



... eine starke Verbindung

DECLARACIÓN DE PRESTACIONES
DoP No. MKT-331 - es

1. Código de identificación única del producto tipo: **MKT Sistema de inyección VME**
2. Tipo, lote o número de serie o cualquier otro elemento que permita la identificación del producto de construcción como se establece en el artículo 11, apartado 4:

ETA-09/0350, Anexo A1, A3
Número de partida: ver embalaje

3. Uso o usos previstos del producto de construcción, con arreglo a la especificación técnica armonizada aplicable, tal como lo establece el fabricante:

Producto tipo	Anclajes bonded
Para uso en	hormigón fisurado y no fisurado C20/25 - C50/60 (EN 206)
Opción	1
Carga	estática y casi-estática, terremoto categoría C1 (M12–M30 & Ø12–Ø32) & C2 (M12, M16)
Material	<u>Acero para hormigón armado (B 500 B):</u> Tamaños incluidos: Hormigón sin fisuras: Ø8, Ø10, Ø12, Ø14, Ø16, Ø20, Ø25, Ø28, Ø32 Hormigón fisurado: Ø12, Ø14, Ø16, Ø20, Ø25, Ø28, Ø32 <u>Acero galvanizado:</u> sólo en espacios interiores secos Tamaños incluidos: Hormigón sin fisuras: M8, M10, M12, M16, M20, M24, M27, M30 Hormigón fisurado: M12, M16, M20, M24, M27, M30 <u>Acero inoxidable (marcado A4):</u> En espacios interiores y exteriores no expuestos a condiciones especialmente agresivas Tamaños incluidos: Hormigón sin fisuras: M8, M10, M12, M16, M20, M24, M27, M30 Hormigón fisurado: M12, M16, M20, M24, M27, M30 <u>Acero altamente resistente a la corrosión (marcado HCR):</u> En espacios interiores y exteriores no expuestos a condiciones especialmente agresivas Tamaños incluidos: Hormigón sin fisuras: M8, M10, M12, M16, M20, M24, M27, M30 Hormigón fisurado: M12, M16, M20, M24, M27, M30
Rango de temperaturas	Zona I: -40 °C - +40 °C Zona II: -40 °C - +60 °C Zona III: -40 °C - +72 °C

4. Nombre, nombre o marca registrados y dirección de contacto del fabricante según lo dispuesto en el artículo 11, apartado 5:

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

5. En su caso, nombre y dirección de contacto del representante autorizado, cuyo mandato abarca las tareas especificadas en el artículo 12, apartado 2: --

6. Sistema o sistemas de evaluación y verificación de la constancia de las prestaciones del producto de construcción tal como figura en el anexo V: **Sistema 1**
7. En caso de declaración de prestaciones relativa a un producto de construcción cubierto por una norma armonizada:

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8. En caso de declaración de prestaciones relativa a un producto de construcción para el que se ha emitido una evaluación técnica europea:

emitido **Deutsches Institut für Bautechnik, Berlin**
ETA-09/0350
sobre la base de **ETAG 001-5**

El organismo notificado para la certificación de productos 1343-CPR ha efectuado lo siguiente de acuerdo con el sistema 1:

- i) la determinación del producto tipo sobre la base de ensayos de tipo (incluido el muestreo), cálculos de tipo, valores tabulados o documentación descriptiva del producto,
- ii) la inspección inicial de la planta de producción y del control de producción en fábrica,
- iii) la vigilancia, evaluación y supervisión permanentes del control de producción en fábrica.

y ha emitido el documento siguiente: Certificado de constancia de prestaciones 1343-CPR-M 550-5

9. Prestaciones declaradas:

Características esenciales	Método de verificación	Prestaciones		Especificaciones técnicas armonizadas
		Varilla roscada	Acero de refuerzo	
Resistencia característica a esfuerzos de tracción	TR 029, CEN/TS 1992-4 TR 045	Anexos C1, C2	Anexos C4, C5	ETAG 001
Resistencia característica a los esfuerzos transversales	TR 029, CEN/TS 1992-4 TR 045	Anexos C3	Anexos C6	
Desplazamientos del anclaje usado	TR 029, CEN/TS 1992-4	Anexos C7	Anexos C8	

Cuando en virtud de los artículos 37 o 38 la documentación técnica específica ha sido utilizada, los requisitos que cumple el producto: --

10. Las prestaciones del producto identificado en los puntos 1 y 2 son conformes con las prestaciones declaradas en el punto 9. La presente declaración de prestaciones se emite bajo la sola responsabilidad del fabricante identificado en el punto 4.

