Deutsches Institut für Bautechnik

Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

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European Technical Assessment ETA-05/0231 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	Chemical Anchor V
Product family to which the construction product belongs	Bonded fastener for use in concrete
Manufacturer	MKT Metall-Kunststoff-Technik GmbH & Co. KG Auf dem Immel 2 67685 Weilerbach DEUTSCHLAND
Manufacturing plant	MKT Herstellwerk 1 MKT Herstellwerk 3
This European Technical Assessment contains	12 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

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Specific Part

1 Technical description of the product

The Chemical Anchor V is a bonded anchor consisting of a glass capsule V-P 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

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

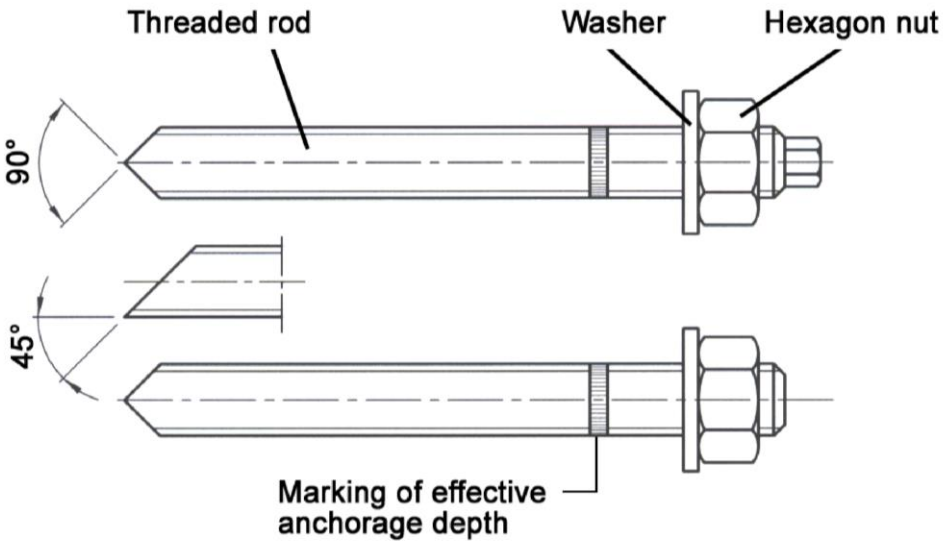
beglaubigt:
Baderschneider

Deutsches Institut für Bautechnik

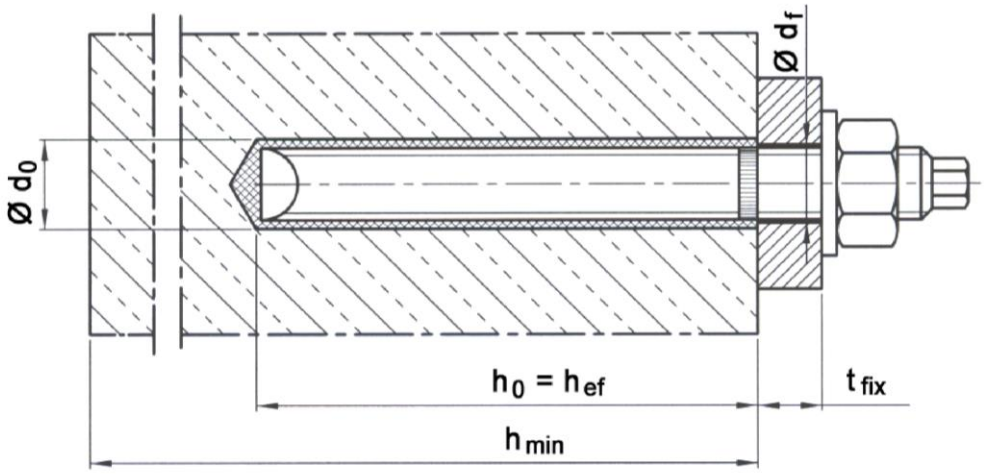
DIBt

Glass Capsule V-P

Threaded rod V-A



Installation condition



Chemical Anchor V	
Product description Insatallation situation	**Annex A1**

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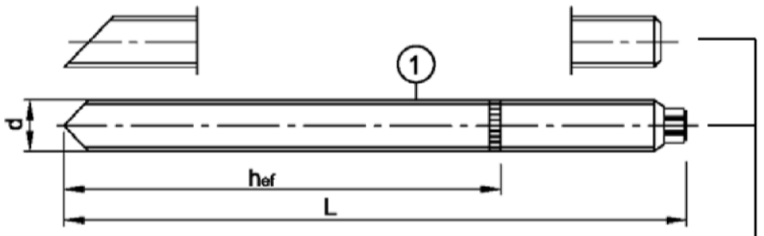
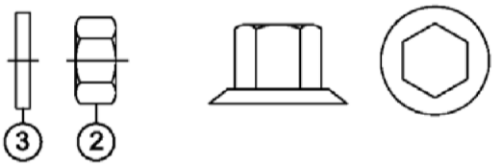
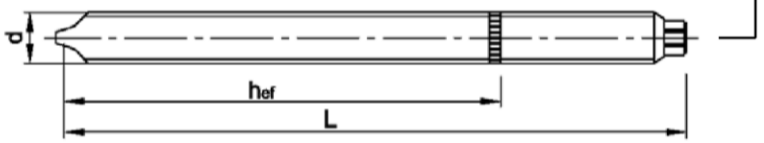
Threaded rod V-A

Machined steel





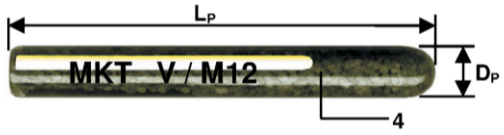
Cold formed



Marking: e.g.

- M12 — Identifiying mark of manufacturing plant
- additional marking of lengths for anchor size M12
  - H — marking of length
  - M12 — Size of thread
- M12-8
  - -8 — additional marking of Steel grade 8.8
- M12 A4
  - A4 — additional marking of Stainless steel A4
- M12 HCR
  - HCR — additional marking of High corrosion restistant steel HCR

Glass capsule V-P



Marking of length	E	F	G	H	I	J	K
Length of anchor min ≥	88,9	101,6	114,3	127,0	139,7	152,4	165,1
Length of anchor max <	101,6	114,3	127,0	139,7	152,4	165,1	177,8

