INSTYTUT TECHNIKI BUDOWLANEJ

Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

Member of EOTA
www.eota.eu

European Technical Assessment

ETA-25/0659 of 14/07/2025

General Part

Technical Assessment Body issuing the European Technical Assessment	Instytut Techniki Budowlanej
Trade name of the construction product	ANCHOR EXTREME 294 ANCHOR ALL SEASON 295
Product family to which the construction product belongs	Bonded anchors for use in concrete
Manufacturer	Dana Lim A/S Kobenhavnsvej 220 DK-4600 Koge Denmark
Manufacturing plant	Manufacturing Plant no. 3
This European Technical Assessment contains	46 pages including 3 Annexes which form an integral part of this Assessment
This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of	European Assessment Document (EAD) 330499-02-0601 "Bonded fasteners and bonded expansion fasteners for use in concrete"

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 assessed

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.

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

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

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

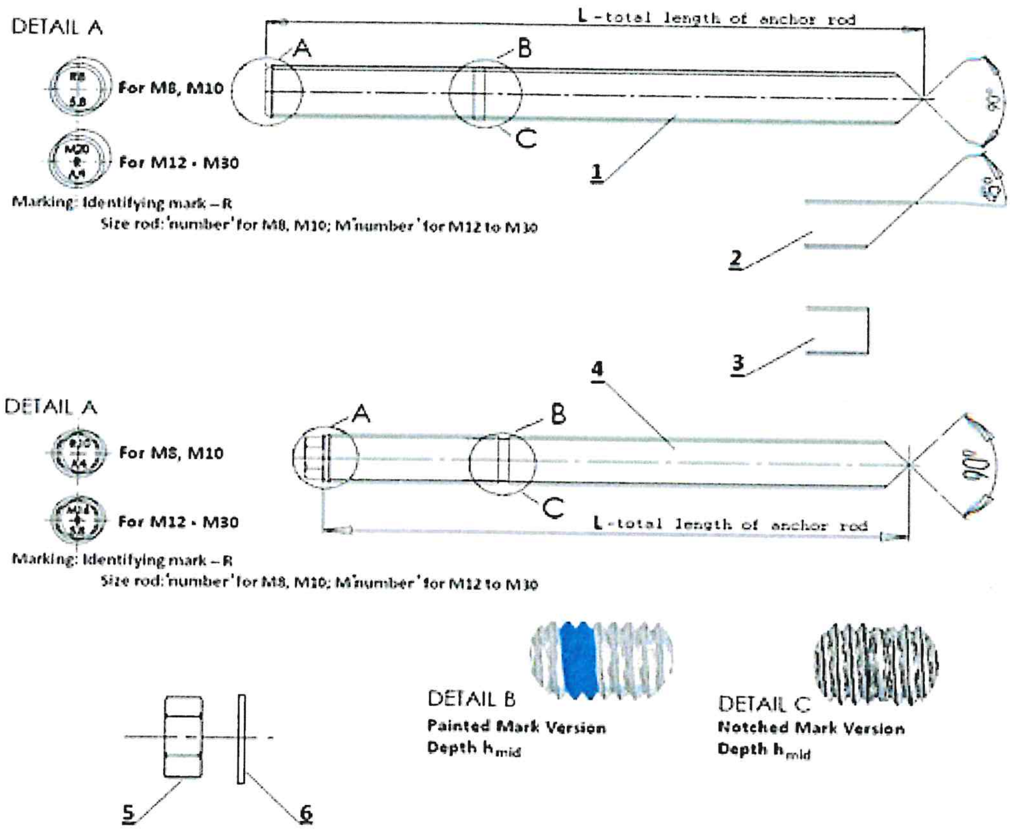
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited in Instytut Techniki Budowlanej.

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

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

Anna Panek, MSc
Deputy Director of ITB

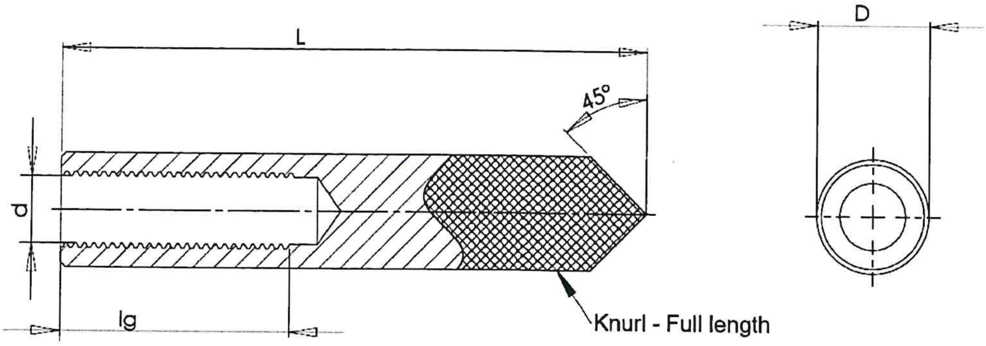
Threaded anchor rods

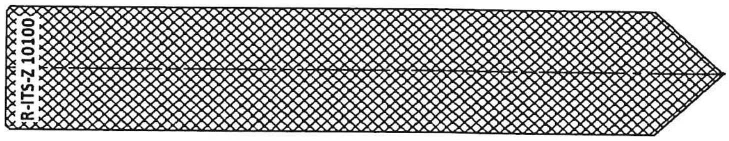


1. Anchor rod R-STUDS
2. 45° shape with anchor rod
3. The flat end of anchor rod
4. Anchor rod R-STUDS
5. Hexagonal nut
6. Washer

ANCHOR EXTREME 294, ANCHOR ALL SEASON 295	**Annex A1** of European Technical Assessment ETA-25/0659
Product description Threaded anchor rods	

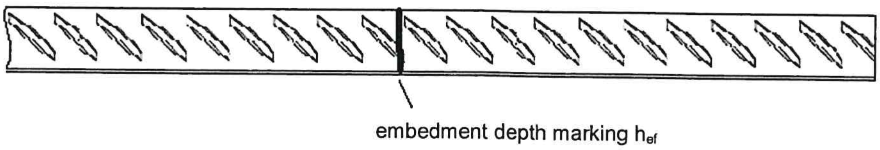
Anchor rods with inner thread





Marking: R - Identifying mark
ITS - product index
Z - carbon steel or A4 - stainless steel
XX - thread size
YYY - length of sleeve

Rebar



ANCHOR EXTREME 294, ANCHOR ALL SEASON 295	**Annex A2** of European Technical Assessment ETA-25/0659
Product description Anchor rods with inner thread and rebar	

Table A1: Threaded rods

Designation					Material
Steel, zinc electroplated ≥ 5 µm according to EN ISO 4042 **Steel, hot-dip galvanized ≥ 40 µm according to EN ISO 10684** **Steel, non-electrolytically applied zinc flake coating ≥ 8 µm according to EN ISO 10683** **Ultra-high Strength Steel, non-electrolytically applied zinc flake coating ≥ 8 µm according to EN ISO 10683**					
Threaded rod	**Property class**	**Characteristic steel ultimate strength**	**Characteristic steel yield strength**	**Fracture elongation**	
	5.8	f_{uk} ≥ 500 N/mm²	f_{yk} ≥ 400 N/mm²	A_5 > 8%	EN ISO 898-1
	8.8	f_{uk} ≥ 800 N/mm²	f_{yk} ≥ 640 N/mm²	A_5 ≥ 12%	
	10.9	f_{uk} ≥ 1000 N/mm²	f_{yk} ≥ 900 N/mm²	A_5 > 9%	
	12.9	f_{uk} ≥ 1200 N/mm²	f_{yk} ≥ 1080 N/mm²	A_5 > 8%	
	14.8	f_{uk} ≥ 1400 N/mm²	f_{yk} ≥ 1120 N/mm²	A_5 ≥ 10%	UHSFG-1416U-2014
	15.8	f_{uk} ≥ 1500 N/mm²	f_{yk} ≥ 1200 N/mm²	A_5 > 9%	
	16.8	f_{uk} ≥ 1600 N/mm²	f_{yk} ≥ 1280 N/mm²	A_5 > 8%	
Hexagon nut	5	for class 5.8 rods			EN ISO 898-2
	8	for class 8.8 rods			
	10	for class 10.9 rods			
	12	for class 12.9 rods			
	14.8U	for class 14.8U rods			UHSFG-1416U-2014
	15.8U	for class 15.8U rods			
	16.8U	for class 16.8U rods			
Washer	Steel according to EN ISO 7089; corresponding to anchor rod material				
Stainless steel A4 (Materials) 1.4401, 1.4404, 1.4571 **High corrosion resistance stainless steel (HCR)** (Materials) 1.4529, 1.4565, 1.4547					
Threaded rod	**Property class**	**Characteristic steel ultimate strength**	**Characteristic steel yield strength**	**Fracture elongation**	EN 10088 EN ISO 3506
	70	f_{uk} ≥ 700 N/mm²	f_{yk} ≥ 450 N/mm²	A_5 ≥ 12%	
	80	f_{uk} ≥ 800 N/mm²	f_{yk} ≥ 600 N/mm²	A_5 ≥ 12%	
Hexagon nut	70	for class 70 rods			EN 10088 EN ISO 3506
	80	for class 80 rods			
Washer	Steel, according to EN 10088; corresponding to anchor rod material				
For anchorages under seismic actions which are designed in accordance with EN 1992-4:2018, Section 9.2 (3), option b): A_5 ≥ 12% and f_{uk} ≤ 800 N/mm².					

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.

