Deutsches Institut für Bautechnik

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Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

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

European Technical Assessment ETA-16/0241 of 11 May 2016

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	B+BTec Chemical Capsule Anchor VD-EA
Product family to which the construction product belongs	Bonded anchor for use in non-cracked concrete
Manufacturer	B+BTec Munterij 8 4762 AH ZEVENBERGEN NIEDERLANDE
Manufacturing plant	B+BTec Werk 1, NIEDERLANDE B+BTec Werk 2, NIEDERLANDE
This European Technical Assessment contains	14 pages including 3 annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	Guideline for European technical approval of "Metal anchors for use in concrete", ETAG 001 Part 1: "Anchors in General", April 2013, used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011.

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Specific Part

1 Technical description of the product

The B+BTec Chemical Capsule Anchor VD-EA is a bonded anchor consisting of a glass capsule VDP-EA and a threaded anchor rod with hexagon nut and washer. The anchor rod (including nut and washer) is made of zinc-plated steel, hot-dip galvanised steel, stainless steel or made of high corrosion resistant steel.

The glass capsule is placed into the hole and the anchor rod is driven by machine with simultaneous hammering and turning. The anchor rod is anchored via the bond between anchor rod, chemical mortar and concrete.

The product description is given in Annex A.

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

The performances given in Section 3 are only valid if the anchor is used in compliance with the specifications and conditions given in Annex B.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the anchor of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance for static and quasi static loads, Displacements	See Annex C1 – C6

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorages satisfy requirements for Class A1
Resistance to fire	No performance assessed

3.3 Hygiene, health and the environment (BWR 3)

Regarding dangerous substances there may be requirements (e.g. transposed European legislation and national laws, regulations and administrative provisions) applicable to the products falling within the scope of this European Technical Assessment. In order to meet the provisions of Regulation (EU) No 305/2011, these requirements need also to be complied with, when and where they apply.

3.4 Safety in use (BWR 4)

The essential characteristics regarding Safety in use are included under the Basic Works Requirement Mechanical resistance and stability.

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

In accordance with guideline for European technical approval ETAG 001, April 2013 used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011 the applicable European legal act is: [96/582/EC]

The system to be applied is: 1

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

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 11 May 2016 by Deutsches Institut für Bautechnik

Uwe Bender
Head of Department

beglaubigt:
Baderschneider

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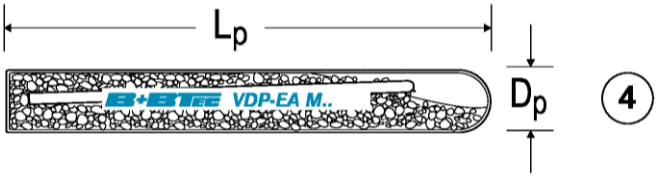
Product and Installed condition

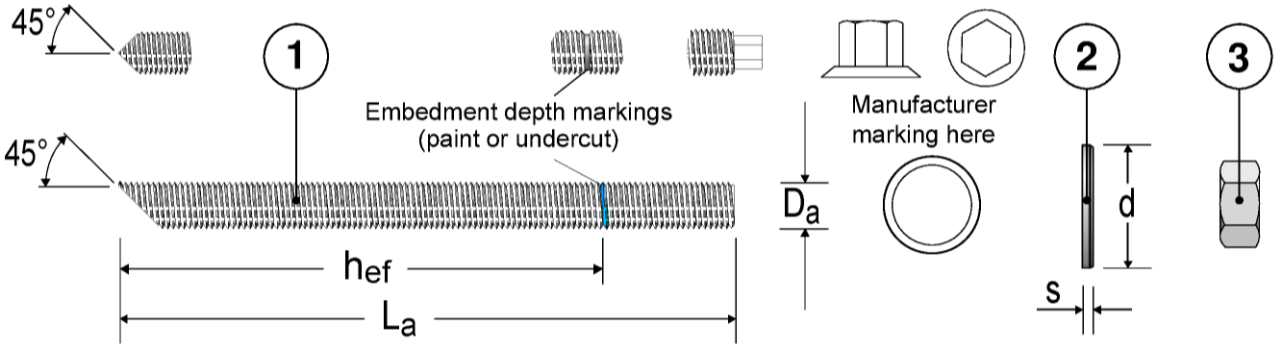
Mortar Capsule VDP-EA:



