DECLARATION OF PERFORMANCE
No. 01455

1. Unique identification code of the product-type: **Pattex CF920**

2. Intended use/es:

Generic type	Bonded Anchor with Anchor rod of size M8 to M30 or rebar Ø8 to Ø32 for use in concrete
For use in	Non-cracked and cracked concrete C20/25 to C50/60 acc. To EN 206:2000-12
Material	**Zinc-plated or hot dip galvanized steel:** Dry internal conditions M8 to M30 **Stainless steel (A4) - 1.4401, 1.4404, 1.4571:** Internal and external use without particular aggressive conditions M8 to M30 **High corrosion resistance steel (HCR) - 1.4529, 1.4565:** Internal and external use with particular aggressive conditions M8 to M30 **Reinforcing bar** Class B and C as EN 1992-1-1 Annex C Ø8 to Ø32
Use category	• Installation in dry and wet concrete (all sizes) • Installation in flooded holes (only M8 to M16 and rebar Ø8 to Ø16) • Overhead installation • Application in non-cracked concrete: M8 to M30, Rebar Ø8 to Ø32 • Application in cracked concrete and seismic C1: M12 to M30, Rebar Ø12 to Ø32
Loading	Static, quasi-static, seismic C1
Temperature range	- 40°C to +40°C (max. short term temperature +40°C; max. long term temperature +24°C) - 40°C to +80°C (max. short term temperature +80°C; max. long term temperature +50°C) - 40°C to +120°C (max. short term temperature +120°C; max. long term temperature +72°C)

Generic type	Post-installed rebar connection with Chemofast Injection System STVK
For use in	Concrete C12/15 to C50/60 acc. To EN 206-1:2000
Material	Reinforcing bar Class B and C as EN 1992-1-1 Annex C Ø8 to Ø32
Use category	• Installation in dry and wet concrete

	• Installation in non-carbonated concrete with the allowable chloride content of 0,40% (CL 0.40) • Overlap joint with existing reinforcement in a building component • Anchoring of the reinforcement at a slab or beam support • anchoring of reinforcement of building components stressed primarily in compression • anchoring of reinforcement to cover the envelope line of tensile force in the bending member
Loading	Static, quasi-static
Temperature range	- 40°C to +80°C (max. short term temperature +80°C; max. long term temperature +50°C)

3. Manufacturer: Henkel AG & Co. KGaA
D-40191 Düsseldorf

4. Authorised representative: Not Relevant

5. System/s of assessment and verification of constancy of performance: System 1

6a. Harmonised standard/s: Not Relevant
Notified body/ies: Not Relevant

6b. European Assessment Document: ETAG 001 Part 1+5 (27.06.2013)
ETAG 001 Part 1+5 (27.06.2013) and EOTA TR023 (November 2006)
European Technical Assessment: ETA 08/0237 – issued 07.09.2017
ETA 09/0277 - issued 22.04.2015
Technical Assessment Body: Deutsches Institut für Bautechnik DiBt
Notified body/ies: MPA Darmstadt (1343)

7. Declared performance/s:

Essential characteristics	Performance	System/s of assessment and verification of constancy of performance	Harmonised technical specification
Characteristic resistance for tension (TR 029 CEN/TS 1992-4-5)	ETA-08/0237, Annex C1, C2, C4	System 1	ETAG 001 Part 1 + 5
Characteristic resistance for shear (TR 029 CEN/TS 1992-4-5)	ETA-08/0237, Annex C1, C3, C5		
Characteristic seismic resistance (TR 045)	ETA-08/0237, Annex C2, C3, C4, C5		
Displacement for serviceability limit state	ETA-08/0237, Annex C6, C7		

Essential characteristics	Performance	System/s of assessment and verification of constancy of performance	Harmonised technical specification
Design values of the ultimate bond resistance (EN 1992-1-1:2004+AC:2010)	ETA-09/0277, Annex C1	System 1	ETAG 001 Part 1 + 5 EOTA TR 023
Minimum anchorage length and lap length (EN 1992-1-1:2004+AC:2010)	ETA-09/0277, Annex C1		

8. Appropriate Technical Documentation and/or Specific Technical Documentation: Not Relevant

The performance of the product identified above is in conformity with the set of declared performance/s. This declaration of performance is issued, in accordance with Regulation (EU) No 305/2011, under the sole responsibility of the manufacturer identified above.

