... eine starke Verbindung

PRESTATIEVERKLARING
DoP Nr. MKT-331 - nl

1. Unieke identificatiecode van het producttype: **MKT Injectiesysteem VME**

2. Type-, partij- of serienummer, dan wel een ander identificatiemiddel voor het bouwproduct, zoals voorgeschreven in artikel 11, lid 4:

ETA-09/0350, Bijlage A1, A3
Chargennummer: zie verpakking

3. Beoogde gebruiken van het bouwproduct, overeenkomstig de toepasselijke geharmoniseerde technische specificatie, zoals door de fabrikant bepaald:

Producttype	verlijmd anker
Voor toepassing in	gescheurd en ongescheurd beton C20/25 - C50/60 (EN 206)
Optie	1
Belasting	statisch en quasi-statisch, aardbeving categorie C1 (M12–M30 & Ø12–Ø32) & C2 (M12, M16)
Materiaal	<u>wapeningsstaal (B500 B):</u> inbegrepen maten: ongescheurd beton: Ø8, Ø10, Ø12, Ø14, Ø16, Ø20, Ø25, Ø28, Ø32 gescheurd beton: Ø12, Ø14, Ø16, Ø20, Ø25, Ø28, Ø32 <u>staal verzinkt:</u> alleen in droge binnenruimtes inbegrepen maten: ongescheurd beton: M8, M10, M12, M16, M20, M24, M27, M30 gescheurd beton: M12, M16, M20, M24, M27, M30 <u>roestvrij staal (markering A4):</u> voor binnen- en buitenbereiken zonder bijzonder agressieve omstandigheden inbegrepen maten: ongescheurd beton: M8, M10, M12, M16, M20, M24, M27, M30 gescheurd beton: M12, M16, M20, M24, M27, M30 <u>hoogcorrosiebestendig staal (markering HCR):</u> voor binnen- en buitenbereiken onder bijzonder agressieve omstandigheden inbegrepen maten: ongescheurd beton: M8, M10, M12, M16, M20, M24, M27, M30 gescheurd beton: M12, M16, M20, M24, M27, M30
Temperatuurbereik (in voorkomende gevallen)	temperatuurbereik I: -40 °C - +40 °C temperatuurbereik II: -40 °C - +60 °C temperatuurbereik III: -40 °C - +72 °C

4. Naam, geregistreerde handelsnaam of geregistreerd handelsmerk en contactadres van de fabrikant, zoals voorgeschreven in artikel 11, lid 5:

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

5. Indien van toepassing, naam en contactadres van de gemachtigde wiens mandaat de in artikel 12, lid 2, vermelde taken bestrijkt: --

6. Het systeem of de systemen voor de beoordeling en verificatie van de prestatiebestendigheid van het bouwproduct, vermeld in bijlage V: **System 1**

7. Indien de prestatieverklaring betrekking heeft op een bouwproduct dat onder een geharmoniseerde norm valt:
--

8. Indien de prestatieverklaring betrekking heeft op een bouwproduct waarvoor een Europese technische beoordeling is afgegeven:

Deutsches Institut für Bautechnik, Berlin

heeft het volgende afgegeven:

ETA-09/0350

op basis van

ETAG 001-5

De aangemelde instantie voor productcertificering 1343-CPR heeft het volgende uitgevoerd volgens systeem 1:

i) de bepaling van het producttype op grond van typeonderzoek (inclusief bemonstering), typeberekening, getabelleerde waarden of een beschrijvende documentatie van het product;
ii) de initiële inspectie van de productie-installatie en van de productiecontrole in de fabriek;
iii) permanente bewaking, beoordeling en evaluatie van de productiecontrole in de fabriek

en heeft het volgende afgegeven: Certificaat van prestatiebestendigheid 1343-CPR-M 550-5

9. Aangegeven prestatie:

Essentiële kenmerken	**Beoordelingsmethode**	**Prestaties**		**Geharmoniseerde technische specificaties**
		Draadstang	**Wapeningsstaal**	
Karakteristieke drukweerstand	TR 029, CEN/TS 1992-4 TR 045	bijlage C1, C2	bijlage C4, C5	ETAG 001
Karakteristieke afschuifweerstand	TR 029, CEN/TS 1992-4 TR 045	bijlage C3	bijlage C6	
Verschuiving in gebruikstoestand	TR 029, CEN/TS 1992-4	bijlage C7	bijlage C8	

Indien overeenkomstig artikel 37 of 38 een specifieke technische documentatie is gebruikt, de eisen waaraan het product voldoet: --

10. De prestaties van het in de punten 1 en 2 omschreven product zijn conform de in punt 9 aangegeven prestaties. Deze prestatieverklaring wordt verstrekt onder de exclusieve verantwoordelijkheid van de in punt 4 vermelde fabrikant. Ondertekend voor en namens de fabrikant door:

