



... eine starke Verbindung

IZJAVA O SVOJSTVIMA  
DoP-br. MKT-331 - hr

1. Jedinstvena identifikacijska oznaka vrste proizvoda: **MKT injekcijski sustav VME**
2. Tip, serija ili serijski broj ili bilo koji drugi element kojim se omogućuje identifikacija građevnog proizvoda, kako je potrebno sukladno članku 11. stavku 4.:

**ETA-09/0350, dodatak A1 i A3**  
**Broj proizvodne serije: pogledajte pakiranje**

3. Namjeravana uporaba ili uporabe građevnog proizvoda, u skladu s primjenjivim usklađenim tehničkim specifikacijama, kako je predvidio proizvođač:

<b>Vrsta proizvoda</b>	vezivna sidra
<b>Za uporabu u</b>	napuknuti i nenapuknuti beton C20/25 - C50/60 (EN 206)
<b>Izbor</b>	1
<b>Opterećenje</b>	statički i kvazi-statički, potres Kategorija C1 (M12–M30 i Ø12–Ø32) i C2 (M12, M16)
<b>Materijal</b>	<u>čelik za armiranje (B500 B):</u> važeće dimenzije: nenapuknuti beton: Ø8, Ø10, Ø12, Ø14, Ø16, Ø20, Ø25, Ø28, Ø32 napuknuti beton + C1: Ø12, Ø14, Ø16, Ø20, Ø25, Ø28, Ø32 <u>Pocinčani čelik:</u> samo u suhim interijerima važeće dimenzije: nenapuknuti beton: M8, M10, M12, M16, M20, M24, M27, M30 napuknuti beton: M12, M16, M20, M24, M27, M30 <u>Nehrđajući čelik (oznaka A4)</u> u unutaršnjim i vanjskim prostorima, bez posebno agresivnih uvjeta važeće dimenzije: nenapuknuti beton: M8, M10, M12, M16, M20, M24, M27, M30 napuknuti beton: M12, M16, M20, M24, M27, M30 <u>Vrlo otporno na koroziju (oznaka HCR)</u> u unutaršnjim i vanjskim prostorima s posebno agresivnih uvjeta važeće dimenzije: nenapuknuti beton: M8, M10, M12, M16, M20, M24, M27, M30 napuknuti beton: M12, M16, M20, M24, M27, M30
<b>Raspon temperature (možda)</b>	Područje I: -40 °C za +40 °C Područje II: -40 °C za +60 °C Područje III: -40 °C za +72 °C

4. Ime, registrirani trgovački naziv ili registrirani žig i kontaktna adresa proizvođača, kako je potrebno sukladno članku 11. stavku 5.:

**MKT Metall-Kunststoff-Technik GmbH & Co. KG**  
**Auf dem Immel 2**  
**D - 67685 Weilerbach**

5. Prema potrebi, ime i kontaktna adresa ovlaštenog predstavnika čije ovlaštenje obuhvaća zadatke pobliže označene u članku 12. stavku 2.: --
6. Sustav ili sustavi ocjenjivanja i provjere stalnosti svojstava građevnog proizvoda, kako je utvrđeno u Prilogu V.:  
**Sustav 1**

7. U slučaju Izjave o svojstvima u vezi s građevnim proizvodom obuhvaćenim usklađenom normom:

--

8. U slučaju izjave o svojstvima koja se odnosi na građevni proizvod za koji je izdana europska tehnička ocjena:

**Deutsches Institut für Bautechnik, Berlin**

izdan:

**ETA-09/0350**

na temelju

**ETAG 001-5**

Ovlaštena kuća izdaje: 1343-CPR, prema sustavu 1:

- i) utvrđivanja vrste proizvoda na temelju ispitivanja tipa (uključujući uzorkovanje), izračuna tipa, tabličnih vrijednosti ili opisne dokumentacije proizvoda;
- ii) početnu inspekciju proizvodnog pogona i kontrolu tvorničke proizvodnje;
- iii) stalni nadzor, ocjenjivanje i vrednovanje kontrole tvorničke proizvodnje.