Signed for and on behalf of the manufacturer by:

Dr. Liam O'Dwyer
Head Global Product Development
(name and function)

(signature)

Simon Duggan-Hill
Global Steering Unit Head ACG
(name and function)

(signature)

Düsseldorf, 18th April 2018
(place and date of issue)

Table C1: Characteristic values for steel tension resistance and steel shear resistance of threaded rods

Size				M 8	M 10	M 12	M 16	M 20	M24	M 27	M 30
Characteristic tension resistance, Steel failure											
Steel, Property class 4.6 and 4.8		$N_{Rk,s}$	[kN]	15	23	34	63	98	141	184	224
Steel, Property class 5.8		$N_{Rk,s}$	[kN]	18	29	42	78	122	176	230	280
Steel, Property class 8.8		$N_{Rk,s}$	[kN]	29	46	67	125	196	282	368	449
Nichtrostender Stahl A4 and HCR, Property class 50		$N_{Rk,s}$	[kN]	18	29	42	79	123	177	230	281
Nichtrostender Stahl A4 and HCR, Property class 70		$N_{Rk,s}$	[kN]	26	41	59	110	171	247	-	-
Characteristic tension resistance, Partial safety factor											
Steel, Property class 4.6		$\gamma_{Ms,N}$ [1)]	[-]	2,0							
Steel, Property class 4.8		$\gamma_{Ms,N}$ [1)]	[-]	1,5							
Steel, Property class 5.8		$\gamma_{Ms,N}$ [1)]	[-]	1,5							
Steel, Property class 8.8		$\gamma_{Ms,N}$ [1)]	[-]	1,5							
Stainless steel A4 and HCR, Property class 50		$\gamma_{Ms,N}$ [1)]	[-]	2,86							
Stainless steel A4 and HCR, Property class 70		$\gamma_{Ms,N}$ [1)]	[-]	1,87							
Characteristic shear resistance, Steel failure											
Without lever arm	Steel, Property class 4.6 and 4.8	$V_{Rk,s}$	[kN]	7	12	17	31	49	71	92	112
	Steel, Property class 5.8	$V_{Rk,s}$	[kN]	9	15	21	39	61	88	115	140
	Steel, Property class 8.8	$V_{Rk,s}$	[kN]	15	23	34	63	98	141	184	224
	Stainless steel A4 and HCR, Property class 50	$V_{Rk,s}$	[kN]	9	15	21	39	61	88	115	140
	Stainless steel A4 and HCR, Property class 70	$V_{Rk,s}$	[kN]	13	20	30	55	86	124	-	-
With lever arm	Steel, Property class 4.6 and 4.8	$M_{Rk,s}$	[Nm]	15	30	52	133	260	449	666	900
	Steel, Property class 5.8	$M_{Rk,s}$	[Nm]	19	37	65	166	324	560	833	1123
	Steel, Property class 8.8	$M_{Rk,s}$	[Nm]	30	60	105	266	519	896	1333	1797
	Stainless steel A4 and HCR, Property class 50	$M_{Rk,s}$	[Nm]	19	37	66	167	325	561	832	1125
	Stainless steel A4 and HCR, Property class 70	$M_{Rk,s}$	[Nm]	26	52	92	232	454	784	-	-
Characteristic shear resistance, Partial safety factor											
Steel, Property class 4.6		$\gamma_{Ms,V}$ [1)]	[-]	1,67							
Steel, Property class 4.8		$\gamma_{Ms,V}$ [1)]	[-]	1,25							
Steel, Property class 5.8		$\gamma_{Ms,V}$ [1)]	[-]	1,25							
Steel, Property class 8.8		$\gamma_{Ms,V}$ [1)]	[-]	1,25							
Stainless steel A4 and HCR, Property class 50		$\gamma_{Ms,V}$ [1)]	[-]	2,38							
Stainless steel A4 and HCR, Property class 70		$\gamma_{Ms,V}$ [1)]	[-]	1,56							

[1)] in absence of national regulation

Table C2: Characteristic values of tension loads under static, quasi-static action and seismic action (performance category C1)