Firmado por y en nombre del fabricante por:


Stefan Weustenhagen
(Director general)
Weilerbach, 29.01.15

i.V. 
Dipl.-Ing. Detlef Bigalke
(Director de Desarrollo de Productos)



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 (\leq 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/mm ²]	15	15	15	14	13	12	12	12
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm ²]	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 ²]	9,5	9,5	9,0	8,5	8,0	7,5	7,5	7,5
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm ²]	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 ²]	8,5	8,5	8,0	7,5	7,0	7,0	6,5	6,5
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm ²]	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]	$1,0 \cdot h_{ef} \leq 2 \cdot h_{ef} \left(2,5 - \frac{h}{h_{ef}} \right) \leq 2,4 \cdot h_{ef}$								
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 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 (\leq 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/mm ²]	7,5	6,5	6,0	5,5	5,5	5,5
		$\tau_{Rk,seis,C1}$	[N/mm ²]	7,1	6,2	5,7	5,5	5,5	5,5
		$\tau_{Rk,seis,C2}$	[N/mm ²]	2,4	2,2	No Performance Determined (NPD)			
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm ²]	7,5	6,0	5,0	4,5	4,0	4,0
		$\tau_{Rk,seis,C1}$	[N/mm ²]	7,1	5,8	4,8	4,5	4,0	4,0
		$\tau_{Rk,seis,C2}$	[N/mm ²]	2,4	2,1	No Performance Determined (NPD)			
Temperature range II: 60°C/43°C	dry and wet concrete	$\tau_{Rk,cr}$	[N/mm ²]	4,5	4,0	3,5	3,5	3,5	3,5
		$\tau_{Rk,seis,C1}$	[N/mm ²]	4,3	3,8	3,4	3,5	3,5	3,5
		$\tau_{Rk,seis,C2}$	[N/mm ²]	1,4	1,4	No Performance Determined (NPD)			
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm ²]	4,5	4,0	3,5	3,5	3,5	3,5
		$\tau_{Rk,seis,C1}$	[N/mm ²]	4,3	3,8	3,4	3,5	3,5	3,5
		$\tau_{Rk,seis,C2}$	[N/mm ²]	1,4	1,4	No Performance Determined (NPD)			
Temperature range III: 72°C/43°C	dry and wet concrete	$\tau_{Rk,cr}$	[N/mm ²]	4,0	3,5	3,0	3,0	3,0	3,0
		$\tau_{Rk,seis,C1}$	[N/mm ²]	3,9	3,4	3,0	3,0	3,0	3,0
		$\tau_{Rk,seis,C2}$	[N/mm ²]	1,3	1,2	No Performance Determined (NPD)			
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm ²]	4,0	3,5	3,0	3,0	3,0	3,0
		$\tau_{Rk,seis,C1}$	[N/mm ²]	3,9	3,4	3,0	3,0	3,0	3,0
		$\tau_{Rk,seis,C2}$	[N/mm ²]	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						

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
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 (\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							
Steel failure with lever arm										
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]								
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							

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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	
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/mm ²]	14	14	13	13	12	12	11	11	11
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm ²]	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 ²]	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 ²]	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 ²]	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 ²]	7,5	7,5	7,5	7,0	7,0	6,0	5,5	5,0	4,5
Increasing factors for non-cracked 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]	$1,0 \cdot h_{ef} \leq 2 \cdot h_{ef} \left(2,5 - \frac{h}{h_{ef}} \right) \leq 2,4 \cdot h_{ef}$									
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

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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/mm ²]	7,5	7,0	6,5	6,0	5,5	5,5	5,5
		$\tau_{Rk,seis,C1}$	[N/mm ²]	6,9	6,4	6,2	5,7	5,5	5,5	5,5
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm ²]	7,5	6,5	6,0	5,0	4,5	4,0	4,0
		$\tau_{Rk,seis,C1}$	[N/mm ²]	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 ²]	4,5	4,0	4,0	3,5	3,5	3,5	3,5
		$\tau_{Rk,seis,C1}$	[N/mm ²]	4,1	3,7	3,8	3,3	3,5	3,5	3,5
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm ²]	4,5	4,0	4,0	3,5	3,5	3,5	3,0
		$\tau_{Rk,seis,C1}$	[N/mm ²]	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 ²]	4,0	3,5	3,5	3,0	3,0	3,0	3,0
		$\tau_{Rk,seis,C1}$	[N/mm ²]	3,7	3,2	3,3	2,9	3,0	3,0	3,0
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm ²]	4,0	3,5	3,5	3,0	3,0	3,0	3,0
		$\tau_{Rk,seis,C1}$	[N/mm ²]	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								

