





European Technical Assessment

ETA-25/0659 of 14/07/2025



General Part

Technical Assessment Body issuing the European Technical Assessment

Trade name of the construction product

Product family to which the construction product belongs

Manufacturer

Manufacturing plant

This European Technical Assessment contains

This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of

Instytut Techniki Budowlanej

ANCHOR EXTREME 294 ANCHOR ALL SEASON 295

Bonded anchors for use in concrete

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Manufacturing Plant no. 3

46 pages including 3 Annexes which form an integral part of this Assessment

European Assessment Document (EAD) 330499-02-0601 "Bonded fasteners and bonded expansion fasteners for use in concrete"



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Specific Part

1 Technical description of the product

The ANCHOR EXTREME 294 and ANCHOR ALL SEASON 295 are bonded anchors (injection type) consisting of injection mortar cartridge using an applicator gun equipped with a special mixing nozzle and steel element. The steel element is:

- threaded anchor rod sizes M8 to M30 made of:
 - galvanized carbon steel,
 - carbon steel with zinc flake coating,
 - stainless steel,
 - high corrosion resistant stainless steel,
 - ultra-high strength steel with zinc flake coating,

with hexagon nut and washer,

- anchor rod with inner thread sizes M6/Ø10 to M16/Ø24 made of:
 - galvanized carbon steel.
 - stainless steel,
 - high corrosion resistant stainless steel,
- rebar sizes Ø8 to Ø32.

The steel element is placed into a drilled hole previously injected (using an applicator gun) with a mortar with a slow and slight twisting motion. The rod or rebar is anchored by the bond between steel element, mortar and concrete.

The threaded rods are available for all diameters with three type of tip end: a one side 45° chamfer, a two sides 45° chamfer or a flat. The threaded rods are either delivered with the mortar cartridges or commercial standard threaded rods purchased separately. The mortar cartridges are available in different sizes and types.

Description of the products is given in Annex A.

2 Specification of the intended use in accordance with the applicable European Assessment Document (EAD)

The performances given in clause 3 are only valid if the bonded anchors are 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 and/or 100 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer or the 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 and shear load (static and quasi static loading), displacements	See Annex C1 to C15
Characteristic resistance for seismic performance category C1, displacements	See Annex C16 to C18
Characteristic resistance for seismic performance category C2, displacements	See Annex C19



3.1.2 Safety in case of fire (BWR 2)

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

3.1.3 Hygiene, health and the environment (BWR 3)

No performance assessed.

3.2 Methods used for the assessment

The assessment has been made in accordance with EAD 330499-02-0601.

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).

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.

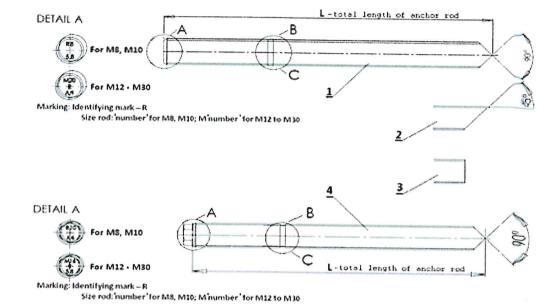
For type testing the results of the tests performed as part of the assessment for the European Technical Assessment shall be used unless there are changes in the production line or plant. In such cases the necessary type testing has to be agreed between Instytut Techniki Budowlanej and the notified body.

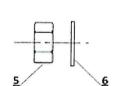
Issued in Warsaw on 14/07/2025 by Instytut Techniki Budowlanej

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Deputy Director of ITB



Threaded anchor rods







Depth h_{mid}

DETAIL C Notched Mark Version Depth h_{mid}

- 1. Anchor rod R-STUDS
- 2. 45° shape with anchor rod
- 3. The flat end of anchor rod
- 4. Anchor rod R-STUDS 5. Hexagonal nut 6. Washer

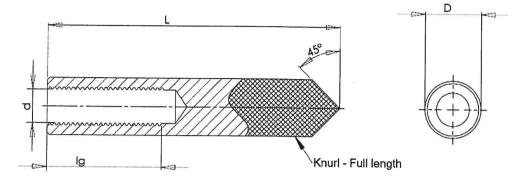
ANCHOR EXTREME 294, ANCHOR ALL SEASON 295

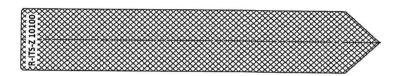
Product description Threaded anchor rods

Annex A1



Anchor rods with inner thread





Marking: R - Identifying mark ITS - product index

Z - carbon steel or A4 - stainless steel

XX - thread size YYY - length of sleeve

Rebar



embedment depth marking hef

ANCHOR EXTREME 294, ANCHOR ALL SEASON 295

Product description Anchor rods with inner thread and rebar

Annex A2



Tab	le A1	 Thread	hel	rode

Designati		Material					
Steel, zinc electroplated Steel, hot-dip galvanized Steel, non-electrolyticall Ultra-high Strength Stee	d ≥ 40 µm accordir ly applied zinc flak	ng to EN ISO 10684 se coating ≥ 8 µm ac	cording to EN ISO 1	0683	0.40502		
Threaded rod	Property class	Characteristic steel ultimate strength	Characteristic steel yield strength	Fracture elongation	0 10663		
	5.8	f _{uk} ≥ 500 N/mm ²	f _{yk} ≥ 400 N/mm ²	A ₅ > 8%	EN ISO 2898-		
	8.8	f _{uk} ≥ 800 N/mm ²	f _{yk} ≥ 640 N/mm ²	A ₅ ≥ 12%			
	10.9	f _{uk} ≥ 1000 N/mm ²	f _{yk} ≥ 900 N/mm ²	A ₅ > 9%	1		
	12.9	f _{uk} ≥ 1200 N/mm ²	f _{yk} ≥ 1080 N/mm ²	A ₅ > 8%	1		
	14.8	f _{uk} ≥ 1400 N/mm ²	f _{yk} ≥ 1120 N/mm ²	A ₅ ≥ 10%			
	15.8	f _{uk} ≥ 1500 N/mm ²	f _{yk} ≥ 1200 N/mm ²	A ₅ > 9%	UHSF G-		
	16.8	f _{uk} ≥ 1600 N/mm ²	f _{yk} ≥ 1280 N/mm ²	A ₅ > 8%	1416U- 2 014		
Hexagon nut	5		ENIOC CON				
	8						
	10		EN ISO 898-				
	12						
	14.8U	fc	UHSF G-				
	15.8U	fo					
	16.8U	fc	or class 16.8U rods		1416U-2014		
Vasher	S	teel according to EN	ISO 7089; correspon	ding to anchor rod	material		
itainless steel A4 ligh corrosion resistanc		(Materials)	1.4401, 1.4404, 1.45 1.4529, 1.4565, 1.45	571			
hreaded rod	Property class	Characteristic steel ultimate strength	Characteristic steel yield strength	Fracture elongation	EN 10088		
•	70	$f_{uk} \ge 700 \text{ N/mm}^2$	f _{yk} ≥ 450 N/mm ²	A ₅ ≥ 12%	EN ISO 3506		
	80	f _{uk} ≥ 800 N/mm ²	f _{yk} ≥ 600 N/mm ²	A ₅ ≥ 12%	1		
	70		for class 70 rods	•	EN 400 c =		
exagon nut			EN 10088 EN ISO 3506				
exagon nut	80		for class 80 rods		I EN ISO 3506		

option b): $A_5 \ge 12\%$ and $f_{uk} \le 800 \text{ N/mm}^2$.

Commercial threaded rods (in the case of rods made of galvanized steel – standard rods with property class ≤ 8.8 only), with:

- material and mechanical properties according to Table A1,
- confirmation of material and mechanical properties by inspection certificate 3.1 according to EN-10204:2004; the documents shall be stored,
- marking of the threaded rod with the embedment depth.

Note: Commercial standard threaded rods made of galvanized steel with property class above 8.8 are not permitted in some Member States.

ANCHOR EXTREME 294, ANCHOR ALL SEASON 295	Annex A3
Product description Materials	of European Technical Assessment ETA-25/0659



Table A2: Rods with inner thread

Designation	n	Material						
Steel, zinc plated electroplated ≥ 5 µm acco hot-dip galvanized ≥ 40 µm								
Rod with inner thread	Property class	Characteristic steel ultimate strength	Characteristic steel yield strength	Fracture elongation	EN ISO -898-1			
	5.8	$f_{uk} \ge 500 \text{ N/mm}^2$	f _{yk} ≥ 400 N/mm ²	A ₅ > 8%	EN 130 -898-1			
8.8		$f_{uk} \ge 800 \text{ N/mm}^2$	f _{yk} ≥ 640 N/mm ²	A ₅ ≥ 12%				
Stainless steel A4		(Materials)	1.4401, 1.4404, 1.4	1571				
High corrosion resistance	stainless steel (HCR) (Materials)	1.4529, 1.4565, 1.4	1547				
Rod with inner thread Proper class		Characteristic steel ultimate strength	Characteristic steel yield strength	Fracture elongation	EN 10 □ 88			
	70	f _{uk} ≥ 700 N/mm²	f _{yk} ≥ 450 N/mm ²	A ₅ ≥ 12%	EN ISO 3506			
	80	f _{uk} ≥ 800 N/mm ²	f _{vk} ≥ 600 N/mm ²	A ₅ ≥ 12%				

Table A3: Reinforcing bars according to EN 1992-1-1, Annex C

Product form	Market Control of the Control of the State o	Bars and de-co	Bars and de-coiled rods		
Class		В	C		
Characteristic yield strength fyk or f0,2k [N/mm²]		400 to	600		
Minimum value of $k = (f_t / f_y)_k$		≥ 1,08	≥ 1 ,15 < 1 ,35		
Characteristic strain at maximum force, ϵ_{uk} [%]		≥ 5,0	≥ 7,5		
Bendability		Bend / Rel			
Maximum deviation from nominal mass (individual bar) [%]	Nominal bar size [mm] ≤ 8 > 8	± 6 ± 4	,0		
Bond: minimum relative rib area, f _{R,min}	Nominal bar size [mm] 8 to 12 > 12	0,04	40		

Rib height h: The maximum rib height h_{rib} shall be: $h_{rib} \le 0.07 \cdot \emptyset$

Table A4: Injection mortars

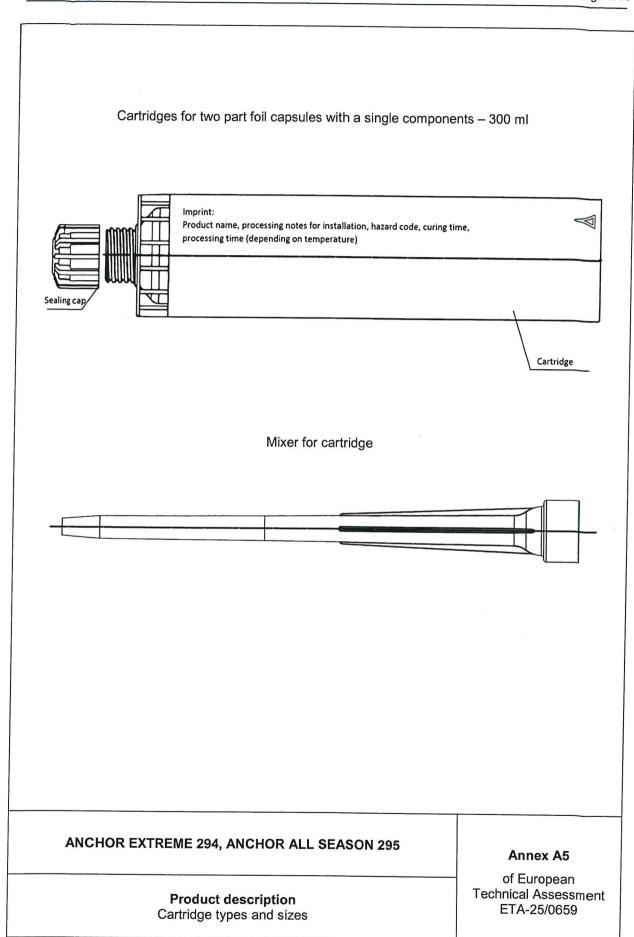
Product	Composition
ANCHOR EXTREME 294, ANCHOR ALL SEASON 295 (two component injection mortars)	Additive: quartz Bonding agent: vinyl ester mortar styrene free Hardener: dibenzoyl peroxide

ANCHOR EXTREME 294, ANCHOR ALL SEASON 295

Annex A4

Product description Materials







Specification of intended use

Anchorages subject to:

- Static and quasi-static loads: threaded rods size M8 to M30, rod with inner thread sizes M6/Ø10 to M16/Ø24 and rebar Ø8 to Ø32.
- Seismic performance category C1: threaded rods size M8 to M30 and rebar Ø8 to Ø32.
- Seismic performance category C2: threaded rods size M12 to M20.