Marking capsule

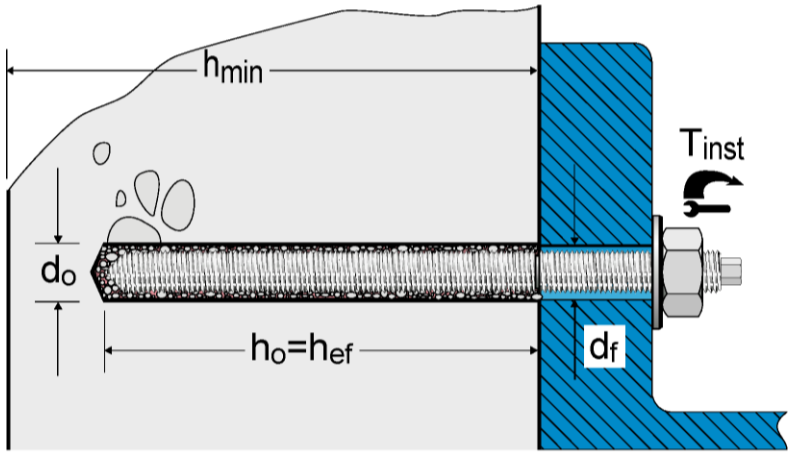
Manufacturer:	B+BTec
Capsule type:	VDP-EA
Capsule size:	M..

Anchor rod



Marking anchor rod **z.B. B16A**

Manufacturer	B		
Size	8, 10, 12, 16, 20, 24		
Material			
Galvanised property class 5.8	A	Stainless steel 1.4401, property class 70	C
Galvanised property class 8.8	B	Stainless steel 1.4404, property class 70	K
Hot dipped galvanised property class 5.8	H	Stainless steel 1.4529, property class 70	E
Hot dipped galvanised property class 8.8	I	Stainless steel 1.4565, property class 70	R
		Stainless steel 1.4571, property class 70	D
		Stainless steel 1.4401, property class 80	M
		Stainless steel 1.4404, property class 80	P
		Stainless steel 1.4571, property class 80	O



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B+BTec Chemical Capsule Anchor VD-EA	Annex A 1
Product description Product and installed condition	

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Table A1: Materials

Part	Description	Material			
1	Threaded rod	Carbon steel property class 5.8 or 8.8 EN ISO 898-1:2013		Stainless steel 1.4401, 1.4404 or 1.4571 property class A4-70 or A4-80 EN ISO 3506-1:2009 A_5 > 8% fracture elongation	High Corrosion resistant steel 1.4529 or 1.4565 property class 70 EN ISO 3506-1:2009 A_5 > 8% fracture elongation
		Galvanised steel ≥ 5µm acc. to EN ISO 4042:1999 A_5 > 8% fracture elongation	Hot dip galvanised steel EN ISO 10684:2004+AC:2009 A_5 > 8% fracture elongation		
2	Washer	Carbon steel		Stainless steel 1.4401, 1.4404 or 1.4571	High Corrosion resistant steel 1.4529 or 1.4565
		Galvanised steel ≥ 5µm acc. to EN ISO 4042:1999	Hot dip galvanised steel 10684:2004+AC:2009		
		EN ISO 887:2006 oder EN ISO 7089:2000 bis EN ISO 7094:2000			
3	Hexagon nut	Carbon steel property class 5 to 8 EN ISO 898-2:2012		Stainless steel 1.4401, 1.4404 or 1.4571 property class A4-70 or A4-80 EN ISO 3506-2:2009	High Corrosion resistant steel 1.4529 or 1.4565 property class 70 EN ISO 3506-2:2009
		Galvanised steel ≥ 5µm acc. to EN ISO 4042:1999	Hot dip galvanised steel 10684:2004+AC:2009		
		EN ISO 4032:2012 oder EN ISO 4034:2012			
4	Glass capsule	Glass Quartz Resin Hardener			

Table A2: Dimensions

Part	Description			M8	M10	M12	M16	M20	M24
1	Threaded rod	D_a $L_a \geq$	[mm]	M8 95	M10 100	M12 120	M16 140	M20 190	M24 235
2	Washer	s d	[mm]	1,6 16	2,1 21	2,5 24	3,0 30	3,0 37	4,0 44
3	Hexagon nut	SW	[mm]	13	17	19	24	30	36
4	Glass capsule	D_p L_p	[mm]	9 80	11 80	13 95	17 95	22 175	24 210

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Specifications of intended use

Anchorages subject to:

- Static and quasi-static loads: all sizes.