i izdano: **Certifikat o stalnosti svojstva 1343-CPR-M 550-5**

9. Objavljeno svojstvo:

Bitne značajke	Metoda	Svojstva		Usklađena tehnička specifikacija
		navojna šipka	čelik za armiranje	
Karakteristična otpornost na vlačne sile	TR 029, CEN/TS 1992-4 TR 045	Dodatak C1, C2	Dodatak C4, C5	ETAG 001
Karakteristična otpornost sile na odrez	TR 029, CEN/TS 1992-4 TR 045	Dodatak C3	Dodatak C6	
Pomak u korištenju	TR 029, CEN/TS 1992-4	Dodatak C7	Dodatak C8	

U slučaju kada je sukladno članku 37. ili 38. upotrijebljena specifična tehnička dokumentacija, zahtjevi s kojima je proizvod usklađen: --

10. Svojstvo proizvoda utvrđeno u točkama 1. i 2. u skladu je s objavljenim svojstvom u točki 9.

Ova izjava o svojstvima objavljena je pod isključivom odgovornošću proizvođača identificiranog u točki 4.

Za proizvođača i u njegovo ime potpisao:

  
**Lore Weustenhagen**  
(Managing Director)  
**Weilerbach, 29.01.15**

i.V.   
**Dipl.-Ing. Detlef Bigalke**  
(Head of Product Development)



**Table C1: Characteristic values for threaded rods under tension loads in non-cracked concrete** (Design according to TR 029 or CEN/TS 1992-4)

Anchor size threaded rod			M8	M10	M12	M16	M20	M24	M27	M30	
<b>Steel failure</b>											
Characteristic tension resistance, Steel, property class 4.6	$N_{Rk,s}$	[kN]	15	23	34	63	98	141	184	224	
Characteristic tension resistance, Steel, property class 5.8	$N_{Rk,s}$	[kN]	18	29	42	78	122	176	230	280	
Characteristic tension resistance, Steel, property class 8.8	$N_{Rk,s}$	[kN]	29	46	67	125	196	282	368	449	
Characteristic tension resistance, Stainless steel A4 and HCR, property class 50 (>M24) and 70 ( $\leq$ M24)	$N_{Rk,s}$	[kN]	26	41	59	110	171	247	230	281	
<b>Combined pullout and concrete cone failure</b>											
Characteristic bond resistance in non-cracked C20/25											
Temperature range I: 40°C/24°C	dry and wet concrete	$\tau_{Rk,ucr}$	[N/mm <sup>2</sup> ]	15	15	15	14	13	12	12	12
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm <sup>2</sup> ]	15	14	13	10	9,5	8,5	7,5	7,0
Temperature range II: 60°C/43°C	dry and wet concrete	$\tau_{Rk,ucr}$	[N/mm <sup>2</sup> ]	9,5	9,5	9,0	8,5	8,0	7,5	7,5	7,5
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm <sup>2</sup> ]	9,5	9,5	9,0	8,5	7,5	7,0	6,5	6,0
Temperature range III: 72°C/43°C	dry and wet concrete	$\tau_{Rk,ucr}$	[N/mm <sup>2</sup> ]	8,5	8,5	8,0	7,5	7,0	7,0	6,5	6,5
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm <sup>2</sup> ]	8,5	8,5	8,0	7,5	7,0	6,0	5,5	5,5
Increasing factors for concrete	$\psi_c$	C30/37		1,04							
		C40/50		1,08							
		C50/60		1,10							
Factor according to CEN/TS 1992-4-5 Section 6.2.2.3	$k_8$	[-]	10,1								
<b>Concrete cone failure</b>											
Factor according to CEN/TS 1992-4-5 Section 6.2.3.1	$k_{ucr}$	[-]	10,1								
Edge distance	$c_{cr,N}$	[mm]	1,5 $h_{ef}$								
Spacing	$s_{cr,N}$	[mm]	3,0 $h_{ef}$								
<b>Splitting failure</b>											
Edge distance	$c_{cr,sp}$	[mm]	$1,0 \cdot h_{ef} \leq 2 \cdot h_{ef} \left( 2,5 - \frac{h}{h_{ef}} \right) \leq 2,4 \cdot h_{ef}$								
Spacing	$s_{cr,sp}$	[mm]	2 $c_{cr,sp}$								
Installation safety factor (dry and wet concrete)	$\gamma_2 = \gamma_{inst}$	[-]	1,2				1,4				
Installation safety factor (flooded bore hole)	$\gamma_2 = \gamma_{inst}$	[-]	1,4								
<b>Injection System VME for concrete</b>											
<b>Performances</b> Characteristic values for <b>threaded rods</b> under tension loads in non-cracked concrete (Design according to TR 029 or CEN/TS 1992-4)									<b>Annex C1</b>		