Base material:

- Reinforced or unreinforced normal weight concrete (without fibres) of strength class C20/25 to C50/60 according to EN 206.
- Cracked and uncracked concrete.

Temperature ranges:

Installation temperature (temperature of substrate):

- -5°C to +40°C in case of ANCHOR EXTREME 294 (standard version).
- -20°C to +40°C in case of ANCHOR EXTREME ALL SEASON 295 (version for all season).

In-service temperature:

The anchors may be used in the following temperature range:

- -40°C to +40°C (max. short term temperature +40°C and max. long term temperature +24°C).
- -40°C to +80°C (max. short term temperature +80°C and max. long term temperature +50°C).
- -40°C to +120°C (max. short term temperature +120°C and max. long term temperature +80°C).

Use conditions (environmental conditions):

- Structures subject to dry internal conditions: all materials.
- For all other conditions according to EN 1993-1-4:2006+A1:2015 corresponding to corrosion resistance class
 - stainless steel A4 according to Annex A, Table A.3: CRC III.
 - high corrosion resistance steel (HCR) according to Annex A, Table A.3: CRC V.

Installation:

- Dry or wet concrete (use category I1).
- Flooded holes (use category 12).
- Installation direction D3 (downward and horizontal and upwards installation).
- The anchors are suitable for hammer drilled holes or by special method with cleaning during drill a hole using hollow drill bit with vacuum cleaner.

Design methods:

- Anchorages are designed in according to EN 1992-4:2018 and EOTA Technical Report TR 055.
- Anchorages under seismic actions (cracked concrete) have to be designed in according to EN 1992-4:2018.
- Anchors are designed under the responsibility of the 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 (e.g. position of the anchor relative to reinforcement or to supports, etc.).

ANCHOR EXTREME 294, ANCHOR ALL SEASON 295

Annex B1

Intended use Specifications



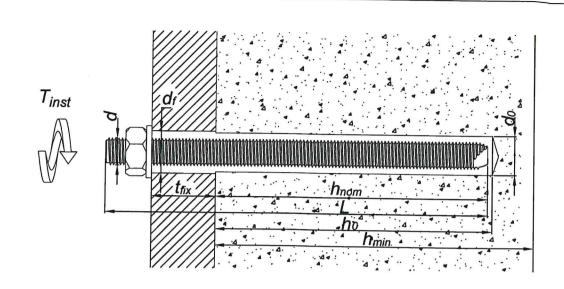


Table B1: Installation parameters – threaded anchor rods

Size		M8	M10	M12	M16	M20	M24	M30
Diameter of anchor rod	d [mm]	8	10	12	16	20	24	30
Nominal drilling diameter	d₀ [mm]	10	12	14	18	24	28	35
Maximum diameter hole in the fixture	d _f [mm]	9	12	14	18	22	26	33
Effective embedment	h _{ef,min} [mm]	60	60	60	60	80	96	120
depth	h _{ef,max} [mm]	160	200	240	320	400	480	600
Depth of the drilling hole	h ₀ [mm]				h _{ef} + 5 mm	•		
Minimum thickness of the concrete slab	h _{min} [mm]	ŀ	n _{ef} + 30 mm	n; ≥ 100 mr	n		h _{ef} + 2d ₀	
Maximum installation torque	T _{inst,max} [N·m]	10	20	40	80	120	160	200
Minimum spacing	s _{min} [mm]	40	40	40	40	40	50	60
Minimum edge distance	c _{min} [mm]	40	40	40	40	40	50	, 60

Intended use

Installation parameters - threaded rods

Annex B2



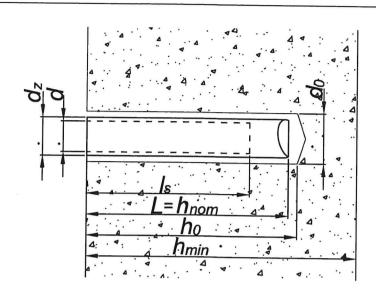


Table B2: Installation parameters – anchor rods with inner thread

Size		M6/ Ø10 /75	M8/ Ø12/ 75	M8/ Ø12/ 90	M10/Ø 16/ 75	M10/Ø 16/ 100	M12/Ø 16/ 100	M16/Ø 24/ 125	
Nominal drilling diameter	d₀ [mm]	12	14	14	20	20	20	28	
Maximum diameter hole in the fixture	d _f [mm]	7	9	9	12	12	14	18	
Effective embedment depth	h _{ef} = h _{nom} [mm]	75	75	90	75	100	100	125	
Thread length, min	I _s [mm]	24	25	25	30	30	35	50	
Depth of the drilling hole	h₀ [mm]				h _{ef} + 5 mm				
Minimum thickness of the concrete slab	h _{min} [mm]	ı	h _{ef} + 30 mm; ≥ 100 mm				h _{ef} + 2d ₀		
Maximum installation torque	T _{inst,max} [N·m]	3	5	5	10	10	20	40	
Minimum spacing	s _{min} [mm]	40	40	50	40	50	50	70	
Minimum edge distance	c _{min} [mm]	40	40	50	40	50	50	70	

Intended use

Installation parameters – anchor rods with inner thread

Annex B3



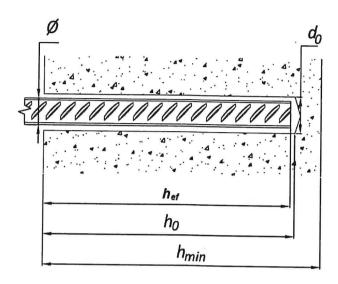


Table B3: Installation parameters – rebar

Size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Nominal drilling diameter	d₀ [mm]	12	14	18	18	22	26	32	40
Effective embedment	h _{ef,min} [mm]	60	60	60	60	64	80	100	128
depth	h _{ef,max} [mm]	160	200	240	240	320	400	500	640
Depth of the drilling hole	h _o [mm]		h _{ef} + 5 mm						
Minimum thickness of the concrete slab	h _{min} [mm]	he	h_{ef} + 30 mm; \geq 100 mm h_{ef} + 2d ₀						
Minimum spacing	s _{min} [mm]	40	40	40	40	40	40	50	70
Minimum edge distance	c _{min} [mm]	40	40	40	40	40	40	50	70

Intended use
Installation parameters – rebar

Annex B4



Table B4: Maximum processing time and minimum curing time

ANCHOR EXTREME 294 (standard version)							
Temperature of mortar [°C]	Temperature of substrate [°C]	Maximum processing (open) time [min]	Minimum curing time 1) [min]				
+5	-5	40	1440				
+5	0	30	180				
+5	+5	15	90				
+10	+10	8	60				
+15	+15	5	60				
+20	+20	2,5	45				
+25	+25	2	45				
+25	+30	2	45				
+25	+35	1,5	30				
+25	+40	1,5	30				

Table B5: Maximum processing time and minimum curing time

	ANCHOR ALL SEASON	295 (version for all season)			
Temperature of mortar [°C]	Temperature of substrate [°C]	Maximum processing time [min.]	Minimum curing tim e [min.]		
+5	-20	100	1440		
+5	-15	60	960		
+5	-10	40	480		
+5	-5	20	240		
+5	0	14	120		
+5	+5	9	60		
+10	+10	5,5	45		
+15	+15	3	30		
+20	+20	2	15		
+25	+25	1,5	10		
+25	+30	1,5	10		
+25	+35	1	5		
+25	+40	1	5		

¹⁾ The minimum time from the end of the mixing to the time when the anchor may be torque or loaded (whichever is longer). Minimum mortar temperature for installation +5°C; maximum mortar temperature for installation +25°C. For wet condition and flooded holes, the curing time must be doubled.

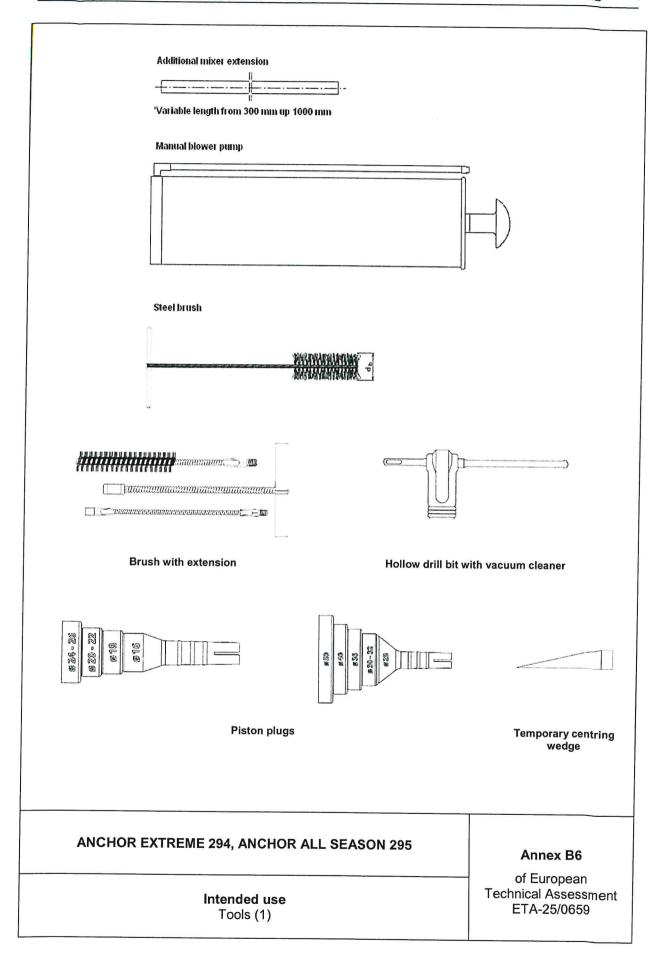
ANCHOR	EXTREME 294,	ANCHOR	ALL	SEASON :	295
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Intended use

Maximum processing time and minimum curing time

Annex B5







Dispensers	Cartridge or foil capsule size
	380, 400, 410 and 420 m
Manual gun for coaxial cartridges	
	345 ml
Manual gun for side by side cartridges	*
	150, 175, 280, 300 and 310 ml
Manual gun for foil capsule in cartridge and coaxial cartridges	
	300 to 600 ml
Manual gun for foil capsules CFS+	
Cordless dispenser gun for coaxial cartridges	380, 400, 410 and 420 ml
Service Service Service Services	3
	300 to 600 ml
Cordless dispenser gun for foil capsules	
	380, 400, 410 and 420 ml
Pneumatic gun for coaxial cartridges	

ANCHOR EXTREME 294, ANCHOR ALL SEASON 295	Annex B7
Intended use Tools (2)	of European Technical Assessment ETA-25/0659



Table B6: Brush diameter for threaded rod

	Threaded rod diame	eter	M8	M10	M12	M16	M20	M24	№ 130
dь	Brush diameter	[mm]	12	14	16	20	26	30	37

Table B7: Brush diameter for rod with inner thread

	Threaded rod diame	eter	M6/Ø10	M8/Ø12	M10/Ø16	M12/Ø16	M16/@24
dь	Brush diameter	[mm]	16	16	22	22	30

Table B8: Brush diameter for rebar

	Rebar diameter		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø 32
dь	Brush diameter	[mm]	14	16	20	20	24	28	37	42

Table B9: Piston plug size

Hole diameter [mm]	16	18	20	22	24	25	26	28	30	32	35	40	50
Piston plug description	Ø16	Ø18	Ø20 t	o Ø22	Ø	24 to Ø	26	Ø28	Ø30 to	o Ø32	Ø35	Ø40	Ø50

ANCHOR EXTREME 294, ANCHOR ALL SEASON 295

Intended use Tools (3) Annex B8



	Drill hole to the required diameter and depth using a rotary percussive machine.
a. b.	 Hole cleaning. Clean the hole with brush and hand pump: starting from the drill hole bottom blow the hole at least 4 times using the hand pump, using the specified brush, mechanically brushout the hole at least 4 times, starting from the drill hole bottom, blow at least 4 times with the hand pump. Cleaning hole with compressed air: starting from the drill hole bottom blow the hole at least twice by compressed air (6 atm), using the specified brush, mechanically brushout the hole at least twice, blow the hole at least twice by compressed air (6 atm), brush out the hole at least twice, blow over the hole at least twice by compressed air (6 atm).
No West	Insert cartridge into dispenser and attach nozzle. Dispense to waste until even color is obtained (min. 10 cm).
→	Insert the mixing nozzle to the far end of the hole and inject mortar, slowly withdrawing the nozzle as the hole is filled to 2/3 of its depth.
	Immediately insert the rod, slowly and with slight twisting motion. Remove any excess mortar around the hole before it sets.
	Leave the fixing undisturbed until the curing time elapses.
V =	7. Attach fixture and tighten the nut to the required installation torque. The applied installation torque cannot exceed T _{inst,max} .