Table A2: Rods with inner thread

Designation	Material				
Steel, zinc plated **electroplated ≥ 5 µm according to EN ISO 4042** **hot-dip galvanized ≥ 40 µm according to EN ISO 10684**					
Rod with inner thread	**Property class**	**Characteristic steel ultimate strength**	**Characteristic steel yield strength**	**Fracture elongation**	EN ISO 898-1
	5.8	f_{uk} ≥ 500 N/mm²	f_{yk} ≥ 400 N/mm²	A_5 > 8%	
	8.8	f_{uk} ≥ 800 N/mm²	f_{yk} ≥ 640 N/mm²	A_5 ≥ 12%	
Stainless steel A4 **High corrosion resistance stainless steel (HCR)**	**(Materials) 1.4401, 1.4404, 1.4571** **(Materials) 1.4529, 1.4565, 1.4547**				
Rod with inner thread	**Property class**	**Characteristic steel ultimate strength**	**Characteristic steel yield strength**	**Fracture elongation**	EN 10088 EN ISO 3506
	70	f_{uk} ≥ 700 N/mm²	f_{yk} ≥ 450 N/mm²	A_5 ≥ 12%	
	80	f_{uk} ≥ 800 N/mm²	f_{yk} ≥ 600 N/mm²	A_5 ≥ 12%	

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

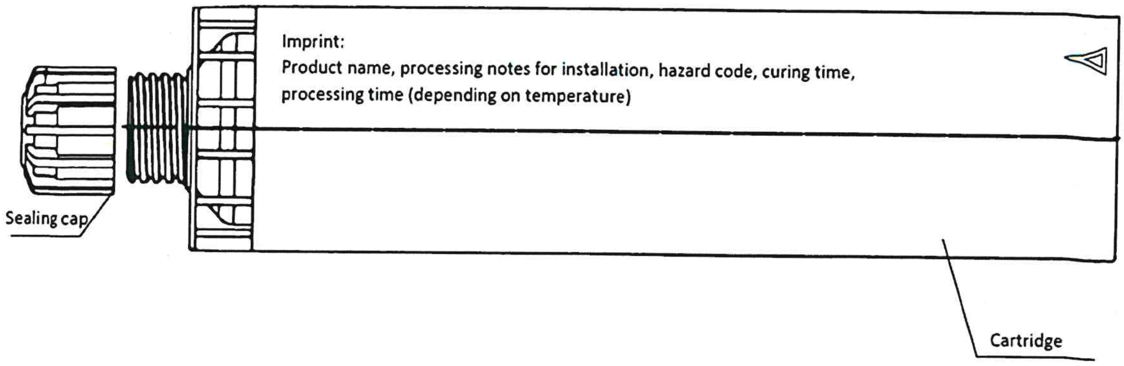
Product form		Bars and de-coiled rods	
Class		B	C
Characteristic yield strength f_{yk} or $f_{0,2k}$ [N/mm²]		400 to 600	
Minimum value of $k = (f_t / f_y)_k$		≥ 1,08	≥ 1,15 < 1,35
Characteristic strain at maximum force, ε_{uk} [%]		≥ 5,0	≥ 7,5
Bendability		Bend / Rebend test	
Maximum deviation from nominal mass (individual bar) [%]	Nominal bar size [mm] ≤ 8 > 8	± 6,0 ± 4,5	
Bond: minimum relative rib area, $f_{R,min}$	Nominal bar size [mm] 8 to 12 > 12	0,040 0,056	

Rib height h: The maximum rib height h_{rib} shall be: $h_{rib} \leq 0{,}07 \cdot Ø$

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

Cartridges for two part foil capsules with a single components – 300 ml



Mixer for cartridge

ANCHOR EXTREME 294, ANCHOR ALL SEASON 295	**Annex A5** of European Technical Assessment ETA-25/0659
Product description Cartridge types and sizes	

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 (CRC):
  - 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 I2).
- 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.).

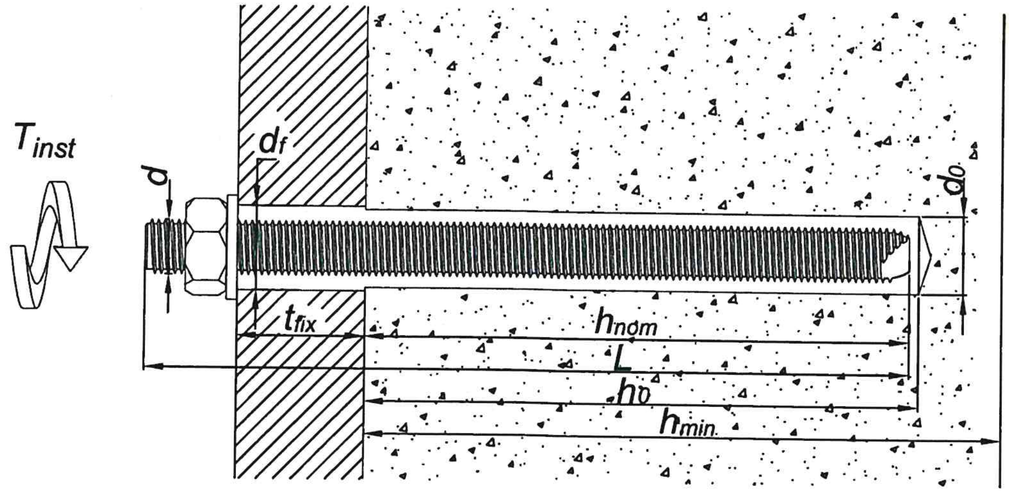


Table B1: Installation parameters – threaded anchor rods

Size		M8	M10	M12	M16	M20	M24	M30
Diameter of anchor rod	d [mm]	8	10	12	16	20	24	30
Nominal drilling diameter	d_0 [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 depth	$h_{ef,min}$ [mm]	60	60	60	60	80	96	120
	$h_{ef,max}$ [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]	h_{ef} + 30 mm; ≥ 100 mm				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

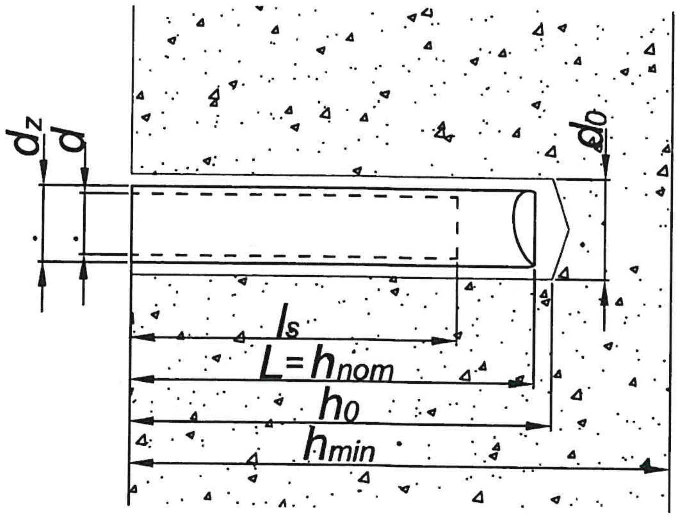


Table B2: Installation parameters – anchor rods with inner thread

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	d_0 [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	l_s [mm]	24	25	25	30	30	35	50
Depth of the drilling hole	h_0 [mm]	h_{ef} + 5 mm						
Minimum thickness of the concrete slab	h_{min} [mm]	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

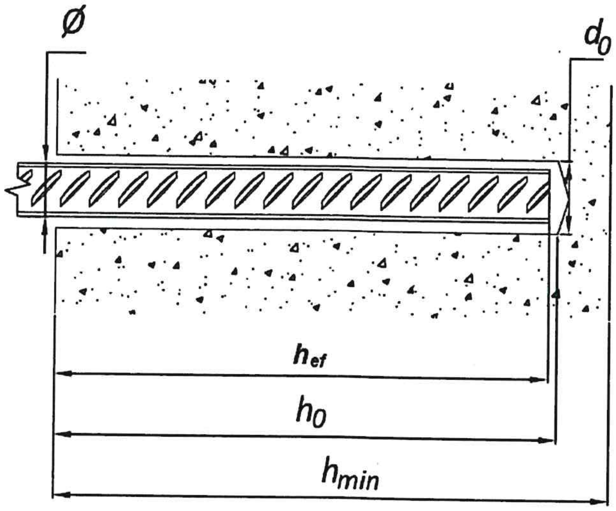


Table B3: Installation parameters – rebar

<table>
<tr><th colspan="2">Size</th><th>Ø8</th><th>Ø10</th><th>Ø12</th><th>Ø14</th><th>Ø16</th><th>Ø20</th><th>Ø25</th><th>Ø32</th></tr>
<tr><td>Nominal drilling diameter</td><td>d_0 [mm]</td><td>12</td><td>14</td><td>18</td><td>18</td><td>22</td><td>26</td><td>32</td><td>40</td></tr>
<tr><td rowspan="2">Effective embedment depth</td><td>$h_{ef,min}$ [mm]</td><td>60</td><td>60</td><td>60</td><td>60</td><td>64</td><td>80</td><td>100</td><td>128</td></tr>
<tr><td>$h_{ef,max}$ [mm]</td><td>160</td><td>200</td><td>240</td><td>240</td><td>320</td><td>400</td><td>500</td><td>640</td></tr>
<tr><td>Depth of the drilling hole</td><td>h_0 [mm]</td><td colspan="8">h_{ef} + 5 mm</td></tr>
<tr><td>Minimum thickness of the concrete slab</td><td>h_{min} [mm]</td><td colspan="4">h_{ef} + 30 mm; ≥ 100 mm</td><td colspan="4">$h_{ef} + 2d_0$</td></tr>
<tr><td>Minimum spacing</td><td>s_{min} [mm]</td><td>40</td><td>40</td><td>40</td><td>40</td><td>40</td><td>40</td><td>50</td><td>70</td></tr>
<tr><td>Minimum edge distance</td><td>c_{min} [mm]</td><td>40</td><td>40</td><td>40</td><td>40</td><td>40</td><td>40</td><td>50</td><td>70</td></tr>
</table>

Table B4: Maximum processing time and minimum curing time

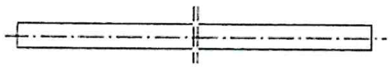
ANCHOR EXTREME 294 (standard version)			
Temperature of mortar [°C]	Temperature of substrate [°C]	Maximum processing (open) time [min]	Minimum curing time [1] [min]
+5	-5	40	1440
+5	0	30	180
+5	+5	15	90
+10	+10	8	60
+15	+15	5	60
+20	+20	2,5	45
+25	+25	2	45
+25	+30	2	45
+25	+35	1,5	30
+25	+40	1,5	30

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 time [1] [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

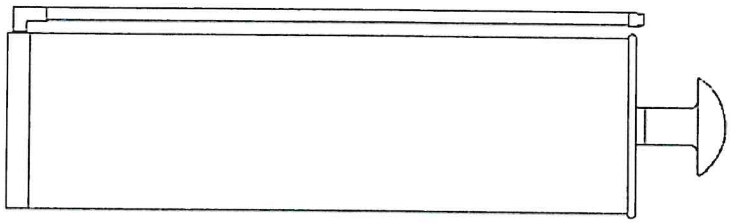
[1] The minimum time from the end of the mixing to the time when the anchor may be torque or loaded (whichever is longer). Minimum mortar temperature for installation +5°C; maximum mortar temperature for installation +25°C. For wet condition and flooded holes, the curing time must be doubled.