**Table C2: Characteristic values for threaded rods under tension loads in cracked concrete**  
(Design according to TR 029 or CEN/TS 1992-4 or TR 045)

Anchor size threaded rod			M12	M16	M20	M24	M27	M30	
<b>Steel failure</b>									
Characteristic tension resistance, Steel, property class 4.6	$N_{Rk,s} = N_{Rk,s,seis}$	[kN]	34	63	98	141	184	224	
Characteristic tension resistance, Steel, property class 5.8	$N_{Rk,s} = N_{Rk,s,seis}$	[kN]	42	78	122	176	230	280	
Characteristic tension resistance, Steel, property class 8.8	$N_{Rk,s} = N_{Rk,s,seis}$	[kN]	67	125	196	282	368	449	
Characteristic tension resistance, Stainless steel A4 and HCR, property class 50 (>M24) and 70 ( $\leq$ M24)	$N_{Rk,s} = N_{Rk,s,seis}$	[kN]	59	110	171	247	230	281	
<b>Combined pullout and concrete cone failure</b>									
Characteristic bond resistance in cracked concrete C20/25									
Temperature range I: 40°C/24°C	dry and wet concrete	$\tau_{Rk,cr}$	[N/mm <sup>2</sup> ]	7,5	6,5	6,0	5,5	5,5	5,5
		$\tau_{Rk,seis,C1}$	[N/mm <sup>2</sup> ]	7,1	6,2	5,7	5,5	5,5	5,5
		$\tau_{Rk,seis,C2}$	[N/mm <sup>2</sup> ]	2,4	2,2	No Performance Determined (NPD)			
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm <sup>2</sup> ]	7,5	6,0	5,0	4,5	4,0	4,0
		$\tau_{Rk,seis,C1}$	[N/mm <sup>2</sup> ]	7,1	5,8	4,8	4,5	4,0	4,0
		$\tau_{Rk,seis,C2}$	[N/mm <sup>2</sup> ]	2,4	2,1	No Performance Determined (NPD)			
Temperature range II: 60°C/43°C	dry and wet concrete	$\tau_{Rk,cr}$	[N/mm <sup>2</sup> ]	4,5	4,0	3,5	3,5	3,5	3,5
		$\tau_{Rk,seis,C1}$	[N/mm <sup>2</sup> ]	4,3	3,8	3,4	3,5	3,5	3,5
		$\tau_{Rk,seis,C2}$	[N/mm <sup>2</sup> ]	1,4	1,4	No Performance Determined (NPD)			
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm <sup>2</sup> ]	4,5	4,0	3,5	3,5	3,5	3,5
		$\tau_{Rk,seis,C1}$	[N/mm <sup>2</sup> ]	4,3	3,8	3,4	3,5	3,5	3,5
		$\tau_{Rk,seis,C2}$	[N/mm <sup>2</sup> ]	1,4	1,4	No Performance Determined (NPD)			
Temperature range III: 72°C/43°C	dry and wet concrete	$\tau_{Rk,cr}$	[N/mm <sup>2</sup> ]	4,0	3,5	3,0	3,0	3,0	3,0
		$\tau_{Rk,seis,C1}$	[N/mm <sup>2</sup> ]	3,9	3,4	3,0	3,0	3,0	3,0
		$\tau_{Rk,seis,C2}$	[N/mm <sup>2</sup> ]	1,3	1,2	No Performance Determined (NPD)			
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm <sup>2</sup> ]	4,0	3,5	3,0	3,0	3,0	3,0
		$\tau_{Rk,seis,C1}$	[N/mm <sup>2</sup> ]	3,9	3,4	3,0	3,0	3,0	3,0
		$\tau_{Rk,seis,C2}$	[N/mm <sup>2</sup> ]	1,3	1,2	No Performance Determined (NPD)			
Increasing factors for concrete (only static or quasi-static actions)	$\psi_c$	C30/37	[-]	1,04					
		C40/50	[-]	1,08					
		C50/60	[-]	1,10					
Factor according to CEN/TS 1992-4-5 Section 6.2.2.3	$k_8$	[-]	7,2						
<b>Concrete cone failure</b>									
Factor according to CEN/TS 1992-4-5 Section 6.2.3.1	$k_{cr}$	[-]	7,2						
Edge distance	$c_{cr,N}$	[mm]	1,5 $h_{ef}$						
Spacing	$s_{cr,N}$	[mm]	3,0 $h_{ef}$						
Installation safety factor (dry and wet concrete)	$\gamma_2 = \gamma_{inst}$	[-]	1,2	1,4					
Installation safety factor (flooded bore hole)	$\gamma_2 = \gamma_{inst}$	[-]	1,4						

