

Approval body for construction products  
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and  
Laender Governments



## European Technical Assessment

ETA-06/0100  
of 29 May 2018

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

GFS Chemical Capsule Anchor VA

Product family  
to which the construction product belongs

Bonded fastener for use in concrete

Manufacturer

DBN BV  
Munterij 8  
4762 AH ZEVENBERGEN  
NIEDERLANDE

Manufacturing plant

DBN BV Plant 1

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

EAD 330499-00-0601

**European Technical Assessment**

**ETA-06/0100**

English translation prepared by DIBt

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## Specific Part

### 1 Technical description of the product

The GFS Chemical Capsule Anchor VA is a bonded anchor consisting of a glass capsule GFS VA 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 to tension load (static and quasi-static loading)	See Annex C 1
Characteristic resistance to shear load (static and quasi-static loading)	See Annex C 2
Displacements (static and quasi-static loading)	See Annex C 1 and C 2
Characteristic resistance and displacements for seismic performance categories C1 and C2	No performance assessed

#### 3.2 Hygiene, health and the environment (BWR 3)

Essential characteristic	Performance
Content, emission and/or release of dangerous substances	No performance assessed

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

In accordance with the European Assessment Document EAD 330499-00-0601 the applicable European legal act is: [96/582/EC].

The system to be applied is: 1

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**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.

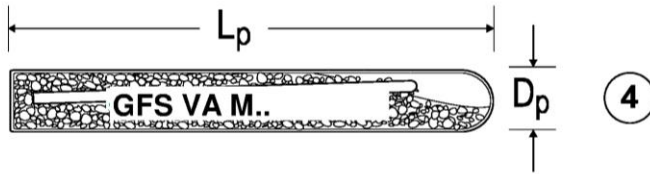
Issued in Berlin on 29 May 2018 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow  
Head of Department

*beglaubigt:*  
Baderschneider

**Product and Installed condition**

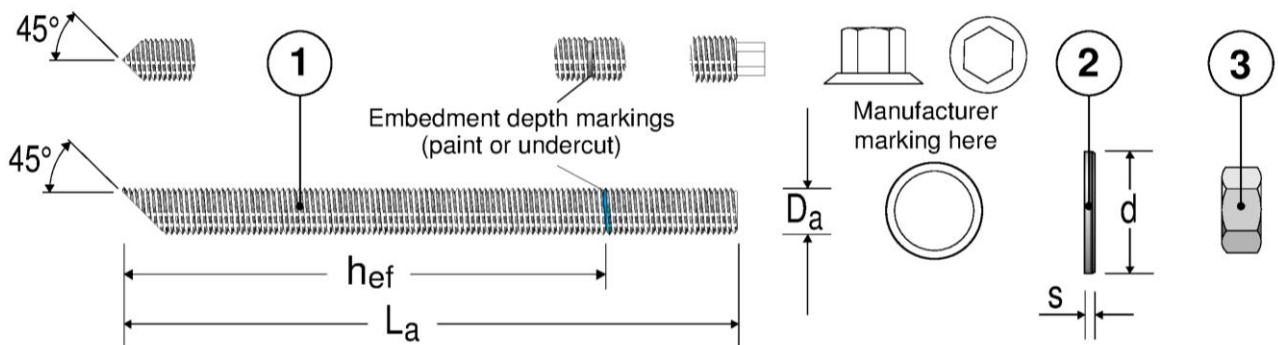
**Mortar Capsule GFS VA:**



**Marking capsule**

Manufacturer:	GFS
Capsule type:	VA
Capsule size:	M..