Marking of length	L	M	N	O	P	Q	R
Length of anchor min ≥	177,8	190,5	203,2	215,9	228,6	241,3	254,0
Length of anchor max <	190,5	203,2	215,9	228,6	241,3	254,0	279,4

Marking of length	S	T	U	V	W	X	Y	Z
Length of anchor min ≥	279,4	304,8	330,2	355,6	381,0	406,4	431,8	457,2
Length of anchor max <	304,8	330,2	355,6	381,0	406,4	431,8	457,2	483,0

Table A1: Dimensions

Part	Anchor size			M8	M10	M12	M16	M20	M24
1	Threaded rod	d	[mm]	8	10	12	16	20	24
		L [1] ≥	[mm]	95	100	120	140	190	235
		h_{ef}	[mm]	80	90	110	125	170	210
2	Hexagon nut	SW	[mm]	13	17	19	24	30	36
4	Glass capsule	D_P	[mm]	9	11	13	17	22	24
		L_P	[mm]	80	80	95	95	175	210

[1] other lengths on demand

dimensions in mm

Chemical Anchor V

Product description
Marking and dimensions

Annex A2

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Table A2: Materials

Part	Designation	Materials
Steel, zinc plated galvanised ≥ 5 µm acc. to EN ISO 4042:1999 or hot-dip galvanised acc. to EN ISO 10684:2004+AC:2009		
1	Anchor rod	Steel, property class 5.8; 8.8, A_5 > 8 % fracture elongation
2	Hexagon nut	Steel, Property class 5 (for anchor rods class 5.8) Property class 8 (for anchor rods class 8.8) acc. to EN ISO 898-2:2013
3	Washer	Steel, zinc plated
Stainless steel A4		
1	Anchor rod	Material 1.4401 / 1.4404 / 1.4571 / 1.4362 / 1.4578 acc. to EN 10088-3:2014 Property class 70 and property class 80 A_5 > 8% fracture elongation
2	Hexagon nut	Stainless steel A4 Property class 70 (for anchor rods class 70), Property class 80 (for anchor rods class 80) acc. to EN ISO 3506-2:2009
3	Washer	Stainless steel A4 acc. to EN ISO 3506-1:2009
High corrosion resistant steel HCR		
1	Anchor rod	Material 1.4529 / 1.4565 acc. to EN 10088-3:2014 Property class 70 A_5 > 8% fracture elongation
2	Hexagon nut	Material 1.4529 / 1.4565 acc. to EN 10088-3:2014 Property class 70, acc. EN ISO 3506-2:2009
3	Washer	Material 1.4529 / 1.4565 acc. to EN 10088-3:2014
Glass capsule		
4	Glass capsule	Glass, Quartz, Resin, Hardener

