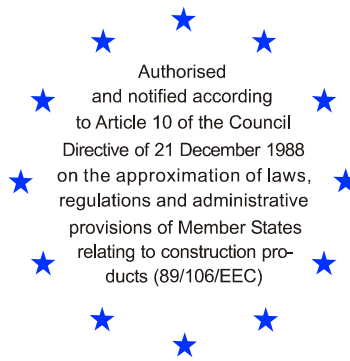


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DIBt

Mitglied der EOTA
Member of EOTA

European Technical Approval ETA-05/0231

English translation prepared by DIBt - Original version in German language

Handelsbezeichnung <i>Trade name</i>	MKT Verbundanker V <i>MKT Chemical Anchor V</i>
Zulassungsinhaber <i>Holder of approval</i>	MKT Metall-Kunststoff-Technik GmbH & Co. KG Auf dem Immel 2 67685 Weilerbach DEUTSCHLAND
Zulassungsgegenstand und Verwendungszweck <i>Generic type and use of construction product</i>	Verbunddübel mit Ankerstange aus galvanisch verzinktem Stahl in den Größen M10, M12, M16, M20 und M24 zur Verankerung im ungerissenen Beton <i>Bonded anchor with anchor rod made of galvanised steel of sizes M10, M12, M16, M20 and M24 for use in non-cracked concrete</i>
Geltungsdauer: <i>Validity:</i>	vom <i>from</i> bis <i>to</i>
Herstellwerke <i>Manufacturing plants</i>	9. Dezember 2005 24. November 2010 MKT Herstellwerk 1, Deutschland MKT Herstellwerk 3, Niederlande

Diese Zulassung umfasst
This Approval contains

13 Seiten einschließlich 5 Anhänge
13 pages including 5 annexes



Europäische Organisation für Technische Zulassungen
European Organisation for Technical Approvals

I LEGAL BASES AND GENERAL CONDITIONS

- 1 This European Technical Approval is issued by Deutsches Institut für Bautechnik in accordance with:
 - Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products¹, modified by Council Directive 93/68/EEC² and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council³;
 - Gesetz über das In-Verkehr-Bringen von und den freien Warenverkehr mit Bauprodukten zur Umsetzung der Richtlinie 89/106/EWG des Rates vom 21. Dezember 1988 zur Angleichung der Rechts- und Verwaltungsvorschriften der Mitgliedstaaten über Bauprodukte und anderer Rechtsakte der Europäischen Gemeinschaften (Bauproduktengesetz - BauPG) vom 28. April 1998⁴, zuletzt geändert durch Gesetz vom ('last amended by law on') 06.01.2004⁵;
 - Common Procedural Rules for Requesting, Preparing and the Granting of European Technical Approvals set out in the Annex to Commission Decision 94/23/EC⁶;
 - Guideline for European Technical Approval for "Metal anchors for use in concrete - Part 5: Bonded anchors", ETAG 001-05.
- 2 Deutsches Institut für Bautechnik is authorized to check whether the provisions of this European Technical Approval are met. Checking may take place in the manufacturing plants. Nevertheless, the responsibility for the conformity of the products to the European Technical Approval and for their fitness for the intended use remains with the holder of the European Technical Approval.
- 3 This European Technical Approval is not to be transferred to manufacturers or agents of manufacturers other than those indicated on page 1, or manufacturing plants other than those indicated on page 1 of this European Technical Approval.
- 4 This European Technical Approval may be withdrawn by Deutsches Institut für Bautechnik, in particular pursuant to information by the Commission according to Article 5(1) of Council Directive 89/106/EEC.
- 5 Reproduction of this European Technical Approval including transmission by electronic means shall be in full. However, partial reproduction can be made with the written consent of Deutsches Institut für Bautechnik. In this case partial reproduction has to be designated as such. Texts and drawings of advertising brochures shall not contradict or misuse the European Technical Approval.
- 6 The European Technical Approval is issued by the approval body in its official language. This version corresponds fully to the version circulated in EOTA. Translations into other languages have to be designated as such.