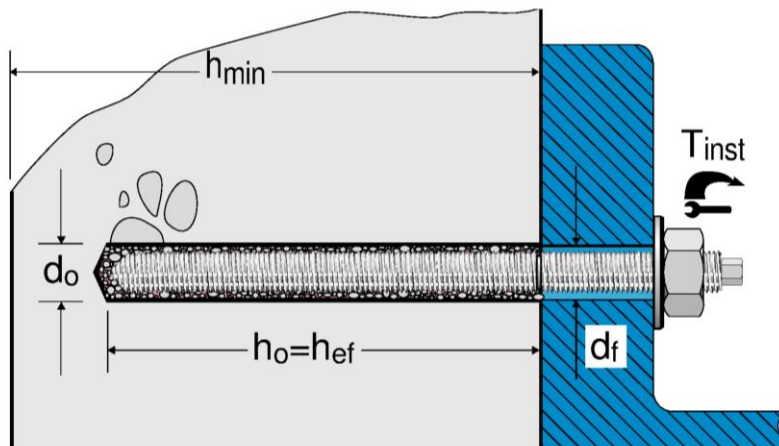
**Anchor rod**



**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



GFS Chemical Capsule Anchor VA

**Product description**  
Product and installed condition

Annex A 1

**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 <sub>5</sub> > 8% fracture elongation	High Corrosion resistant steel 1.4529 or 1.4565 property class 70 EN ISO 3506-1:2009 A <sub>5</sub> > 8% fracture elongation
		Galvanised steel ≥ 5µm acc. to EN ISO 4042:1999 A <sub>5</sub> > 8% fracture elongation	Hot dip galvanised steel EN ISO 10684:2004+AC:2009 A <sub>5</sub> > 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 <sub>a</sub>	M8	M10	M12	M16	M20	M24
		L <sub>a</sub> ≥ [mm]	95	100	120	140	190	235
2	Washer	s	1,6	2,1	2,5	3,0	3,0	4,0
		d [mm]	16	21	24	30	37	44
3	Hexagon nut	SW [mm]	13	17	19	24	30	36
4	Glass capsule	D <sub>p</sub>	9	11	13	17	22	24
		L <sub>p</sub> [mm]	80	80	95	95	175	210

GFS Chemical Capsule Anchor VA

**Product description**  
Materials  
Dimensions

Annex A 2



## Specifications of intended use

### Anchorage subject to:

- Static and quasi-static loads: all sizes.

### Base materials:

- Reinforced or unreinforced normal weight concrete without fibers according to EN 206:2013.
- Strength classes C20/25 to C50/60 according to EN 206-1:2013.
- 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 are designed in accordance with FprEN 1992-4:2016 and TR 055.

### 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.

GFS Chemical Capsule Anchor VA

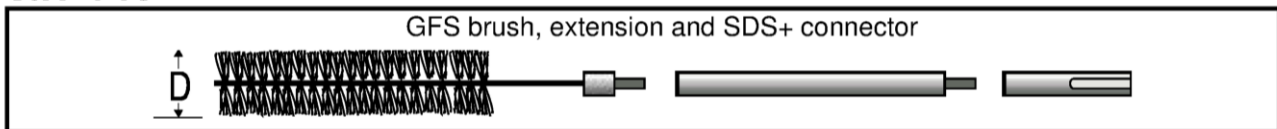
**Intended Use**  
Specifications

Annex B 1

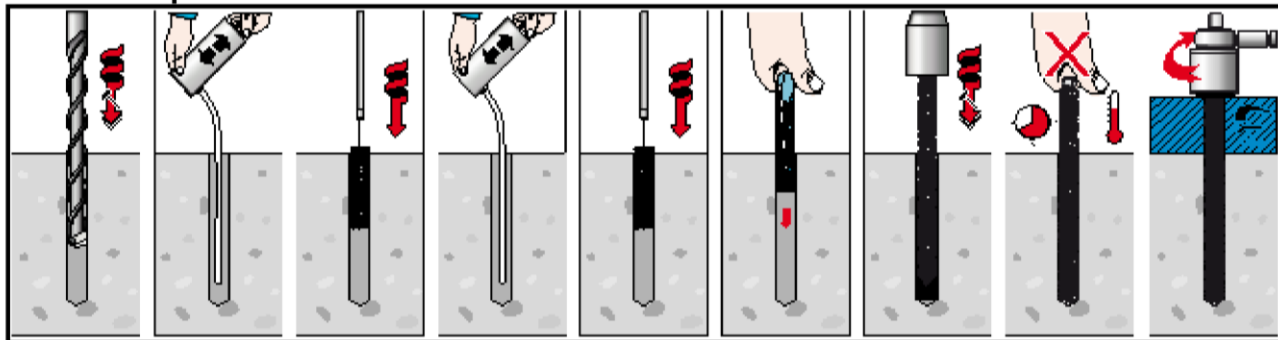
**Table B1: Installation parameters**

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
Maximum torque moment	$T_{inst}$ [Nm]	10	20	40	80	120	180

**Steel brush**



**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
$\geq 0^\circ\text{C}$	5 hrs.	10 hrs.
$\geq +5^\circ\text{C}$	1 hr.	2 hrs.
$\geq +20^\circ\text{C}$	20 min.	40 min.
$\geq +30^\circ\text{C}$	10 min.	20 min.