Base materials:

- Reinforced or unreinforced normal weight concrete according to EN 206-1:2000.
- Strength classes C20/25 to C50/60 according to EN 206-1:2000.
- Non-cracked concrete.

Temperature Range:

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

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions
  (zinc coated steel, stainless steel or high corrosion resistant steel).
- Structures subject to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal condition, if no particular aggressive conditions exist
  (stainless steel or high corrosion resistant steel).
- Structures subject to external atmospheric exposure and to permanently damp internal condition, if other particular aggressive conditions exist
  (high corrosion resistant steel).
  Note: Particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used).

Design:

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the anchor is indicated on the design drawings (e. g. position of the anchor relative to reinforcement or to supports, etc.).
- Anchorages under static or quasi-static actions are designed in accordance with:
  - EOTA Technical Report TR 029 "Design of bonded anchors", Edition September 2010 or
  - CEN/TS 1992-4:2009

Installation:

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Dry or wet concrete: all sizes.
- Hole drilling by hammer drilling.
- cleaning the drill hole:
  removing possibly existing water in the drill hole completely and cleaning the drill hole by at least one blowing operation, by at least 1 x brushing / 1 x blowing / 1 x brushing operation by using the steel brush supplied by the manufacturer; before brushing cleaning the brush and checking whether the brush diameter according to Annex B 2, Table B3 is still sufficient. The steel brush shall produce natural resistance as it enters the anchor hole. If this is not the case a new brush or a brush with a larger diameter must be used.
- the anchor component installation temperature shall be at least +5 °C; during curing of the chemical mortar the temperature of the concrete must not fall below -5 °C.

B+BTec Chemical Capsule Anchor VD-EA	Annex B 1
Intended Use Specifications	

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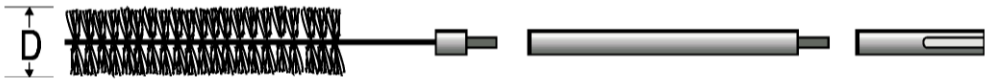
Table B1: Installation parameters

Anchor size			M8	M10	M12	M16	M20	M24
Nominal drill hole diameter	d_0	[mm]	10	12	14	18	25	28
Cutting diameter	$d_{cut} \leq$	[mm]	10,5	12,5	14,5	18,5	25,5	28,5
Depth of drill hole	h_0	[mm]	80	90	110	125	170	210
Effective anchorage depth	h_{ef}	[mm]	80	90	110	125	170	210
Diameter of clearance hole in the fixture	d_f	[mm]	9	12	14	18	22	26
Diameter of steel brush	D	[mm]	11	13	16	20	27	30
Torque moment	T_{inst}	[Nm]	10	20	40	80	120	180