**Injection System VME for concrete**

**Performances**

Characteristic values for **threaded rods** under tension loads in cracked concrete  
(Design according to TR 029 or CEN/TS 1992-4 or TR 045)

**Annex C2**

**Table C3:** Characteristic values for **threaded rods** under **shear loads** in cracked and non-cracked concrete (Design according to TR 029 or CEN/TS 1992-4 or TR 045)

Anchor size threaded rod			M8	M10	M12	M16	M20	M24	M27	M30
<b>Steel failure without lever arm</b>										
Characteristic shear resistance, Steel, property class 4.6	$V_{Rk,s}$	[kN]	7	12	17	31	49	71	92	112
	$V_{Rk,s,seis,C1}$	[kN]	No Performance Determined (NPD)		14	27	42	56	72	88
	$V_{Rk,s,seis,C2}$	[kN]			13	25	No Performance Determined (NPD)			
Characteristic shear resistance, Steel, property class 5.8	$V_{Rk,s}$	[kN]	9	15	21	39	61	88	115	140
	$V_{Rk,s,seis,C1}$	[kN]	No Performance Determined (NPD)		18	34	53	70	91	111
	$V_{Rk,s,seis,C2}$	[kN]			17	31	No Performance Determined (NPD)			
Characteristic shear resistance, Steel, property class 8.8	$V_{Rk,s}$	[kN]	15	23	34	63	98	141	184	224
	$V_{Rk,s,seis,C1}$	[kN]	No Performance Determined (NPD)		30	55	85	111	145	177
	$V_{Rk,s,seis,C2}$	[kN]			27	50	No Performance Determined (NPD)			
Characteristic shear resistance, Stainless steel A4 and HCR, property class 50 (>M24) and 70 ( $\leq$ M24)	$V_{Rk,s}$	[kN]	13	20	30	55	86	124	115	140
	$V_{Rk,s,seis,C1}$	[kN]	No Performance Determined (NPD)		26	48	75	98	91	111
	$V_{Rk,s,seis,C2}$	[kN]			24	44	No Performance Determined (NPD)			
Ductility factor according to CEN/TS 1992-4-5 Section 6.3.2.1	$k_2$	[-]	0,8							
<b>Steel failure with lever arm</b>										
Characteristic bending moment, Steel, property class 4.6	$M_{Rk,s}^0$	[Nm]	15	30	52	133	260	449	666	900
	$M_{Rk,s,seis,C1}^0$	[Nm]	No Performance Determined (NPD)							
	$M_{Rk,s,seis,C2}^0$	[Nm]								
Characteristic bending moment, Steel, property class 5.8	$M_{Rk,s}^0$	[Nm]	19	37	65	166	324	560	833	1123
	$M_{Rk,s,seis,C1}^0$	[Nm]	No Performance Determined (NPD)							
	$M_{Rk,s,seis,C2}^0$	[Nm]								
Characteristic bending moment, Steel, property class 8.8	$M_{Rk,s}^0$	[Nm]	30	60	105	266	519	896	1333	1797
	$M_{Rk,s,seis,C1}^0$	[Nm]	No Performance Determined (NPD)							
	$M_{Rk,s,seis,C2}^0$	[Nm]								
Characteristic bending moment, Stainless steel A4 and HCR, property class 50 (>M24) and 70 ( $\leq$ M24)	$M_{Rk,s}^0$	[Nm]	26	52	92	232	454	784	832	1125
	$M_{Rk,s,seis,C1}^0$	[Nm]	No Performance Determined (NPD)							
	$M_{Rk,s,seis,C2}^0$	[Nm]								
<b>Concrete pryout failure</b>										
Factor $k$ acc. to TR 029 and $k_3$ acc. to CEN/TS 1992-4 Section 6.3.3	$k_{(3)}$	[-]	2,0							
<b>Concrete edge failure</b>										
Effective length of anchor	$l_f$	[mm]	$l_f = \min(h_{ef}, 8 d_{nom})$							
Outside diameter of anchor	$d_{nom}$	[mm]	8	10	12	16	20	24	27	30
Installation safety factor	$\gamma_2 = \gamma_{inst}$	[-]	1,0							