1 Official Journal of the European Communities N° L 40, 11.2.1989, p. 12

2 Official Journal of the European Communities N° L 220, 30.8.1993, p. 1

3 Official Journal of the European Union N° L 284, 31.10.2003, p. 25

4 Bundesgesetzblatt I, p. 812

5 Bundesgesetzblatt I, p.2, 15

6 Official Journal of the European Communities N° L 17, 20.1.1994, p. 34

Each anchor rod V-A shall be marked with the identifying mark of the producer, the embedment depth, the anchor size and an additional marking for the steel grade in accordance with Annex 2. In addition, anchor rods M12 are marked with a marking of length according to Annex 2.

2.2 Methods of verification

The assessment of fitness of the anchor for the intended use in relation to the requirements for mechanical resistance and stability and safety in use in the sense of the Essential Requirements 1 and 4 has been made in accordance with the "Guideline for European Technical Approval of Metal Anchors for Use in Concrete", Part 1 "Anchors in general" and Part 5 "Bonded anchors", on the basis of Option 8.

In addition to the specific clauses relating to dangerous substances contained in this European Technical Approval, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Directive, these requirements need also to be complied with, when and where they apply.

3 Evaluation and attestation of conformity and CE marking

3.1 System of attestation of conformity

According to the decision 96/582/EG of the European Commission⁸ the system 2(i) (referred to as System 1) of attestation of conformity applies.

This system of attestation of conformity is defined as follows:

System 1: Certification of the conformity of the product by an approved certification body on the basis of:

- (a) Tasks for the manufacturer:
 - (1) factory production control;
 - (2) further testing of samples taken at the factory by the manufacturer in accordance with a prescribed test plan;
- (b) Tasks for the approved body:
 - (3) initial type-testing of the product;
 - (4) initial inspection of factory and of factory production control;
 - (5) continuous surveillance, assessment and approval of factory production control.

Note: Approved bodies are also referred to as "notified bodies".

3.2 Responsibilities

3.2.1 Tasks of the manufacturer

3.2.1.1 Factory production control

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall insure that the product is in conformity with this European Technical Approval.

The manufacturer may only use initial / raw / constituent materials stated in the technical documentation of this European Technical Approval.

⁸ Official Journal of the European Communities L 254 of 08.10.1996

The factory production control shall be in accordance with the control plan of November 2005 which is part of the technical documentation of this European Technical Approval. The control plan is laid down in the context of the factory production control system operated by the manufacturer and deposited at Deutsches Institut für Bautechnik.⁹

The results of factory production control shall be recorded and evaluated in accordance with the provisions of the "control plan".

3.2.1.2 Other tasks of manufacturer

The manufacturer shall, on the basis of a contract, involve a body which is approved for the tasks referred to in section 3.1 in the field of anchors in order to undertake the actions laid down in section 3.2.2. For this purpose, the "control plan" referred to in sections 3.2.1.1 and 3.2.2 shall be handed over by the manufacturer to the approved body involved.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of this European Technical Approval.

3.2.2 Tasks of approved bodies

The approved body shall perform the following tasks in accordance with the provisions laid down in the control plan:

- initial type-testing of the product,
- initial inspection of factory and of factory production control,
- continuous surveillance, assessment and approval of factory production control.

The approved body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report.

The approved certification body involved by the manufacturer shall issue an EC certificate of conformity of the product stating the conformity with the provisions of this European Technical Approval.

In cases where the provisions of the European Technical Approval and its "control plan" are no longer fulfilled the certification body shall withdraw the certificate of conformity and inform Deutsches Institut für Bautechnik without delay.

3.3 CE marking

The CE marking shall be affixed on the ...(product itself - indicate where on the product, if necessary - or the label attached to it; packaging; accompanying commercial document, e.g. the EC declaration of conformity). The letters "CE" shall be followed by the identification number of the approved certification body, where relevant, and be accompanied by the following additional information:

- the name and address of the producer (legal entity responsible for the manufacturer),
- the last two digits of the year in which the CE marking was affixed,
- the number of the EC certificate of conformity for the product,
- the number of the European Technical Approval,
- the number of the guideline for European Technical Approval,
- use category (ETAG 001-1, Option 8),
- size.

⁹ The control plan is a confidential part of the documentation of the European Technical Approval, but not published together with the ETA and only handed over to the approved body involved in the procedure of attestation of conformity.
See section 3.2.2.

4 Assumptions under which the fitness of the product for the intended use was favourably assessed

4.1 Manufacturing

The anchor is manufactured in accordance with the provisions of the European Technical Approval using the automated manufacturing process as identified in the inspection of the plant by the Deutsches Institut für Bautechnik and the approved body and laid down in the technical documentation.