Steel brush

B+BTec brush, extension and SDS+ connector



Installation procedure

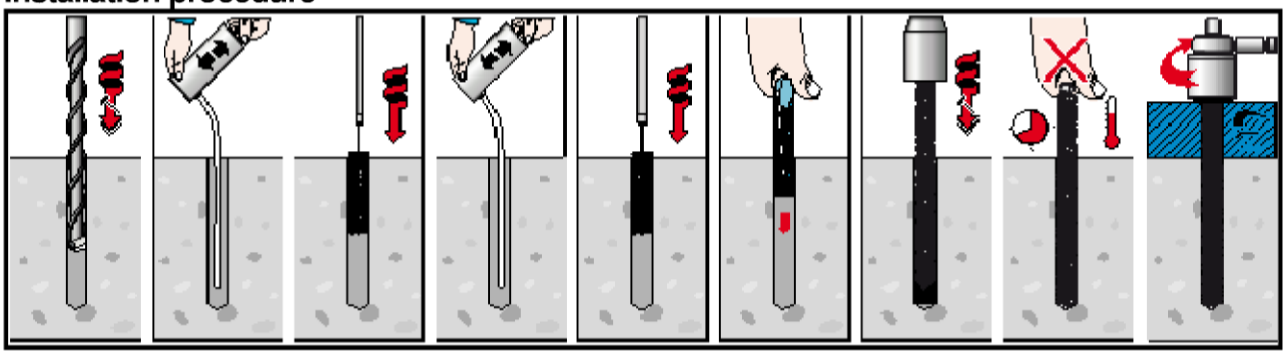


Table B2: Minimum member thickness, edge distance and spacing

Anchor size			M8	M10	M12	M16	M20	M24
Minimum member thickness	h_{min}	[mm]	110	120	140	160	220	260
Minimum edge distance	c_{min}	[mm]	40	45	55	65	85	105
Minimum spacing	s_{min}	[mm]	40	45	55	65	85	105

Table B3: Minimum curing time

Temperature in the concrete member	Minimum curing time in dry concrete	Minimum curing time in wet concrete
≥ - 5°C	5 hrs.	10 hrs.
≥ + 5°C	1 hr.	2 hrs.
≥ +20°C	20 min.	40 min.
≥ +30°C	10 min.	20 min.

B+BTec Chemical Capsule Anchor VD-EA

Annex B 3

Intended Use
Installations parameters, minimum thickness of concrete member,
Minimum edge distance and spacing, Minimum curing time

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Metal parts made of zinc plated or hot dip galvanised steel

Table C1: Design method A, characteristic values for tension loads

Anchor size			M8	M10	M12	M16	M20	M24
Steel failure								
Characteristic resistance **property class 5.8**	$N_{Rk,S}$	[kN]	18	29	42	78	123	177
Characteristic resistance **property class 8.8**	$N_{Rk,S}$	[kN]	29	46	67	126	196	282
Combined pull-out and concrete failure								
Characteristic resistance in non-cracked concrete C20/25 to C50/60								
Temperature range I	$N^0_{Rk,p}$ [1)]	[kN]	20	30	40	60	90	120
Temperature range II	$N^0_{Rk,p}$ [1)]	[kN]	20	30	40	50	75	90
Factor according to CEN/TS 1992-4-5 Section 6.2.2.3	k_8	[-]	10,1					
Concrete cone failure								
Factor according to CEN/TS 1992-4-5 Section 6.2.3.1	k_{ucr}	[-]	10,1					
Characteristic edge distance	$c_{cr,N}$	[mm]	1,5 h_{ef}					
Characteristic spacing	$s_{cr,N}$	[mm]	3 h_{ef}					
Splitting[2)]								
Edge distance	$c_{cr,sp}$	[mm]	1,5 h_{ef}	1 h_{ef}				
Spacing	$s_{cr,sp}$	[mm]	3 h_{ef}	2 h_{ef}				
Installation safety factor	$\gamma_2 = \gamma_{inst}$	[-]	1,2					

1) $\tau_{Rk} = N^0_{Rk,p} / (h_{ef} \cdot D_a \cdot \pi)$, D_a acc. Table A2
2) For the proof against splitting failure, $N^0_{Rk,c}$ has to be replaced by $N^0_{Rk,p}$.

Table C2: Displacements under tension loads

Anchor size			M8	M10	M12	M16	M20	M24
Tension load	N	[kN]	8	12	16	20	30	38
Displacement	δ_{N0}	[mm]	0,1	0,2	0,2	0,2	0,5	0,4
	$\delta_{N\infty}$	[mm]	0,5					

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Metal parts made of stainless steel 1.4401, 1.4404 or 1.4571