**Injection System VME for concrete**

**Performances**

Characteristic values for **threaded rods** under shear loads in cracked and non-cracked concrete (Design according to TR 029 or CEN/TS 1992-4 or TR 045)

**Annex C3**

**Table C4: Characteristic values for rebar under tension loads in non-cracked concrete**  
(Design according to TR 029 or CEN/TS 1992-4)

Rebar size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32	
<b>Steel failure</b>												
Characteristic tension resistance	$N_{Rk,s}$	[kN]	$A_s \cdot f_{uk}$									
<b>Combined pullout and concrete cone failure</b>												
Characteristic bond resistance in non-cracked concrete C20/25												
Temperature range I: 40°C/24°C	dry and wet concrete	$\tau_{Rk,ucr}$	[N/mm <sup>2</sup> ]	14	14	13	13	12	12	11	11	11
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm <sup>2</sup> ]	14	13	11	10	9,5	8,5	7,5	7,0	6,0
Temperature range II: 60°C/43°C	dry and wet concrete	$\tau_{Rk,ucr}$	[N/mm <sup>2</sup> ]	8,5	8,5	8,0	8,0	7,5	7,0	7,0	6,5	6,5
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm <sup>2</sup> ]	8,5	8,5	8,0	8,0	7,5	7,0	6,0	5,5	5,0
Temperature range III: 72°C/43°C	dry and wet concrete	$\tau_{Rk,ucr}$	[N/mm <sup>2</sup> ]	7,5	7,5	7,5	7,0	7,0	6,5	6,0	6,0	6,0
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm <sup>2</sup> ]	7,5	7,5	7,5	7,0	7,0	6,0	5,5	5,0	4,5
Increasing factors for non-cracked concrete	$\psi_c$	C30/37	[-]	1,04								
		C40/50	[-]	1,08								
		C50/60	[-]	1,10								
Factor according to CEN/TS 1992-4-5 Section 6.2.2.3	$k_8$	[-]	10,1									
<b>Concrete cone failure</b>												
Factor according to CEN/TS 1992-4-5 Section 6.2.3.1	$k_{ucr}$	[-]	10,1									
Edge distance	$c_{cr,N}$	[mm]	$1,5 h_{ef}$									
Spacing	$s_{cr,N}$	[mm]	$3,0 h_{ef}$									
<b>Splitting failure</b>												
Edge distance	$c_{cr,sp}$	[mm]	$1,0 \cdot h_{ef} \leq 2 \cdot h_{ef} \left( 2,5 - \frac{h}{h_{ef}} \right) \leq 2,4 \cdot h_{ef}$									
Spacing	$s_{cr,sp}$	[mm]	$2 c_{cr,sp}$									
Installation safety factor (dry and wet concrete)	$\gamma_2 = \gamma_{inst}$	[-]	1,2					1,4				
Installation safety factor (flooded bore hole)	$\gamma_2 = \gamma_{inst}$	[-]	1,4									

**Injection System VME for concrete**

**Performances**

Characteristic values of resistance for rebar under tension loads in non-cracked concrete (Design according to TR 029 or CEN/TS 1992-4)

**Annex C4**

**Table C5: Characteristic values for rebar under tension loads in cracked concrete**  
(Design according to TR 029 or CEN/TS 1992-4 or TR 045)