Anchor size threaded rod				**M 8**	**M 10**	**M 12**	**M 16**	**M 20**	**M24**	**M27**	**M30**
Steel failure											
Characteristic tension resistance		$N_{Rk,s}$	[kN]	see Table C1							
		$N_{Rk,s,C1}$	[kN]	$1{,}0 \cdot N_{Rk,s}$							
Partial safety factor		$\gamma_{Ms,N}$	[-]	see Table C1							
Combined pull-out and concrete 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]	10	12	12	12	12	11	10	9
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm²]	7,5	8,5	8,5	8,5	No Performance Determined (NPD)			
Temperature range II: 80°C/50°C	dry and wet concrete	$\tau_{Rk,ucr}$	[N/mm²]	7,5	9	9	9	9	8,5	7,5	6,5
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm²]	5,5	6,5	6,5	6,5	No Performance Determined (NPD)			
Temperature range III: 120°C/72°C	dry and wet concrete	$\tau_{Rk,ucr}$	[N/mm²]	5,5	6,5	6,5	6,5	6,5	6,5	5,5	5,0
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm²]	4,0	5,0	5,0	5,0	No Performance Determined (NPD)			
Characteristic bond resistance in cracked concrete C20/25											
Temperature range I: 40°C/24°C	dry and wet concrete	$\tau_{Rk,cr}$	[N/mm²]	4,0	5,0	5,5	5,5	5,5	5,5	6,5	6,5
		$\tau_{Rk,C1}$	[N/mm²]	2,5	3,1	3,7	3,7	3,7	3,8	4,5	4,5
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm²]	4,0	4,0	5,5	5,5	No Performance Determined (NPD)			
		$\tau_{Rk,C1}$	[N/mm²]	2,5	2,5	3,7	3,7	No Performance Determined (NPD)			
Temperature range II: 80°C/50°C	dry and wet concrete	$\tau_{Rk,cr}$	[N/mm²]	2,5	3,5	4,0	4,0	4,0	4,0	4,5	4,5
		$\tau_{Rk,C1}$	[N/mm²]	1,6	2,2	2,7	2,7	2,7	2,8	3,1	3,1
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm²]	2,5	3,0	4,0	4,0	No Performance Determined (NPD)			
		$\tau_{Rk,C1}$	[N/mm²]	1,6	1,9	2,7	2,7	No Performance Determined (NPD)			
Temperature range III: 120°C/72°C	dry and wet concrete	$\tau_{Rk,cr}$	[N/mm²]	2,0	2,5	3,0	3,0	3,0	3,0	3,5	3,5
		$\tau_{Rk,C1}$	[N/mm²]	1,3	1,6	2,0	2,0	2,0	2,1	2,4	2,4
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm²]	2,0	2,5	3,0	3,0	No Performance Determined (NPD)			
		$\tau_{Rk,C1}$	[N/mm²]	1,3	1,6	2,0	2,0	No Performance Determined (NPD)			
Increasing factors for concrete (only static or quasi-static actions) ψ_c		C25/30		1,02							
		C30/37		1,04							
		C35/45		1,07							
		C40/50		1,08							
		C45/55		1,09							
		C50/60		1,10							
Factor according to CEN/TS 1992-4-5 Section 6.2.2.3	Non-cracked concrete	k_8	[-]	10,1							
	Cracked concrete			7,2							
Concrete cone failure											
Factor according to CEN/TS 1992-4-5 Section 6.2.3.1	Non-cracked concrete	k_{ucr}	[-]	10,1							
	Cracked concrete	k_{cr}	[-]	7,2							
Edge distance		$c_{cr,N}$	[mm]	$1{,}5\ h_{ef}$							
Axial distance		$s_{cr,N}$	[mm]	$3{,}0\ h_{ef}$							
Splitting											
Edge distance		$c_{cr,sp}$	[mm]	$1{,}0 \cdot h_{ef} \le 2 \cdot h_{ef}\left(2{,}5 - \frac{h}{h_{ef}}\right) \le 2{,}4 \cdot h_{ef}$							
Axial distance		$s_{cr,sp}$	[mm]	$2\ c_{cr,sp}$							
Installation safety factor (dry and wet concrete)		$\gamma_2 = \gamma_{inst}$		1,0	1,2						
Installation safety factor (flooded bore hole)		$\gamma_2 = \gamma_{inst}$		1,4				No Performance Determined (NPD)			

CF920 for concrete (ETA 08/0237 - 07.09.2017)

Performances
Characteristic values of tension loads under static, quasi-static action and seismic action (performance category C1)

Annex C 2

Table C3: Characteristic values of shear loads under static, quasi-static action and seismic action (performance category C1)