Additional mixer extension

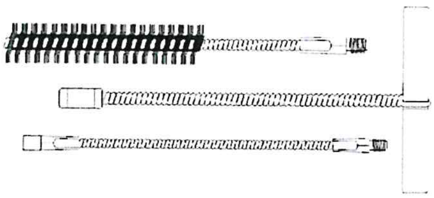


'Variable length from 300 mm up 1000 mm

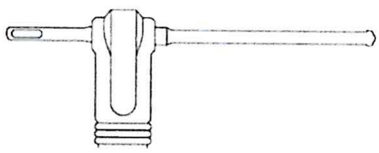
Manual blower pump



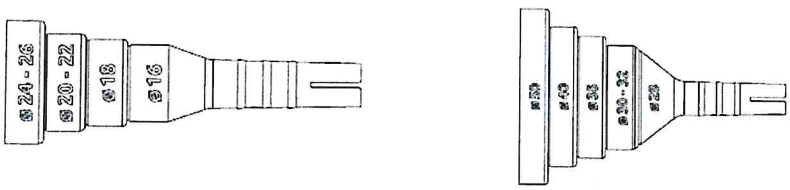
Steel brush



Brush with extension



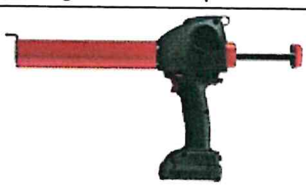
Hollow drill bit with vacuum cleaner



Piston plugs

Temporary centring wedge

ANCHOR EXTREME 294, ANCHOR ALL SEASON 295	**Annex B6** of European Technical Assessment ETA-25/0659
Intended use Tools (1)	

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

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

Table B6: Brush diameter for threaded rod

Threaded rod diameter			M8	M10	M12	M16	M20	M24	M30
d_b	Brush diameter	[mm]	12	14	16	20	26	30	37

Table B7: Brush diameter for rod with inner thread

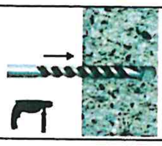
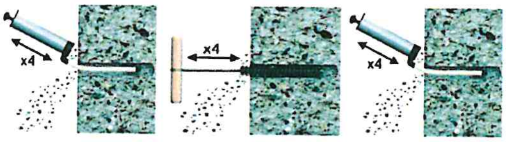
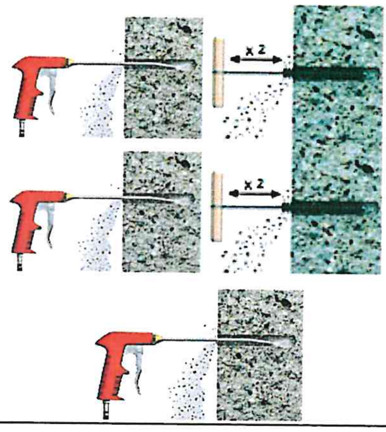
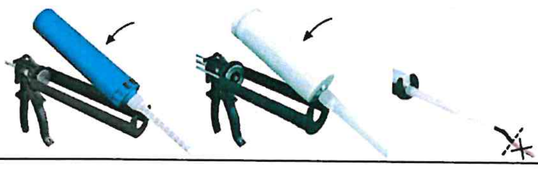
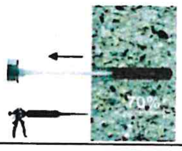
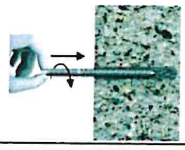
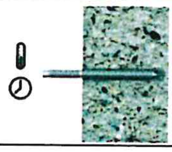
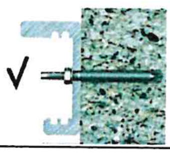
Threaded rod diameter			M6/Ø10	M8/Ø12	M10/Ø16	M12/ Ø16	M16/Ø24
d_b	Brush diameter	[mm]	16	16	22	22	30

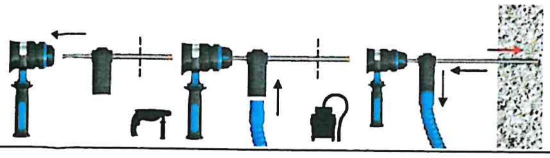
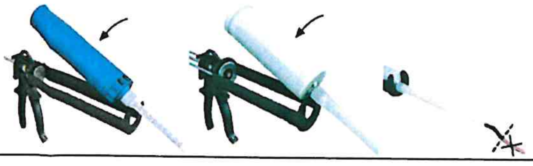
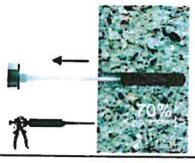
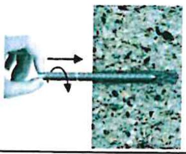
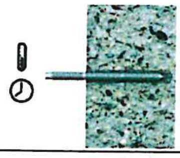
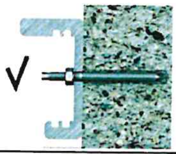
Table B8: Brush diameter for rebar

Rebar diameter			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
d_b	Brush diameter	[mm]	14	16	20	20	24	28	37	42

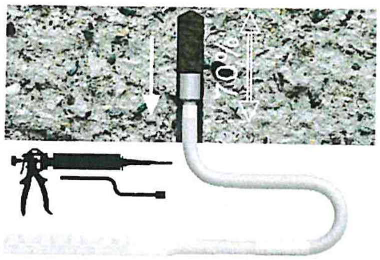
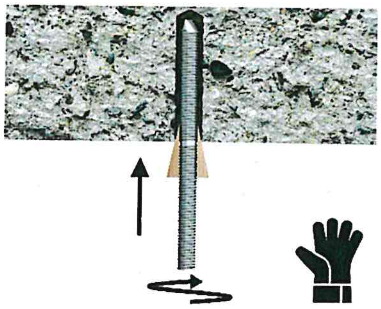
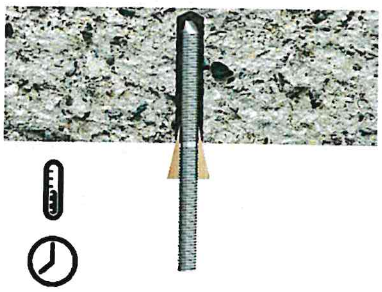
Table B9: Piston plug size

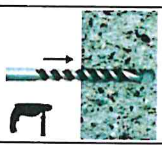
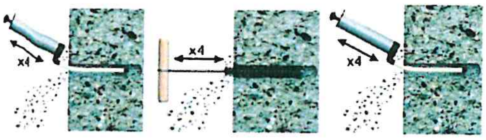
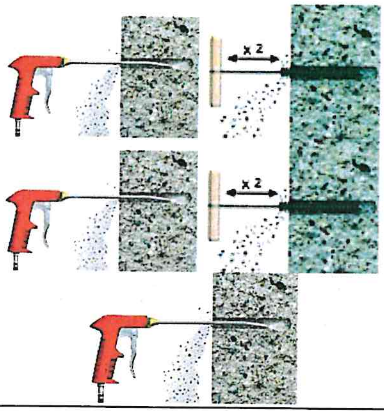
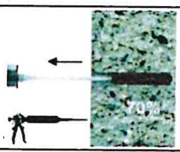
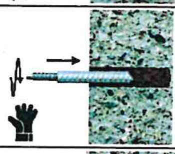
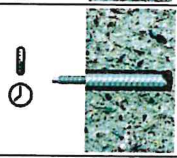
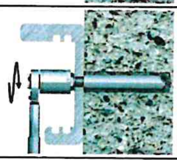
Hole diameter [mm]	16	18	20	22	24	25	26	28	30	32	35	40	50
Piston plug description	Ø16	Ø18	Ø20 to Ø22	Ø20 to Ø22	Ø24 to Ø26	Ø24 to Ø26	Ø24 to Ø26	Ø28	Ø30 to Ø32	Ø30 to Ø32	Ø35	Ø40	Ø50

	1. Drill hole to the required diameter and depth using a rotary percussive machine.
a.  b. 	2. Hole cleaning. a. 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. b. 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).
	3. Insert cartridge into dispenser and attach nozzle. Dispense to waste until even color is obtained (min. 10 cm).
	4. 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, slowly and with slight twisting motion. Remove any excess mortar around the hole before it sets.
	6. Leave the fixing undisturbed until the curing time elapses.
	7. Attach fixture and tighten the nut to the required installation torque. The applied installation torque cannot exceed $T_{inst,max}$.

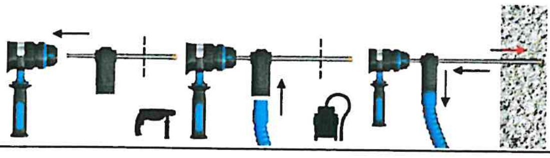
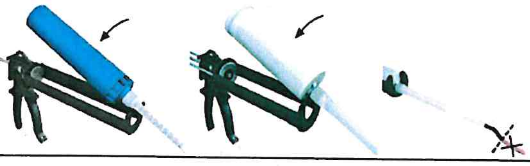
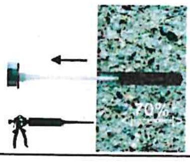
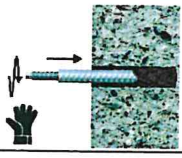
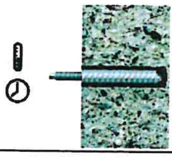
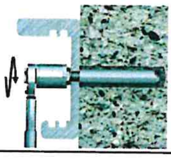
	1. Drill hole to the required diameter and depth using a hollow drill bit with vacuum cleaner.
	2. Insert cartridge into dispenser and attach nozzle. Dispense to waste until even color is obtained.
	3. Insert the mixing nozzle to the far end of the hole and inject mortar, slowly withdrawing the nozzle as the hole is filled to 2/3 of its depth.
	4. Immediately insert the rod, slowly and with slight twisting motion. Remove any excess mortar around the hole before it sets.
	5. 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 $T_{inst,max}$.