Table C3: Design method A, characteristic values for tension loads

Anchor size			M8	M10	M12	M16	M20	M24
Steel failure								
Characteristic resistance **strength class A4-70**	$N_{Rk,S}$	[kN]	26	40	59	110	172	247
Characteristic resistance **strength class A4-80**	$N_{Rk,S}$	[kN]	29	46	67	126	196	282
Combined pull-out and concrete failure								
Characteristic resistance in non-cracked concrete C20/25 to C50/60								
Temperature range I	$N^0_{Rk,p}$ [1]	[kN]	20	30	40	60	90	120
Temperature range II	$N^0_{Rk,p}$ [1]	[kN]	20	30	40	50	75	90
Factor according to CEN/TS 1992-4-5 Section 6.2.2.3	k_8	[-]	10,1					
Concrete cone failure								
Factor according to CEN/TS 1992-4-5 Section 6.2.3.1	k_{ucr}	[-]	10,1					
Characteristic edge distance	$c_{cr,N}$	[mm]	1,5 h_{ef}					
Characteristic spacing	$s_{cr,N}$	[mm]	3 h_{ef}					
Splitting[2]								
Edge distance	$c_{cr,sp}$	[mm]	1,5 h_{ef}	1 h_{ef}				
Spacing	$s_{cr,sp}$	[mm]	3 h_{ef}	2 h_{ef}				
Installation safety factor	$\gamma_2 = \gamma_{inst}$	[-]	1,2					

1) $\tau_{Rk} = N^0_{Rk,p} / (h_{ef} \cdot D_a \cdot \pi)$, D_a acc. Table A2
2) For the proof against splitting failure, $N^0_{Rk,c}$ has to be replaced by $N^0_{Rk,p}$.

Table C4: Displacements under tension loads

Anchor size			M8	M10	M12	M16	M20	M24
Tension load	N	[kN]	8	12	16	20	30	38
Displacement	δ_{N0}	[mm]	0,1	0,2	0,2	0,2	0,5	0,4
	$\delta_{N\infty}$	[mm]	0,5					

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Metal parts made of high corrosion resistant steel 1.4529 or 1.4565

Table C5: Design method A, characteristic values for tension loads

Anchor size			M8	M10	M12	M16	M20	M24
Steel failure								
Characteristic resistance **strength class 70**	$N_{Rk,S}$	[kN]	26	40	59	110	172	247
Combined pull-out and concrete failure								
Characteristic resistance in non-cracked concrete C20/25 to C50/60								
Temperature range I	$N^0_{Rk,p}$ [1]	[kN]	20	30	40	60	90	120
Temperature range II	$N^0_{Rk,p}$ [1]	[kN]	20	30	40	50	75	90
Factor according to CEN/TS 1992-4-5 Section 6.2.2.3	k_8	[-]	10,1					
Concrete cone failure								
Factor according to CEN/TS 1992-4-5 Section 6.2.3.1	k_{ucr}	[-]	10,1					
Characteristic edge distance	$c_{cr,N}$	[mm]	$1{,}5\ h_{ef}$					
Characteristic spacing	$s_{cr,N}$	[mm]	$3\ h_{ef}$					
Splitting[2]								
Edge distance	$c_{cr,sp}$	[mm]	$1{,}5\ h_{ef}$	$1\ h_{ef}$				
Spacing	$s_{cr,sp}$	[mm]	$3\ h_{ef}$	$2\ h_{ef}$				
Installation safety factor	$\gamma_2 = \gamma_{inst}$	[-]	1,2					

[1] $\tau_{Rk} = N^0_{Rk,p} / (h_{ef} \cdot D_a \cdot \pi)$, D_a acc. Table A2

[2] For the proof against splitting failure, $N^0_{Rk,c}$ has to be replaced by $N^0_{Rk,p}$.

Table C6: Displacements under tension loads

Anchor size			M8	M10	M12	M16	M20	M24
Tension load	N	[kN]	8	12	16	20	30	38
Displacement	δ_{N0}	[mm]	0,1	0,2	0,2	0,2	0,5	0,4
	$\delta_{N\infty}$	[mm]	0,5					

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Metal parts made of zinc plated or hot dip galvanised steel

Table C7: Design method A, characteristic values for shear loads

Anchor size			M8	M10	M12	M16	M20	M24
Steel failure without lever arm								
Characteristic resistance **property class 5.8**	$V_{Rk,S}$	[kN]	9	14	21	39	61	88
Characteristic resistance **property class 8.8**	$V_{Rk,S}$	[kN]	15	23	33	63	98	141
Ductility factor according to CEN/TS 1992-4-5 Section 6.3.2.1	k_2	[-]	0,8					
Steel failure with lever arm								
Characteristic bending moment **property class 5.8**	$M^0_{Rk,S}$	[Nm]	19	37	65	166	325	561
Characteristic bending moment **property class 8.8**	$M^0_{Rk,S}$	[Nm]	30	60	105	266	519	898
Pry out failure								
Factor k_3 in equation (27) of CEN/TS 1992-4-5 Section 6.3.3 Factor k acc. to ETAG 001, Annex C	$k_{(3)}$	[-]	2,0					
Installation safety factor	$\gamma_2 = \gamma_{inst}$	[-]	1,0					
Concrete edge failure								
Effective length of anchor	ℓ_f	[mm]	80	90	110	125	170	210
Outside diameter of anchor	d_{nom}	[mm]	10	12	14	18	25	28
Installation safety factor	$\gamma_2 = \gamma_{inst}$	[-]	1,0					