Intended use

Installation instruction – threaded rod – standard cleaning

Annex B9



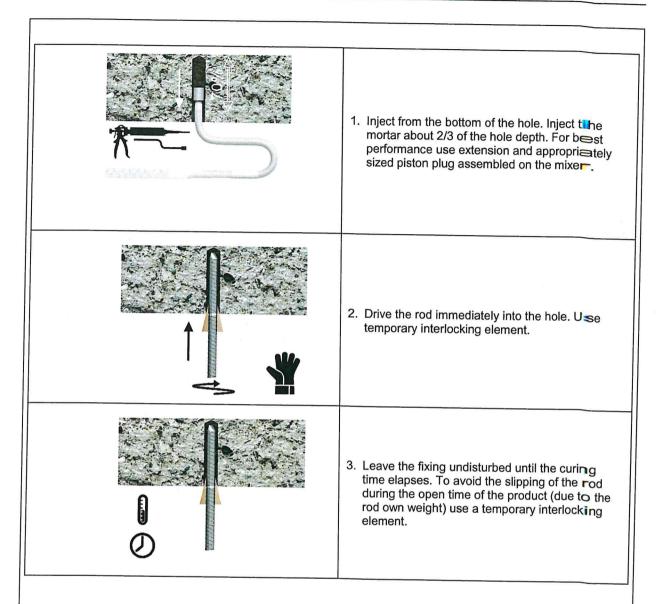
	Drill hole to the required diameter and deptensing a hollow drill bit with vacuum cleaner.
No No No	Insert cartridge into dispenser and attach nozzle. Dispense to waste until even color is obtained.
→	3. Insert the mixing nozzle to the far end of the hole and inject mortar, slowly withdrawing the nozzle as the hole is filled to 2/3 of its depth.
	Immediately insert the rod, slowly and with slight twisting motion. Remove any excess mortar around the hole before it sets.
	Leave the fixing undisturbed until the curing time elapses.
√ = □	6. Attach fixture and tighten the nut to the required installation torque. The applied installation torque cannot exceed T _{inst,max} .

Intended use

Installation instruction – threaded rod – cleaning with hollow drill bit (special cleaning method)

Annex B10





Intended use

Installation instruction – threaded rod – overhead installation

Annex B11



	Drill hole to the required diameter and depth using a rotary percussive machine.
a. b.	 Hole cleaning. Clean the hole with brush and hand pump: starting from the drill hole bottom blow the hole at least 4 times using the hand pump, using the specified brush, mechanically brush out the hole at least 4 times, starting from the drill hole bottom, blow at least 4 times with the hand pump. Cleaning hole with compressed air: starting from the drill hole bottom blow the hole at least twice by compressed air (6 atm), using the specified brush, mechanically brush out the hole at least twice, blow the hole at least twice by compressed air (6 atm), brush out the hole at least twice, blow over the hole at least twice by compressed air (6 atm).
No Park	Insert cartridge into dispenser and attach nozzle. Dispense to waste until even colour is obtained (min. 10 cm).
Toris,	Insert the mixing nozzle to the far end of the hole and inject mortar, slowly withdrawing the nozzle as the hole is filled to 2/3 of its depth.
	5. Immediately insert the rod with inner thread, slowly and with slight twisting motion. Remove any excess mortar around the hole before it sets.
	Leave the fixing undisturbed until the curing time elapses.
	7. Attach fixture and tighten the bolt to the required installation torque. The applied installation torque cannot exceed T _{inst,max} .

Intended use

Installation instruction – anchor rod with inner thread – standard cleaning

Annex B12



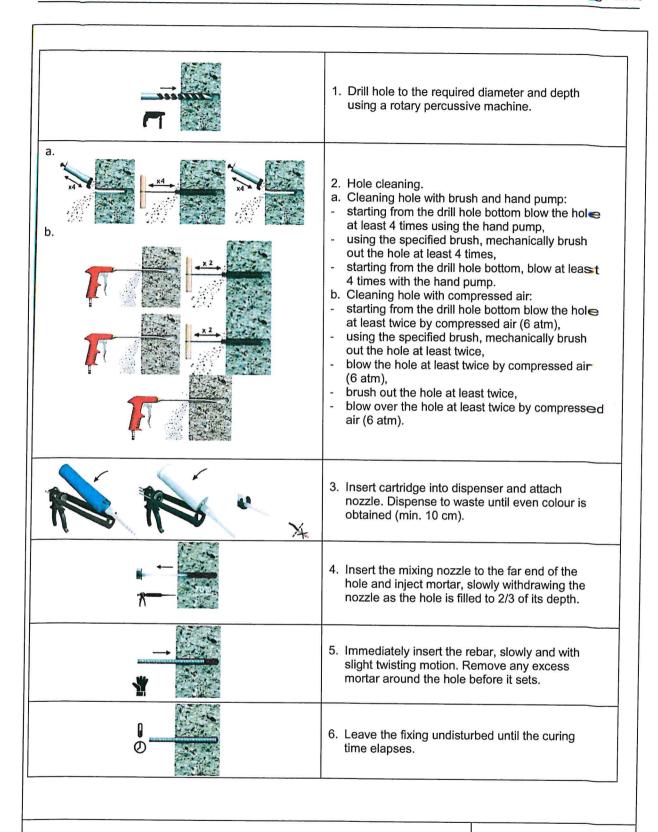
	Drill hole to the required diameter and depted using a hollow drill bit with vacuum cleaner.
No No No X	Insert cartridge into dispenser and attach nozzle. Dispense to waste until even color is obtained (min. 10 cm).
*************************************	3. Insert the mixing nozzle to the far end of the hole and inject mortar, slowly withdrawing the nozzle as the hole is filled to 2/3 of its depth.
	4. Immediately insert the rod with inner thread, slowly and with slight twisting motion. Remove any excess mortar around the hole before it sets.
	Leave the fixing undisturbed until the curing time elapses.
	6. Attach fixture and tighten the bolt to the required installation torque. The applied installation torque cannot exceed T _{inst,max} .

Intended use

Installation instruction – anchor rod with inner thread – cleaning with hollow drill bit (special cleaning method)

Annex B13





Intended use

Installation instruction - rebar - standard cleaning

Annex B14



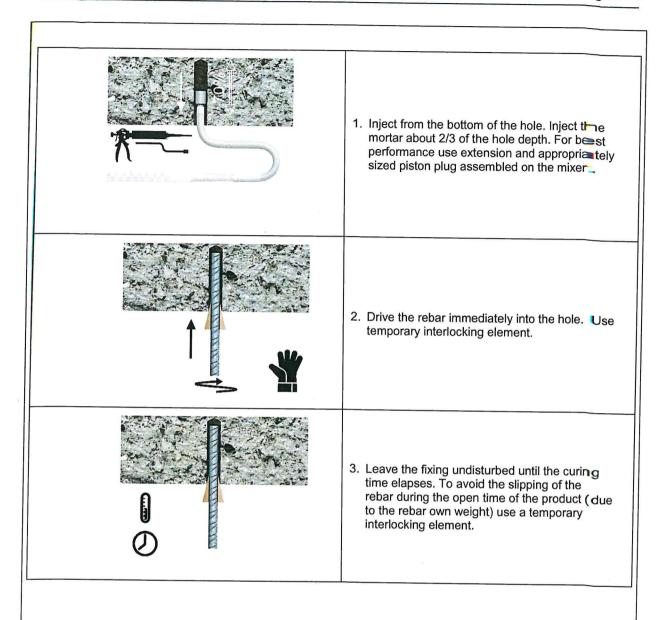
	Drill hole to the required diameter and depth using a hollow drill bit with vacuum cleaner.
No Park	 Insert cartridge into dispenser and attach nozzle. Dispense to waste until even colour is obtained (min. 10 cm).
→ * * * * * * * * * *	3. Insert the mixing nozzle to the far end of the hole and inject mortar, slowly withdrawing the nozzle as the hole is filled to 2/3 of its depth.
	4. Immediately insert the rebar, slowly and with slight twisting motion. Remove any excess mortar around the hole before it sets.
	Leave the fixing undisturbed until the curing time elapses.

Intended use

Installation instruction – rebar – cleaning with hollow drill bit (special cleaning method)