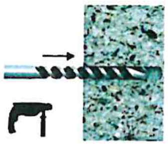
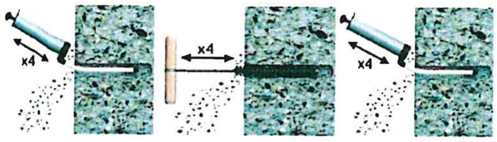
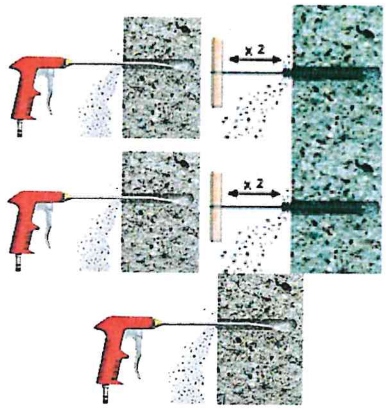
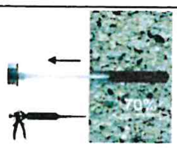
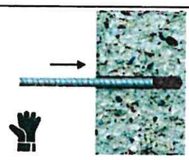
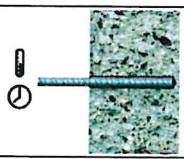
ANCHOR EXTREME 294, ANCHOR ALL SEASON 295	**Annex B10** of European Technical Assessment ETA-25/0659
Intended use Installation instruction – threaded rod – cleaning with hollow drill bit (special cleaning method)	

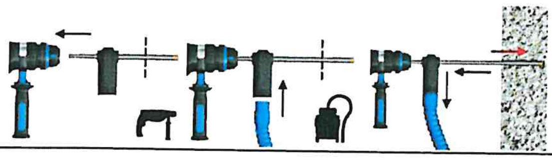
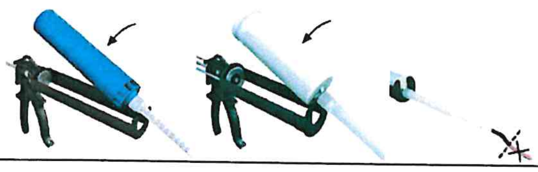
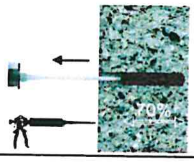
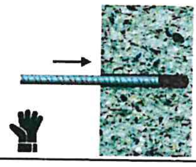
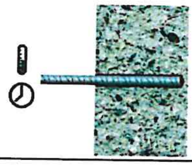
	1. Inject from the bottom of the hole. Inject the mortar about 2/3 of the hole depth. For best performance use extension and appropriately sized piston plug assembled on the mixer.
	2. Drive the rod immediately into the hole. Use temporary interlocking element.
	3. Leave the fixing undisturbed until the curing time elapses. To avoid the slipping of the rod during the open time of the product (due to the rod own weight) use a temporary interlocking element.

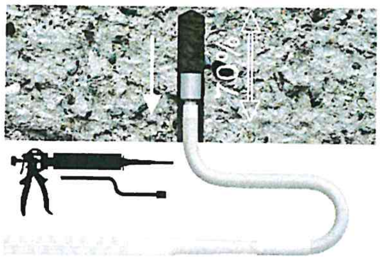
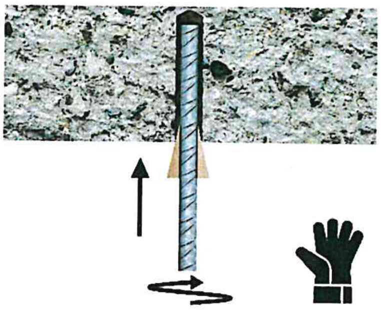
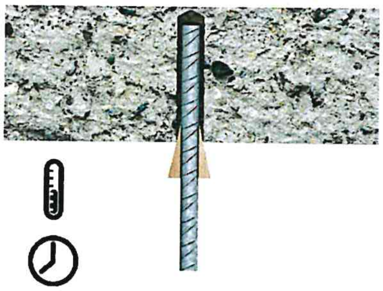
	1. Drill hole to the required diameter and depth using a rotary percussive machine.
a.  b. 	2. Hole cleaning. a. Clean the hole with brush and hand pump: - starting from the drill hole bottom blow the hole at least 4 times using the hand pump, - using the specified brush, mechanically brush out the hole at least 4 times, - starting from the drill hole bottom, blow at least 4 times with the hand pump. b. 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).
	3. Insert cartridge into dispenser and attach nozzle. Dispense to waste until even colour is obtained (min. 10 cm).
	4. 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.
	6. 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 $T_{inst,max}$.

ANCHOR EXTREME 294, ANCHOR ALL SEASON 295	**Annex B12** of European Technical Assessment ETA-25/0659
Intended use Installation instruction – anchor rod with inner thread – standard cleaning	

	1. Drill hole to the required diameter and depth using a hollow drill bit with vacuum cleaner.
	2. 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.
	5. 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 $T_{inst,max}$.

	1. Drill hole to the required diameter and depth using a rotary percussive machine.
a.  b. 	2. Hole cleaning. a. Cleaning 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. b. 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).
	3. Insert cartridge into dispenser and attach nozzle. Dispense to waste until even colour is obtained (min. 10 cm).
	4. 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 rebar, slowly and with slight twisting motion. Remove any excess mortar around the hole before it sets.
	6. Leave the fixing undisturbed until the curing time elapses.

	1. Drill hole to the required diameter and depth using a hollow drill bit with vacuum cleaner.
	2. 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.
	5. Leave the fixing undisturbed until the curing time elapses.

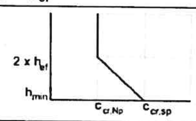
	1. Inject from the bottom of the hole. Inject the mortar about 2/3 of the hole depth. For best performance use extension and appropriately sized piston plug assembled on the mixer.
	2. Drive the rebar immediately into the hole. Use temporary interlocking element.
	3. Leave the fixing undisturbed until the curing time elapses. To avoid the slipping of the rebar during the open time of the product (due to the rebar own weight) use a temporary interlocking element.

ANCHOR EXTREME 294, ANCHOR ALL SEASON 295	**Annex B16** of European Technical Assessment ETA-25/0659
Intended use Installation instruction – rebar – overhead installation	

Table C1: Characteristic resistance under tension load for threaded rods in uncracked concrete

Size			M8	M10	M12	M16	M20	M24	M30
Steel failure									
Steel failure with threaded rod grade 5.8									
Characteristic resistance	$N_{Rk,s}$	[kN]	18	29	42	78	122	176	280
Partial safety factor [1]	γ_{Ms}	[-]	1,50						
Steel failure with threaded rod grade 8.8									
Characteristic resistance	$N_{Rk,s}$	[kN]	29	46	67	125	196	282	448
Partial safety factor [1]	γ_{Ms}	[-]	1,50						
Steel failure with threaded rod grade 10.9									
Characteristic resistance	$N_{Rk,s}$	[kN]	36	58	84	157	245	353	561
Partial safety factor [1]	γ_{Ms}	[-]	1,40						
Steel failure with threaded rod grade 12.9									
Characteristic resistance	$N_{Rk,s}$	[kN]	43	69	101	188	294	423	673
Partial safety factor [1]	γ_{Ms}	[-]	1,40						
Steel failure with stainless steel threaded rod A4-70									
Characteristic resistance	$N_{Rk,s}$	[kN]	25	40	59	109	171	247	392
Partial safety factor [1]	γ_{Ms}	[-]	1,87						
Steel failure with stainless steel threaded rod A4-80									
Characteristic resistance	$N_{Rk,s}$	[kN]	29	46	67	125	196	282	448
Partial safety factor [1]	γ_{Ms}	[-]	1,60						
Steel failure with high corrosion resistant steel grade 70									
Characteristic resistance	$N_{Rk,s}$	[kN]	25	40	59	109	171	247	392
Partial safety factor [1]	γ_{Ms}	[-]	1,87						
Steel failure with ultra-high strength steel threaded rod grade 14.8									
Characteristic resistance	$N_{Rk,s}$	[kN]	51	81	118	219	343	494	785
Partial safety factor [1]	γ_{Ms}	[-]	1,5						
Steel failure with ultra-high strength steel threaded rod grade 15.8									
Characteristic resistance	$N_{Rk,s}$	[kN]	54	87	126	235	367	529	841
Partial safety factor [1]	γ_{Ms}	[-]	1,5						
Steel failure with ultra-high strength steel threaded rod grade 16.8									
Characteristic resistance	$N_{Rk,s}$	[kN]	58	92	134,9	251	392	564	897
Partial safety factor [1]	γ_{Ms}	[-]	1,5						
Combined pull-out and concrete cone failure in uncracked concrete C20/25 for a working life of 50 years									
Characteristic bond resistance									
Temperature range I: 24°C / 40°C	$\tau_{Rk,ucr,50}$	[N/mm²]	16,0	15,6	14,7	13,6	10,2	10,1	8,4
Temperature range II: 50°C / 80°C	$\tau_{Rk,ucr,50}$	[N/mm²]	16,0	15,6	14,7	13,6	10,2	10,1	8,4
Temperature range III: 80°C / 120°C	$\tau_{Rk,ucr,50}$	[N/mm²]	8,6	8,4	7,9	7,3	5,5	5,4	4,5
Increasing factor	ψ_c	C30/37	1,04						
		C40/50	1,07						
		C50/60	1,09						
Sustained load factor	ψ^0_{sus}	24°C / 40°C	0,74						
		50°C / 80°C	0,73						
		80°C / 120°C	0,61						
Combined pull-out and concrete cone failure in uncracked concrete C20/25 for a working life of 100 years									
Characteristic bond resistance									
Temperature range I: 24°C / 40°C	$\tau_{Rk,ucr,100}$	[N/mm²]	16,0	15,6	14,7	13,6	10,2	10,1	8,4
Temperature range II: 50°C / 80°C	$\tau_{Rk,ucr,100}$	[N/mm²]	16,0	15,6	14,7	13,6	10,2	10,1	8,4
Increasing factor	ψ_c	C30/37	1,04						
		C40/50	1,07						
		C50/60	1,09						
Sustained load factor	ψ^0_{sus}	24°C / 40°C	0,74						
		50°C / 80°C	0,73						

