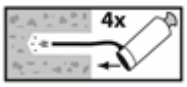
or



The hand pump can be used for anchor sizes up to bore hole diameter 20 mm.
For bore holes larger then 20 mm or deeper 240 mm, compressed air (min. 6 bar) must be used.

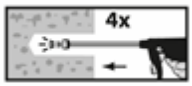


2b Check brush diameter (Table B2) and attach the brush to a drilling machine or a battery screwdriver. Brush the hole with an appropriate sized wire brush > db,min (Table B2) a minimum of four times. If the bore hole ground is not reached with the brush, a brush extension shall be used (Table B2).

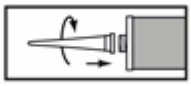


2c Finally blow the hole clean again with compressed air or a hand pump (Annex B 2) a minimum of four times. If the bore hole ground is not reached an extension shall be used.
The hand pump can be used for anchor sizes up to bore hole diameter 20 mm.
For bore holes larger then 20 mm or deeper 240 mm, compressed air (min. 6 bar) must be used.

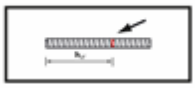
or



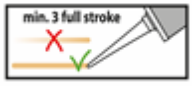
After cleaning, the bore hole has to be protected against re-contamination in an appropriate way, until dispensing the mortar in the bore hole. If necessary, the cleaning repeated has to be directly before dispensing the mortar.
In-flowing water must not contaminate the bore hole again



3 Attach a supplied static-mixing nozzle to the cartridge and load the cartridge into the correct dispensing tool. For foil tube cartridges, cut off the foil tube clip before use. For every working interruption longer than the recommended working time (Table B3) as well as for new cartridges, a new static-mixer shall be used.



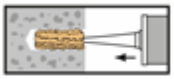
4 Prior to inserting the anchor rod into the filled bore hole, the position of the embedment depth shall be marked on the anchor rods

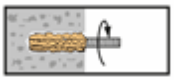


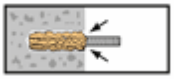
5 Prior to dispensing into the anchor hole, squeeze out separately a minimum of three full strokes and discard non-uniformly mixed adhesive components until the mortar shows a consistent grey colour. For foil tube cartridges is must be discarded a minimum of six full strokes.

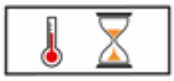
EPOXY+	
Intended use Installation instructions	**Annex B 3**

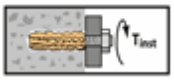
Assembly instructions (continuation)











6 Starting from the bottom or back of the cleaned anchor hole fill the hole up to approximately two-thirds with adhesive. Slowly withdraw the static mixing nozzle as the hole fills to avoid creating air pockets. For embedment larger than 190 mm an extension nozzle shall be used. Observe the gel-Working times given in Table B3.

7 Push the threaded rod into the anchor hole while turning slightly to ensure positive distribution of the adhesive until the embedment depth is reached.

The anchor should be free of dirt, grease, oil or other foreign material.

8 Be sure that the anchor is fully seated at the bottom of the hole and that excess mortar is visible at the top of the hole. If these requirements are not maintained, the application has to be renewed. For overhead application the anchor rod should be fixed (e.g. wedges).

9 Allow the adhesive to cure to the specified time prior to applying any load or torque. Do not move or load the anchor until it is fully cured (attend Table B3).

10 After full curing, the add-on part can be installed with the max. torque (Table B1) by using a calibrated torque wrench.

Table B3: Minimum curing time

Concrete temperature	Working time	Minimum curing time
+5°C to +9°C	10 min	145 min
+10°C to +19°C	6 min	85 min
+20°C to +24°C	5 min	50 min
+25°C to +29°C	4 min	40 min
+30°C	4 min	35 min
Cartridge temperature	+5°C to +30°C	

Table C1: Design method EN 1992-4
Characteristic values of resistance to tension load

Steel failure – Characteristic resistance								
Size			**M8**	**M10**	**M12**	**M16**	**M20**	**M24**
Steel grade **5.8**	$N_{Rk,s}$	[kN]	18	29	42	79	123	177
Partial safety factor	γ_{Ms}	[-]	1,5					
Steel grade **8.8**	$N_{Rk,s}$	[kN]	29	46	67	126	196	282
Partial safety factor	γ_{Ms}	[-]	1,5					
Steel grade **10.9**	$N_{Rk,s}$	[kN]	37	58	84	157	245	353
Partial safety factor	γ_{Ms}	[-]	1,4					
Stainless steel grade **A2-70**, **A4-70**	$N_{Rk,s}$	[kN]	26	41	59	110	172	247
Partial safety factor	γ_{Ms}	[-]	1,9					
Stainless steel grade **A4-80**	$N_{Rk,s}$	[kN]	29	46	67	126	196	282
Partial safety factor	γ_{Ms}	[-]	1,6					
Stainless steel grade **1.4529**	$N_{Rk,s}$	[kN]	26	41	59	110	172	247
Partial safety factor	γ_{Ms}	[-]	1,5					
Stainless steel grade **1.4565**	$N_{Rk,s}$	[kN]	26	41	59	110	172	247
Partial safety factor	γ_{Ms}	[-]	1,9					