The European Technical Approval is issued for the product on the basis of agreed data/information, deposited with Deutsches Institut für Bautechnik, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to Deutsches Institut für Bautechnik before the changes are introduced. Deutsches Institut für Bautechnik will decide whether or not such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA and if so whether further assessment or alterations to the ETA shall be necessary.

4.2 Installation

4.2.1 Design of anchorages

The fitness of the anchor for the intended use is given under the following conditions:

The anchorages are designed in accordance with the "Guideline for European Technical Approval of Metal Anchors for Use in Concrete", Annex C, Method A, for bonded anchors under the responsibility of an engineer experienced in anchorages and concrete work.

For the verifications given below according to Annex C the following shall be observed:

- For the verification 'concrete cone failure' (clause 5.2.2.4, Annex C of the Guideline) $N_{Rk,c}$ shall be determined according to (1) and (2): The smaller of the values according to (1) and (2) is decisive.

(1) $N_{Rk,c}$ according to equation (5.2), Annex C of the Guideline

where: $N_{Rk,c}^0$ according to Annex 4, Table 6,

$s_{cr,N}$ according to Annex 4, Table 6,

$c_{cr,N}$ according to Annex 4, Table 6,

$\psi_{ucr,N} = 1,0$

In special cases according to clause 5.2.2.4 g, Annex C of the Guideline the method given there is valid. However, the value $N_{Rk,c}^0$ shall be calculated according to the following equation:

$$N_{Rk,c}^0 = N_{Rk,c}^0 (\text{Table 6}) \times \frac{h'_{ef}}{h_{ef}}$$

(2) $N_{Rk,c}$ according to equation (5.2), Annex C of the Guideline

where: $N_{Rk,c}^0 = 0,75 \times 15,5 \times h_{ef}^{1,5} \times f_{ck,cube}^{0,5}$

$s_{cr,N} = 3 h_{ef}$

$c_{cr,N} = 1,5 h_{ef}$

$\psi_{ucr,N} = 1,0$

- For the verification 'splitting failure due to loading' (clause 5.2.2.6, Annex C of the Guideline) NRk,sp shall be determined according to (3).

(3) $N_{Rk,sp}$ according to equation (5.3), Annex C of the Guideline

where: $N_{Rk,c}^0$ according to Annex 4, Table 6,

$s_{cr,sp}$ according to Annex 4, Table 6,

$c_{cr,sp}$ according to Annex 4, Table 6,

$\Psi_{ucr,N} = 1,0$

$\Psi_{h,sp} = 1,0$

- For the verification 'concrete pryout failure' (clause 5.2.3.3, Annex C of the Guideline) $N_{Rk,c}$ for equation (5.6), Annex C of the Guideline, shall be determined according to (1).

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.).

4.2.2 Installation of anchors

The fitness for use of the anchor can only be assumed if the anchor is installed as follows:

- anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site,
- use of the anchor only as supplied by the manufacturer without exchanging the components of an anchor,
- anchor installation in accordance with the manufacturer's specifications and drawings using the tools indicated in the technical documentation of this European Technical Approval,
- checks before placing the anchor to ensure that the strength class of the concrete in which the anchor is to be placed is in the range given and is not lower than that of the concrete to which the characteristic loads apply,
- check of concrete being well compacted, e.g. without significant voids,
- keeping the effective anchorage depth,
- Edge distance and spacing not less than the specified values without minus tolerances,
- positioning of the drill holes without damaging the reinforcement,
- in case of aborted drill hole: the drill hole shall be filled with mortar,
- 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 one brushing operation followed again by at least one blowing operation and one 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 3, Table 3 is still sufficient,
- 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; observing the curing time according to Annex 3, Table 5 until the anchor may be loaded,
- after the curing time fixing the member to be anchored by using a calibrated torque wrench by not exceeding the torque moment given in Annex 3.

5 Indications to the manufacturer

5.1 Responsibility of the manufacturer

It is in the responsibility of the manufacturer to ensure that the information on the specific conditions according to 1 and 2 including Annexes referred to and 4.2.1 and 4.2.2 as well as 5.1 is given to those who are concerned. This information may be made by reproduction of the respective parts of the European Technical Approval. In addition all installation data shall be shown clearly on the package and/or on an enclosed instruction sheet, preferably using illustration(s).