Table C1 (continuation)

Size				M8	M10	M12	M16	M20	M24	M30
Concrete cone failure in uncracked concrete										
Factor for uncracked concrete		$k_{ucr,N}$	[-]	11,0						
Edge distance		$c_{ucr,N}$	[mm]	$1,5 \cdot h_{ef}$						
Spacing		$s_{ucr,N}$	[mm]	$3,0 \cdot h_{ef}$						
Splitting failure										
Edge distance		$c_{cr,sp}$ for h_{min}	[mm]	$2,0 \cdot h_{ef}$					$1,5 \cdot h_{ef}$	
		$c_{cr,sp}$ for $h_{min} < h$ [2] $< 2 \cdot h_{ef}$ ($c_{cr,sp}$ from linear interpolation)								
		$c_{cr,sp}$ for h [2] $\geq 2 \cdot h_{ef}$		$c_{cr,N}$						
Spacing		$s_{cr,sp}$	[mm]	$2,0 \cdot c_{cr,sp}$						
Installation factor for combined pull-out, concrete cone and splitting failure										
Installation factor for in use category I1	standard cleaning	γ_{inst}	[-]	1,0						
	special cleaning			1,2	1,0					1,2
Installation factor for in use category I2	standard cleaning			1,0						
	special cleaning			1,2	1,0					1,2

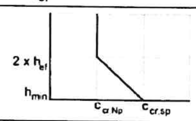
[1] In the absence of other national regulation.

[2] h – concrete member thickness.

Table C2: Characteristic resistance under tension loads for threaded rods in cracked concrete

Size			M8	M10	M12	M16	M20	M24	M30
Steel failure									
Steel failure with threaded rod grade 5.8									
Characteristic resistance	$N_{Rk,s}$	[kN]	18	29	42	78	122	176	280
Partial safety factor [1)]	γ_{Ms}	[-]	1,50						
Steel failure with threaded rod grade 8.8									
Characteristic resistance	$N_{Rk,s}$	[kN]	29	46	67	125	196	282	448
Partial safety factor [1)]	γ_{Ms}	[-]	1,50						
Steel failure with threaded rod grade 10.9									
Characteristic resistance	$N_{Rk,s}$	[kN]	36	58	84	157	245	353	561
Partial safety factor [1)]	γ_{Ms}	[-]	1,40						
Steel failure with threaded rod grade 12.9									
Characteristic resistance	$N_{Rk,s}$	[kN]	43	69	101	188	294	423	673
Partial safety factor [1)]	γ_{Ms}	[-]	1,40						
Steel failure with stainless steel threaded rod A4-70									
Characteristic resistance	$N_{Rk,s}$	[kN]	25	40	59	109	171	247	392
Partial safety factor [1)]	γ_{Ms}	[-]	1,87						
Steel failure with stainless steel threaded rod A4-80									
Characteristic resistance	$N_{Rk,s}$	[kN]	29	46	67	125	196	282	448
Partial safety factor [1)]	γ_{Ms}	[-]	1,60						
Steel failure with high corrosion resistant steel grade 70									
Characteristic resistance	$N_{Rk,s}$	[kN]	25	40	59	109	171	247	392
Partial safety factor [1)]	γ_{Ms}	[-]	1,87						
Steel failure with ultra-high strength steel threaded rod grade 14.8									
Characteristic resistance	$N_{Rk,s}$	[kN]	51	81	118	219	343	494	785
Partial safety factor [1)]	γ_{Ms}	[-]	1,5						
Steel failure with ultra-high strength steel threaded rod grade 15.8									
Characteristic resistance	$N_{Rk,s}$	[kN]	54	87	126	235	367	529	841
Partial safety factor [1)]	γ_{Ms}	[-]	1,5						
Steel failure with ultra-high strength steel threaded rod grade 16.8									
Characteristic resistance	$N_{Rk,s}$	[kN]	58	92	134,9	251	392	564	897
Partial safety factor [1)]	γ_{Ms}	[-]	1,5						
Combined pull-out and concrete cone failure in cracked concrete C20/25 for a working life of 50 years									
Characteristic bond resistance									
Temperature range I: 24°C / 40°C	$\tau_{Rk,cr,50}$	[N/mm²]	10,0	10,6	11,0	9,6	7,5	6,9	4,8
Temperature range II: 50°C / 80°C	$\tau_{Rk,cr,50}$	[N/mm²]	10,0	10,6	11,0	9,6	7,5	6,9	4,8
Temperature range III: 80°C / 120°C	$\tau_{Rk,cr,50}$	[N/mm²]	5,3	5,7	5,9	5,1	4,0	3,6	2,6
Increasing factor	ψ_c	C30/37	1,04						
		C40/50	1,07						
		C50/60	1,09						
Sustained load factor	ψ^0_{sus}	24°C / 40°C	0,74						
		50°C / 80°C	0,73						
		80°C / 120°C	0,61						
Combined pull-out and concrete cone failure in cracked concrete C20/25 for a working life of 100 years									
Characteristic bond resistance									
Temperature range I: 24°C / 40°C	$\tau_{Rk,cr,100}$	[N/mm²]	9,4	10,3	10,8	9,5	7,5	6,8	4,8
Temperature range II: 50°C / 80°C	$\tau_{Rk,cr,100}$	[N/mm²]	9,4	10,3	10,8	9,5	7,5	6,8	4,8
Increasing factor	ψ_c	C30/37	1,04						
		C40/50	1,07						
		C50/60	1,09						
Sustained load factor	ψ^0_{sus}	24°C / 40°C	0,74						
		50°C / 80°C	0,73						

Table C2 (continuation)

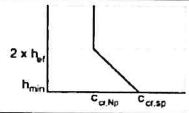
Size				M8	M10	M12	M16	M20	M24	M30
Concrete cone failure in cracked concrete										
Factor for cracked concrete		$k_{cr,N}$	[-]	7,7						
Edge distance		$c_{cr,N}$	[mm]	$1{,}5 \cdot h_{ef}$						
Spacing		$s_{cr,N}$	[mm]	$3{,}0 \cdot h_{ef}$						
Splitting failure										
Edge distance		$c_{cr,sp}$ for h_{min}	[mm]	$2{,}0 \cdot h_{ef}$					$1{,}5 \cdot h_{ef}$	
		$c_{cr,sp}$ for $h_{min} < h$ [2] $< 2 \cdot h_{ef}$ ($c_{cr,sp}$ from linear interpolation)								
		$c_{cr,sp}$ for h [2] $\geq 2 \cdot h_{ef}$		$c_{cr,N}$						
Spacing		$s_{cr,sp}$	[mm]	$2{,}0 \cdot c_{cr,sp}$						
Installation factor for combined pull-out, concrete cone and splitting failure										
Installation factor for in use category I1	standard cleaning	γ_{inst}	[-]	1,0						
	special cleaning			1,2	1,0					1,2
Installation factor for in use category I2	standard cleaning			1,0						
	special cleaning			1,2	1,0					1,2

[1] In the absence of other national regulation.
[2] h – concrete member thickness.

Table C3: Characteristic resistance under tension load for rods with inner thread in uncracked concrete

Size			M6/ Ø10	M8/ Ø12	M10/ Ø16	M12/ Ø16	M16/ Ø24
Steel failure							
Steel failure with rod with inner thread grade 5.8							
Characteristic resistance	$N_{Rk,s}$	[kN]	10	18	29	42	78
Partial safety factor [1)]	γ_{Ms}	[-]	1,50				
Steel failure with rod with inner thread grade 8.8							
Characteristic resistance	$N_{Rk,s}$	[kN]	16	29	46	67	125
Partial safety factor [1)]	γ_{Ms}	[-]	1,50				
Steel failure with stainless steel rod with inner thread threaded rod A4-70							
Characteristic resistance	$N_{Rk,s}$	[kN]	14	25	40	59	109
Partial safety factor [1)]	γ_{Ms}	[-]	1,87				
Steel failure with stainless steel rod with inner thread A4-80							
Characteristic resistance	$N_{Rk,s}$	[kN]	16	29	46	67	125
Partial safety factor [1)]	γ_{Ms}	[-]	1,60				
Steel failure with high corrosion resistant steel grade 70							
Characteristic resistance	$N_{Rk,s}$	[kN]	14	25	40	59	109
Partial safety factor [1)]	γ_{Ms}	[-]	1,87				
Combined pull-out and concrete cone failure in uncracked concrete C20/25 for a working life of 50 years							
Temperature range I: 24°C / 40°C	$\tau_{Rk,ucr,50}$	[N/mm²]	10,7	13,7	11,0	11,8	8,0
Temperature range II: 50°C / 80°C	$\tau_{Rk,ucr,50}$	[N/mm²]	10,7	13,7	11,0	11,8	8,0
Temperature range III: 80°C / 120°C	$\tau_{Rk,ucr,50}$	[N/mm²]	5,7	7,4	5,9	6,3	4,3
Increasing factor	ψ_c	C30/37	1,04				1,00
		C40/50	1,07				1,00
		C50/60	1,09				1,00
Sustained load factor	ψ^0_{sus}	24°C / 40°C	0,74				
		50°C / 80°C	0,73				
		80°C / 120°C	0,61				
Combined pull-out and concrete cone failure in uncracked concrete C20/25 for a working life of 100 years							
Temperature range I: 24°C / 40°C	$\tau_{Rk,ucr,100}$	[N/mm²]	10,7	13,7	11,0	11,8	8,0
Temperature range II: 50°C / 80°C	$\tau_{Rk,ucr,100}$	[N/mm²]	10,7	13,7	11,0	11,8	8,0
Increasing factor	ψ_c	C30/37	1,04				1,00
		C40/50	1,07				1,00
		C50/60	1,09				1,00
Sustained load factor	ψ^0_{sus}	24°C / 40°C	0,74				
		50°C / 80°C	0,73				

Table C3 (continuation)

Resistance to concrete cone failure in uncracked concrete					
Factor for ucracked concrete		$k_{ucr,N}$	[-]	11,0	
Edge distance		$c_{ucr,N}$	[mm]	$1,5 \cdot h_{ef}$	
Spacing		$s_{ucr,N}$	[mm]	$3,0 \cdot h_{ef}$	
Splitting failure					
Edge distance		$c_{cr,sp}$ for h_{min}	[mm]	$2,0 \cdot h_{ef}$	$1,5 \cdot h_{ef}$
		$c_{cr,sp}$ for $h_{min} < h^{2)} < 2 \cdot h_{ef}$ ($c_{cr,sp}$ from linear interpolation)			
		$c_{cr,sp}$ for $h^{2)} \geq 2 \cdot h_{ef}$		$c_{cr,N}$	
Spacing		$s_{cr,sp}$	[mm]	$2,0 \cdot c_{cr,sp}$	
Installation factor for combined pull-out, concrete cone and splitting failure					
Installation factor for use category I1 1)	standard cleaning	γ_{inst}	[-]	1,0	
	special cleaning			1,0	
Installation factor for use category I2 1)	standard cleaning			1,0	
	special cleaning			1,0	

1) In the absence of other national regulation.