Stefan Weustenhagen
(CEO)
Weilerbach, 29.01.15

i.V.
Dipl.-Ing. Detlef Bigalke
(Director 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**
Steel failure											
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 (≤ M24)		$N_{Rk,s}$	[kN]	26	41	59	110	171	247	230	281
Combined pullout and concrete cone failure											
Characteristic bond resistance in non-cracked C20/25											
Temperature range I: 40°C/24°C	dry and wet concrete	$\tau_{Rk,ucr}$	[N/mm²]	15	15	15	14	13	12	12	12
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm²]	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/mm²]	9,5	9,5	9,0	8,5	8,0	7,5	7,5	7,5
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm²]	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/mm²]	8,5	8,5	8,0	7,5	7,0	7,0	6,5	6,5
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm²]	8,5	8,5	8,0	7,5	7,0	6,0	5,5	5,5
Increasing factors for concrete		ψ_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							
Concrete cone failure											
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}							
Splitting failure											
Edge distance		$c_{cr,sp}$	[mm]	$1{,}0 \cdot h_{ef} \le 2 \cdot h_{ef}\left(2{,}5 - \frac{h}{h_{ef}}\right) \le 2{,}4 \cdot h_{ef}$							
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 for **threaded rods** under tension loads in non-cracked concrete
(Design according to TR 029 or CEN/TS 1992-4)

Annex C1

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**
Steel failure									
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 (≤ M24)	$N_{Rk,s} = N_{Rk,s,seis}$		[kN]	59	110	171	247	230	281
Combined pullout and concrete cone failure									
Characteristic bond resistance in cracked concrete C20/25									
Temperature range I: 40°C/24°C	dry and wet concrete	$\tau_{Rk,cr}$	[N/mm²]	7,5	6,5	6,0	5,5	5,5	5,5
		$\tau_{Rk,seis,C1}$	[N/mm²]	7,1	6,2	5,7	5,5	5,5	5,5
		$\tau_{Rk,seis,C2}$	[N/mm²]	2,4	2,2	No Performance Determined (NPD)			
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm²]	7,5	6,0	5,0	4,5	4,0	4,0
		$\tau_{Rk,seis,C1}$	[N/mm²]	7,1	5,8	4,8	4,5	4,0	4,0
		$\tau_{Rk,seis,C2}$	[N/mm²]	2,4	2,1	No Performance Determined (NPD)			
Temperature range II: 60°C/43°C	dry and wet concrete	$\tau_{Rk,cr}$	[N/mm²]	4,5	4,0	3,5	3,5	3,5	3,5
		$\tau_{Rk,seis,C1}$	[N/mm²]	4,3	3,8	3,4	3,5	3,5	3,5
		$\tau_{Rk,seis,C2}$	[N/mm²]	1,4	1,4	No Performance Determined (NPD)			
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm²]	4,5	4,0	3,5	3,5	3,5	3,5
		$\tau_{Rk,seis,C1}$	[N/mm²]	4,3	3,8	3,4	3,5	3,5	3,5
		$\tau_{Rk,seis,C2}$	[N/mm²]	1,4	1,4	No Performance Determined (NPD)			
Temperature range III: 72°C/43°C	dry and wet concrete	$\tau_{Rk,cr}$	[N/mm²]	4,0	3,5	3,0	3,0	3,0	3,0
		$\tau_{Rk,seis,C1}$	[N/mm²]	3,9	3,4	3,0	3,0	3,0	3,0
		$\tau_{Rk,seis,C2}$	[N/mm²]	1,3	1,2	No Performance Determined (NPD)			
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm²]	4,0	3,5	3,0	3,0	3,0	3,0
		$\tau_{Rk,seis,C1}$	[N/mm²]	3,9	3,4	3,0	3,0	3,0	3,0
		$\tau_{Rk,seis,C2}$	[N/mm²]	1,3	1,2	No Performance Determined (NPD)			
Increasing factors for concrete (only static or quasi-static actions)	ψ_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					
Concrete cone failure									
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					

