

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-21/1068
of 28 February 2022

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the
European Technical Assessment:

Trade name of the construction product

Product family
to which the construction product belongs

Manufacturer

Manufacturing plant

This European Technical Assessment
contains

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

Deutsches Institut für Bautechnik

Capsule Adhesive Anchor HB-VZ

Bonded fasteners for use in concrete

Leviat GmbH
Liebigstraße 14
40764 Langenfeld
DEUTSCHLAND

Leviat Herstellwerk HB1

15 pages including 3 annexes which form an integral part
of this assessment

EAD 330499-01-0601, Edition 04/2020

The European Technical Assessment is issued by the Technical Assessment Body in its official language. Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and shall be identified as such.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full. However, partial reproduction may only be made with the written consent of the issuing Technical Assessment Body. Any partial reproduction shall be identified as such.

This European Technical Assessment may be withdrawn by the issuing Technical Assessment Body, in particular pursuant to information by the Commission in accordance with Article 25(3) of Regulation (EU) No 305/2011.

Specific Part

1 Technical description of the product

The Capsule Adhesive Anchor HB-VZ is a bonded fastener consisting of a glass capsule HB-VZ-P and a threaded rod HB-V-A according to Annex A1.

The glass capsule HB-VZ-P is placed in the hole and the threaded rod HB-V-A is driven by machine as specified in Annex B4.

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 B2, C1 and C2
Characteristic resistance to shear load (static and quasi-static loading)	See Annex C1 and C3
Displacements under short-term and long-term loading	See Annex C4
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 330499-01-0601 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 28. Februar 2022 by Deutsches Institut für Bautechnik

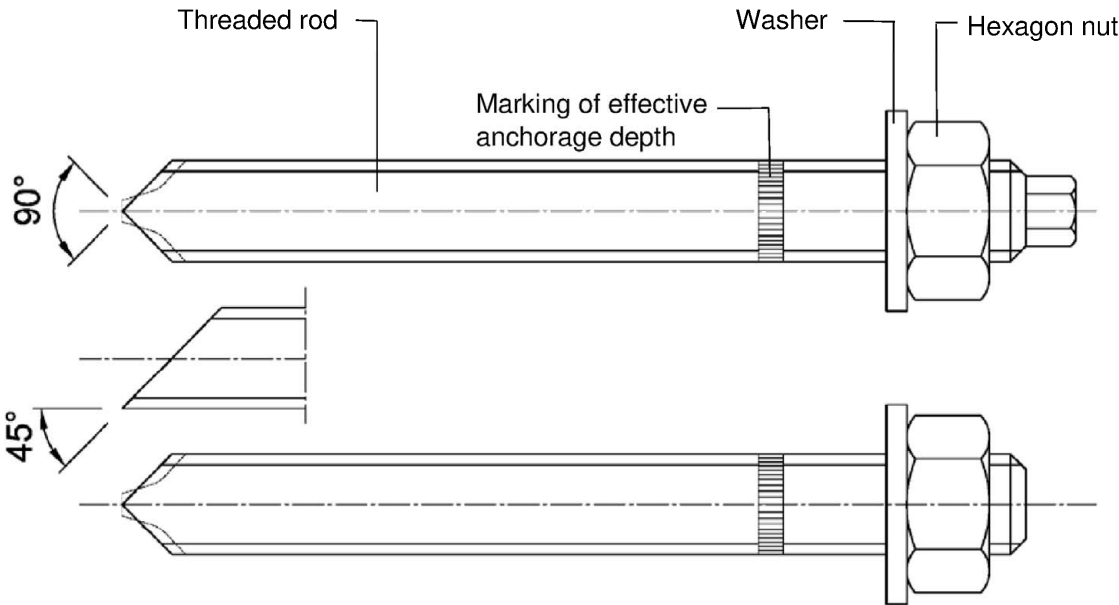
Dipl.-Ing. Beatrix Wittstock
Head of Section