2) h – concrete member thickness.

ANCHOR EXTREME 294, ANCHOR ALL SEASON 295

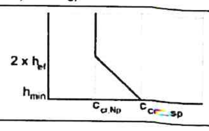
Performance
Characteristic resistance under tension loads for rods with inner thread in uncracked concrete

Annex C5
of European Technical Assessment ETA-25/0659

Table C4: Characteristic resistance under tension loads for rods with inner thread in cracked concrete

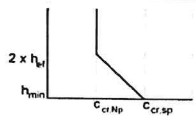
Size			M6/ Ø10	M8/ Ø12	M10/ Ø16	M12/ Ø16	M16/ Ø24
Steel failure							
Steel failure with rod with inner thread grade 5.8							
Characteristic resistance	$N_{Rk,s}$	[kN]	10	18	29	42	78
Partial safety factor [1)]	γ_{Ms}	[-]	1,50				
Steel failure with rod with inner thread grade 8.8							
Characteristic resistance	$N_{Rk,s}$	[kN]	16	29	46	67	125
Partial safety factor [1)]	γ_{Ms}	[-]	1,50				
Steel failure with stainless steel rod with inner thread A4-70							
Characteristic resistance	$N_{Rk,s}$	[kN]	14	25	40	59	109
Partial safety factor [1)]	γ_{Ms}	[-]	1,87				
Steel failure with stainless steel rod with inner thread rod A4-80							
Characteristic resistance	$N_{Rk,s}$	[kN]	16	29	46	67	125
Partial safety factor [1)]	γ_{Ms}	[-]	1,60				
Steel failure with high corrosion resistant steel grade 70							
Characteristic resistance	$N_{Rk,s}$	[kN]	14	25	40	59	109
Partial safety factor [1)]	γ_{Ms}	[-]	1,87				
Combined pull-out and concrete cone failure in cracked concrete C20/25 for a working life of 50 years							
Temperature range I: 24°C / 40°C	$\tau_{Rk,cr,50}$	[N/mm²]	10,3	10,3	9,5	8,9	4,0
Temperature range II: 50°C / 80°C	$\tau_{Rk,cr,50}$	[N/mm²]	10,3	10,3	9,5	8,9	4,0
Temperature range III: 80°C / 120°C	$\tau_{Rk,cr,50}$	[N/mm²]	5,5	5,5	5,1	4,8	2,1
Increasing factor	ψ_c	C30/37	1,04				1,00
		C40/50	1,07				1,00
		C50/60	1,09				1,00
Sustained load factor	ψ^0_{sus}	24°C / 40°C	0,74				
		50°C / 80°C	0,73				
		80°C / 120°C	0,61				
Combined pull-out and concrete cone failure in cracked concrete C20/25 for a working life of 100 years							
Temperature range I: 24°C / 40°C	$\tau_{Rk,cr,100}$	[N/mm²]	7,2	9,5	9,0	8,4	4,0
Temperature range II: 50°C / 80°C	$\tau_{Rk,cr,100}$	[N/mm²]	7,2	9,5	9,0	8,4	4,0
Increasing factor	ψ_c	C30/37	1,04				1,00
		C40/50	1,07				1,00
		C50/60	1,09				1,00
Sustained load factor	ψ^0_{sus}	24°C / 40°C	0,74				
		50°C / 80°C	0,73				

Table C4 (continuation)

Cone failure in cracked concrete					
Factor for cracked concrete		$k_{cr,N}$	[-]	7,7	
Edge distance		$c_{cr,N}$	[mm]	$1{,}5 \cdot h_{ef}$	
Spacing		$s_{cr,N}$	[mm]	$3{,}0 \cdot h_{ef}$	
Splitting failure					
Edge distance	$c_{cr,sp}$ for h_{min}		[mm]	$2{,}0 \cdot h_{ef}$	$1{,}5 \cdot h_{ef}$
	$c_{cr,sp}$ for $h_{min} < h$ [2] $< 2 \cdot h_{ef}$ ($c_{cr,sp}$ from linear interpolation)				
	$c_{cr,sp}$ for h [2] $\geq 2 \cdot h_{ef}$			$c_{cr,N}$	
Spacing	$s_{cr,sp}$		[mm]	$2{,}0 \cdot c_{cr,sp}$	
Installation factor for combined pull-out, concrete cone and splitting failure					
Installation factor for use category I1	standard cleaning	γ_{inst}	[-]	1,0	
	special cleaning			1,0	
Installation factor for use category I2	standard cleaning			1,0	
	special cleaning			1,0	

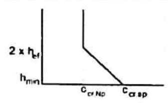
[1] In the absence of other national regulation.
[2] h – concrete member thickness.

Table C5: Characteristic resistance under tension load for rebar in uncracked concrete

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Steel failure with rebar										
Characteristic resistance	$N_{Rk,s}$	[kN]	A_s[2] · f_{uk}[3]							
Partial safety factor [1]	γ_{Ms}	[-]	1,40							
Combined pull-out and concrete cone failure in uncracked concrete C20/25 for a working life of 50 years										
Temperature range I: 24°C / 40°C	$\tau_{Rk,ucr,50}$	[N/mm²]	12,9	14,4	14,9	13,1	12,8	10,4	8,9	7,3
Temperature range II: 50°C / 80°C	$\tau_{Rk,ucr,50}$	[N/mm²]	12,9	14,4	14,9	13,1	12,8	10,4	8,9	7,3
Temperature range III: 80°C / 120°C	$\tau_{Rk,ucr,50}$	[N/mm²]	6,9	7,7	8,0	7,0	6,8	5,6	4,8	3,9
Increasing factor	ψ_c	C30/37	1,04							
		C40/50	1,07							
		C50/60	1,09							
Sustained load factor	ψ^0_{sus}	24°C / 40°C	0,74							
		50°C / 80°C	0,73							
		80°C / 120°C	0,61							
Combined pull-out and concrete cone failure in uncracked concrete C20/25 for a working life of 100 years										
Temperature range I: 24°C / 40°C	$\tau_{Rk,ucr,100}$	[N/mm²]	12,9	14,4	14,9	13,1	12,8	10,4	8,9	7,3
Temperature range II: 50°C / 80°C	$\tau_{Rk,ucr,100}$	[N/mm²]	12,9	14,4	14,9	13,1	12,8	10,4	8,9	7,3
Increasing factor	ψ_c	C30/37	1,04							
		C40/50	1,07							
		C50/60	1,09							
Sustained load factor	ψ^0_{sus}	24°C / 40°C	0,74							
		50°C / 80°C	0,73							
Concrete cone failure in uncracked concrete										
Factor for non-cracked concrete	$k_{ucr,N}$	[-]	11,0							
Edge distance	$c_{ucr,N}$	[mm]	1,5 · h_{ef}							
Spacing	$s_{ucr,N}$	[mm]	3,0 · h_{ef}							
Splitting failure										
Edge distance	$c_{cr,sp}$ for h_{min}	[mm]	2,0 · h_{ef}							1,5 · h_{ef}
	$c_{cr,sp}$ for $h_{min} < h$[4] $< 2 \cdot h_{ef}$ ($c_{cr,sp}$ from linear interpolation)	[mm]								
	$c_{cr,sp}$ for h[4] $\geq 2 \cdot h_{ef}$	[mm]	$c_{cr,N}$							
Spacing	$s_{cr,sp}$	[mm]	2,0 · $c_{cr,sp}$							
Installation factor for combined pull-out, concrete cone and splitting failure										
Installation factor for use category I1 – standard cleaning	γ_{inst}	[-]	1,0							
Installation factor for use category I1 – special cleaning	γ_{inst}	[-]	1,2	1,0						1,2
Installation factor for use category I2 – standard cleaning	γ_{inst}	[-]	1,2							
Installation factor for use category I2 – special cleaning	γ_{inst}	[-]	1,2	1,0						1,2

[1] In the absence of other national regulation.
[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