Annex B15





Intended use

Installation instruction - rebar - overhead installation

Annex B16



Size			M8	M10	M12	M16	M20	M24	B.A
Steel failure							IIIZO	17124	M
Steel failure with threaded rod grade 5.8									
Characteristic resistance	N _{Rk,s}	[kN]	18	29	42	78	122	176	
Partial safety factor 1)	γMs	[-]				1,50	122	170	2
Steel failure with threaded rod grade 8.8						.,,			
Characteristic resistance	$N_{Rk,s}$	[kN]	29	46	67	125	196	282	4
Partial safety factor 1)	γMs	[-]				1,50		LUL	1 4
Steel failure with threaded rod grade 10.									
Characteristic resistance	N _{Rk,s}	[kN]	36	58	84	157	245	353	56
Partial safety factor 1)	γMs	[-]				1,40			
Steel failure with threaded rod grade 12.		T							
Characteristic resistance	N _{Rk,s}	[kN]	43	69	101	188	294	423	67
Partial safety factor 1)	γMs	[-]				1,40			
Steel failure with stainless steel threaded									
Characteristic resistance	N _{Rk,s}	[kN]	25	40	59	109	171	247	39
Partial safety factor 1)	γMs	[-]				1,87			
Steel failure with stainless steel threaded Characteristic resistance		FI 3 17	T ==						
Partial safety factor 1)	N _{Rk,s}	[kN]	29	46	67	125	196	282	44
Steel failure with high corrosion resistant	γMs	[-]				1,60			
Characteristic resistance	N _{Rk,s}		0.5	40					
Partial safety factor 1)		[kN]	25	40	59	109	171	247	39
Steel failure with ultra-high strength steel	threaded rod	[-]				1,87			
Characteristic resistance	N _{Rk,s}	[kN]	51	04	110	040			
Partial safety factor 1)	YMs	[-]	31	81	118	219	343	494	78
Steel failure with ultra-high strength steel		grade 15.8				1,5			
Characteristic resistance	N _{Rk,s}	[kN]	54	87	126	235	267		
Partial safety factor 1)	Ϋ́Ms	[-]	0-1	01	120	1,5	367	529	84
Steel failure with ultra-high strength steel	threaded rod	grade 16.8				1,5			
Characteristic resistance	N _{Rk.s}	[kN]	58	92	134,9	251	392	FCA	00
Partial safety factor 1)	γMs	[-]		- 02	104,0	1,5	392	564	89
Combined pull-out and concrete cone	failure in unc		C20/25 fc	r a worki	ing life o	F 50 War		5/5/1903/02	
Characteristic bond resistance	B 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		020,20 10	or a Work	ing ine o	Ju year	3		40.00
remperature range I: 24°C / 40°C	-	[N/mm²]	10.0	45.0	44-				
Temperature range II: 50°C / 80°C	TRk,ucr,50	[N/mm²]	16,0	15,6	14,7	13,6	10,2	10,1	8,4
	TRk,ucr,50	[N/mm²]	16,0	15,6	14,7	13,6	10,2	10,1	8,4
emperature range III: 80°C / 120°C	TRk,ucr,50	[N/mm ²]	8,6	8,4	7,9	7,3	5,5	5,4	4,5
		C30/37				1,04			
ncreasing factor	Ψc	C40/50				1,07			
		C50/60				1,09			
		24°C / 40°C							
Sustained load factor	Ψ^0_{sus}	50°C / 80°C				0,74			
	2 sus					0,73			
Combined will gut and account		80°C / 120°C				0,61			
combined pull-out and concrete cone	allure in unci	racked concrete (C20/25 fo	r a worki	ng life of	100 yea	rs		
characteristic bond resistance									
emperature range I: 24°C / 40°C	τ _{Rk,ucr,100}	[N/mm ²]	16,0	15,6	14,7	13,6	10,2	10,1	8,4
emperature range II: 50°C / 80°C	τ _{Rk,ucr,100}	[N/mm²]	16,0	15,6	14,7	13,6	10,2	10,1	
		C30/37	7-			1,04	10,2	10,1	8,4
creasing factor	W-	C40/50							
	Ψο					1,07			
	1	C50/60				1,09			
		24°C / 40°C				0,74	-		

ANCHOR EXTREME 294,	ANCHOR ALL SEASON 295
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Performance

Characteristic resistance under tension loads for threaded rods in uncracked concrete

Annex C1



Table C1 (continuation)

Size				M8 M10 M12 M16 M20 M24				M30		
Concrete cone failure in	n uncracked o	oncrete							10124	MISC
Factor for uncracked con	crete	k _{ucr,N}	[-]				11,0			
Edge distance		Cucr,N	[mm]				1,5 · h _{ef}			
Spacing		S _{ucr,N}	[mm]	3,0 · h _{ef}						
Splitting failure										a de la composición della comp
		C _{cr,sp} for h _{min}		[mm] 2xh _{ef} 1,5		i . h .				
Edge distance		$c_{cr,sp}$ for $h_{min} < h^{2} < 2 \cdot h_{ef}$ ($c_{cr,sp}$ from linear	[mm]			1,0	,			
		interpolation) c _{cr,sp} for h ²⁾ ≥ 2 · h _{ef}	-					C _{cr.sp}		
Spacing		S _{cr,sp}	[mm]	C _{cr,N} 2,0 · c _{cr,sp}						
Installation factor for co	ombined pull-						Allesia			
standard Installation factor for in cleaning		,	Pintang	1,0						
use category I1	special cleaning	γinst	[-]	1,2			1,0			1,2
Installation factor for in	standard cleaning	7 inst	[-]	1,0						
use category I2	special cleaning			1,2			1,0			1,2

¹⁾ In the absence of other national regulation.

ANCHOR EXTREME 294, ANCHOR ALL SEASON 295

Performance

Characteristic resistance under tension loads for threaded rods in uncracked concrete

Annex C2

²⁾ h – concrete member thickness.



Table C2: Characteristic resist Size	Ballery Street		M8	M10	M12	M16	M20		
Steel failure						WITE	WIZU	M24	M
Steel failure with threaded rod grade 5.	8								
Characteristic resistance	N _{Rk,s}	[kN]	18	29	42	78	122	470	1 0
Partial safety factor 1)	γMs	[-]			12	1,50	122	176	2
Steel failure with threaded rod grade 8.						1,00			
Characteristic resistance	N _{Rk,s}	[kN]	29	46	67	125	196	282	T 4
Partial safety factor 1)	γMs	[-]			07	1,50	130		4
Steel failure with threaded rod grade 10).9		-		-	1,00			
Characteristic resistance	N _{Rk,s}	[kN]	36	58	84	157	245	252	
Partial safety factor 1)	γMs	[-]		_ 00		1,40	240	353	5
Steel failure with threaded rod grade 12	2.9		1			1,40			
Characteristic resistance	N _{Rk,s}	[kN]	43	69	101	188	294	400	T 0:
Partial safety factor 1)	γMs	[-]			101	1,40	234	423	6
Steel failure with stainless steel threads	ed rod A4-70					1,40			
Characteristic resistance	N _{Rk,s}	[kN]	25	40	59	109	171	247	T 2
Partial safety factor 1)	Ϋ́Ms	[-]		1 10	_ 00	1,87	171	247	3
Steel failure with stainless steel threade						1,07			
Characteristic resistance	N _{Rk,s}	[kN]	29	46	67	125	196	000	
Partial safety factor 1)	γMs	[-]		10	01	1,60	190	282	44
Steel failure with high corrosion resistar	t steel grade 70)				1,00			
Characteristic resistance	N _{Rk,s}	[kN]	25	40	59	109	171	0.47	00
Partial safety factor 1)	γMs	[-]		10	00	1,87	17.1	247	39
Steel failure with ultra-high strength stee						1,07			
Characteristic resistance	N _{Rk,s}	[kN]	51	81	118	219	343	404	70
Partial safety factor 1)	γMs	[-]		<u> </u>	110	1,5	343	494	78
Steel failure with ultra-high strength stee						1,0			
Characteristic resistance	N _{Rk,s}	[kN]	54	87	126	235	367	529	0.4
Partial safety factor 1)	γMs	[-]				1,5	001	329	84
Steel failure with ultra-high strength stee	el threaded rod	grade 16.8				1,0			
Characteristic resistance	$N_{Rk,s}$	[kN]	58	92	134,9	251	392	564	90
Partial safety factor 1)	γMs	[-]			.0.1,0	1,5	-002	304	89
Combined pull-out and concrete con-			0/25 for a	working	life of 5	0 voore			1001
Characteristic bond resistance			0,20 101 (Working	ine or 3	o years			
		[N1/mm mm 2]	40.0	40.0					
Femperature range I: 24°C / 40°C	TRk,cr,50	[N/mm²]	10,0	10,6	11,0	9,6	7,5	6,9	4,8
Temperature range II: 50°C / 80°C	τ _{Rk,cr,50}	[N/mm²]	10,0	10,6	11,0	9,6	7,5	6,9	4,8
emperature range III: 80°C / 120°C	τ _{Rk,cr,50}	[N/mm ²]	5,3	5,7	5,9	5,1	4,0	3,6	2,6
		C30/37				1,04		,	
ncreasing factor	Ψο	C40/50			-	1,07			
	1	C50/60							
-	-					1,09			
North to and to and for a to		24°C / 40°C				0,74			
Sustained load factor	Ψ^0_{sus}	50°C / 80°C				0,73			
		80°C / 120°C				0,61			
combined pull-out and concrete cone	failure in crac	ked concrete C2	0/25 for a	working	life of 10	0 years		THE RESIDENCE	
Characteristic bond resistance				or King	ine or 10	years			
emperature range I: 24°C / 40°C		[N1/mm == 21	0.4	40.5	4				
	TRk,cr,100	[N/mm²]	9,4	10,3	10,8	9,5	7,5	6,8	4,8
emperature range II: 50°C / 80°C	τ _{Rk,cr,100}	[N/mm²]	9,4	10,3	10,8	9,5	7,5	6,8	4,8
		C30/37				1,04			
ncreasing factor	Ψο	C40/50				1,07			
Creasing lactor		C50/60				- 374			
	Ψ ^o _{sus}	24°C / 40°C		-	_	1,09 0,74			

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50°C / 80°C

Performance

Characteristic resistance under tension loads for threaded rods in cracked concrete

Annex C3

0,73



Table C2 (continuation)

Size Concrete cone failure i				M8	M10	M12	M16	M20	M24	M30
									THE RESERVE	
Factor for cracked concr	ete	k _{cr,N}	[-]	7,7						
Edge distance		C _{cr,N}	[mm]	1,5 · h _{ef}						
Spacing		S _{cr,N}	[mm]	3,0 · h _{ef}						
Splitting failure									× 11.161.736	(d) Signal
		C _{cr,sp} for h _{min}		2,0 · h _{ef}				15	· h _{ef}	
Edge distance		$c_{cr,sp}$ for $h_{min} < h^{2} < 2 \cdot h_{ef}$	[mm]						1,5	Tlef
		(c _{cr,sp} from linear interpolation)		2 x h _{tr}						
		$c_{cr,sp}$ for $h^{2} \ge 2 \cdot h_{ef}$		C _{cr,N}						
Spacing		S _{cr,sp}	[mm]	2.0 · Cor on						
Installation factor for co	ombined pul	I-out, concrete cone ar	nd splitting	failure			- 01,01	,		
Installation factor for in	standard cleaning						1,0			
use category I1	special cleaning	γinst	[-]	1,2	-		1,0			1,2
Installation factor for in	standard cleaning) inst	[-]				1,0			
use category I2	special cleaning			1,2			1,0			1,2

¹⁾ In the absence of other national regulation.

ANCHOR EXTREME 294, ANCHOR ALL SEASON 295

Performance

Characteristic resistance under tension loads for threaded rods in cracked concrete

Annex C4

²⁾ h — concrete member thickness.



Taible C3: Characteristic resistance under tension load for rods with inner thread in uncrac⊌ked concrete