Anchor size threaded rod			**M 8**	**M 10**	**M 12**	**M 16**	**M 20**	**M24**	**M 27**	**M 30**
Steel failure without lever arm										
Characteristic shear resistance	$V_{Rk,s}$	[kN]	see Table C1							
	$V_{Rk,s,C1}$	[kN]	$0{,}70 \cdot V_{Rk,s}$							
Partial safety factor	$\gamma_{Ms,V}$	[-]	see Table C1							
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]	see Table C1							
	$M^0_{Rk,s,C1}$	[Nm]	No Performance Determined (NPD)							
Partial safety factor	$\gamma_{Ms,V}$	[-]	see Table C1							
Concrete pry-out failure										
Factor k_3 in equation (27) of CEN/TS 1992-4-5 Section 6.3.3 Factor k in equation (5.7) of Technical Report TR 029	$k_{(3)}$		2,0							
Installation safety factor	$\gamma_2 = \gamma_{inst}$		1,0							
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 of tension loads under static, quasi-static action and seismic action (performance category C1)

Anchor size reinforcing bar				**Ø 8**	**Ø 10**	**Ø 12**	**Ø 14**	**Ø 16**	**Ø 20**	**Ø 25**	**Ø 28**	**Ø 32**
Steel failure												
Characteristic tension resistance		$N_{Rk,s}$	[kN]	$A_s \cdot f_{uk}$ [1)]								
		$N_{Rk,s,C1}$	[kN]	$1{,}0 \cdot A_s \cdot f_{uk}$ [1)]								
Cross section area		A_s	[mm²]	50	79	113	154	201	214	491	616	804
Partial safety factor		$\gamma_{Ms,N}$	[-]	1,4 [2)]								
Combined pull-out and concrete 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]	10	12	12	12	12	12	11	10	8,5
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm²]	7,5	8,5	8,5	8,5	8,5	No Performance Determined (NPD)			
Temperature range II: 80°C/50°C	dry and wet concrete	$\tau_{Rk,ucr}$	[N/mm²]	7,5	9	9	9	9	9	8,0	7,0	6,0
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm²]	5,5	6,5	6,5	6,5	6,5	No Performance Determined (NPD)			
Temperature range III: 120°C/72°C	dry and wet concrete	$\tau_{Rk,ucr}$	[N/mm²]	5,5	6,5	6,5	6,5	6,5	6,5	6,0	5,0	4,5
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm²]	4,0	5,0	5,0	5,0	5,0	No Performance Determined (NPD)			
Characteristic bond resistance in cracked concrete C20/25												
Temperature range I: 40°C/24°C	dry and wet concrete	$\tau_{Rk,cr}$	[N/mm²]	4,0	5,0	5,5	5,5	5,5	5,5	5,5	6,5	6,5
		$\tau_{Rk,C1}$	[N/mm²]	2,5	3,1	3,7	3,7	3,7	3,7	3,8	4,5	4,5
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm²]	4,0	4,0	5,5	5,5	5,5	No Performance Determined (NPD)			
		$\tau_{Rk,C1}$	[N/mm²]	2,5	2,5	3,7	3,7	3,7	No Performance Determined (NPD)			
Temperature range II: 80°C/50°C	dry and wet concrete	$\tau_{Rk,cr}$	[N/mm²]	2,5	3,5	4,0	4,0	4,0	4,0	4,0	4,5	4,5
		$\tau_{Rk,C1}$	[N/mm²]	1,6	2,2	2,7	2,7	2,7	2,7	2,8	3,1	3,1
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm²]	2,5	3,0	4,0	4,0	4,0	No Performance Determined (NPD)			
		$\tau_{Rk,C1}$	[N/mm²]	1,6	1,9	2,7	2,7	2,7	No Performance Determined (NPD)			
Temperature range III: 120°C/72°C	dry and wet concrete	$\tau_{Rk,cr}$	[N/mm²]	2,0	2,5	3,0	3,0	3,0	3,0	3,0	3,5	3,5
		$\tau_{Rk,C1}$	[N/mm²]	1,3	1,6	2,0	2,0	2,0	2,0	2,1	2,4	2,4
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm²]	2,0	2,5	3,0	3,0	3,0	No Performance Determined (NPD)			
		$\tau_{Rk,C1}$	[N/mm²]	1,3	1,6	2,0	2,0	2,0	No Performance Determined (NPD)			
Increasing factors for concrete (only static or quasi-static actions) ψ_c		C25/30		1,02								
		C30/37		1,04								
		C35/45		1,07								
		C40/50		1,08								
		C45/55		1,09								
		C50/60		1,10								
Factor according to CEN/TS 1992-4-5 Section 6.2.2.3	Non-cracked concrete	k_8	[-]	10,1								
	Cracked concrete			7,2								
Concrete cone failure												
Factor according to CEN/TS 1992-4-5 Section 6.2.3.1	Non-cracked concrete	k_{ucr}	[-]	10,1								
	Cracked concrete	k_{cr}	[-]	7,2								
Edge distance		$c_{cr,N}$	[mm]	$1{,}5\ h_{ef}$								
Axial distance		$s_{cr,N}$	[mm]	$3{,}0\ h_{ef}$								
Splitting												
Edge distance		$c_{cr,sp}$	[mm]	$1{,}0 \cdot h_{ef} \le 2 \cdot h_{ef}\left(2{,}5 - \frac{h}{h_{ef}}\right) \le 2{,}4 \cdot h_{ef}$								
Axial distance		$s_{cr,sp}$	[mm]	$2\ c_{cr,sp}$								
Installation safety factor (dry and wet concrete)		$\gamma_2 = \gamma_{inst}$		1,0	1,2							
Installation safety factor (flooded bore hole)		$\gamma_2 = \gamma_{inst}$		1,4					No Performance Determined (NPD)			