Chemical Anchor V

Produktbeschreibung
Materials

Annex A3

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Specifications of intended use

Chemical Anchor V		Anchor rod V-A					
		M8	M10	M12	M16	M20	M24
Static or quasi-static action		✔					
Base materials		reinforced or unreinforced normal weight concrete without fibres acc. to EN 206:2013					
		strength classes C20/25 to C50/60, acc. to EN 206:2013					
		uncracked concrete					
Temperature Range I	-40°C to +40°C	max long term temperature +24°C and max short term temperature +40°C					
Temperature Range 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 plated 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:

- 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 under the responsibility of an engineer experienced in anchorages and concrete work
- Anchorages are designed in accordance with FprEN 1992-4:2016 and TR 055

Chemical Anchor V	Annex B1
Intended use Specifications	

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Table B1: Installation parameters

Anchor size			M8	M10	M12	M16	M20	M24
Nominal diameter of drill hole	d_0	[mm]	10	12	14	18	25	28
Cutting diameter of drill hole	$d_{cut} \leq$	[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_b	[mm]	11	13	16	20	27	30
Maximum installation torque	T_{inst}	[Nm]	10	20	40	80	120	180

Steelbrush d_b

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 drill hole	Minimum curing time	
	dry concrete	wet concrete
≥ 0°C	5 h	10 h
≥ + 5°C	1 h	2 h
≥ +20°C	20 min	40 min
≥ +30°C	10 min	20 min

Chemical Anchor V

Intended use
Installation parameters / Curing Time

Annex B2

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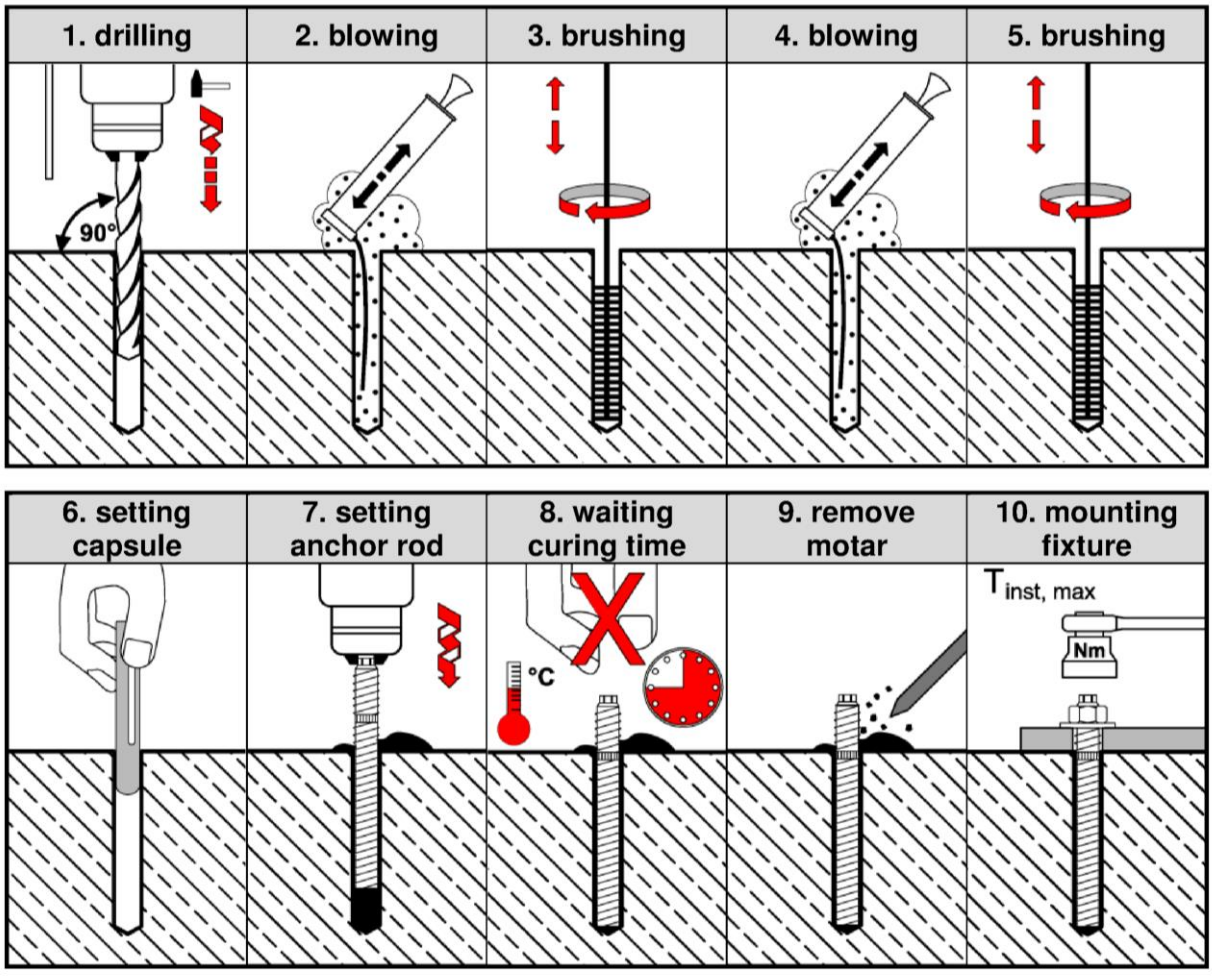
Installation