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**
Steel failure without lever arm										
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 (≤ 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							
Steel failure with lever arm										
Characteristic bending moment, Steel, property class 4.6	$M^0_{Rk,s}$	[Nm]	15	30	52	133	260	449	666	900
	$M^0_{Rk,s,seis,C1}$	[Nm]	No Performance Determined (NPD)							
	$M^0_{Rk,s,seis,C2}$	[Nm]								
Characteristic bending moment, Steel, property class 5.8	$M^0_{Rk,s}$	[Nm]	19	37	65	166	324	560	833	1123
	$M^0_{Rk,s,seis,C1}$	[Nm]	No Performance Determined (NPD)							
	$M^0_{Rk,s,seis,C2}$	[Nm]								
Characteristic bending moment, Steel, property class 8.8	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	896	1333	1797
	$M^0_{Rk,s,seis,C1}$	[Nm]	No Performance Determined (NPD)							
	$M^0_{Rk,s,seis,C2}$	[Nm]								
Characteristic bending moment, Stainless steel A4 and HCR, property class 50 (>M24) and 70 (≤ M24)	$M^0_{Rk,s}$	[Nm]	26	52	92	232	454	784	832	1125
	$M^0_{Rk,s,seis,C1}$	[Nm]	No Performance Determined (NPD)							
	$M^0_{Rk,s,seis,C2}$	[Nm]								
Concrete pryout failure										
Factor k acc. to TR 029 and k_3 acc. to CEN/TS 1992-4 Section 6.3.3	$k_{(3)}$	[-]	2,0							
Concrete edge failure										
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							

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**
Steel failure												
Characteristic tension resistance		$N_{Rk,s}$	[kN]	$A_s \cdot f_{uk}$								
Combined pullout and concrete cone failure												
Characteristic bond resistance in non-cracked concrete C20/25												
Temperature range I: 40°C/24°C	dry and wet concrete	$\tau_{Rk,ucr}$	[N/mm²]	14	14	13	13	12	12	11	11	11
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm²]	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/mm²]	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/mm²]	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/mm²]	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/mm²]	7,5	7,5	7,5	7,0	7,0	6,0	5,5	5,0	4,5
Increasing factors for non-cracked concrete	C30/37	ψ_c	[-]	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								
Concrete cone failure												
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]	$3,0\ h_{ef}$								
Splitting failure												
Edge distance		$c_{cr,sp}$	[mm]	$1{,}0 \cdot h_{ef} \le 2 \cdot h_{ef}\left(2{,}5 - \frac{h}{h_{ef}}\right) \le 2{,}4 \cdot h_{ef}$								
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**
Steel failure										
Characteristic tension resistance	$N_{Rk,s}=N_{Rk,s,seis,C1}$		[kN]	$A_s \cdot f_{uk}$						
Combined pullout and concrete cone failure										
Characteristic bond resistance in cracked concrete C20/25										
Temperature range I: 40°C/24°C	dry and wet concrete	$\tau_{Rk,cr}$	[N/mm²]	7,5	7,0	6,5	6,0	5,5	5,5	5,5
		$\tau_{Rk,seis,C1}$	[N/mm²]	6,9	6,4	6,2	5,7	5,5	5,5	5,5
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm²]	7,5	6,5	6,0	5,0	4,5	4,0	4,0
		$\tau_{Rk,seis,C1}$	[N/mm²]	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/mm²]	4,5	4,0	4,0	3,5	3,5	3,5	3,5
		$\tau_{Rk,seis,C1}$	[N/mm²]	4,1	3,7	3,8	3,3	3,5	3,5	3,5
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm²]	4,5	4,0	4,0	3,5	3,5	3,5	3,0
		$\tau_{Rk,seis,C1}$	[N/mm²]	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/mm²]	4,0	3,5	3,5	3,0	3,0	3,0	3,0
		$\tau_{Rk,seis,C1}$	[N/mm²]	3,7	3,2	3,3	2,9	3,0	3,0	3,0
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm²]	4,0	3,5	3,5	3,0	3,0	3,0	3,0
		$\tau_{Rk,seis,C1}$	[N/mm²]	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)	ψ_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						
Concrete cone failure										
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**
Steel failure without lever arm											
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								
Steel failure with lever arm											
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)								
Concrete pryout failure											
Factor k acc. to TR 029 and k_3 acc. to CEN/TS 1992-4 Section 6.3.3	$k_{(3)}$	[-]	2,0								
Concrete edge failure											
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								

Table C7: Displacements under tension loads[1] (threaded rod)