beglaubigt:
Baderschneider

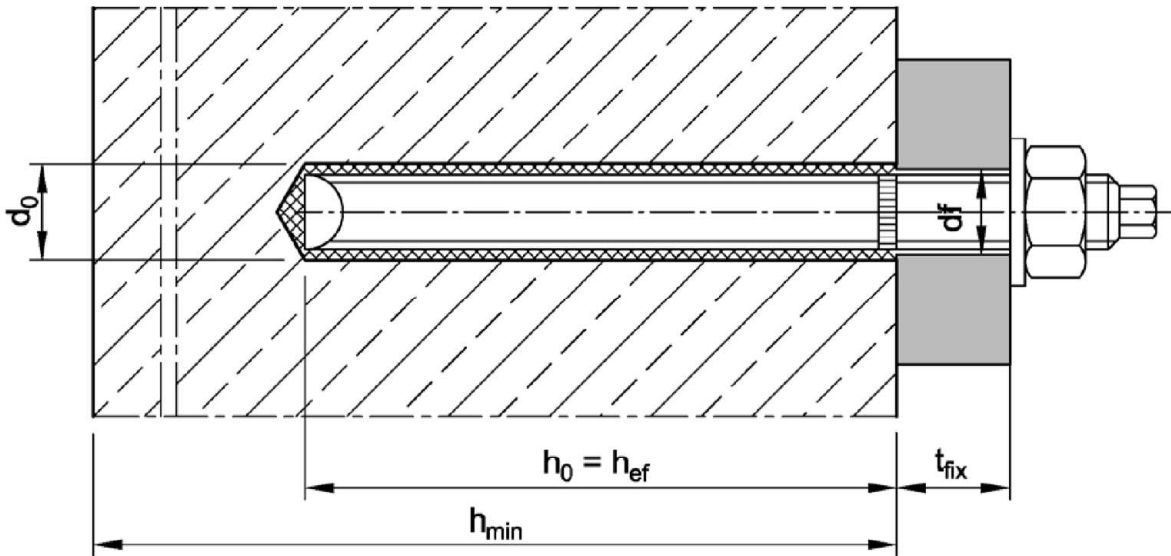
Glass capsule HB-VZ-P



Threaded rod HB-V-A



Installation condition

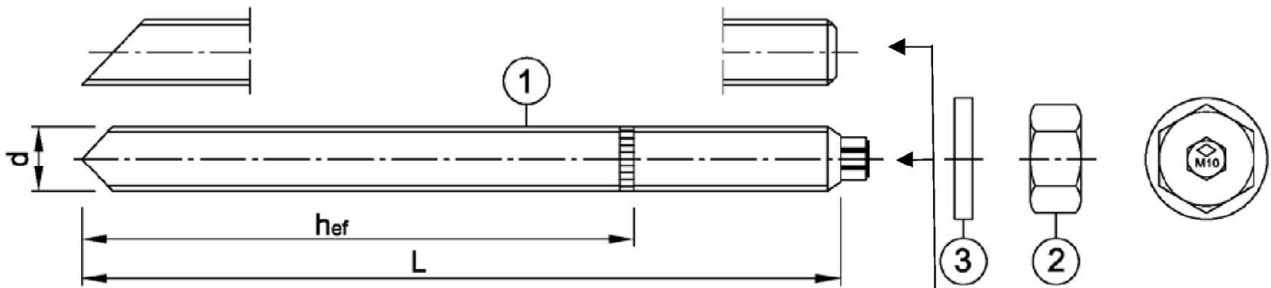


Capsule Adhesive Anchor HB-VZ

Product description
Product and installation condition

Annex A1

Threaded rod HB-V-A M8, M10, M12, M16, M20



Marking: e.g.  M10

 identifying mark of manufacturing plant
M10 anchor size

Additional marking:

- 8 property class 8.8
- A4 stainless steel
- HC high corrosion resistant steel

Glass capsule HB-VZ-P



Table A1: Dimensions

Part	Anchor size		M8	M10	M12	M16	M20
1	Threaded rod	d [mm]	8	10	12	16	20
		L ≥ [mm]	95	101	125	145	192
		hef [mm]	80	90	110	125	170
2	Hexagon nut	SW [mm]	13	17	19	24	30
4	Glass capsule	[-]	HB-VZ-P 8	HB-VZ-P 10	HB-VZ-P 12	HB-VZ-P 16	HB-VZ-P 20