The minimum data required are:

- drill bit,
- hole depth,
- diameter of anchor rod,
- minimum effective anchorage depth,
- maximum thickness of the fixture,
- information on the installation procedure, including cleaning of the hole with the cleaning equipments, preferably by means of an illustration,
- anchor component installation temperature,
- ambient temperature of the concrete during installation of the anchor,
- admissible processing time (open time) of the mortar,
- curing time until the anchor may be loaded as a function of the ambient temperature in the concrete during installation,
- torque moment,
- identification of the manufacturing batch.

All data shall be presented in a clear and explicit form.

5.2 Packaging, transport and storage

The glass capsules shall be protected against sun radiation and shall be stored according to the manufacture's installation instructions in dry condition at temperatures of at least +5 °C to not more than +25 °C.

Glass capsules with expired shelf life must no longer be used.

The anchor shall only be packaged and supplied as a complete unit. Glass capsules may be packed separately from anchor rods, nuts and washers.

The manufacturer's installation instruction shall indicate that the glass capsules V-P shall be used with the anchor rods V-A according to Annex 2.

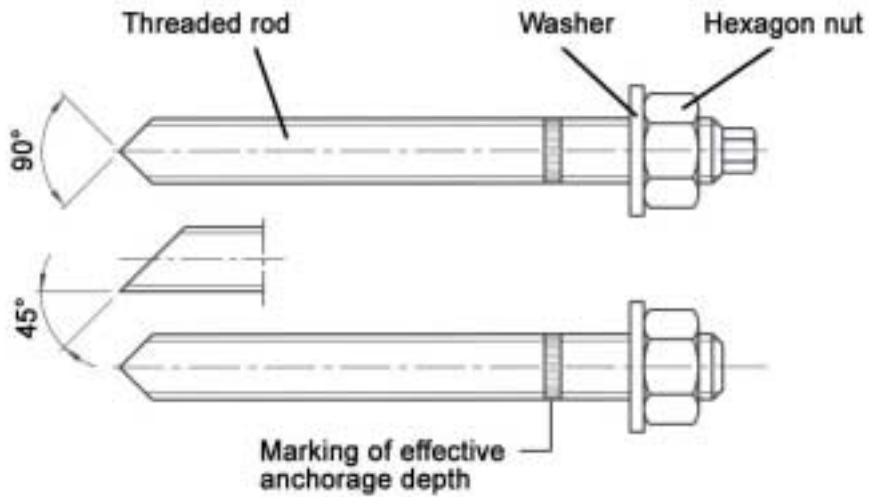
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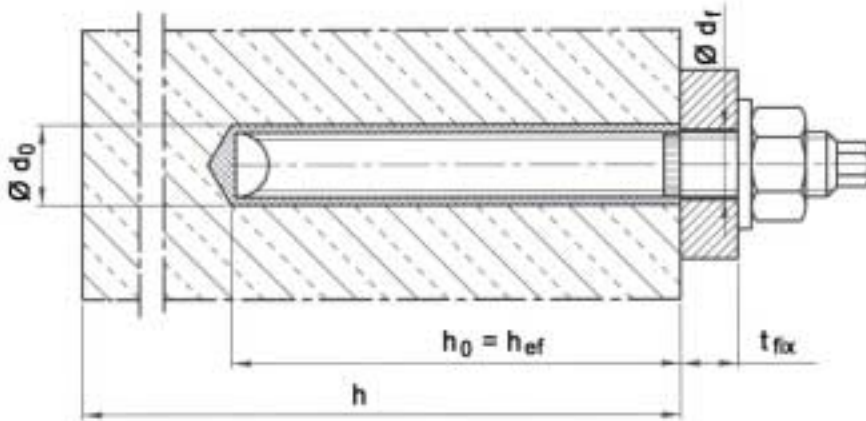
Glass Capsule V-P



Threaded rod V-A



Intended use



Use category

Installation in dry or wet concrete
Service in dry internal conditions

No overhead installation.