- 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 blowing / 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 B2, Table B1 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.
- Curing time must be observed pior to loading the anchor.
- Observe expiration date



Chemical Anchor V

Intended use
Installation

Annex B3

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Table C1: Characteristic values for tension loads

Anchor size				M8	M10	M12	M16	M20	M24
Steel failure									
Characteristic resistance	**Steel, zinc plated** property class **5.8**	$N_{Rk,s}$	[kN]	18	29	42	78	123	177
	Steel, zinc plated property class **8.8**	$N_{Rk,s}$	[kN]	29	46	67	126	196	282
	Stainless steel A4 property class **70**	$N_{Rk,s}$	[kN]	26	40	59	110	172	247
	Stainless steel A4 property class **80**	$N_{Rk,s}$	[kN]	29	46	67	126	196	282
	High corrosion resistant steel HCR	$N_{Rk,s}$	[kN]	26	40	59	110	172	247
Combined pull-out and concrete failure									
Characteristic resistance in uncracked concrete C20/25 to C50/60									
Temperature range I		τ_{Rk}	[N/mm²]	10	11	9,5	9,5	8,5	7,5
Temperature range II		τ_{Rk}	[N/mm²]	10	11	9,5	8,0	7,0	5,5
Concrete cone failure									
Factor for k_1		$k_{ucr,N}$	[-]	11,0					
Edge distance		$c_{cr,N}$	[mm]	1,5 h_{ef}					
Spacing		$s_{cr,N}$	[mm]	3 h_{ef}					
Splitting									
Characteristic resistance		$N^0_{Rk,sp}$	[kN]	min [$N^0_{Rk,p}$; $N^0_{Rk,c}$]					
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		γ_{inst}	[-]	1,2					

Table C2: Displacements under tension load

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					

Chemical Anchor V

Performance
Characteristic values and displacements under **tension load**

Annex C1

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Table C3: Characteristic values for shear loads

Anchor size				**M8**	**M10**	**M12**	**M16**	**M20**	**M24**
Steel failure without lever arm									
Characteristic shear resistance	**Steel, zinc plated** property class **5.8**	$V^0_{Rk,s}$	[kN]	9	14	21	39	61	88
	Steel, zinc plated property class **8.8**	$V^0_{Rk,s}$	[kN]	15	23	33	63	98	141
	Stainless steel A4 property class **70**	$V^0_{Rk,s}$	[kN]	13	20	29	55	86	124
	Stainless steel A4 property class **80**	$V^0_{Rk,s}$	[kN]	15	23	33	62	98	141
	High corrosion resistant steel HCR	$V^0_{Rk,s}$	[kN]	13	20	29	55	86	124
Ductility factor		k_7	[-]	0,8					
Steel failure with lever arm									
Characteristic bending moment	**Steel, zinc plated** property class **5.8**	$M^0_{Rk,s}$	[Nm]	19	37	65	166	325	561
	Steel, zinc plated property class **8.8**	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	898
	Stainless steel A4 property class **70**	$M^0_{Rk,s}$	[Nm]	26	52	92	233	454	785
	Stainless steel A4 property class **80**	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	898
	High corrosion resistant steel HCR	$M^0_{Rk,s}$	[Nm]	26	52	92	233	454	785
Pry-out failure									
Factor		k_8	[-]	2,0					
Concrete edge failure									
Effective length of anchor		l_f	[mm]	80	90	110	125	170	210
Effective diameter of anchor		d_{nom}	[mm]	10	12	14	18	25	28
Installation factor		γ_{inst}	[-]	1,0					

Table C4: Displacements under shear load

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

Chemical Anchor V

Annex C2

Performance
Characteristic values and displacements under **shear load**