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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 loads¹⁾ (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/mm ²)]	0,011	0,013	0,015	0,020	0,024	0,029	0,032	0,035							
	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	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/mm ²)]	0,013	0,015	0,018	0,023	0,028	0,033	0,037	0,043							
	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	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/mm ²)]	0,013	0,015	0,018	0,023	0,028	0,033	0,037	0,043							
	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	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/mm ²)]	No Performance Determined (NPD)														
	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]									0,032	0,037	0,042	0,048	0,053	0,058	
Temperature range II: 60°C/43°C	δ_{N0} -factor	[mm/(N/mm ²)]									0,21	0,21	0,21	0,21	0,21	0,21	0,21
	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]									0,037	0,043	0,049	0,055	0,061	0,067	
Temperature range III: 72°C/43°C	δ_{N0} -factor	[mm/(N/mm ²)]									0,24	0,24	0,24	0,24	0,24	0,24	0,24
	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]									0,037	0,043	0,049	0,055	0,061	0,067	
Temperature range I: 40°C/24°C	$\delta_{N,seis}$ (DLS)	[mm/(N/mm ²)]	No Performance Determined (NPD)														
	$\delta_{N,seis}$ (ULS)	[mm/(N/mm ²)]									0,03	0,05					
Temperature range II: 60°C/43°C	$\delta_{N,seis}$ (DLS)	[mm/(N/mm ²)]									0,06	0,09					
	$\delta_{N,seis}$ (ULS)	[mm/(N/mm ²)]									0,03	0,05					
Temperature range III: 72°C/43°C	$\delta_{N,seis}$ (DLS)	[mm/(N/mm ²)]									0,06	0,09					
	$\delta_{N,seis}$ (ULS)	[mm/(N/mm ²)]									0,03	0,05					
Cracked concrete C20/25 under seismic C2 action																	
Temperature range I: 40°C/24°C	$\delta_{N,seis}$ (DLS)	[mm/(N/mm ²)]	No Performance Determined (NPD)														
	$\delta_{N,seis}$ (ULS)	[mm/(N/mm ²)]									0,03	0,05					
Temperature range II: 60°C/43°C	$\delta_{N,seis}$ (DLS)	[mm/(N/mm ²)]									0,06	0,09					
	$\delta_{N,seis}$ (ULS)	[mm/(N/mm ²)]									0,03	0,05					
Temperature range III: 72°C/43°C	$\delta_{N,seis}$ (DLS)	[mm/(N/mm ²)]									0,06	0,09					
	$\delta_{N,seis}$ (ULS)	[mm/(N/mm ²)]									0,03	0,05					

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 load¹⁾ (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)							
	$\delta_{V,seis}$ (ULS)	[mm/kN]								
Cracked concrete C20/25 under seismic C2 action										
All temperature ranges	$\delta_{V,seis}$ (DLS)	[mm/kN]	No Performance Determined (NPD)							
	$\delta_{V,seis}$ (ULS)	[mm/kN]								

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			Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32
Non-cracked concrete C20/25 under static and quasi-static action											
Temperature range I: 40°C/24°C	δ _{N0} -factor	[mm/(N/mm ²)]	0,011	0,013	0,015	0,018	0,020	0,024	0,030	0,033	0,037
	δ _{N∞} -factor	[mm/(N/mm ²)]	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/mm ²)]	0,013	0,015	0,018	0,020	0,023	0,028	0,034	0,038	0,043
	δ _{N∞} -factor	[mm/(N/mm ²)]	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/mm ²)]	0,013	0,015	0,018	0,020	0,023	0,028	0,034	0,038	0,043
	δ _{N∞} -factor	[mm/(N/mm ²)]	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/mm ²)]	-	0,032	0,035	0,037	0,042	0,049	0,055	0,061	
	δ _{N∞} -factor	[mm/(N/mm ²)]		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/mm ²)]	-	0,037	0,040	0,043	0,049	0,056	0,063	0,070	
	δ _{N∞} -factor	[mm/(N/mm ²)]		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/mm ²)]	-	0,037	0,040	0,043	0,049	0,056	0,063	0,070	
	δ _{N∞} -factor	[mm/(N/mm ²)]		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 load¹⁾ (rebar)

Rebar size			Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 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
	δ _{V∞} -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

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

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

Injection System VME for concrete

Performances
Displacements (rebar)

Annex C8