Combined pullout and concrete cone failure in uncracked concrete C20/25								
Size				**M8**	**M10**	**M12**	**M16**	**M20**	**M24**
Characteristic bond resistance in uncracked concrete									
Temperature range I: +24°C / +40°C	dry/wet concrete	$\tau_{Rk,ucr}$	[N/mm²]	8.5	8.0	8.0	8.0	8.0	8.0
	flooded hole	$\tau_{Rk,ucr}$	[N/mm²]	8.5	8.0	8.0	8.0	8.0	8.0
Temperature range II: +50°C / +80°C	dry/wet concrete	$\tau_{Rk,ucr}$	[N/mm²]	6.5	6.0	6.0	6.0	6.0	6.0
	flooded hole	$\tau_{Rk,ucr}$	[N/mm²]	6.5	6.0	6.0	6.0	6.0	6.0
Dry/wet concrete and flooded hole									
Installation safety factor		γ_{inst}	[-]	1,2					
Factor for concrete	C25/30	ψ_c	[-]	1,06					
	C30/37			1,12					
	C35/45			1,19					
	C40/50			1,23					
	C45/55			1,27					
	C50/60			1,30					

Concrete cone failure			
Factor for concrete cone failure	$k_{ucr,N}$	[-]	11
Edge distance	$c_{cr,N}$	[mm]	$1{,}5h_{ef}$

Splitting failure								
Size			**M8**	**M10**	**M12**	**M16**	**M20**	**M24**
Edge distance	$c_{cr,sp}$	[mm]	$2 \cdot h_{ef}$			$1{,}5 \cdot h_{ef}$		
Spacing	$s_{cr,sp}$	[mm]	$2 \cdot c_{cr,sp}$					

EPOXY+

Performances
Characteristic resistance for tension loads

Annex C 1

Table C2: Design method EN 1992-4
Characteristic values of resistance to shear load

Steel failure without lever arm								
Size			**M8**	**M10**	**M12**	**M16**	**M20**	**M24**
Steel grade **5.8**	$V_{Rk,s}$	[kN]	9	15	21	39	61	88
Partial safety factor	γ_{Ms}	[-]	1,25					
Steel grade **8.8**	$V_{Rk,s}$	[kN]	15	23	34	63	98	141
Partial safety factor	γ_{Ms}	[-]	1,25					
Steel grade **10.9**	$V_{Rk,s}$	[kN]	18	29	42	79	123	177
Partial safety factor	γ_{Ms}	[-]	1,5					
Stainless steel grade **A2-70**, **A4-70**	$V_{Rk,s}$	[kN]	13	20	30	55	86	124
Partial safety factor	γ_{Ms}	[-]	1,56					
Stainless steel grade **A4-80**	$V_{Rk,s}$	[kN]	15	23	34	63	98	141
Partial safety factor	γ_{Ms}	[-]	1,33					
Stainless steel grade **1.4529**	$V_{Rk,s}$	[kN]	13	20	30	55	86	124
Partial safety factor	γ_{Ms}	[-]	1,25					
Stainless steel grade **1.4565**	$V_{Rk,s}$	[kN]	13	20	30	55	86	124
Partial safety factor	γ_{Ms}	[-]	1,56					
Characteristic resistance of group of fasteners								
Ductility factor	k_7 = 1,0 for steel with rupture elongation A_5 > 8%							
Steel failure with lever arm								
Size			**M8**	**M10**	**M12**	**M16**	**M20**	**M24**
Steel grade **5.8**	$M^0_{Rk,s}$	[N.m]	19	37	66	166	325	561
Partial safety factor	γ_{Ms}	[-]	1,25					
Steel grade **8.8**	$M^0_{Rk,s}$	[N.m]	30	60	105	266	519	898
Partial safety factor	γ_{Ms}	[-]	1,25					
Steel grade **10.9**	$M^0_{Rk,s}$	[N.m]	37	75	131	333	649	1123
Partial safety factor	γ_{Ms}	[-]	1,50					
Stainless steel grade **A2-70**, **A4-70**	$M^0_{Rk,s}$	[N.m]	26	52	92	233	454	786
Partial safety factor	γ_{Ms}	[-]	1,56					
Stainless steel grade **A4-80**	$M^0_{Rk,s}$	[N.m]	30	60	105	266	519	898
Partial safety factor	γ_{Ms}	[-]	1,33					
Stainless steel grade **1.4529**	$M^0_{Rk,s}$	[N.m]	26	52	92	233	454	786
Partial safety factor	γ_{Ms}	[-]	1,25					
Stainless steel grade **1.4565**	$M^0_{Rk,s}$	[N.m]	26	52	92	233	454	786
Partial safety factor	γ_{Ms}	[-]	1,56					
Concrete pry-out failure								
Factor for resistance to pry-out failure	k_8	[-]	2					
Concrete edge failure								
Size			**M8**	**M10**	**M12**	**M16**	**M20**	**M24**
Outside diameter of fastener	d_{nom}	[mm]	8	10	12	16	20	24
Effective length of fastener	ℓ_f	[mm]	min (h_{ef}, 8 d_{nom})					

EPOXY+

Performances
Characteristic resistance for shear loads

Annex C 2

Table C3: Displacement under tension and shear load

Size		M8	M10	M12	M16	M20	M24
Tension load							
δ_{N0}	[mm/kN]	0,03	0,03	0,03	0,02	0,02	0,02
$\delta_{N\infty}$	[mm/kN]	0,06	0,05	0,03	0,02	0,02	0,02
Shear load							
δ_{V0}	[mm/kN]	0,71	0,45	0,31	0,17	0,11	0,07
$\delta_{V\infty}$	[mm/kN]	1,06	0,67	0,46	0,25	0,16	0,11

EPOXY+

Performances
Displacement

Annex C 3