Table C8: Displacements under shear loads

Anchor size			M8	M10	M12	M16	M20	M24
Shear load	V	[kN]	5	8	12	22	35	50
Displacement	δ_{V0}	[mm]	2	3	3	4	5	5
	$\delta_{V\infty}$	[mm]	4	5	5	6	7	7

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Metal parts made of stainless steel 1.4401, 1.4404 or 1.4571

Table C9: Design method A, characteristic values for shear loads

Anchor size			M8	M10	M12	M16	M20	M24
Steel failure without lever arm								
Characteristic resistance **strength class A4-70**	$V_{Rk,S}$	[kN]	13	20	29	55	86	124
Characteristic resistance **strength class A4-80**	$V_{Rk,S}$	[kN]	15	23	33	62	98	141
Ductility factor according to CEN/TS 1992-4-5 Section 6.3.2.1	k_2	[-]	0,8					
Steel failure with lever arm								
Characteristic bending moment **strength class A4-70**	$M^0_{Rk,S}$	[Nm]	26	52	92	233	454	785
Characteristic bending moment **strength class A4-80**	$M^0_{Rk,S}$	[Nm]	30	60	105	266	519	898
Pry out failure								
Factor k_3 in equation (27) of CEN/TS 1992-4-5 Section 6.3.3 Factor k acc. to ETAG 001, Annex C	$k_{(3)}$	[-]	2,0					
Installation safety factor	$\gamma_2 = \gamma_{inst}$	[-]	1,0					
Concrete edge failure								
Effective length of anchor	ℓ_f	[mm]	80	90	110	125	170	210
Outside diameter of anchor	d_{nom}	[mm]	10	12	14	18	25	28
Installation safety factor	$\gamma_2 = \gamma_{inst}$	[-]	1,0					

Table C10: Displacements under shear loads

Anchor size			M8	M10	M12	M16	M20	M24
Shear load	V	[kN]	5	8	12	22	35	50
Displacement	δ_{V0}	[mm]	2	3	3	4	5	5
	$\delta_{V\infty}$	[mm]	4	5	5	6	7	7

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Metal parts made of high corrosion resistant steel 1.4529 or 1.4565

Table C11: Design method A, characteristic values for shear loads

Anchor size			M8	M10	M12	M16	M20	M24
Steel failure without lever arm								
Characteristic resistance **strength class 70**	$V_{Rk,S}$	[kN]	13	20	29	55	86	124
Ductility factor according to CEN/TS 1992-4-5 Section 6.3.2.1	k_2	[-]	0,8					
Steel failure with lever arm								
Characteristic bending moment **strength class 70**	$M^0_{Rk,S}$	[Nm]	26	52	92	233	454	785
Pry out failure								
Factor k_3 in equation (27) of CEN/TS 1992-4-5 Section 6.3.3 Factor k acc. to ETAG 001, Annex C	$k_{(3)}$	[-]	2,0					
Installation safety factor	$\gamma_2 = \gamma_{inst}$	[-]	1,0					
Concrete edge failure								
Effective length of anchor	ℓ_f	[mm]	80	90	110	125	170	210
Outside diameter of anchor	d_{nom}	[mm]	10	12	14	18	25	28
Installation safety factor	$\gamma_2 = \gamma_{inst}$	[-]	1,0					

Table C12: Displacements under shear loads

Anchor size			M8	M10	M12	M16	M20	M24
Shear load	V	[kN]	5	8	12	22	35	50
Displacement	δ_{V0}	[mm]	2	3	3	4	5	5
	$\delta_{V\infty}$	[mm]	4	5	5	6	7	7

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