N _{Rk,s} yms ad A4-80 N _{Rk,s} yms de 70 N _{Rk,s} yms	[kN] [-] ded rod A4-70 [kN] [-] [kN] [-] [kN] [-] [kN] [-] [kN] [-] [kN] [-] [kN] [-]	10,7	29 25 29 25 working life		67 59 67	78 125 109
γ _{Ms} N _{Rk,s} γ _{Ms} ad threac N _{Rk,s} γ _{Ms} ad A4-80 N _{Rk,s} γ _{Ms} de 70 N _{Rk,s} γ _{Ms} uncrack	[-] [kN] [-] ded rod A4-70 [kN] [-] [kN] [-] [kN] [-] ked concrete [N/mm²]	16 14 16 14 C20/25 for a 10,7	29 25 29 25 working life	1,50 46 1,50 40 1,87 46 1,60 40 1,87 of 50 years	59	125
γ _{Ms} N _{Rk,s} γ _{Ms} ad threac N _{Rk,s} γ _{Ms} ad A4-80 N _{Rk,s} γ _{Ms} de 70 N _{Rk,s} γ _{Ms} uncrack	[-] [kN] [-] ded rod A4-70 [kN] [-] [kN] [-] [kN] [-] ked concrete [N/mm²]	16 14 16 14 C20/25 for a 10,7	29 25 29 25 working life	1,50 46 1,50 40 1,87 46 1,60 40 1,87 of 50 years	59	125
γ _{Ms} N _{Rk,s} γ _{Ms} ad threac N _{Rk,s} γ _{Ms} ad A4-80 N _{Rk,s} γ _{Ms} de 70 N _{Rk,s} γ _{Ms} v _{Ms} de 70 v _{R,s} γ _{Ms}	[kN] [-] ded rod A4-70 [kN] [-] [kN] [-] [kN] [-] [kN] [-] ked concrete [N/mm²]	16 14 16 14 C20/25 for a 10,7	29 25 29 25 working life	1,50 46 1,50 40 1,87 46 1,60 40 1,87 of 50 years	59	125
YMs ad thread NRk,s YMs ad A4-80 NRk,s YMs de 70 NRk,s YMs vms vms vms vms vmcrack vr,50	[-] ded rod A4-70 [kN] [-]) [kN] [-] [kN] [-] [kN] [-] ked concrete [N/mm²]	14 16 14 C20/25 for a	25 29 25 working life	46 1,50 40 1,87 46 1,60 40 1,87 of 50 years	59	109
YMs ad thread NRk,s YMs ad A4-80 NRk,s YMs de 70 NRk,s YMs vms vms vms vms vmcrack vr,50	[-] ded rod A4-70 [kN] [-]) [kN] [-] [kN] [-] [kN] [-] ked concrete [N/mm²]	14 16 14 C20/25 for a	25 29 25 working life	1,50 40 1,87 46 1,60 40 1,87 of 50 years	59	109
YMs ad thread NRk,s YMs ad A4-80 NRk,s YMs de 70 NRk,s YMs vms vms vms vms vmcrack vr,50	[-] ded rod A4-70 [kN] [-]) [kN] [-] [kN] [-] [kN] [-] ked concrete [N/mm²]	14 16 14 C20/25 for a	25 29 25 working life	1,50 40 1,87 46 1,60 40 1,87 of 50 years	59	109
$\begin{array}{c} N_{Rk,s} \\ \gamma_{Ms} \\ \text{ad A4-80} \\ N_{Rk,s} \\ \gamma_{Ms} \\ \text{de 70} \\ N_{Rk,s} \\ \gamma_{Ms} \\ \text{uncrack} \\ \text{uncrack} \\ \text{urcrack} \\ ur$	[kN] [-] [kN] [-] [kN] [-] [kM] [-] ked concrete [N/mm²]	16 14 C20/25 for a 10,7	29 25 working life	40 1,87 46 1,60 40 1,87 of 50 years	67	125
$\begin{array}{c} N_{Rk,s} \\ \gamma_{Ms} \\ \text{ad A4-80} \\ N_{Rk,s} \\ \gamma_{Ms} \\ \text{de 70} \\ N_{Rk,s} \\ \gamma_{Ms} \\ \text{uncrack} \\ \text{uncrack} \\ \text{urcrack} \\ ur$	[kN] [-] [kN] [-] [kN] [-] [kM] [-] ked concrete [N/mm²]	16 14 C20/25 for a 10,7	29 25 working life	1,87 46 1,60 40 1,87 of 50 years	67	125
Ad A4-80 N _{Rk,s} y _{Ms} de 70 N _{Rk,s} y _{Ms} uncrack	[kN] [r] [kN] [s] [kN] [r] ked concrete [N/mm²]	14 C20/25 for a	29 25 working life	1,87 46 1,60 40 1,87 of 50 years	67	125
N _{Rk,s} yms de 70 N _{Rk,s} yms uncrack	[kN] [-] [kN] [-] ked concrete [N/mm²]	14 C20/25 for a	25 working life	46 1,60 40 1,87 of 50 years		
YMs de 70 N _{Rk,s} YMs uncrack	[-] [kN] [-] ked concrete [N/mm²]	14 C20/25 for a	25 working life	1,60 40 1,87 of 50 years		
le 70 N _{Rk,s} y _{Ms} uncrack	[kN] [-] ked concrete [N/mm²]	C20/25 for a 10,7	working life	1,60 40 1,87 of 50 years		
N _{Rk,s} γ _{Ms} uncrack cr,50 cr,50	[-] ked concrete [N/mm²]	C20/25 for a 10,7	working life	40 1,87 of 50 years	59	109
yms uncrack	[-] ked concrete [N/mm²]	C20/25 for a 10,7	working life	1,87 of 50 years	59	109
uncrack er,50	ked concrete [N/mm²]	10,7		1,87 of 50 years		109
er,50 er,50	[N/mm ²]	10,7		of 50 years	and the same	
er,50 er,50	[N/mm ²]	10,7				
	[N/mm ²]			11,0	11,8	8,0
- 50		10,7	13,7	11,0	11,8	
	[N/mm ²]	5,7	7,4	5,9	6,3	8,0
,,,,,	C30/37	0,1			0,3	4,3
	C40/50	1,04				1,00
;		1,07				1,00
	C50/60	1,09				1,00
	24°C / 40°C	0,74 0,73				
	50°C / 80°C					
80°C / 120°C		0,61				
uncrack	ked concrete	C20/25 for a	working life	of 100 years		
	[N/mm ²]	10,7	13,7	11,0	The same of the sa	8,0
,100	[N/mm ²]	10,7	13,7	11.0		8,0
	C30/37		1			
						1,00
						1,00
		1,09			1 00	
2	24°C / 40°C			0,74		1,00
cr,	cr,100	cr,100 [N/mm²] cr,100 [N/mm²] C30/37	cr,100 [N/mm²] 10,7 cr,100 [N/mm²] 10,7 C30/37 C40/50	cr,100 [N/mm²] 10,7 13,7 cr,100 [N/mm²] 10,7 13,7 C30/37 1,0 1,0 C4 C40/50 1,0	cr,100 [N/mm²] 10,7 13,7 11,0 cr,100 [N/mm²] 10,7 13,7 11,0 C30/37 1,04 C40/50 1,07	C30/37 1,04 1,07 1,07 1,07 1,07 1,07 1,07 1,07 1,07

Performance

Characteristic resistance under tension loads for rods with inner thread in uncracked concrete

Annex C5



Table C3 (continuation)

Factor for ucracked co	ncrete	k _{ucr,N}	[-]	11,0			
E dge distance	9	C _{ucr,N}	[mm]	1,5 · h _{ef}			
Spacing		S _{ucr,N}	[mm]	3,0 · h _{ef}			
S plitting failure							
		c _{cr,sp} for h _{min}		2,0 · h _{ef} 1,5 · h _{ef}			
E d ge distance		$c_{cr,sp}$ for $h_{min} < h^{2} < 2 \cdot h_{ef}$ ($c_{cr,sp}$ from linear interpolation)		2 x h _e , h _{min} c _{cu Np} c _{cu sp}			
		$c_{cr,sp}$ for $h^{(2)} \ge 2 \cdot h_{ef}$		C _{Cr,N}			
Spacing		S _{cr,sp}	[mm]	20 · c			
In stallation factor for	combined pu	II-out, concrete cone ar	nd splitting f	ailure			
standard cleaning				1,0			
us e category I11)	special cleaning	Yinst	[-]	1,0			
Installation factor for	standard cleaning			1,0			
us e category 121)	special cleaning			1,0			

¹⁾ In the absence of other national regulation.

ANCHOR EXTREME 294, ANCHOR ALL SEASON 295

Performance

Characteristic resistance under tension loads for rods with inner thread in uncracked concrete

Annex C5

²⁾ h – concrete member thickness.



Table C4: Characteristic resistance	e under tension loads for rods with i	inner thread in Caracked concrete
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Size			M6/ Ø10	M8/ Ø12	M10/ Ø16	M12/ Ø16	M10
Steel failure						210	WZ
Steel failure with rod with inner thread grade 5.8	3						
Characteristic resistance	N _{Rk,s}	[kN]	10	18	29	42	70
Partial safety factor 1)	γMs	[-]			1,50	42	78
Steel failure with rod with inner thread grade 8.8	3				1,00		-
Characteristic resistance	N _{Rk,s}	[kN]	16	29	46	67	125
Partial safety factor 1)	γMs	[-]		01	120		
Steel failure with stainless steel rod with inner the	nread A4-70				1,50		-
Characteristic resistance	$N_{Rk,s}$	[kN]	14	25	40	59	109
Partial safety factor 1)	γMs	[-]			1.87		108
Steel failure with stainless steel rod with inner the	read rod A4-80)			.,,,,		
Characteristic resistance	$N_{Rk,s}$	[kN]	16	29	46	67	125
Partial safety factor 1)	γMs	[-]			1,60	01	120
Steel failure with high corrosion resistant steel of	rade 70				.,,		
Characteristic resistance	N _{Rk,s}	[kN]	14	25	40	59	109
Partial safety factor 1)	γMs	[-]			1,87	- 00	103
Combined pull-out and concrete cone failure	in cracked co	ncrete C20/25 for	a working	g life of 50	years		
Temperature range I: 24°C / 40°C	T _{Rk,cr,50}	[N/mm ²]	10,3	10,3	9,5	8,9	4,0
Temperature range II: 50°C / 80°C	τ _{Rk,cr,50}	[N/mm²]	10,3	10,3	9,5	8,9	4,0
Temperature range III: 80°C / 120°C	TRk,cr,50	[N/mm ²]	5,5	5,5	5,1	4,8	2,1
		C30/37			04	7,0	1.00
Increasing factor	Ψο	C40/50	1,07				1,00
		C50/60	1,09				1,00
		24°C / 40°C			0,74		1,00
Sustained load factor	Ψ^o_{sus}	50°C / 80°C			0,73		
		80°C / 120°C			0,61		
Combined pull-out and concrete cone failure	in cracked co	ncrete C20/25 for	a working	life of 10	0 years		and Y
Temperature range I: 24°C / 40°C	TRk,cr,100	[N/mm²]	7,2	9,5	9,0	8,4	4,0
Temperature range II: 50°C / 80°C	TRk,cr,100	[N/mm²]	7,2	9,5	9,0	8,4	4,0
		C30/37		1.	04		1,00
ncreasing factor	Ψα	C40/50			07		1,00
		C50/60			09		1,00
Sustained load factor	Ψ ⁰ sus	24°C / 40°C			0,74		1,00
	I sus	50°C / 80°C			0.73		-

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Performance

Characteristic resistance under tension loads for rods with inner thread in cracked concrete

Annex C6



Table C4 (continuation)

Factor for cracked concrete		k _{cr,N}	[-]	7,7
Edge distance		C _{cr,N}	[mm]	1,5 · h _{ef}
Spacing	S _{cr,N}	[mm]	3,0 · h _{ef}	
Splitting failure				O,O Tier
	C _{cr,sp} fo	r h _{min}		2,0 · h _{ef} 1,5 · h _{ef}
Edge distance	C _{cr,sp} h _{min} < h ²⁾ (C _{cr,sp} fror interpol	< 2 · h _{ef} n linear	[mm]	2 x h _{et} h _{mon} c _{co-sp}
	C _{cr,sp} for h ²	⁾ ≥ 2 · h _{ef}		C _{cr,N}
Spacing	S _{cr.}	sp	[mm]	2,0 · C _{cr,sp}
Installation factor for combined pull-c	ut, concrete c	one and sp	litting failure	
Installation factor for use category I1	standard cleaning			1,0
	special cleaning	γinst	[-]	1,0
Installation factor for use category I2	standard cleaning	/ iiist	[7]	1,0
	special cleaning			1,0

¹⁾ In the absence of other national regulation.

ANCHOR EXTREME 294,	ANCHOR ALI	SEASON 295
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Performance

Characteristic resistance under tension loads for rods with inner thread in cracked concrete

Annex C6

²⁾ h – concrete member thickness.