Capsule Adhesive Anchor HB-VZ

Product description
Marking and dimensions

Annex A2

Table A2: Materials

Part	Designation	Materials						
Steel, zinc plated electroplated ≥ 5 μm acc. to EN ISO 4042:2018 hot-dip galvanized ≥ 40 μm (50 μm in average) acc. to EN ISO 1461:2009 and EN ISO 10684:2004+AC:2009 sherardized ≥ 45 μm acc. to EN ISO 17668:2016								
1	Threaded rod	Property class	characteristic ultimate strength		characteristic yield strength		fracture elongation	EN 10277:2018, EN 10263:2001, EN 10025-2:2019
		5.8	f _{uk}	500	f _{yk}	400	A ₅ > 8 %	
		8.8	[N/mm ²]	800	[N/mm ²]	640	A ₅ > 8 %	
2	Hexagon nut	5	for class 5.8					EN ISO 898-2:2012
		8	for class 5.8, 8.8					
3	Washer	steel, zinc plated						
Stainless steel A2 Stainless steel A4 High corrosion resistant steel HCR								
1	Threaded rod	Property class	characteristic ultimate strength		characteristic steel yield strength		fracture elongation	EN 10088:2014 EN ISO 3506-1:2020
		70	f _{uk}	700	f _{yk}	450	A ₅ > 8 %	
		80	[N/mm ²]	800	[N/mm ²]	600	A ₅ > 8 %	
2	Hexagon nut	70	for class 70					EN 10088:2014 EN ISO 3506-2:2020
		80	for class 70, 80					
3	Washer	stainless steel or high corrosion resistant steel (corrosion resistant class at least corresponding to the threaded rod)					EN 10088:2014	
Glass capsule								
4	Glass capsule	glass, quartz, resin, hardener						

Capsule Adhesive Anchor HB-VZ

Product description
Materials

Annex A3

Specifications of intended use

Anchor size	M8	M10	M12	M16	M20
Static or quasi-static action	✓				
Base materials	compacted, reinforced or unreinforced normal weight concrete without fibers acc. to EN 206:2013+A1:2016				
	strength classes C20/25 to C50/60, acc. to EN 206:2013+A1:2016				
	cracked or uncracked concrete				
Temperature range I -40°C to +40°C	max long term temperature +24°C; max short term temperature +40°C				
Temperature range II -40°C to +80°C	max long term temperature +50°C; max short term temperature +80°C				

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions: all versions
- For all other conditions corresponding to corrosion resistance classes CRC according to EN 1993-1-4:2015, Annex A, Table A.2:
 - V-A A2: CRC II
 - V-A A4: CRC III
 - V-A HCR: CRC V

Design:

- 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.)
- Anchorage is designed under the responsibility of an engineer experienced in anchorages and concrete work
- Anchorage is designed according to EN 1992-4:2018 or TR 055, version February 2018

Installation:

- Dry or wet concrete
- Making of drill hole by hammer drilling, compressed air drilling or vacuum drilling
- Installation direction: D3 - downwards, horizontally and upwards (e.g. overhead) installation

Capsule Adhesive Anchor HB-VZ

Intended use
Specifications

Annex B1

Table B1: Installation parameters

Anchor size			M8	M10	M12	M16	M20
Diameter of threaded rod	$d=d_{nom}$	[mm]	8	10	12	16	20
Nominal diameter of drill hole	d_0	[mm]	10	12	14	18	22
Depth of drill hole	h_0	[mm]	80	90	110	125	170
Effective anchorage depth	h_{ef}	[mm]	80	90	110	125	170
Diameter of clearance hole in the fixture	d_f	[mm]	9	12	14	18	22
Cleaning Brush		[-]	RB 10	RB 12	RB 14	RB 18	RB 22
Diameter of Cleaning Brush	$d_b \geq$	[mm]	10,5	12,5	14,5	18,5	22,5
Maximum installation torque	$\max T_{inst}$	[Nm]	10	20	40	80	150

Supplies

Vacuum drill bit



Vacuum drill bit (MKT Hollow drill bit SB, Würth extraction drill bit or Heller Duster Expert) and a class M vacuum with minimum negative pressure of 253 hPa and a flow rate of minimum 42 l/s

Blow-out pump (volume 750ml)