Rebar size			Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32	
<b>Steel failure</b>										
Characteristic tension resistance	$N_{Rk,s}=N_{Rk,s,seis,C1}$	[kN]	$A_s \cdot f_{uk}$							
<b>Combined pullout and concrete cone failure</b>										
Characteristic bond resistance in cracked concrete C20/25										
Temperature range I: 40°C/24°C	dry and wet concrete	$\tau_{Rk,cr}$	[N/mm <sup>2</sup> ]	7,5	7,0	6,5	6,0	5,5	5,5	5,5
		$\tau_{Rk,seis,C1}$	[N/mm <sup>2</sup> ]	6,9	6,4	6,2	5,7	5,5	5,5	5,5
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm <sup>2</sup> ]	7,5	6,5	6,0	5,0	4,5	4,0	4,0
		$\tau_{Rk,seis,C1}$	[N/mm <sup>2</sup> ]	6,9	6,0	5,7	4,8	4,5	4,0	4,0
Temperature range II: 60°C/43°C	dry and wet concrete	$\tau_{Rk,cr}$	[N/mm <sup>2</sup> ]	4,5	4,0	4,0	3,5	3,5	3,5	3,5
		$\tau_{Rk,seis,C1}$	[N/mm <sup>2</sup> ]	4,1	3,7	3,8	3,3	3,5	3,5	3,5
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm <sup>2</sup> ]	4,5	4,0	4,0	3,5	3,5	3,5	3,0
		$\tau_{Rk,seis,C1}$	[N/mm <sup>2</sup> ]	4,1	3,7	3,8	3,3	3,5	3,5	3,0
Temperature range III: 72°C/43°C	dry and wet concrete	$\tau_{Rk,cr}$	[N/mm <sup>2</sup> ]	4,0	3,5	3,5	3,0	3,0	3,0	3,0
		$\tau_{Rk,seis,C1}$	[N/mm <sup>2</sup> ]	3,7	3,2	3,3	2,9	3,0	3,0	3,0
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm <sup>2</sup> ]	4,0	3,5	3,5	3,0	3,0	3,0	3,0
		$\tau_{Rk,seis,C1}$	[N/mm <sup>2</sup> ]	3,7	3,2	3,3	2,9	3,0	3,0	3,0
Increasing factors for cracked concrete (only static or quasi-static actions)	$\psi_c$	C30/37	[-]	1,04						
		C40/50	[-]	1,08						
		C50/60	[-]	1,10						
Factor according to CEN/TS 1992-4-5 Section 6.2.2.3	$k_8$	[-]	7,2							
<b>Concrete cone failure</b>										
Factor according to CEN/TS 1992-4-5 Section 6.2.3.1	$k_{cr}$	[-]	7,2							
Edge distance	$c_{cr,N}$	[mm]	1,5 $h_{ef}$							
Spacing	$s_{cr,N}$	[mm]	3,0 $h_{ef}$							
Installation safety factor (dry and wet concrete)	$\gamma_2 = \gamma_{inst}$	[-]	1,2				1,4			
Installation safety factor (flooded bore hole)	$\gamma_2 = \gamma_{inst}$	[-]	1,4							

### Injection System VME for concrete

#### Performances

Characteristic values of resistance for rebar under tension loads in cracked concrete  
(Design according to TR 029 or CEN/TS 1992-4 or TR 045)

**Annex C5**

**Table C6:** Characteristic values of resistance for **rebar** under **shear loads** in cracked and non-cracked concrete (Design according to TR 029 or CEN/TS 1992-4 or TR 045)

Rebar size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32	
<b>Steel failure without lever arm</b>											
Characteristic shear resistance	$V_{RK,s}$	[kN]	$0,50 \cdot A_s \cdot f_{uk}$								
	$V_{RK,s,seis,C1}$	[kN]	No Performance Determined (NPD)	$0,44 \cdot A_s \cdot f_{uk}$							
Ductility factor according to CEN/TS 1992-4-5 Section 6.3.2.1	$k_2$	[-]	0,8								
<b>Steel failure with lever arm</b>											
Characteristic bending moment	$M^0_{RK,s}$	[Nm]	$1.2 \cdot W_{el} \cdot f_{uk}$								
	$M^0_{RK,s,seis,C1}$	[Nm]	No Performance Determined (NPD)								
<b>Concrete pryout failure</b>											
Factor k acc. to TR 029 and $k_3$ acc. to CEN/TS 1992-4 Section 6.3.3	$k_{(3)}$	[-]	2,0								
<b>Concrete edge failure</b>											
Effective length of anchor	$l_f$	[mm]	$l_f = \min(h_{ef}, 8 d_{nom})$								
Outside diameter of anchor	$d_{nom}$	[mm]	8	10	12	14	16	20	25	28	32
Installation safety factor	$\gamma_2 = \gamma_{inst}$	[-]	1,0								