Table 00. Characteristic resistance under tension to repar in increcked concrete	Table C5: Characteristic resistance unde	er tension load for rebar in uncracked concrete
--	--	---

Size						Ø8	Ø10	Ø12	Ø14	Ø16	2 20	Ø25	Ø3	
Steel failure with re	bar		,									025	103	
Characteristic resis	tance			$N_{Rk,s}$	[kN]				A _s ²⁾	· f _{uk} ³⁾				
Partial safety factor				γмs	[-]				1	.40				
Combined pull-ou	t and con	crete cone	failure	in unc	racked concrete	e C20/25	for a w	orking I	ife of 50	vears				
Temperature range	1: 24°C / 4	40°C		k,ucr,50	[N/mm²]	12,9	14,4	14,9	13,1	12,8	■0,4	8,9	7,3	
Temperature range			τ _R	Rk,ucr,50	[N/mm ²]	12,9	14,4	14,9	13,1	12,8	10,4	8,9	7,3	
Temperature range	III: 80°C /	120°C	τ _R	k,ucr,50	[N/mm²]	6,9	7,7	8,0	7.0	6.8	5 ,6	4,8	3,9	
					C30/37				1,	04	0,0	4,0	5,5	
Increasing factor				Ψο	C40/50					.07				
					C50/60					09				
					24°C / 40°C					74				
Sustained load factor	or		!	Ψ^0_{sus}	50°C / 80°C					73				
					80°C / 120°C					61				
Combined pull-out	and con	crete cone f	ailure	in uncr	acked concrete	C20/25	for a we	orkina li	ife of 10	0 years				
Temperature range				,ucr,100	[N/mm²]	12,9	14,4	14,9			104	9.0	7.0	
Temperature range	II: 50°C /	80°C	τ _{Rk}	,ucr,100	[N/mm²]	12,9	14.4	14,9					7,3 7,3	
					C30/37			,0		13,1 12,8 1 0,4 8,9 13,1 12,8 1 0,4 8,9 1,04 1,07 1,09 0,74 0,73				
Increasing factor	creasing factor			Ψε	C40/50									
					C50/60		-							
Custoined land facts	ustained load factor			**	24°C / 40°C									
Sustained load facto	DΓ		3	po _{sus}	50°C / 80°C				- 7					
Concrete cone fail	ure in un	cracked cor	crete					AT THE	7,		Tall and the			
Factor for non-crack	ced concre	ete	k	ucr,N	[-]				11	.0				
Edge distance				ucr,N	[mm]					· h _{ef}				
Spacing				ucr.N	[mm]					· h _{ef}				
Splitting failure							21/41		5,0	riet		U SHELA	Region .	
		C _{cr,sp}	for h _m	in				2,0	· h _{ef}			1,5 ·	har	
		C _{cr}	_{sp} for						1 1	ĭ		- 1,-		
Edge distance		h _{min} < h	4) < 2	· h _{ef}	[mm]			2.	, N.					
		(C _{cr,sp} fro			[11111]				min.					
			olatio							cr.Np C _{cr.sp}	_			
		C _{cr,sp} for h	1 ⁴⁾ ≥ 2	2 · h _{ef}					Cc	r,N				
Spacing			cr,sp		[mm]				2,0 ·	C _{cr,sp}				
nstallation factor f				crete co	ne and splitting	failure				AMERICA IN	Alena (HEX.	
nstallation factor	stand	dard cleaning	9						1,	0				
or use category (1)	spec	cial cleaning				1,2			1,0	0			1,2	
	cing allation factor for combined pull- allation factor standard clear use category I1 int c _{cr,sp} from the combined pull- standard clear special clean				Yinst [-]							- 1		
nstallation factor	tallation factor standard cleaning				[-]				1,				1,2	

¹⁾ In the absence of other national regulation.

Performance

Characteristic resistance under tension loads for rebar in uncracked concrete

Annex C7

²⁾ Stressed cross section of the steel.

³⁾ According to EN 1992-1-1.

⁴⁾ h - concrete member thickness.



Table C6: Characteristic resistance under tension	loads for rebar in cracked concrete
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Size Steel failure with reb	ar				Ø8	Ø10	Ø12	Ø14	Ø16	₩20	Ø25	Ø32
Characteristic resista			T		1			100	v -28			
of topic Academic species is a second			N _{Rk,s}	[kN]				A _s ²⁾	· f _{uk} ³)			
Partial safety factor			γMs	[-]				1	,40		-	
Combined pull-out	and cor	icrete cone		racked concrete (king life	of 50 ye	ears	Me Kat		A STATE
Temperature range			T _{Rk,cr,50}	[N/mm²]	8,4	9,1	9,9	9,9	8,5	7,5	5,8	3,5
Temperature range			TRk,cr,50	[N/mm²]	8,4	9,1	9,9	9,9	8,5	7,5	5,8	3,5
Temperature range	II: 80°C	/ 120°C	τ _{Rk,cr,50}	[N/mm²]	4,5	4,9	5,3	5,3	4,5	4 ,0	3,1	1.9
				C30/37				1,	,04			
Increasing factor			Ψο	C40/50				1,	,07			
				C50/60				1,	,09			
				24°C / 40°C				0,	74			
Sustained load facto	Г		Ψ^0_{sus}	50°C / 80°C				0.	73			
				80°C / 120°C				0.	61			
Combined pull-out	and con	crete cone	failure in ne	on-cracked concr	ete C20	25 for a	working	life of	100 year	rs		
Temperature range I	: 24°C /	40°C	TRk,cr, 100	[N/mm ²]	7,5	9,1	9,9	9,9	8,5	7,5	5,8	2 5
Temperature range I	l: 50°C /	80°C	τ _{Rk,cr,100}	[N/mm ²]	7.5	9,1	9.9	9,9	8,5	7,5	5,8	3,5
				C30/37	,		-10		04	•,5	5,0	3,5
creasing factor		Ψο	C40/50					07				
			1,5	C50/60			-		09			
0				24°C / 40°C								
Sustained load factor	4		Ψ^0_{sus}	50°C / 80°C	0,74 0,73							
Concrete cone failu	re in cra	cked concr	ete			V. Till		0,	13	ALCOHOL:		
			k _{cr,N}	[-]		the second	The state of	7	,7			
Edge distance			C _{cr,N}	[mm]					, / · h _{ef}			
Spacing			S _{cr.N}	[mm]					· h _{ef}			
Splitting failure	a dila s					17.29.78	166	3,0	1 let	WATER ST		
		C _{cr,sp} f	or h _{min}				2,0	her	ACC DEPTH N		1.5	h
			_{sp} for	1							1,5 ·	Hef
Edge distance) < 2 · h _{ef}	[mm]								
2490 410141100		100.000	m linear	[mm]				2 x 1 ₁ ,				
			olation)					h _{mm} C	Casp Casp			
		c _{cr,sp} for h	⁴⁾ ≥ 2 · h _{ef}					Cc	r N			
Spacing			r,sp	[mm]				2,0 ·				
nstallation factor fo	r combi	ned pull-ou	t, concrete	cone and splittin	g failure)		•	- от,ор			
nstallation factor for								1,	.0			
use category I11)	$\frac{\text{distance}}{\text{distance}} \\ \frac{\text{C}_{\text{cr,sp}}}{\text{distance}} \\ \frac{\text{distance}}{\text{distance}} \\ \frac{\text{C}_{\text{cr,sp}}}{\text{c}_{\text{cr,sp}}} \\ \frac{\text{c}_{\text{cr,sp}}}{\text{c}_{\text{cr,sp}}} \\ \frac{\text{distance}}{\text{c}_{\text{cr,sp}}} \\ \frac{\text{distance}}{\text{distance}} \\ \frac{\text{distance}}{\text{c}_{\text{cr,sp}}} \\ \frac{\text{distance}}{\text{c}_{\text{cr,sp}}} \\ \frac{\text{distance}}{\text{c}_{\text{cr,sp}}} \\ \frac{\text{distance}}{\text{distance}} $	ecial cleaning	9		1,2			1,0				4.0
nstallation factor for	stan	dard cleanir	γ _{ii}	nst [-]	-,-							1,2
ise category I21)		cial cleaning			12			1,				
In the absence of oth					1,2			1,0	0			1,2

¹⁾ In the absence of other national regulation.

Performance

Characteristic resistance under tension loads for rebar in cracked concrete

Annex C8

²⁾ Stressed cross section of the steel.

³⁾ According to EN 1992-1-1.

⁴⁾ h – concrete member thickness.



Table C7: Characteristic resistance under shear loads – steel failure without lever arm – threaded rods

Description in the second					threaded rous							
Size				M8	M10	M12	M16	M 20	M24	M30		
Characteristic	resistance	V ⁰ Rk,s	[kN]	$k_6 \cdot A_s^{2)} \cdot f_{uk}^{3)}$								
Factor	carbon steel with f _{uk} ≤ 500 N/mm²						0,6					
considering ductility	carbon steel with 500 < f _{uk} ≤ 1000 N/mm² or stainless steel	k ₆	[-]		0,5							
Factor conside	ring ductility	k ₇					1,0					
Partial safety	factor 1)					ater and						
Threaded rod g						1,25						
Threaded rod g	rade 8.8						1,25					
Threaded rod g	rade 10.9			1,50								
Threaded rod g	rade 12.9			1,50								
Stainless steel	threaded rod A4-70			1,56								
Stainless steel	threaded rod A4-80	γMs	[-]	1,33								
High corrosion	High corrosion stainless steel grade 70			1,56								
Ultra-high strength steel threaded rod grade 14.8 Ultra-high strength steel threaded rod grade 15.8				1,50								
							1,50					
Ultra-high stren	gth steel threaded rod grade 16.8					1.0-	1,50					

¹⁾ In the absence of other national regulation.

Performance

Characteristic resistance under shear loads for threaded rods in cracked and uncracked concrete

Annex C9

²⁾ Stressed cross section of the steel.

³⁾ According to EN 1992-1-1.



Table C8: Characteristic resistance under shear loads for threaded rods – steel failure wi the lever arm

M	Q	8840					
	U	M10	M12	M16	M=20	M24	M30
					0	IVIZ4	IVIS
1 1	9	37	65	166	324	561	1124
						301	11124
ALC: NO	R.C.	EURE				7 S S S S S S S S S S S S S S S S S S S	72 T T T T
1 3	0	60	105	266	510	900	1700
			,,,,		019	090	179
EEL				1,20	SULAN		THE WAY
1 3	7	75	131	333	640	1100	20.4
			101		0-9	1123	2249
		1		1,00	III E SVA	CTUSING IN	
1 4	5	90	157	400	770	1247	000
		- 00	107		11 9	1347	2698
Market 1				1,00			e,c.eggan
1 26	6	52	92	233	15.1	700	457
· -			- 02		70-4	700	1574
	1			1,00	ARA J = 20	92 (D. 1970)	
1 30)	60	105	266	51.0	200	4700
-		00	100		313	898	1799
STATE OF THE PARTY	3/3			1,00		Mary States	
1 26	3	52	92	233	45.4	706	4574
			- 02		70-4	700	1574
			Valley and	1,00		a market state	- 45 455
1 52	,	104	183	466	90.0	1571	24.40
	-	101	100		300	15/1	3148
	151			1,00	LIDEN'S STORY	NEW YORK	Marca .
56	3	112	196	499	973	1000	2070
		114	100		313	1003	3373
				1,00		e de la companya del companya de la companya del companya de la co	212 100
59	,	119	209	532	1030	1706	2500
-		1,10	200	1.50	1000	1790	3598
] 30] 31] 49] 26] 56	30 37 37 31 45 1 26 1 30 1 26 1 52	30 60 37 75 3 45 90 3 26 52 3 30 60 3 26 52 3 52 104	30 60 105 37 75 131 38 90 157 39 90 157 30 60 105 30 60 105 30 52 92 31 52 104 183	1,25 1,26 1,27 1,28 1,50 1,50 1,50 1,28 1,56 1,33 1,56 1,33 1,56 1,50 1,50 1,50 1,50	1,25 1,26 1,27 1,50 1,28 1,50 1,29 1,33 1,26 1,26 1,33 1,26 1,33 1,33 1,33 1,33 1,36 1,33 1,33 1,33 1,50	1,25 1,25 1,25 30 60 105 266 51 9 898 1,25 1,25 1,25 1,25 1,25 1,25 1,25 1,25 1,25 1,25 1,25 1,25 1,25 1,26 1,27 1,28 1,29 1,29 1,29 1,29 1,29 1,29 1,29 1,29 1,29 1,20 <td< td=""></td<>

¹⁾ In the absence of other national regulation.