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Steel failure with rebar										
Characteristic resistance	$N_{Rk,s}$	[kN]	A_s [2] · f_{uk} [3]							
Partial safety factor [1]	γ_{Ms}	[-]	1,40							
Combined pull-out and concrete cone failure in cracked concrete C20/25 for a working life of 50 years										
Temperature range I: 24°C / 40°C	$\tau_{Rk,cr,50}$	[N/mm²]	8,4	9,1	9,9	9,9	8,5	7,5	5,8	3,5
Temperature range II: 50°C / 80°C	$\tau_{Rk,cr,50}$	[N/mm²]	8,4	9,1	9,9	9,9	8,5	7,5	5,8	3,5
Temperature range III: 80°C / 120°C	$\tau_{Rk,cr,50}$	[N/mm²]	4,5	4,9	5,3	5,3	4,5	4,0	3,1	1,9
Increasing factor	ψ_c	C30/37	1,04							
		C40/50	1,07							
		C50/60	1,09							
Sustained load factor	ψ^0_{sus}	24°C / 40°C	0,74							
		50°C / 80°C	0,73							
		80°C / 120°C	0,61							
Combined pull-out and concrete cone failure in non-cracked concrete C20/25 for a working life of 100 years										
Temperature range I: 24°C / 40°C	$\tau_{Rk,cr,100}$	[N/mm²]	7,5	9,1	9,9	9,9	8,5	7,5	5,8	3,5
Temperature range II: 50°C / 80°C	$\tau_{Rk,cr,100}$	[N/mm²]	7,5	9,1	9,9	9,9	8,5	7,5	5,8	3,5
Increasing factor	ψ_c	C30/37	1,04							
		C40/50	1,07							
		C50/60	1,09							
Sustained load factor	ψ^0_{sus}	24°C / 40°C	0,74							
		50°C / 80°C	0,73							
Concrete cone failure in cracked concrete										
Factor for racked 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										
Edge distance	$c_{cr,sp}$ for h_{min}	[mm]	2,0 · h_{ef}						1,5 · h_{ef}	
	$c_{cr,sp}$ for $h_{min} < h$ [4] $< 2 \cdot h_{ef}$ ($c_{cr,sp}$ from linear interpolation)	[mm]								
	$c_{cr,sp}$ for h [4] $\geq 2 \cdot h_{ef}$	[mm]	$c_{cr,N}$							
Spacing	$s_{cr,sp}$	[mm]	2,0 · $c_{cr,sp}$							
Installation factor for combined pull-out, concrete cone and splitting failure										
Installation factor for use category I1 [1] – standard cleaning	γ_{inst}	[-]	1,0							
Installation factor for use category I1 [1] – special cleaning	γ_{inst}	[-]	1,2	1,0						1,2
Installation factor for use category I2 [1] – standard cleaning	γ_{inst}	[-]	1,2							
Installation factor for use category I2 [1] – special cleaning	γ_{inst}	[-]	1,2	1,0						1,2

[1] In the absence of other national regulation.
[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

Size				M8	M10	M12	M16	M20	M24	M30
Characteristic resistance		$V^0_{Rk,s}$	[kN]	$k_6 \cdot A_s$[2] $\cdot f_{uk}$[3]						
Factor considering ductility	carbon steel with $f_{uk} \leq 500$ N/mm²	k_6	[-]	0,6						
	carbon steel with $500 < f_{uk} \leq 1000$ N/mm² or stainless steel			0,5						
Factor considering ductility		k_7		1,0						
Partial safety factor [1]										
Threaded rod grade 5.8		γ_{Ms}	[-]	1,25						
Threaded rod grade 8.8				1,25						
Threaded rod grade 10.9				1,50						
Threaded rod grade 12.9				1,50						
Stainless steel threaded rod A4-70				1,56						
Stainless steel threaded rod A4-80				1,33						
High corrosion stainless steel grade 70				1,56						
Ultra-high strength steel threaded rod grade 14.8				1,50						
Ultra-high strength steel threaded rod grade 15.8				1,50						
Ultra-high strength steel threaded rod grade 16.8				1,50						

[1] In the absence of other national regulation.
[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 with lever arm

Size			M8	M10	M12	M16	M20	M24	M30
Steel failure with threaded rod grade 5.8									
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	19	37	65	166	324	561	1124
Partial safety factor [1]	γ_{Ms}	[-]	1,25						
Steel failure with threaded rod grade 8.8									
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	898	1799
Partial safety factor [1]	γ_{Ms}	[-]	1,25						
Steel failure with threaded rod grade 10.9									
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	37	75	131	333	649	1123	2249
Partial safety factor [1]	γ_{Ms}	[-]	1,50						
Steel failure with threaded rod grade 12.9									
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	45	90	157	400	779	1347	2698
Partial safety factor [1]	γ_{Ms}	[-]	1,50						
Steel failure with stainless steel threaded rod A4-70									
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233	454	786	1574
Partial safety factor [1]	γ_{Ms}	[-]	1,56						
Steel failure with stainless steel threaded rod A4-80									
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	898	1799
Partial safety factor [1]	γ_{Ms}	[-]	1,33						
Steel failure with high corrosion resistant steel grade 70									
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233	454	786	1574
Partial safety factor [1]	γ_{Ms}	[-]	1,56						
Steel failure with ultra-high strength steel threaded rod grade 14.8									
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	52	104	183	466	908	1571	3148
Partial safety factor [1]	γ_{Ms}	[-]	1,50						
Steel failure with ultra-high strength steel threaded rod grade 15.8									
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	56	112	196	499	973	1683	3373
Partial safety factor [1]	γ_{Ms}	[-]	1,50						
Steel failure with ultra-high strength steel threaded rod grade 16.8									
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	59	119	209	532	1038	1796	3598
Partial safety factor [1]	γ_{Ms}	[-]	1,50						

[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			M8	M10	M12	M16	M20	M24	M30
Pry out failure									
Pry out factor	k_8	[-]	2						
Concrete edge failure									
Outside diameter of anchor	d_{nom}	[mm]	8	10	12	16	20	24	30
Effective length of anchor under shear loading	l_f	[mm]	$l_f = h_{ef}$ and $\leq 12\ d_{nom}$						$l_f = h_{ef}$ and $\leq$ max $(8 \cdot d_{nom}; 300\ mm)$

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

Size				M6/ Ø10	M8/ Ø12	M10/ Ø16	M12/ Ø16	M16/ Ø24
Characteristic resistance		$V^0_{Rk,s}$	[kN]	$k_6 \cdot A_s{}^{2)} \cdot f_{uk}{}^{3)}$				
Factor considering ductility	carbon steel with $f_{uk} \leq 500$ N/mm²	k_6	[-]	0,6				
	carbon steel with $500 < f_{uk} \leq 1000$ N/mm² or stainless steel			0,5				
Factor considering ductility		k_7		1,0				
Partial safety factor 1)								
Threaded rod grade 5.8		γ_{Ms}	[-]	1,25				
Threaded rod grade 8.8				1,25				
Stainless steel threaded rod A4-70				1,56				
Stainless steel threaded rod A4-80				1,33				
High corrosion stainless steel grade 70				1,56				

1) In the absence of other national regulation.
2) Stressed cross section of the steel.
3) According to EN 1992-1-1.

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/ Ø24
Steel failure with rod with inner thread grade 5.8							
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	7,6	18,7	37,4	65,5	166,5
Partial safety factor 1)	γ_{Ms}	[-]	1,25				
Steel failure with rod with inner thread grade 8.8							
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	12,2	30,0	59,8	104,8	266,4
Partial safety factor 1)	γ_{Ms}	[-]	1,25				
Steel failure with stainless steel for rod with inner thread A4-70							
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	10,7	26,2	52,3	91,7	233,1
Partial safety factor 1)	γ_{Ms}	[-]	1,56				
Steel failure with stainless steel for rod with inner thread A4-80							
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	12,2	30,0	59,8	104,8	266,4
Partial safety factor 1)	γ_{Ms}	[-]	1,33				
Steel failure with high corrosion resistant steel grade 70							
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	10,7	26,2	52,3	91,7	233,1
Partial safety factor 1)	γ_{Ms}	[-]	1,56				

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			M6/ Ø10	M8/ Ø12	M10/ Ø16	M12/ Ø16	M16/ Ø24
Pry out failure							
Factor	k_8	[-]	2				
Concrete edge failure							
Outside diameter of anchor	d_{nom}	[mm]	10	12	16	16	24
Effective length of anchor under shear loading	l_f	[mm]	$l_f = h_{ef}$ and $\leq 12\ d_{nom}$				

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

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Steel failure – rebar										
Characteristic resistance	$V^0_{Rk,s}$	[kN]	$0{,}5 \cdot A_s$ 2) $\cdot f_{uk}$ 3)							
Factor considering ductility	k_7	[-]	1,0							
Partial safety factor 1)	γ_{Ms}	[-]	1,5							

1) In the absence of other national regulation.
2) Stressed cross section of the steel element.
3) According to EN 1992-1-1.

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

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Steel failure – rebar										
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	$1{,}2 \cdot W_{el}$ 2) $\cdot f_{uk}$ 3)							
Partial safety factor 1)	γ_{Ms}	[-]	1,5							

1) In the absence of other national regulation.
2) Elastic section modulus.
3) According to EN 1992-1-1.

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

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]	$l_f = h_{ef}$ and $\leq 12\ d_{nom}$							$l_f = h_{ef}$ and $\leq$ max ($8 \cdot d_{nom}$; 300 mm)

Table C16: Displacement under tension loads – threaded rods

Size			M8	M10	M12	M16	M20	M24	M30
Characteristic displacement in uncracked concrete C20/25 to C50/60 under tension loads									
Displacement [1]	δ_{N0}	[mm/(N/mm²)]	0,052	0,072	0,071	0,096	0,108	0,143	0,192
	$\delta_{N\infty}$	[mm/(N/mm²)]	0,086	0,086	0,086	0,086	0,086	0,086	0,086
Characteristic displacement in cracked concrete C20/25 to C50/60 under tension loads									
Displacement [1]	δ_{N0}	[mm/(N/mm²)]	0,056	0,076	0,074	0,096	0,110	0,150	0,175
	$\delta_{N\infty}$	[mm/(N/mm²)]	0,158	0,173	0,173	0,198	0,260	0,261	0,323

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

Table C17: Displacement under shear loads – threaded rods

Size			M8	M10	M12	M16	M20	M24	M30
Characteristic displacement in cracked and uncracked concrete C20/25 to C50/60 under shear loads									
Displacement [1]	δ_{V0}	[mm/kN]	0,285	0,180	0,124	0,066	0,043	0,030	0,019
	$\delta_{V\infty}$	[mm/kN]	0,427	0,269	0,185	0,100	0,064	0,044	0,028

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

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

Size			M6 / Ø10	M8 / Ø12	M10 / Ø 16	M12 / Ø 16	M16 / Ø 24
Characteristic displacement in uncracked concrete C20/25 to C50/60 under tension loads							
Displacement [1]	δ_{N0}	[mm/N/mm²]	0,067	0,068	0,078	0,110	0,148
	$\delta_{N\infty}$	[mm/N/mm²]	0,086	0,086	0,086	0,086	0,086
Characteristic displacement in cracked concrete C20/25 to C50/60 under tension loads							
Displacement [1]	δ_{N0}	[mm/N/mm²]	0,051	0,048	0,051	0,073	0,058
	$\delta_{N\infty}$	[mm/N/mm²]	0,228	0,177	0,228	0,231	0,322