Anchor size threaded rod			M8	M10	M12	M16	M20	M24	M27	M30
Non-cracked concrete C20/25 under static and quasi-static action										
Temperature range I: 40°C/24°C	δ_{N0}-factor	[mm/(N/mm²)]	0,011	0,013	0,015	0,020	0,024	0,029	0,032	0,035
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,044	0,052	0,061	0,079	0,096	0,114	0,127	0,140
Temperature range II: 60°C/43°C	δ_{N0}-factor	[mm/(N/mm²)]	0,013	0,015	0,018	0,023	0,028	0,033	0,037	0,043
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,050	0,060	0,070	0,091	0,111	0,131	0,146	0,161
Temperature range III: 72°C/43°C	δ_{N0}-factor	[mm/(N/mm²)]	0,013	0,015	0,018	0,023	0,028	0,033	0,037	0,043
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,050	0,060	0,070	0,091	0,111	0,131	0,146	0,161
Cracked concrete C20/25 under static, quasi-static and seismic C1 action										
Temperature range I: 40°C/24°C	δ_{N0}-factor	[mm/(N/mm²)]	No Performance Determined (NPD)		0,032	0,037	0,042	0,048	0,053	0,058
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]			0,21	0,21	0,21	0,21	0,21	0,21
Temperature range II: 60°C/43°C	δ_{N0}-factor	[mm/(N/mm²)]			0,037	0,043	0,049	0,055	0,061	0,067
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]			0,24	0,24	0,24	0,24	0,24	0,24
Temperature range III: 72°C/43°C	δ_{N0}-factor	[mm/(N/mm²)]			0,037	0,043	0,049	0,055	0,061	0,067
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]			0,24	0,24	0,24	0,24	0,24	0,24
Cracked concrete C20/25 under seismic C2 action										
Temperature range I: 40°C/24°C	$\delta_{N,seis(DLS)}$	[mm/(N/mm²)]	No Performance Determined (NPD)		0,03	0,05	No Performance Determined (NPD)			
	$\delta_{N,seis(ULS)}$	[mm/(N/mm²)]			0,06	0,09				
Temperature range II: 60°C/43°C	$\delta_{N,seis(DLS)}$	[mm/(N/mm²)]			0,03	0,05				
	$\delta_{N,seis(ULS)}$	[mm/(N/mm²)]			0,06	0,09				
Temperature range III: 72°C/43°C	$\delta_{N,seis(DLS)}$	[mm/(N/mm²)]			0,03	0,05				
	$\delta_{N,seis(ULS)}$	[mm/(N/mm²)]			0,06	0,09				

[1] 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[1] (threaded rod)

Anchor size threaded rod			M8	M10	M12	M16	M20	M24	M27	M30
Non-cracked and cracked concrete C20/25 under static, quasi-static and seismic C1 action										
All temperature ranges	δ_{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
Cracked concrete C20/25 under seismic C2 action										
All temperature ranges	$\delta_{V,seis(DLS)}$	[mm/kN]	No Performance Determined (NPD)		0,2	0,1	No Performance Determined (NPD)			
	$\delta_{V,seis(ULS)}$	[mm/kN]			0,2	0,1				

[1] 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 [1] (rebar)

Rebar size			∅ 8	∅ 10	∅ 12	∅ 14	∅ 16	∅ 20	∅ 25	∅ 28	∅ 32
Non-cracked concrete C20/25 under static and quasi-static action											
Temperature range I: 40°C/24°C	δ_{N0}-factor	[mm/(N/mm²)]	0,011	0,013	0,015	0,018	0,020	0,024	0,030	0,033	0,037
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	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_{N0}-factor	[mm/(N/mm²)]	0,013	0,015	0,018	0,020	0,023	0,028	0,034	0,038	0,043
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	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_{N0}-factor	[mm/(N/mm²)]	0,013	0,015	0,018	0,020	0,023	0,028	0,034	0,038	0,043
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,050	0,060	0,070	0,081	0,091	0,111	0,136	0,151	0,172
Cracked concrete C20/25 under static, quasi-static and seismic C1 action											
Temperature range I: 40°C/24°C	δ_{N0}-factor	[mm/(N/mm²)]	-		0,032	0,035	0,037	0,042	0,049	0,055	0,061
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]			0,21	0,21	0,21	0,21	0,21	0,21	0,21
Temperature range II: 60°C/43°C	δ_{N0}-factor	[mm/(N/mm²)]	-		0,037	0,040	0,043	0,049	0,056	0,063	0,070
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]			0,24	0,24	0,24	0,24	0,24	0,24	0,24
Temperature range III: 72°C/43°C	δ_{N0}-factor	[mm/(N/mm²)]	-		0,037	0,040	0,043	0,049	0,056	0,063	0,070
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]			0,24	0,24	0,24	0,24	0,24	0,24	0,24

[1] 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[1] (rebar)

Rebar size			∅ 8	∅ 10	∅ 12	∅ 14	∅ 16	∅ 20	∅ 25	∅ 28	∅ 32
For concrete C20/25 under static, quasi-static and seismic C1 action											
All temperature ranges	δ_{V0}-factor	[mm/(kN)]	0,06	0,05	0,05	0,04	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	0,04	0,04

[1] Calculation of the displacement
$\delta_{V0} = \delta_{V0}\text{-factor} \cdot V$;
$\delta_{V\infty} = \delta_{V\infty}\text{-factor} \cdot V$;