Table C9: Characteristic resistance under shear loads – pry out and concrete edge failure for threaded rods

Size Pry out failure			M8	M10	M12	M16	M20	M24	M30
Pry out factor	k ₈	[-]				2	A CONTRACTOR		
Concrete edge failure			AVEL TO S			2 (1/23)	A KING W	Control of	The Street
Outside diameter of anchor	d _{nom}	[mm]	8	10	12	16	20	24	30
Effective length of anchor under shear loading	I _f	[mm]		lţ	= h _{ef} and	d ≤ 12 d _r	om	- =	I _f = h _{ef} and ≤ max (8·d _{nom} ; 300 mm)

Performance

Characteristic resistance under shear loads for threaded rods in cracked and uncracked concrete

Annex C10



Table C10: Characteristic resistance under shear loads for rods with inner thread – steel failur without lever arm

THE PERSON NAMED IN					U. U
Size				(210) (242) (246)	16/
Characteristic	resistance	V ⁰ _{Rk,s}	[kN]	$k_6 \cdot A_s^{2)} \cdot f_{uk}^{3)}$	
Factor	carbon steel with f _{uk} ≤ 500 N/mm²			0,6	
considering ductility	carbon steel with 500 < f _{uk} ≤ 1000 N/mm² or stainless steel	k ₆	[-]	0,5	
Factor consid	ering ductility	k ₇		1,0	
Partial safety	factor 1)				Day 1
Threaded rod	grade 5.8			1,25	
Threaded rod	grade 8.8			1,25	
Stainless stee	l threaded rod A4-70	γMs	[-]	1,56	_
Stainless stee	I threaded rod A4-80			1,33	
High corrosion	n stainless steel grade 70			1,56	

¹⁾ In the absence of other national regulation.

Table C11: Characteristic resistance under shear loads for rods with inner thread - steel failure with lever arm

Size			M6/ Ø10	M8/ Ø12	M10/ Ø16	M12/ Ø16	M16/
Steel failure with rod with inner thread	grade 5.8				2.0	2010	Ø24
Characteristic resistance	M ⁰ _{Rk,s}	[Nm]	7,6	18,7	37,4	65.5	166,5
Partial safety factor 1)	γMs	[-]			1,25	00,0	100,0
Steel failure with rod with inner thread		STATE OF THE PARTY OF			1,20		10-4300
Characteristic resistance	M ⁰ _{Rk,s}	[Nm]	12,2	30,0	59,8	104,8	200 4
Partial safety factor 1)	Ϋ́Ms	[-]		00,0	1,25	104,6	266,4
Steel failure with stainless steel for roo		0			1,20		
Characteristic resistance	M ⁰ _{Rk,s}	[Nm]	10,7	26,2	52,3	91.7	222.4
Partial safety factor 1)	γMs	[-]			1,56	91,1	233,1
Steel failure with stainless steel for roo			5,10 ⁶ 2 5 8 12 12		1,00	Andrews	
Characteristic resistance	M ⁰ _{Rk,s}	[Nm]	12,2	30,0	59,8	104.8	200 4
Partial safety factor 1)	γMs	[-]	,.	00,0	1.33	104,8	266,4
Steel failure with high corrosion resista					1,00	A CONTRACTOR	
Characteristic resistance	M ⁰ _{Rk.s}	[Nm]	10,7	26,2	52,3	91.7	000.4
Partial safety factor 1)	γMs	[-]	, ,	20,2	1,56	91,7	233,1

¹⁾ In the absence of other national regulation.

Table C12: Characteristic resistance under shear loads – pry out and concrete edge failure for rods with inner thread

Size Pry out failure				M6/ Ø10 M8/ Ø12 M10/ Ø16 M12/ Ø16				
Factor	k ₈	[-]			2			
Concrete edge failure			45-41-0-14			TO STANDARD		
Outside diameter of anchor	d _{nom}	[mm]	10	12	16	16	24	
Effective length of anchor under shear loading	lf	[mm]		f =	h _{ef} and ≤ 12 o			

Performance

Characteristic resistance under shear loads for rods with inner thread in cracked and uncracked concrete

Annex C11

²⁾ Stressed cross section of the steel.

³⁾ According to EN 1992-1-1.



Table C13: Characteristic resistance under shear loads for rebar – steel failure without lever arm

Size			Ø8	Ø10	Ø12	Ø14	Ø16	2 20	Ø25	Ø32
Steel failure - rebar								To the same		
Characteristic resistance	V ⁰ _{Rk,s}	[kN]			The State of the	0,5 · A _s	2) · f _{uk} 3)	5 5 5 6 5 6 5 6 5 6 5 6 5 6 5 6 5 6 5 6		
Factor considering ductility	k ₇	[-]				1	,0			
Partial safety factor 1)	γмѕ	[-]				1,	,5			

¹⁾ In the absence of other national regulation.

Table C14: Characteristic resistance under shear loads for rebar – steel failure with lever arm

Size			Ø8	Ø10	Ø12	Ø14	Ø16	≤ 20	Ø25	Ø32
Steel failure - rebar										
Characteristic resistance	M ^o _{Rk,s}	[Nm]				1,2 · W _e	2) · f _{uk} 3)			8 8 6
Partial safety factor 1)	γMs	[-]				1,	5			

¹⁾ In the absence of other national regulation.

Table C15: Characteristic resistance under shear loads for rebar – pry out and concrete edge failure

	The same of the same of											
Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32		
Pry out failure												
Factor	k ₈	[-]					2					
Concrete edge failure												
Outside diameter of anchor	d _{nom}	[mm]	8	10	12	14	16	20	25	32		
Effective length of anchor under shear loading	l _f	[mm]			I _í = h _e	_f and ≤ 1	2 d _{nom}			I _f = h _{ef} and ≤ max (8·d _{nom} ; 300 mm)		

ANCHOR EXTREME 294, ANCHOR ALL SEASON 295

Performance

Characteristic resistance under shear loads for rebar in cracked and uncracked concrete

Annex C12

²⁾ Stressed cross section of the steel element.

³⁾ According to EN 1992-1-1.

²⁾ Elastic section modulus.

³⁾ According to EN 1992-1-1.



Table C16: Displacement under tension loads – threaded rods

Size	M8	M10	M12	M16	M20	M24	M30		
Characteristic displacement in	uncracked concrete C	20/25 to C50/60 ur	nder tens	sion load	ls				IVISO
Displacement 1)	δ_{N0}	[mm/(N/mm²)]	0,052	0,072	0,071	0,096	0,1 08	0.143	0,192
	δ _{N∞}	[mm/(N/mm ²)]	0,086	0,086	0,086	0,086	0,0-86	0,086	0,086
Characteristic displacement in	cracked concrete C20/	25 to C50/60 unde	er tensio	n loads					
Displacement 1)	δ_{N0}	[mm/(N/mm ²)]	0,056	0,076	0,074	0,096	0,1 10	0,150	0.175
	δ _{N∞}	[mm/(N/mm ²)]	0,158	0,173	0,173	0,198	0,2€0	0,261	0,323

These values are suitable for each temperature range and categories specified in Annex B1. Calculation of the displacement: $\delta_{N0} = \delta_{N0^{-}factor} \cdot N$; $\delta_{N} = \delta_{N\infty^{-}factor} \cdot N$; (N – applied tension load)

Table C17: Displacement under shear loads – threaded rods

Size					M12	M16	M20	M24	M30
Characteristic displacement in	cracked and uncracked	concrete C20/2	25 to C50/	60 unde	shear le	oads		10.24	_ WISO
Displacement 1)	δ_{V0}	[mm/kN]	0,285	0,180	0,124	0,066	0,043	0,030	0.019
	δ _{V∞}	[mm/kN]	0,427	0,269	0,185	0,100	0,064	0,044	0,028

These values are suitable for each temperature range and categories specified in Annex B1. Calculation of the displacement: $\delta_{V0} = \delta_{V0}$ -fador V; $\delta_{V} = \delta_{V\infty}$ -fador V; (V – applied shear load)

ANCHOR EXTREME 294, ANCHOR ALL SEASON 295

Performance

Displacement under service loads: tension and shear loads - threaded rods

Annex C13



Table C18: Displacement under tension loads - rods with inner thread

Size			M6/Ø10	M8/Ø12	M10/Ø16	M12/ Ø 16	M16/Ø24
Characteristic displacem	ent in uncracked	concrete C20/25	to C50/60 un	der tension lo	ads	District Co.	
Displacement 1)	δ_{N0}	[mm/N/mm ²]	0,067	0,068	0,078	0,1 10	0,148
	$\delta_{N\infty}$	[mm/N/mm ²]	0,086	0,086	0,086	0,0=86	0.086
Characteristic displacem	ent in cracked c	oncrete C20/25 to	C50/60 under	tension loads	S		0,000
Displacement 1)	δ_{N0}	[mm/N/mm ²]	0,051	0,048	0,051	0,0 73	0,058
	δ _{N∞}	[mm/N/mm ²]	0,228	0,177	0,228	0,2=31	0,322

These values are suitable for each temperature range and categories specified in Annex B1. Calculation of the displacement: $\delta_{N0} = \delta_{N0^-factor} \cdot N$; $\delta_N = \delta_{N\infty^-factor} \cdot N$; (N – applied tension load)

Table C19: Displacement under shear loads - rods with inner thread

Size			M6/Ø10	M8/Ø12	M10/Ø16	M12/ 16	M16 / Ø24
Characteristic displacem	ent in cracked an	d uncracked co	ncrete C20/25	#87 Ø10			
Displacement 1)	δ_{V0}	[mm/kN]	0,180	0,124	0,066	0,066	0.030
2.op.acomont	$\delta_{V\infty}$	[mm/kN]	0,269	0,185	0,100	0,100	0,044

These values are suitable for each temperature range and categories specified in Annex B1. Calculation of the displacement: $\delta_{V0} = \delta_{V0}$ -factor · V; $\delta_{V} = \delta_{V\infty}$ -factor · V; (V – applied shear load)

ANCHOR EXTREME 294, ANCHOR ALL SEASON 295

Performance

Displacement under service loads: tension and shear loads

– rods with inner thread

Annex C14



Table C20: Displacement under tension loads - rebar

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø=20	Ø25	Ø32				
Characteristic displacement in	n uncracked concre	ete C20/25 to C	50/60 un	der tens	ion load	ls	pate 1	0,102 0,						
Displacement 1)	δ _{NO}	[mm/N/mm ²]	0,055	0,056	0,072	0,079	0,100	0,1 43	0.162	0,244				
Diopiacoment	$\delta_{N\infty}$	[mm/N/mm ²]	0,086	0,086	0,086	0,086	0,086	0,086	0,086	0,086				
Characteristic displacement in	cracked concrete	C20/25 to C50/	60 unde	r tensio	n loads									
Displacement 1)	δηο	[mm/N/mm ²]	0,061	0,059	0,056	0,075	0,099	0,1 42	0,163	0,229				
Diopiacomont	δ _{N∞}	[mm/N/mm ²]	0,268	0,284	0,325	0,472	0,548	0,6577	0,736	0,697				

These values are suitable for each temperature range and categories specified in Annex B1. Calculation of the displacement: $\delta_{N0} = \delta_{N0^{-}factor} \cdot N$; $\delta_{N} = \delta_{N\infty^{-}factor} \cdot N$; (N – applied tension load)

Table C21: Displacement under shear loads - rebar

Size				Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Characteristic displacement i	n cracked and uncrac	ked concrete	e C20/25	to C50/	60 unde	r shear I	oads			
			100					the second second second second		
Displacement 1)	δ_{V0}	[mm/kN]	0,181	0,116	0,080	0,059	0,045	0,029	0,019	0.011

These values are suitable for each temperature range and categories specified in Annex B1. Calculation of the displacement: $\delta_{V0} = \delta_{V0}$ -factor · V; $\delta_{V} = \delta_{V\infty}$ -factor · V; (V – applied shear load)

ANCHOR EXTREME 294, ANCHOR ALL SEASON 295

Performance

Displacement under service loads: tension and shear loads - rebar

Annex C15



Table C22: Characteristic resistance under tension load for threaded rods for seismic performance category C1