Temperature range:

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

MKT Chemical Anchor V

Product and intended use

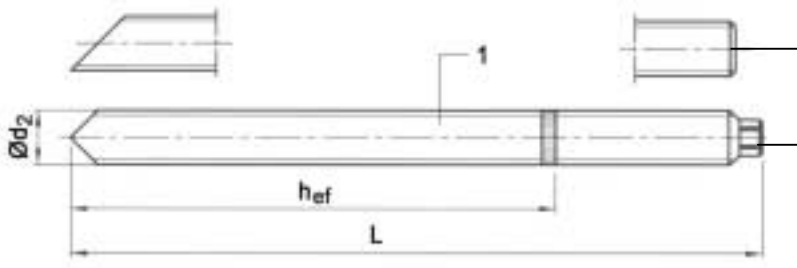
Annex 1

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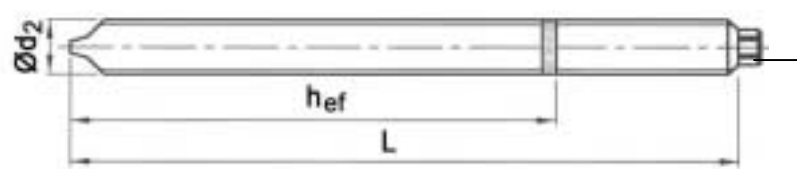
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Threaded rod V-A

Machined steel



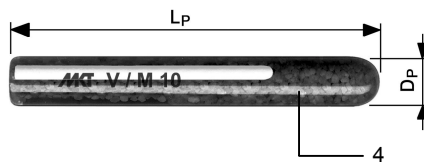
Cold formed



Marking: e.g. \diamond M12
 \diamond Identifying mark of manufacturing plant
 additional marking of lengths for anchor size M12
 H marking of length
 M12 Size of thread

\diamond M12-8
 -8 additional marking of steel grad 8.8

Glass capsule V-P



Marking of length	F	G	H	I	J	K	L
Length of anchor min \geq	101,6	114,3	127,0	139,7	152,4	165,1	177,8
Length of anchor max $<$	114,3	127,0	139,7	152,4	165,1	177,8	190,5



Marking of length	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Length of anchor min \geq	190,5	203,2	215,9	228,6	241,3	254,0	279,4	304,8	330,2	355,6	381,0	406,4	431,8	457,2
Length of anchor max $<$	203,2	215,9	228,6	241,3	254,0	279,4	304,8	330,2	355,6	381,0	406,4	431,8	457,2	483,0

Dimensions in mm

Table 1: Dimensions

Anchor size		M10	M12	M16	M20	M24
1	Threaded rod	$\varnothing d_2$	M10	M12	M16	M20
		$L^{1)} \geq$	100	120	140	190
		h_{ef}	90	110	125	170
3	Hexagon nut	SW	17	19	24	30
4	Glass capsule	D_p	11	13	17	22
		L_p	80	95	95	175

¹⁾ Other lengths on demand

Dimensions in mm

Table 2: Materials

Part	Designation	Steel, galvanised $\geq 5 \mu\text{m}$, acc. to EN ISO 4042	
1	Threaded rod	Steel acc. to DIN EN 10087 Steel acc. to DIN EN 10263 Grade 5.8, EN ISO 898-1	Steel acc. to DIN EN 10087 Steel acc. to DIN EN 10263 Grade 8.8, EN ISO 898-1
2	Washer acc. to EN ISO 7089, or EN ISO 7093, or EN ISO 7094	Steel, galvanised	
3	Hexagon nut DIN 934	Strength class 8 acc. to EN 20 898-2, galvanised	
4	Glass capsule	Glass, Quartz, Resin, Hardener	

MKT Chemical Anchor V

Dimensions and material

Annex 2

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Table 3: Installation parameters

Anchor size		M10	M12	M16	M20	M24
Nominal diameter of drill hole	$d_0 =$ [mm]	12	14	18	25	28
Cutting diameter of drill hole	$d_{cut} \leq$ [mm]	12.5	14.5	18.5	25.5	28.5
Depth of drill hole	$h_0 \geq$ [mm]	90	110	125	170	210
Diameter of clearance hole in the fixture	$d_f \leq$ [mm]	12	14	18	22	26
Diameter of steel brush	D [mm]	13	16	20	27	30
Installation torque	$T_{inst} =$ [Nm]	12	20	45	100	150