**Injection System VME for concrete**

**Performances**

Characteristic values of resistance for **rebar** under shear loads in cracked and non-cracked concrete (Design according to TR 029 or CEN/TS 1992-4 or TR 045)

**Annex C6**



**Table C7: Displacements under tension loads<sup>1)</sup> (threaded rod)**

Anchor size threaded rod			M8	M10	M12	M16	M20	M24	M27	M30							
<b>Non-cracked concrete C20/25 under static and quasi-static action</b>																	
Temperature range I: 40°C/24°C	$\delta_{N0}$ -factor	[mm/(N/mm <sup>2</sup> )]	0,011	0,013	0,015	0,020	0,024	0,029	0,032	0,035							
	$\delta_{N\infty}$ -factor	[mm/(N/mm <sup>2</sup> )]	0,044	0,052	0,061	0,079	0,096	0,114	0,127	0,140							
Temperature range II: 60°C/43°C	$\delta_{N0}$ -factor	[mm/(N/mm <sup>2</sup> )]	0,013	0,015	0,018	0,023	0,028	0,033	0,037	0,043							
	$\delta_{N\infty}$ -factor	[mm/(N/mm <sup>2</sup> )]	0,050	0,060	0,070	0,091	0,111	0,131	0,146	0,161							
Temperature range III: 72°C/43°C	$\delta_{N0}$ -factor	[mm/(N/mm <sup>2</sup> )]	0,013	0,015	0,018	0,023	0,028	0,033	0,037	0,043							
	$\delta_{N\infty}$ -factor	[mm/(N/mm <sup>2</sup> )]	0,050	0,060	0,070	0,091	0,111	0,131	0,146	0,161							
<b>Cracked concrete C20/25 under static, quasi-static and seismic C1 action</b>																	
Temperature range I: 40°C/24°C	$\delta_{N0}$ -factor	[mm/(N/mm <sup>2</sup> )]	No Performance Determined (NPD)														
	$\delta_{N\infty}$ -factor	[mm/(N/mm <sup>2</sup> )]									0,032	0,037	0,042	0,048	0,053	0,058	
Temperature range II: 60°C/43°C	$\delta_{N0}$ -factor	[mm/(N/mm <sup>2</sup> )]									0,21	0,21	0,21	0,21	0,21	0,21	0,21
	$\delta_{N\infty}$ -factor	[mm/(N/mm <sup>2</sup> )]									0,037	0,043	0,049	0,055	0,061	0,067	
Temperature range III: 72°C/43°C	$\delta_{N0}$ -factor	[mm/(N/mm <sup>2</sup> )]									0,24	0,24	0,24	0,24	0,24	0,24	0,24
	$\delta_{N\infty}$ -factor	[mm/(N/mm <sup>2</sup> )]									0,037	0,043	0,049	0,055	0,061	0,067	
<b>Cracked concrete C20/25 under seismic C2 action</b>																	
Temperature range I: 40°C/24°C	$\delta_{N,seis}(DLS)$	[mm/(N/mm <sup>2</sup> )]	No Performance Determined (NPD)														
	$\delta_{N,seis}(ULS)$	[mm/(N/mm <sup>2</sup> )]									0,03	0,05					
Temperature range II: 60°C/43°C	$\delta_{N,seis}(DLS)$	[mm/(N/mm <sup>2</sup> )]									0,06	0,09					
	$\delta_{N,seis}(ULS)$	[mm/(N/mm <sup>2</sup> )]									0,03	0,05					
Temperature range III: 72°C/43°C	$\delta_{N,seis}(DLS)$	[mm/(N/mm <sup>2</sup> )]									0,06	0,09					
	$\delta_{N,seis}(ULS)$	[mm/(N/mm <sup>2</sup> )]									0,03	0,05					