Size			M8	M10	M12	M16	M2=0	M24	M30
Steel failure						Septem.			
Steel failure with threaded rod grade 5.8									
Characteristic resistance	N _{Rk,s,seis}	[kN]	18	29	42	78	122	176	280
Partial safety factor 1)	γMs, seis	[-]				1,50		170	
Steel failure with threaded rod grade 8.8						.,00			
Characteristic resistance	N _{Rk,s,seis}	[kN]	29	46	67	125	196	282	440
Partial safety factor 1)	γMs, seis	[-]				1,50	100	202	448
Steel failure with stainless steel threaded	rod A4-70					1,00			
Characteristic resistance	N _{Rk,s, seis}	[kN]	25	40	59	109	177	247	200
Partial safety factor 1)	γMs, seis	[-]				1,87		241	392
Steel failure with stainless steel threaded	rod A4-80					1,01			
Characteristic resistance	N _{Rk,s,seis}	[kN]	29	46	67	125	196	282	440
Partial safety factor 1)	YMs.seis	[-]			<u> </u>	1.60	100	202	448
Steel failure with high corrosion resistant	steel grade 70					1,00			
Characteristic resistance	N _{Rk,s,seis}	[kN]	25	40	59	109	171	247	200
Partial safety factor 1)	YMs, seis	[-]				1,87		241	392
Combined pull-out and concrete cone	failure in concre	te C20/25 for a	working	life of 5	0 vears	1,07	APPENDED		(All In-
Characteristic bond resistance			127						
Temperature range I: 24°C / 40°C	τ _{Rk,seis,50}	[N/mm ²]	8,2	9,7	10,6	9.6	7,5	6.8	3,8
Temperature range II: 50°C / 80°C	T _{Rk,seis,50}	[N/mm ²]	8,2	9,7	10,6	9,6	7,5	6,8	3,8
Temperature range II: 80°C / 120°C	τ _{Rk,seis,50}	[N/mm ²]	4,3	5,2	5,7	5,1	4,0	3,6	2,1
Combined pull-out and concrete cone	failure in concre	te C20/25 for a		life of 10		W = 2.5	ELECTES	3,0	2,1
Characteristic bond resistance									
Temperature range I: 24°C / 40°C	τ _{Rk,seis,100}	[N/mm ²]	7,7	9,4	10,4	9,5	7,5	6.8	3,8
Temperature range II: 50°C / 80°C	TRk,seis,100	[N/mm²]	7,7	9,4	10.4	9,5	7,5	6,8	3,8

Table C23: Characteristic resistance under tension load for rebar for seismic performance category C1

			Selen-See	The Landson		р с		ince c	ategoi	y Cı
Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Steel failure with rebar										
Characteristic resistance	N _{Rk,s,seis}	[kN]				A _s ²⁾	· f _u ,3)			
Partial safety factor 1)	γMs,seis	[-]					40			
Combined pull-out and concrete cone	failure in concre	ete C20/25 fo	r a work	ing life	of 50 year				SU SE	A. Desi
Characteristic bond resistance					77.17					
Temperature range I: 24°C / 40°C	TRk,seis,50	[N/mm²]	6,8	8,3	9,6	9,6	8,5	7,5	5,8	2,8
Temperature range II: 50°C / 80°C	T _{Rk,seis,50}	[N/mm²]	6,8	8,3	9,6	9,6	8,5	7,5	5,8	2,8
Temperature range II: 80°C / 120°C	τ _{Rk,seis,50}	[N/mm ²]	3,6	4,5	5,1	5,1	4,5	4,0	3,1	1,5
Combined pull-out and concrete cone	failure in concre	ete C20/25 for	a work	ing life o	of 100 ve			1,0	3,1	1,0
Characteristic bond resistance				PRINT.						
Temperature range I: 24°C / 40°C	TRk,seis,100	[N/mm ²]	6,1	8,3	9,6	9,6	8,5	7,5	5,8	2,8
Temperature range II: 50°C / 80°C	τ _{Rk,seis,100}	[N/mm²]	6,1	8,3	9,6	9,6	8.5	7,5	5,8	2,8

¹⁾ In the absence of other national regulation.

ANCHOR EXTREME 294, ANCHOR ALL SEASON 295

Performance

Characteristic resistance under tension loads for seismic action category C1 – threaded rods and rebar

Annex C16

²⁾ Stressed cross section of the steel element.

³⁾ According to EN 1992-1-1.



Table C24: Characteristic resistance under shear loads for threaded rods for seismic performance category C1 – steel failure without lever arm

Size			M8	M10	M12	M16	M=20	M24	M30
Steel failure with threaded rod grade 5.							CAPE STATE	1012-4	14130
Characteristic resistance	$V_{Rk,s,seis}$	[kN]	6,3	10.1	14,7	27,3	42,7	C4.0	1 00 0
Partial safety factor 1)	γMs, seis	[-]	1		,,	1.25	12,	61,6	98,0
Steel failure with threaded rod grade 8.8						1,20	THE SHAPE		
Characteristic resistance	V _{Rk,s, seis}	[kN]	10.2	16.1	23,5	44,1	68,6	00.7	1
Partial safety factor 1)	γMs, seis	[-]	,2	10,1	20,0	1.25	00,6	98,7	156,8
Steel failure with stainless steel threade	d rod A4-70	1279	MENO A			1,20	No. of Contract	Esta Enve	
Characteristic resistance	$V_{Rk,seis}$	[kN]	9.1	14,4	20,7	38,5	59 9	00.5	107.4
Partial safety factor 1)	YMs, seis	[-]			20,1	1.56	00,9	86,5	137,4
Steel failure with stainless steel threade		2015 T. F. S		11-11-11		1,00	Who he storm	100	
Characteristic resistance	V _{Rk.seis}	[kN]	10.2	16,1	23.5	44.1	69 0		
Partial safety factor 1)	YMs, seis	[-]	10,2	10,1	23,3	1.33	68_6	98,7	157,2
Steel failure with high corrosion stainle				GENERAL SERVICE		1,55			
Characteristic resistance	V _{Rk,seis}	[kN]	9,1	14.4	20.7	38,5	50.0	20.5	
Partial safety factor 1)	YMs, seis	[-]	0,1	17,4	20,7	1,56	59_9	86,5	137,4

¹⁾ In the absence of other national regulation.

Table C25: Characteristic resistance under shear loads for rebar for seismic performance category C1 – steel failure without lever arm

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32	
Steel failure with rebar								787 21 73			
Characteristic resistance	V _{Rk,s,seis}	[kN]		$0.35 \cdot A_s^{2)} \cdot f_{uk}^{3)}$							
Partial safety factor 1)	γMs, seis	[-]				1	,5				

¹⁾ In the absence of other national regulation.

ANCHOR EXTREME 294, ANCHOR ALL SEASON 295

Performance

Characteristic resistance under shear loads for seismic action category C1 – threaded rods and rebar

Annex C17

²⁾ Stressed cross section of the steel element.

³⁾ According to EN 1992-1-1.



Table C26: Displacement under tension loads for threaded rods for seismic performanc category C1

					,			ategory	/ 61
Size			M8	M10	M12	M16	M=20	M24	M30
Displacement	$\delta_{N,seis}$	[mm]	3,0	3,1	3,5	4,0	5. 0	6,0	6,6
								0,0	0,0

Table C27: Displacement under shear loads for threaded rods for seismic performance category C1

TOTAL PROPERTY.				
M12	M16	M20	M24	M30
4,6	5,0	5, 3	6.5	7,0
	4,6	4,6 5,0	4,6 5,0 5,-8	4,6 5,0 5,=8 6,5

Table C28: Displacement under tension loads for rebar for seismic performance category C1

		Ø8	Ø10						
	Market State of State	THE REAL PROPERTY.	210	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
$\delta_{N,seis}$	[mm]	3,0	3,1	3,5	4,0	4,0	5,0	6,0	6,4
	$\delta_{N,seis}$	δ _{N,seis} [mm]	$\delta_{N,seis}$ [mm] 3,0	$\delta_{N,seis}$ [mm] 3,0 3,1	δ _{N,seis} [mm] 3,0 3,1 3,5	$\delta_{N,seis}$ [mm] 3,0 3,1 3,5 4,0	$\delta_{N,seis}$ [mm] 3,0 3,1 3,5 4,0 4,0		

Table C29: Displacement under shear loads for rebar for seismic performance category C1

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Displacement	δ _{V,seis}	[mm]	3,5	4,0	4,6	5,0	5,0	5,8	6,5	7,2

ANCHOR EXTREME 294, ANCHOR ALL SEASON 295

Performance

Displacement under tension and shear loads for seismic action category C1 – threaded rods and rebar

Annex C18



Table C30: Characteristic resistance under tension loads for seismic performance category C2 – threaded rods

Size			M12	M16	M20
Steel failure				The Residence	14120
Characteristic resistance	N _{Rk,s,eq,C2}	[kN]			
Combined pull-out and concrete cone failure	e la		A STATE OF S	N _{Rk,s}	Established and
Characteristic bond resistance temperature range -40°C / +40°C	T _{Rk,eq,C2}	[N/mm²]	1,78	2,65	2,28
Characteristic bond resistance temperature range -40°C / +80°C	T _{Rk,eq,C2}	[N/mm²]	1,78	2,65	2,28

Table C31: Characteristic resistance under shear loads for seismic performance cat egory C2 – threaded rods

Size			M12	M16	M20
Steel failure with threaded rod grade	5.8		He was the second		IVIZU
Characteristic resistance	V _{Rk,s,eq,C2}	[kN]	13,17	12,92	
Partial safety factor 1)	γ _{Ms,V} 1)	[-]	10,17	1,25	44,44
Steel failure with threaded rod grade				1,20	
Characteristic resistance	V _{Rk,s,eq,C2}	[kN]	21,33	20,86	74.40
Partial safety factor 1)	γ _{Ms,V} 1)	[-]	21,00	1,25	71,40
Steel failure with threaded rod grade				1,20	
Characteristic resistance	V _{Rk,s,eq,C2}	[kN]	26,35	25,83	00.00
Partial safety factor 1)	γ _{Ms,V} 1)	[-]	20,00	1.50	88,88
Steel failure with threaded rod grade 1	12.9		2,45,570 (201)	1,00	
Characteristic resistance	V _{Rk,s,eq,C2}	[kN]	31,99	31,13	107.10
Partial safety factor 1)	γ _{Ms,V} 1)	[-]	01,00	1.50	107,10
Stainless steel, property class A4-70			No September	1,00	
Characteristic resistance	V _{Rk,s,eq,C2}	[kN]	18,19	18,21	62,65
Partial safety factor 1)	γ _{Ms,V} 1)	[-]	·	1,56	02,00
Stainless steel, property class A4-80			LO BOLL TO BE		
Characteristic resistance	V _{Rk,s,eq,C2}	[kN]	21,33	20,86	71,40
Partial safety factor 1)	γ _{Ms,V} 1)	[-]	İ	1,33	71,40
High corrosion resistant stainless stee					ALC: NAME OF
Characteristic resistance	V _{Rk,s,eq,C2}	[kN]	18,19	18,21	60.65
Partial safety factor 1)	γ _{Ms,V} 1)	[-]	10,10	1,56	62,65

¹⁾ In the absence of other national regulation.

Table C32: Displacements under tensile and shear loads for seismic performance category C2 – threaded rods

Size	M12	M16	M20		
Displacements for tensile and shear load for seis	mic performance	category C2			MZU
Displacement in tensile at damage limitation state	δ _{N,eq,C2} (DLS)	[mm]	0,17	0,16	0,06
Displacement in tensile at ultimate limit state	δ _{N,eq,C2} (ULS)	[mm]	0,69	0,62	0,15
Displacement in shear at damage limitation state	δ _{V,eq,C2} (DLS)	[mm]	5,47	5,63	4,04
Displacement in shear at ultimate limit state	δ _{V,eq,C2} (ULS)	[mm]	10,39	13,85	12,55

ANCHOR EXTREME 294, ANCHOR ALL SEASON 295

Performances

Characteristic resistance and displacements under tension and shear loads for seismic performance category C2 – threaded rods

Annex C19