**Table 4: Minimum thickness of concrete, spacing and edge distance**

Anchor size		M10	M12	M16	M20	M24
Minimum thickness of concrete	$h_{min} \geq$ [mm]	120	140	160	220	260
Minimum spacing	$s_{min} \geq$ [mm]	45	55	65	85	105
Minimum edge distance	$c_{min} \geq$ [mm]	45	55	65	85	105

Table 5: Minimum curing time

Temperature [°C] in the drill hole	Minimum curing time [minutes]	
	dry concrete	wet concrete
+ 35 °C	10	20
+ 30 °C	10	20
+ 20 °C	20	40
+ 10 °C	60	120
+ 5 °C	60	120
0 °C	300	600
- 5 °C	300	600

MKT Chemical Anchor V

Installation parameters, minimum thickness of concrete, spacing and edge distance, minimum curing time

Annex 3

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Table 6: Design method A
Characteristic values for tension loads

Anchor size			M10	M12	M16	M20	M24
Steel failure							
Characteristic tension resistance Steel grade 5.8	$N_{Rk,s}$	[kN]	29	42	79	123	177
Characteristic tension resistance Steel grade 8.8	$N_{Rk,s}$	[kN]	46	67	126	196	282
Partial safety factor	γ_{Ms} ¹⁾	-	1.5				
Pullout failure, concrete cone failure							
Characteristic resistance in non-cracked concrete C20/25 to C50/60	$N_{Rk,p} = N_{Rk,c}^0$	[kN]	20	25	40	60	75
Partial safety factor	$\gamma_{Mp} = \gamma_{Mc}$ ¹⁾	-	1.8 ²⁾				
Effective anchorage depth	h_{ef}	[mm]	90	110	125	170	210
Characteristic spacing	$s_{cr,N}$	[mm]	2 h_{ef}				
Characteristic edge distance	$c_{cr,N}$	[mm]	1 h_{ef}				
Splitting							
Spacing	$s_{cr,Sp}$	[mm]	2 h_{ef}				
Edge distance	$c_{cr,Sp}$	[mm]	1 h_{ef}				
Partial safety factor	$\gamma_{MSp} = \gamma_{Mc}$ ¹⁾	-	1.8 ²⁾				

¹⁾ In absence of other national regulations

²⁾ The partial safety factor $\gamma_2 = 1,2$ is included

Table 7: Displacements under tension loads

Anchor size			M10	M12	M16	M20	M24
Tension load	N	[kN]	8	10	16	24	30
Displacement	δ_{N0}	[mm]	0.5	0.5	0.6	0.6	0.6
	$\delta_{N\infty}$	[mm]	1.3				

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Design method A,
Characteristic values for tension loads,
Displacements

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Table 8: Design method A
Characteristic values for shear loads

Anchor size			M10	M12	M16	M20	M24
Steel failure without lever arm							
Characteristic shear resistance steel grade 5.8	$V_{Rk,s}$	[kN]	15	21	39	61	88
Characteristic shear resistance steel grade 8.8	$V_{Rk,s}$	[kN]	23	34	63	98	141
Partial safety factor	γ_{Ms}	¹⁾	1.25				
Steel failure with lever arm							
Characteristic bending moments steel grade 5.8	$M^0_{Rk,s}$	[Nm]	37	65	166	325	561
Characteristic bending moments steel grade 8.8	$M^0_{Rk,s}$	[Nm]	60	105	266	519	898
Partial safety factor	γ_{Ms}	¹⁾	1.25				
Concrete pryout failure							
Factor in equation (5.6) ETAG Annex C, 5.2.3.3	k	-	2				
Partial safety factor	γ_{Mcp}	¹⁾	1.5 ²⁾				
Concrete edge failure							
Effective length of anchor in shear load	l_f	[mm]	90	110	125	170	210
Diameter of anchor	d_{nom}	[mm]	12	14	18	25	28
Partial safety factor	γ_{Mc}	¹⁾	1.5 ²⁾				

¹⁾ In absence of other national regulations

²⁾ The partial safety factor $\gamma_2 = 1,0$ is included

Table 9: Displacements under shear loads

Anchor size			M10	M12	M16	M20	M24
Shear load	V	[kN]	8	12	22	35	40
Displacements	δ_{V0}	[mm]	3	3	4	5	5
	$\delta_{V\infty}$	[mm]	5	5	6	7	7

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Design method A,
Characteristic values for shear loads,
Displacements

Annex 5

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