[1)] f_{uk} shall be taken from the specifications of reinforcing bars
[2)] in absence of national regulation

CF920 for concrete (ETA 08/0237 - 07.09.2017)

Performances
Characteristic values of tension loads under static, quasi-static action and seismic action (performance category C1)

Annex C 4

Table C5: Characteristic values of shear loads under static, quasi-static action and seismic action (performance category C1)

Anchor size reinforcing bar			**Ø 8**	**Ø 10**	**Ø 12**	**Ø 14**	**Ø 16**	**Ø 20**	**Ø 25**	**Ø 28**	**Ø 32**
Steel failure without lever arm											
Characteristic shear resistance	$V_{Rk,s}$	[kN]	$0{,}50 \cdot A_s \cdot f_{uk}$ [1)]								
	$V_{Rk,s,C1}$	[kN]	$0{,}35 \cdot A_s \cdot f_{uk}$ [1)]								
Cross section area	A_s	[mm²]	50	79	113	154	201	214	491	616	804
Partial safety factor	$\gamma_{Ms,V}$	[-]	1,5 [2)]								
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]	$1.2 \cdot W_{el} \cdot f_{uk}$ [1)]								
	$M^0_{Rk,s,\ C1}$	[Nm]	No Performance Determined (NPD)								
Elastic section modulus	W_{el}	[mm³]	50	98	170	269	402	785	1534	2155	3217
Partial safety factor	$\gamma_{Ms,V}$	[-]	1,5 [2)]								
Concrete pry-out failure											
Factor k_3 in equation (27) of CEN/TS 1992-4-5 Section 6.3.3 Factor k in equation (5.7) of Technical Report TR 029	$k_{(3)}$		2,0								
Installation safety factor	$\gamma_2 = \gamma_{inst}$		1,0								
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								

[1)] f_{uk} shall be taken from the specifications of reinforcing bars
[2)] in absence of national regulation

Table C6: Displacements under tension load[1)] (threaded rod)

Anchor size threaded rod			M 8	M 10	M 12	M 16	M 20	M24	M 27	M 30
Non-cracked concrete C20/25										
Temperature range I: 40°C/24°C	δ_{N0}-factor	[mm/(N/mm²)]	0,021	0,023	0,026	0,031	0,036	0,041	0,045	0,049
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,030	0,033	0,037	0,045	0,052	0,060	0,065	0,071
Temperature range II: 80°C/50°C	δ_{N0}-factor	[mm/(N/mm²)]	0,050	0,056	0,063	0,075	0,088	0,100	0,110	0,119
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,072	0,081	0,090	0,108	0,127	0,145	0,159	0,172
Temperature range III: 120°C/72°C	δ_{N0}-factor	[mm/(N/mm²)]	0,050	0,056	0,063	0,075	0,088	0,100	0,110	0,119
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,072	0,081	0,090	0,108	0,127	0,145	0,159	0,172
Cracked concrete C20/25										
Temperature range I: 40°C/24°C	δ_{N0}-factor	[mm/(N/mm²)]	0,090			0,070				
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,105			0,105				
Temperature range II: 80°C/50°C	δ_{N0}-factor	[mm/(N/mm²)]	0,219			0,170				
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,255			0,245				
Temperature range III: 120°C/72°C	δ_{N0}-factor	[mm/(N/mm²)]	0,219			0,170				
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,255			0,245				