Cleaning Brush RB



Table B2: Minimum member thickness, edge distance and spacing

Anchor size			M8	M10	M12	M16	M20
Minimum member thickness	h_{min}	[mm]	110	120	140	160	220
Minimum edge distance	c_{min}	[mm]	40	45	45	50	55
Minimum spacing	s_{min}	[mm]	40	50	60	75	90

Table B3: Curing time

Concrete temperature			Minimum curing time	
-20°C	to	-16°C	17 h	
-15°C	to	-11°C	7 h	
-10°C	to	-6°C	4 h	
-5°C	to	-1°C	3 h	
0°C	to	+4°C	50 min	
+5°C	to	+9°C	25 min	
+10°C	to	+19°C	15 min	
+20°C	to	+29°C	6 min	
+30°C	to	+40°C	6 min	
Capsule temperature			-15°C to +40°C	

Capsule Adhesive Anchor HB-VZ

Intended use

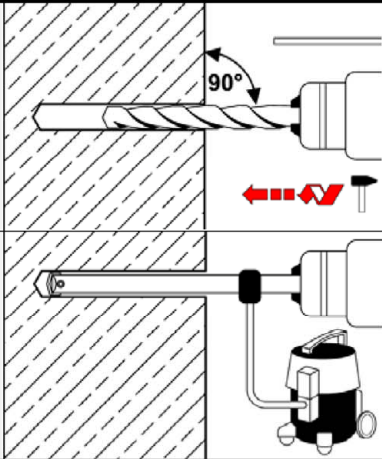
Installation parameters, edge distance and spacing, Curing time

Annex B2

Installation instructions

Drilling

1



Hammer drill or compressed air drill:

Drill the hole with diameter and depth according to Table B1.
Continue with step 2.

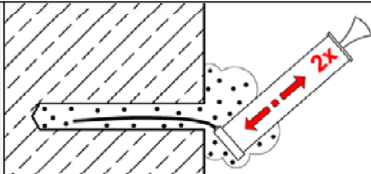
Vacuum drill: see Annex B2

Drill the hole with diameter and depth according to Table B1.
Additional cleaning is not necessary - continue with step 3.

Cleaning

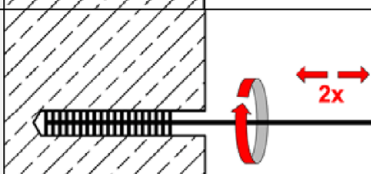
Drill hole must be cleaned directly before installation of the anchor, or it must be protected against recontamination in a suitable manner until installation of the anchor.

2a



Blow out the drill hole completely at least **2x** from the bottom of the drill hole with blow-out pump or compressed air.

2b



Brush the drill hole **2x** with Cleaning Brush RB (Table B1).
Observe and check brush diameter $d_{b,min}$. When inserting the brush into the drill hole, a clear resistance must be noticeable.
Otherwise use a new Cleaning Brush.

2c



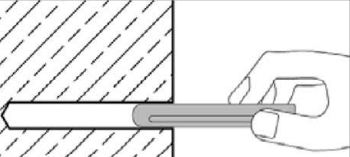
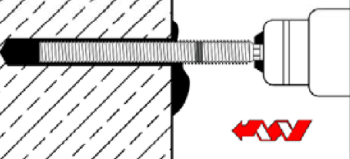
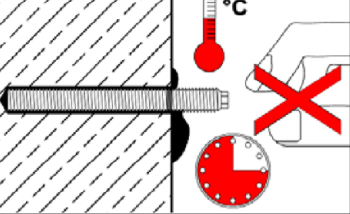
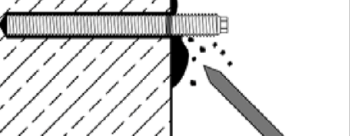
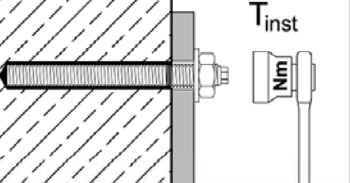
Blow out the drill hole completely at least **2x** from the bottom of the drill hole with blow-out pump or compressed air.