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

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

Size			M6 / Ø10	M8 / Ø12	M10/ Ø16	M12/ Ø16	M16 / Ø24
Characteristic displacement in cracked and uncracked concrete C20/25 to C50/60 under shear loads							
Displacement [1]	δ_{V0}	[mm/kN]	0,180	0,124	0,066	0,066	0,030
	$\delta_{V\infty}$	[mm/kN]	0,269	0,185	0,100	0,100	0,044

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

Table C20: Displacement under tension loads – rebar

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Characteristic displacement in uncracked concrete C20/25 to C50/60 under tension loads										
Displacement [1)]	δ_{N0}	[mm/N/mm²]	0,055	0,056	0,072	0,079	0,100	0,143	0,162	0,244
	$\delta_{N\infty}$	[mm/N/mm²]	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 under tension loads										
Displacement [1)]	δ_{N0}	[mm/N/mm²]	0,061	0,059	0,056	0,075	0,099	0,142	0,163	0,229
	$\delta_{N\infty}$	[mm/N/mm²]	0,268	0,284	0,325	0,472	0,548	0,677	0,736	0,697

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

Table C21: Displacement under shear loads – rebar

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Characteristic displacement in cracked and uncracked concrete C20/25 to C50/60 under shear loads										
Displacement [1)]	δ_{V0}	[mm/kN]	0,181	0,116	0,080	0,059	0,045	0,029	0,019	0,011
	$\delta_{V\infty}$	[mm/kN]	0,271	0,174	0,121	0,089	0,068	0,043	0,028	0,017

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

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

Size			M8	M10	M12	M16	M20	M24	M30
Steel failure									
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)	$\gamma_{Ms,seis}$	[-]	1,50						
Steel failure with threaded rod grade 8.8									
Characteristic resistance	$N_{Rk,s,seis}$	[kN]	29	46	67	125	196	282	448
Partial safety factor 1)	$\gamma_{Ms,seis}$	[-]	1,50						
Steel failure with stainless steel threaded rod A4-70									
Characteristic resistance	$N_{Rk,s,seis}$	[kN]	25	40	59	109	171	247	392
Partial safety factor 1)	$\gamma_{Ms,seis}$	[-]	1,87						
Steel failure with stainless steel threaded rod A4-80									
Characteristic resistance	$N_{Rk,s,seis}$	[kN]	29	46	67	125	196	282	448
Partial safety factor 1)	$\gamma_{Ms,seis}$	[-]	1,60						
Steel failure with high corrosion resistant steel grade 70									
Characteristic resistance	$N_{Rk,s,seis}$	[kN]	25	40	59	109	171	247	392
Partial safety factor 1)	$\gamma_{Ms,seis}$	[-]	1,87						
Combined pull-out and concrete cone failure in concrete C20/25 for a working life of 50 years									
Characteristic bond resistance									
Temperature range I: 24°C / 40°C	$\tau_{Rk,seis,50}$	[N/mm²]	8,2	9,7	10,6	9,6	7,5	6,8	3,8
Temperature range II: 50°C / 80°C	$\tau_{Rk,seis,50}$	[N/mm²]	8,2	9,7	10,6	9,6	7,5	6,8	3,8
Temperature range II: 80°C / 120°C	$\tau_{Rk,seis,50}$	[N/mm²]	4,3	5,2	5,7	5,1	4,0	3,6	2,1
Combined pull-out and concrete cone failure in concrete C20/25 for a working life of 100 years									
Characteristic bond resistance									
Temperature range I: 24°C / 40°C	$\tau_{Rk,seis,100}$	[N/mm²]	7,7	9,4	10,4	9,5	7,5	6,8	3,8
Temperature range II: 50°C / 80°C	$\tau_{Rk,seis,100}$	[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

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Steel failure with rebar										
Characteristic resistance	$N_{Rk,s,seis}$	[kN]	A_s 2) · f_{uk} 3)							
Partial safety factor 1)	$\gamma_{Ms,seis}$	[-]	1,40							
Combined pull-out and concrete cone failure in concrete C20/25 for a working life of 50 years										
Characteristic bond resistance										
Temperature range I: 24°C / 40°C	$\tau_{Rk,seis,50}$	[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	$\tau_{Rk,seis,50}$	[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	$\tau_{Rk,seis,50}$	[N/mm²]	3,6	4,5	5,1	5,1	4,5	4,0	3,1	1,5
Combined pull-out and concrete cone failure in concrete C20/25 for a working life of 100 years										
Characteristic bond resistance										
Temperature range I: 24°C / 40°C	$\tau_{Rk,seis,100}$	[N/mm²]	6,1	8,3	9,6	9,6	8,5	7,5	5,8	2,8
Temperature range II: 50°C / 80°C	$\tau_{Rk,seis,100}$	[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.
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	M20	M24	M30
Steel failure with threaded rod grade 5.8									
Characteristic resistance	$V_{Rk,s,seis}$	[kN]	6,3	10,1	14,7	27,3	42,7	61,6	98,0
Partial safety factor [1]	$\gamma_{Ms,seis}$	[-]	1,25						
Steel failure with threaded rod grade 8.8									
Characteristic resistance	$V_{Rk,s,seis}$	[kN]	10,2	16,1	23,5	44,1	68,6	98,7	156,8
Partial safety factor [1]	$\gamma_{Ms,seis}$	[-]	1,25						
Steel failure with stainless steel threaded rod A4-70									
Characteristic resistance	$V_{Rk,seis}$	[kN]	9,1	14,4	20,7	38,5	59,9	86,5	137,4
Partial safety factor [1]	$\gamma_{Ms,seis}$	[-]	1,56						
Steel failure with stainless steel threaded rod A4-80									
Characteristic resistance	$V_{Rk,seis}$	[kN]	10,2	16,1	23,5	44,1	68,6	98,7	157,2
Partial safety factor [1]	$\gamma_{Ms,seis}$	[-]	1,33						
Steel failure with high corrosion stainless steel grade 70									
Characteristic resistance	$V_{Rk,seis}$	[kN]	9,1	14,4	20,7	38,5	59,9	86,5	137,4
Partial safety factor [1]	$\gamma_{Ms,seis}$	[-]	1,56						

[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										
Characteristic resistance	$V_{Rk,s,seis}$	[kN]	$0,35 \cdot A_s^{2)} \cdot f_{uk}^{3)}$							
Partial safety factor [1]	$\gamma_{Ms,seis}$	[-]	1,5							

[1] In the absence of other national regulation.
[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 performance category C1

Size			M8	M10	M12	M16	M20	M24	M30
Displacement	$\delta_{N,seis}$	[mm]	3,0	3,1	3,5	4,0	5,0	6,0	6,6

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

Size			M8	M10	M12	M16	M20	M24	M30
Displacement	$\delta_{V,seis}$	[mm]	3,5	4,0	4,6	5,0	5,8	6,5	7,0

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

Size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
Displacement	$\delta_{N,seis}$	[mm]	3,0	3,1	3,5	4,0	4,0	5,0	6,0	6,4

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

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

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

Size			M12	M16	M20
Steel failure					
Characteristic resistance	$N_{Rk,s,eq,C2}$	[kN]		$N_{Rk,s}$	
Combined pull-out and concrete cone failure					
Characteristic bond resistance temperature range -40°C / +40°C	$\tau_{Rk,eq,C2}$	[N/mm²]	1,78	2,65	2,28
Characteristic bond resistance temperature range -40°C / +80°C	$\tau_{Rk,eq,C2}$	[N/mm²]	1,78	2,65	2,28

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

Size			M12	M16	M20
Steel failure with threaded rod grade 5.8					
Characteristic resistance	$V_{Rk,s,eq,C2}$	[kN]	13,17	12,92	44,44
Partial safety factor [1)]	$\gamma_{Ms,V}$ [1)]	[-]		1,25	
Steel failure with threaded rod grade 8.8					
Characteristic resistance	$V_{Rk,s,eq,C2}$	[kN]	21,33	20,86	71,40
Partial safety factor [1)]	$\gamma_{Ms,V}$ [1)]	[-]		1,25	
Steel failure with threaded rod grade 10.9					
Characteristic resistance	$V_{Rk,s,eq,C2}$	[kN]	26,35	25,83	88,88
Partial safety factor [1)]	$\gamma_{Ms,V}$ [1)]	[-]		1,50	
Steel failure with threaded rod grade 12.9					
Characteristic resistance	$V_{Rk,s,eq,C2}$	[kN]	31,99	31,13	107,10
Partial safety factor [1)]	$\gamma_{Ms,V}$ [1)]	[-]		1,50	
Stainless steel, property class A4-70					
Characteristic resistance	$V_{Rk,s,eq,C2}$	[kN]	18,19	18,21	62,65
Partial safety factor [1)]	$\gamma_{Ms,V}$ [1)]	[-]		1,56	
Stainless steel, property class A4-80					
Characteristic resistance	$V_{Rk,s,eq,C2}$	[kN]	21,33	20,86	71,40
Partial safety factor [1)]	$\gamma_{Ms,V}$ [1)]	[-]		1,33	
High corrosion resistant stainless steel, property class 70					
Characteristic resistance	$V_{Rk,s,eq,C2}$	[kN]	18,19	18,21	62,65
Partial safety factor [1)]	$\gamma_{Ms,V}$ [1)]	[-]		1,56	

[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 seismic performance category C2					
Displacement in tensile at damage limitation state	$\delta_{N,eq,C2\,(DLS)}$	[mm]	0,17	0,16	0,06
Displacement in tensile at ultimate limit state	$\delta_{N,eq,C2\,(ULS)}$	[mm]	0,69	0,62	0,15
Displacement in shear at damage limitation state	$\delta_{V,eq,C2\,(DLS)}$	[mm]	5,47	5,63	4,04
Displacement in shear at ultimate limit state	$\delta_{V,eq,C2\,(ULS)}$	[mm]	10,39	13,85	12,55