[1)] Calculation of the displacement
$\delta_{N0} = \delta_{N0}\text{-factor} \cdot \tau$; τ: action bond stress for tension
$\delta_{N\infty} = \delta_{N\infty}\text{-factor} \cdot \tau$;

Table C7: Displacements under shear load[1)] (threaded rod)

Anchor size threaded rod			M 8	M 10	M 12	M 16	M 20	M24	M 27	M 30
For non-cracked concrete C20/25										
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
For cracked concrete C20/25										
All temperature ranges	δ_{V0}-factor	[mm/(kN)]	0,12	0,12	0,11	0,10	0,09	0,08	0,08	0,07
	$\delta_{V\infty}$-factor	[mm/(kN)]	0,18	0,18	0,17	0,15	0,14	0,13	0,12	0,10

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

Table C8: Displacements under tension load[1] (rebar)

Anchor size reinforcing bar			∅ 8	∅ 10	∅ 12	∅ 14	∅ 16	∅ 20	∅ 25	∅ 28	∅ 32
Non-cracked concrete C20/25											
Temperature range I: 40°C/24°C	δ_{N0}-factor	[mm/(N/mm²)]	0,021	0,023	0,026	0,028	0,031	0,036	0,043	0,047	0,052
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,030	0,033	0,037	0,041	0,045	0,052	0,061	0,071	0,075
Temperature range II: 80°C/50°C	δ_{N0}-factor	[mm/(N/mm²)]	0,050	0,056	0,063	0,069	0,075	0,088	0,104	0,113	0,126
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,072	0,081	0,090	0,099	0,108	0,127	0,149	0,163	0,181
Temperature range III: 120°C/72°C	δ_{N0}-factor	[mm/(N/mm²)]	0,050	0,056	0,063	0,069	0,075	0,088	0,104	0,113	0,126
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,072	0,081	0,090	0,099	0,108	0,127	0,149	0,163	0,181
Cracked concrete C20/25											
Temperature range I: 40°C/24°C	δ_{N0}-factor	[mm/(N/mm²)]	0,090			0,070					
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,105			0,105					
Temperature range II: 80°C/50°C	δ_{N0}-factor	[mm/(N/mm²)]	0,219			0,170					
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,255			0,245					
Temperature range III: 120°C/72°C	δ_{N0}-factor	[mm/(N/mm²)]	0,219			0,170					
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,255			0,245					

[1] Calculation of the displacement

$\delta_{N0} = \delta_{N0}\text{-factor} \cdot \tau$; τ: action bond stress for tension

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

Table C9: Displacement under shear load[1] (rebar)

Anchor size reinforcing bar			∅ 8	∅ 10	∅ 12	∅ 14	∅ 16	∅ 20	∅ 25	∅ 28	∅ 32
Non-cracked concrete C20/25											
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
Cracked concrete C20/25											
All temperature ranges	δ_{V0}-factor	[mm/(kN)]	0,12	0,12	0,11	0,11	0,10	0,09	0,08	0,07	0,06
	$\delta_{V\infty}$-factor	[mm/(kN)]	0,18	0,18	0,17	0,16	0,15	0,14	0,12	0,11	0,10

[1] Calculation of the displacement

$\delta_{V0} = \delta_{V0}\text{-factor} \cdot V$; V: action shear load

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

Minimum anchorage length and minimum lap length

The minimum anchorage length $\ell_{b,min}$ and the minimum lap length $\ell_{0,min}$ according to EN 1992-1-1:2004+AC:2010 ($\ell_{b,min}$ acc. to Eq. 8.6 and Eq. 8.7 and $\ell_{0,min}$ acc. to Eq. 8.11) shall be multiply by a factor according to Table C1.

Table C1: Factor related to concrete class and drilling method

Concrete class	Drilling method	Factor
C12/15 to C50/60	Hammer drilling and compressed air drilling	1,0

Table C2: Design values of the ultimate bond resistance f_{bd} in N/mm² for all drilling methods for good conditions

according to EN 1992-1-1:2004+AC:2010 for good bond conditions
(for all other bond conditions multiply the values by 0.7)

Rebar - ∅	Concrete class								
ϕ	C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
8 to 25 mm	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3
28 bis 32 mm	1,6	2,0	2,3	2,7	3,0	3,4	3,7	3,7	3,7