GFS Chemical Capsule Anchor VA

**Intended Use**

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

Annex B 3



**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
<b>Steel failure</b>							
Characteristic resistance <b>property class 5.8</b>	$N_{Rk,S}$ [kN]	18	29	42	78	123	177
Characteristic resistance <b>property class 8.8</b>	$N_{Rk,S}$ [kN]	29	46	67	126	196	282
<b>Combined pull-out and concrete failure</b>							
Characteristic resistance in non-cracked concrete C20/25 to C50/60							
Temperature range I	$N_{Rk,p}^0$ [kN]	20	30	40	60	90	120
Temperature range II	$N_{Rk,p}^0$ [kN]	20	30	40	50	75	90
Factor for $k_1$	$k_{ucr,N}$ [-]	11,0					
<b>Concrete cone failure</b>							
Factor for $k_1$	$k_{ucr,N}$ [-]	11,0					
Characteristic edge distance	$c_{cr,N}$ [mm]	1,5 $h_{ef}$					
Characteristic spacing	$s_{cr,N}$ [mm]	3 $h_{ef}$					
<b>Splitting<sup>1)</sup></b>							
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 factor	$\gamma_{inst}$ [-]	1,2					

<sup>1)</sup> For the proof against splitting failure,  $N_{Rk,c}^0$  has to be replaced by  $N_{Rk,p}^0$ .

**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	$\delta_{N0}$ [mm]	0,1	0,2	0,2	0,2	0,5	0,4
	$\delta_{N\infty}$ [mm]	0,5					

GFS Chemical Capsule Anchor VA

**Performance**  
Characteristic values for tension loads  
Displacements

Annex C 1

**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
<b>Steel failure</b>							
Characteristic resistance <b>strength class A4-70</b>	$N_{Rk,S}$ [kN]	26	40	59	110	172	247
Characteristic resistance <b>strength class A4-80</b>	$N_{Rk,S}$ [kN]	29	46	67	126	196	282
<b>Combined pull-out and concrete failure</b>							
Characteristic resistance in non-cracked concrete C20/25 to C50/60							
Temperature range I	$N_{Rk,p}^0$ [kN]	20	30	40	60	90	120
Temperature range II	$N_{Rk,p}^0$ [kN]	20	30	40	50	75	90
Factor for $k_1$	$k_{ucr,N}$ [-]	11,0					
<b>Concrete cone failure</b>							
Factor for $k_1$	$k_{ucr,N}$ [-]	11,0					
Characteristic edge distance	$c_{cr,N}$ [mm]	1,5 $h_{ef}$					
Characteristic spacing	$s_{cr,N}$ [mm]	3 $h_{ef}$					
<b>Splitting<sup>1)</sup></b>							
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 factor	$\gamma_{inst}$ [-]	1,2					

<sup>1)</sup> For the proof against splitting failure,  $N_{Rk,c}^0$  has to be replaced by  $N_{Rk,p}^0$ .

**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	$\delta_{N0}$ [mm]	0,1	0,2	0,2	0,2	0,5	0,4
	$\delta_{N\infty}$ [mm]	0,5					

GFS Chemical Capsule Anchor VA

**Performance**  
Characteristic values for tension loads  
Displacements

Annex C 2

**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
<b>Steel failure</b>							
Characteristic resistance <b>strength class 70</b>	$N_{Rk,S}$ [kN]	26	40	59	110	172	247
<b>Combined pull-out and concrete failure</b>							
Characteristic resistance in non-cracked concrete C20/25 to C50/60							
Temperature range I	$N_{Rk,p}^0$ [kN]	20	30	40	60	90	120
Temperature range II	$N_{Rk,p}^0$ [kN]	20	30	40	50	75	90
Factor for $k_1$	$k_{ucr,N}$ [-]	11,0					
<b>Concrete cone failure</b>							
Factor for $k_1$	$k_{ucr,N}$ [-]	11,0					
Characteristic edge distance	$c_{cr,N}$ [mm]	1,5 $h_{ef}$					
Characteristic spacing	$s_{cr,N}$ [mm]	3 $h_{ef}$					
<b>Splitting<sup>1)</sup></b>							
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 factor	$\gamma_{inst}$ [-]	1,2					

<sup>1)</sup> For the proof against splitting failure,  $N_{Rk,c}^0$  has to be replaced by  $N_{Rk,p}^0$ .