Capsule Adhesive Anchor HB-VZ

Intended use
Installation instructions

Annex B3

Installation instructions - continuation

Inserting the threaded rod		
3		Insert the capsule into the drill hole.
4		Drive in the anchor rod using a hammer drill set on rotary impact. Stop immediately after reaching the setting depth.
5		Observe curing time according to Table B3. Do not move or load the anchor until it is fully cured.
6		Remove excess adhesive.
7		Install fixture and apply installation torque T_{inst} according to Table B1.

Capsule Adhesive Anchor HB-VZ

Intended Use

Installation instructions - continuation

Annex B4

Table C1: Characteristic steel resistance under tension load

Anchor size				M8	M10	M12	M16	M20
Steel failure								
Characteristic resistance under tension load								
Steel, zinc plated	Property class 5.8	$N_{Rk,s}$	[kN]	18	29	42	79	123
	Property class 8.8	$N_{Rk,s}$	[kN]	29	46	67	126	196
Stainless steel / High corrosion resistant steel	Property class 70	$N_{Rk,s}$	[kN]	26	41	59	110	172
	Property class 80	$N_{Rk,s}$	[kN]	29	46	67	126	196
Partial factor ¹⁾								
Steel, zinc plated	Property class 5.8	$\gamma_{Ms,N}$	[-]	1,5				
	Property class 8.8	$\gamma_{Ms,N}$	[-]	1,5				
Stainless steel / High corrosion resistant steel	Property class 70	$\gamma_{Ms,N}$	[-]	1,87				
	Property class 80	$\gamma_{Ms,N}$	[-]	1,6				

¹⁾ In absence of other national regulations

Table C2: Characteristic steel resistance under shear load

Anchor size				M8	M10	M12	M16	M20
Characteristic resistances under shear load								
Steel failure <u>without</u> lever arm								
Steel, zinc plated	Property class 5.8	$V^0_{Rk,s}$	[kN]	11	17	25	47	73
	Property class 8.8	$V^0_{Rk,s}$	[kN]	15	23	34	63	98
Stainless steel / High corrosion resistant steel	Property class 70	$V^0_{Rk,s}$	[kN]	13	20	30	55	86
	Property class 80	$V^0_{Rk,s}$	[kN]	15	23	34	63	98
Steel failure <u>with</u> lever arm								
Steel, zinc plated	Property class 5.8	$M^0_{Rk,s}$	[Nm]	19	37	65	166	325
	Property class 8.8	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519
Stainless steel / High corrosion resistant steel	Property class 70	$M^0_{Rk,s}$	[Nm]	26	52	92	233	454
	Property class 80	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519
Partial factor ¹⁾								
Steel, zinc plated	Property class 5.8	$\gamma_{Ms,V}$	[-]	1,25				
	Property class 8.8	$\gamma_{Ms,V}$	[-]	1,25				
Stainless steel / High corrosion resistant steel	Property class 70	$\gamma_{Ms,V}$	[-]	1,56				
	Property class 80	$\gamma_{Ms,V}$	[-]	1,33				

¹⁾ In absence of other national regulations

Capsule Adhesive Anchor HB-VZ

Performance
Characteristic **steel resistance** under **tension** and **shear load**