<sup>1)</sup> Calculation of the displacement

$$\delta_{N0} = \delta_{N0}\text{-factor} \cdot \tau;$$

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

**Table C8: Displacement under shear load<sup>1)</sup> (threaded rod)**

Anchor size threaded rod			M8	M10	M12	M16	M20	M24	M27	M30
<b>Non-cracked and cracked concrete C20/25 under static, quasi-static and seismic C1 action</b>										
All temperature ranges	$\delta_{V0}$ -factor	[mm/(kN)]	0,06	0,06	0,05	0,04	0,04	0,03	0,03	0,03
	$\delta_{V\infty}$ -factor	[mm/(kN)]	0,09	0,08	0,08	0,06	0,06	0,05	0,05	0,05
<b>Cracked concrete C20/25 under seismic C2 action</b>										
All temperature ranges	$\delta_{V,seis}(DLS)$	[mm/kN]	No Performance Determined (NPD)							
	$\delta_{V,seis}(ULS)$	[mm/kN]								

<sup>1)</sup> Calculation of the displacement

$$\delta_{V0} = \delta_{V0}\text{-factor} \cdot V;$$

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

**Injection System VME for concrete**

**Performances**  
Displacements (threaded rod)

**Annex C7**

**Table C9: Displacements under tension load <sup>1)</sup> (rebar)**

Rebar size			Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32
<b>Non-cracked concrete C20/25 under static and quasi-static action</b>											
Temperature range I: 40°C/24°C	δ <sub>N0</sub> -factor	[mm/(N/mm <sup>2</sup> )]	0,011	0,013	0,015	0,018	0,020	0,024	0,030	0,033	0,037
	δ <sub>N∞</sub> -factor	[mm/(N/mm <sup>2</sup> )]	0,044	0,052	0,061	0,070	0,079	0,096	0,118	0,132	0,149
Temperature range II: 60°C/43°C	δ <sub>N0</sub> -factor	[mm/(N/mm <sup>2</sup> )]	0,013	0,015	0,018	0,020	0,023	0,028	0,034	0,038	0,043
	δ <sub>N∞</sub> -factor	[mm/(N/mm <sup>2</sup> )]	0,050	0,060	0,070	0,081	0,091	0,111	0,136	0,151	0,172
Temperature range III: 72°C/43°C	δ <sub>N0</sub> -factor	[mm/(N/mm <sup>2</sup> )]	0,013	0,015	0,018	0,020	0,023	0,028	0,034	0,038	0,043
	δ <sub>N∞</sub> -factor	[mm/(N/mm <sup>2</sup> )]	0,050	0,060	0,070	0,081	0,091	0,111	0,136	0,151	0,172
<b>Cracked concrete C20/25 under static, quasi-static and seismic C1 action</b>											
Temperature range I: 40°C/24°C	δ <sub>N0</sub> -factor	[mm/(N/mm <sup>2</sup> )]	-		0,032	0,035	0,037	0,042	0,049	0,055	0,061
	δ <sub>N∞</sub> -factor	[mm/(N/mm <sup>2</sup> )]			0,21	0,21	0,21	0,21	0,21	0,21	0,21
Temperature range II: 60°C/43°C	δ <sub>N0</sub> -factor	[mm/(N/mm <sup>2</sup> )]	-		0,037	0,040	0,043	0,049	0,056	0,063	0,070
	δ <sub>N∞</sub> -factor	[mm/(N/mm <sup>2</sup> )]			0,24	0,24	0,24	0,24	0,24	0,24	0,24
Temperature range III: 72°C/43°C	δ <sub>N0</sub> -factor	[mm/(N/mm <sup>2</sup> )]	-		0,037	0,040	0,043	0,049	0,056	0,063	0,070
	δ <sub>N∞</sub> -factor	[mm/(N/mm <sup>2</sup> )]			0,24	0,24	0,24	0,24	0,24	0,24	0,24

<sup>1)</sup> Calculation of the displacement

$$\delta_{N0} = \delta_{N0\text{-factor}} \cdot \tau;$$

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

**Table C10: Displacement under shear load<sup>1)</sup> (rebar)**

Rebar size			Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32
<b>For concrete C20/25 under static, quasi-static and seismic C1 action</b>											
All temperature ranges	δ <sub>V0</sub> -factor	[mm/(kN)]	0,06	0,05	0,05	0,04	0,04	0,04	0,03	0,03	0,03
	δ <sub>V∞</sub> -factor	[mm/(kN)]	0,09	0,08	0,08	0,06	0,06	0,05	0,05	0,04	0,04

<sup>1)</sup> Calculation of the displacement

$$\delta_{V0} = \delta_{V0\text{-factor}} \cdot V;$$

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

**Injection System VME for concrete**

**Performances**  
Displacements (rebar)

**Annex C8**