**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	$\delta_{N0}$ [mm]	0,1	0,2	0,2	0,2	0,5	0,4
	$\delta_{N\infty}$ [mm]	0,5					

GFS Chemical Capsule Anchor VA

**Performance**  
Characteristic values for tension loads  
Displacements

Annex C 3

**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
<b>Steel failure without lever arm</b>							
Characteristic resistance <b>property class 5.8</b>	$V_{Rk,S}^0$ [kN]	9	14	21	39	61	88
Characteristic resistance <b>property class 8.8</b>	$V_{Rk,S}^0$ [kN]	15	23	33	63	98	141
Ductility factor	$k_7$ [-]	0,8					
<b>Steel failure with lever arm</b>							
Characteristic bending moment <b>property class 5.8</b>	$M_{Rk,S}^0$ [Nm]	19	37	65	166	325	561
Characteristic bending moment <b>property class 8.8</b>	$M_{Rk,S}^0$ [Nm]	30	60	105	266	519	898
<b>Pry out failure</b>							
Factor	$k_8$ [-]	2,0					
Installation factor	$\gamma_{inst}$ [-]	1,0					
<b>Concrete edge failure</b>							
Effective length of anchor	$\ell_f$ [mm]	80	90	110	125	170	210
Outside diameter of anchor	$d_{nom}$ [mm]	10	12	14	18	25	28
Installation factor	$\gamma_{inst}$ [-]	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	$\delta_{V0}$ [mm]	2	3	3	4	5	5
	$\delta_{V\infty}$ [mm]	4	5	5	6	7	7

GFS Chemical Capsule Anchor VA

**Performance**  
Characteristic values for shear loads  
Displacements

Annex C 4

**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
<b>Steel failure without lever arm</b>							
Characteristic resistance <b>strength class A4-70</b>	$V_{Rk,S}^0$ [kN]	13	20	29	55	86	124
Characteristic resistance <b>strength class A4-80</b>	$V_{Rk,S}^0$ [kN]	15	23	33	62	98	141
Ductility factor	$k_7$ [-]	0,8					
<b>Steel failure with lever arm</b>							
Characteristic bending moment <b>strength class A4-70</b>	$M_{Rk,S}^0$ [Nm]	26	52	92	233	454	785
Characteristic bending moment <b>strength class A4-80</b>	$M_{Rk,S}^0$ [Nm]	30	60	105	266	519	898
<b>Pry out failure</b>							
Factor	$k_8$ [-]	2,0					
Installation factor	$\gamma_{inst}$ [-]	1,0					
<b>Concrete edge failure</b>							
Effective length of anchor	$\ell_f$ [mm]	80	90	110	125	170	210
Outside diameter of anchor	$d_{nom}$ [mm]	10	12	14	18	25	28
Installation factor	$\gamma_{inst}$ [-]	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	$\delta_{V0}$ [mm]	2	3	3	4	5	5
	$\delta_{V\infty}$ [mm]	4	5	5	6	7	7

GFS Chemical Capsule Anchor VA

**Performance**  
Characteristic values for shear loads  
Displacements

Annex C 5

**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
<b>Steel failure without lever arm</b>							
Characteristic resistance <b>strength class 70</b>	$V_{Rk,S}^0$ [kN]	13	20	29	55	86	124
Ductility factor	$k_7$ [-]	0,8					
<b>Steel failure with lever arm</b>							
Characteristic bending moment <b>strength class 70</b>	$M_{Rk,S}^0$ [Nm]	26	52	92	233	454	785
<b>Pry out failure</b>							
Factor	$k_8$ [-]	2,0					
Installation factor	$\gamma_{inst}$ [-]	1,0					
<b>Concrete edge failure</b>							
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 factor	$\gamma_{inst}$ [-]	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	$\delta_{V0}$ [mm]	2	3	3	4	5	5
	$\delta_{V\infty}$ [mm]	4	5	5	6	7	7

GFS Chemical Capsule Anchor VA

**Performance**  
Characteristic values for shear loads  
Displacements

Annex C 6