Annex C1

Table C3: Characteristic values for tension load

Anchor size				M8	M10	M12	M16	M20
Steel failure								
Characteristic resistance under tension load								
Characteristic tension resistance	$N_{Rk,s}$	[kN]	see Table C1					
Partial factor	$\gamma_{Ms,N}$	[-]	see Table C1					
Combined pull-out and concrete failure								
Characteristic bond resistance in <u>uncracked</u> concrete C20/25								
Temperature range I:	+24°C / +40°C	$\tau_{Rk,ucr}$	[N/mm²]	10,0	13,0	13,0	13,0	13,0
Temperature range II:	+50°C / +80°C	$\tau_{Rk,ucr}$	[N/mm²]	8,5	11,0	11,0	11,0	11,0
Increasing factors for <u>uncracked</u> concrete $\tau_{Rk,ucr} = \psi_c \cdot \tau_{Rk,ucr} \text{ (C20/25)}$	ψ_c	[-]	$\left(\frac{f_{ck}}{20}\right)^{0,17}$					
Characteristic bond resistance in <u>cracked</u> concrete C20/25								
Temperature range I:	+24°C / +40°C	$\tau_{Rk,cr}$	[N/mm²]	5,0	6,5	7,0	7,5	7,5
Temperature range II:	+50°C / +80°C	$\tau_{Rk,cr}$	[N/mm²]	4,5	5,5	6,0	6,0	6,0
Increasing factors for <u>cracked</u> concrete $\tau_{Rk,cr} = \psi_c \cdot \tau_{Rk,cr} \text{ (C20/25)}$	ψ_c	[-]	$\left(\frac{f_{ck}}{20}\right)^{0,14}$					
Reduction factor ψ^0_{sus} in concrete C20/25								
Temperature range I:	+24°C / +40°C	ψ^0_{sus}	[-]	0,64				
Temperature range II:	+50°C / +80°C	ψ^0_{sus}	[-]	0,63				
Concrete cone failure								
Factor for	uncracked concrete	$k_{ucr,N}$	[-]	11,0				
	cracked concrete	$k_{cr,N}$	[-]	7,7				
Edge distance		$c_{cr,N}$	[mm]	1,5 h_{ef}				
Spacing		$s_{cr,N}$	[mm]	3 h_{ef}				
Splitting failure								
Edge distance	$h/h_{ef} \geq 2,0$	$c_{cr,sp}$	[mm]	1,0 h_{ef}				
	$2,0 > h/h_{ef} > 1,3$			$2 \cdot h_{ef} \text{ (2,5 - } h / h_{ef} \text{)}$				
	$h/h_{ef} \leq 1,3$			2,4 h_{ef}				
Spacing		$s_{cr,sp}$	[mm]	2 $c_{cr,sp}$				
Installation factor	γ_{inst}	[-]	1,2					

Capsule Adhesive Anchor HB-VZ

Performance
Characteristic values under **tension load**

Annex C2

Table C4: Characteristic values for shear loads

Anchor size			M8	M10	M12	M16	M20
Steel failure <u>without</u> lever arm							
Characteristic shear resistance	$V^0_{Rk,s}$	[kN]	see Table C2				
Ductility factor	k_7	[-]	1,0				
Partial factor	$\gamma_{Ms,V}$	[-]	see Table C2				
Steel failure <u>with</u> lever arm							
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	see Table C2				
Partial factor	$\gamma_{Ms,V}$	[-]	see Table C2				
Concrete pry-out failure							
Pry-out factor	k_8	[-]	2,0				
Concrete edge failure							
Effective length of anchor	l_f	[mm]	min (h_{ef} ; 12 d_{nom})				
Outside diameter of anchor	d_{nom}	[mm]	8	10	12	16	20
Installation factor	γ_{inst}	[-]	1,0				

Capsule Adhesive Anchor HB-VZ

Performance
Characteristic values under **shear load**

Annex C3

Table C5: Displacements under tension load

Anchor size			M8	M10	M12	M16	M20
Displacement factor¹⁾ for uncracked concrete							
Displacement	δ_{N0} -factor	[mm/(N/mm ²)]	0,015	0,031	0,035	0,015	0,046
	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,085	0,067	0,067	0,067	0,067
Displacement factor¹⁾ for cracked concrete							
Displacement	δ_{N0} -factor	[mm/(N/mm ²)]	0,046	0,038	0,024	0,008	0,024
	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,192	0,142	0,090	0,104	0,082

¹⁾ Calculation of the displacement

$$\delta_{N0} = \delta_{N0}\text{-factor} \cdot \tau; \quad \tau: \text{acting bond stress for tension}$$

$$\delta_{N\infty} = \delta_{N\infty}\text{-factor} \cdot \tau;$$

Table C6: Displacements under shear load

Anchor size			M8	M10	M12	M16	M20
Displacement factor¹⁾							
Displacement	δ_{V0} -factor	[mm/(kN)]	0,06	0,06	0,05	0,04	0,04
	$\delta_{V\infty}$ -factor	[mm/(kN)]	0,09	0,08	0,08	0,06	0,06

¹⁾ Calculation of the displacement

$$\delta_{V0} = \delta_{V0}\text{-factor} \cdot V; \quad V: \text{acting shear load}$$

$$\delta_{V\infty} = \delta_{V\infty}\text{-factor} \cdot V;$$

Capsule Adhesive Anchor HB-VZ

Performance
Displacements

Annex C4