

YDEEVNEDEKLARATION

Nr.: 4 - 018 - 160107 - 2021/02

DK

EJOT®

b) Sikkerhed ved brand (BWR 2)

Væsentlige egenskaber	Ydelse

c) Hygiejne, sundhed og miljø (BWR 3)

Væsentlige egenskaber	Ydelse

d) Beskyttelse mod støj (BWR 5)

Væsentlige egenskaber	Ydelse

e) Energibesparelser og varmebinding (BWR 6)

Væsentlige egenskaber	Ydelse

f) Bæredygtig udnyttelse af naturressourcer (BWR 7)

Væsentlige egenskaber	Ydelse

Ydeevnen for den vare, der er anført ovenfor, er i overensstemmelse med den deklarerede ydeevne. Denne ydeevnedeklaration er udarbejdet i overensstemmelse med forordning (EU) nr. 305/2011 på eneansvar af den fabrikant, der er anført ovenfor.

Underskrevet for fabrikanten og på dennes vegne af:

Dr. Jens Weber

(navn)

Bad Laasphe, 27 January 2021

(sted og dato for udstedelse)



(underskrift)

Table C1: Characteristic values for steel tension resistance and steel shear resistance of threaded rods											
Size			M8	M10	M12	M16	M20	M24	M27	M30	
Cross section area	A_s	[mm ²]	36,6	58	84,3	157	245	353	459	561	
Characteristic tension resistance, Steel failure ¹⁾											
Steel, Property class 4.6 and 4.8	$N_{Rk,s}$	[kN]	15 (13)	23 (21)	34	63	98	141	184	224	
Steel, Property class 5.6 and 5.8	$N_{Rk,s}$	[kN]	18 (17)	29 (27)	42	78	122	176	230	280	
Steel, Property class 8.8	$N_{Rk,s}$	[kN]	29 (27)	46 (43)	67	125	196	282	368	449	
Stainless steel A2, A4 and HCR, class 50	$N_{Rk,s}$	[kN]	18	29	42	79	123	177	230	281	
Stainless steel A2, A4 and HCR, class 70	$N_{Rk,s}$	[kN]	26	41	59	110	171	247	- ³⁾	- ³⁾	
Stainless steel A4 and HCR, class 80	$N_{Rk,s}$	[kN]	29	46	67	126	196	282	- ³⁾	- ³⁾	
Characteristic tension resistance, Partial factor ²⁾											
Steel, Property class 4.6 and 5.6	$\gamma_{Ms,N}$	[-]	2,0								
Steel, Property class 4.8, 5.8 and 8.8	$\gamma_{Ms,N}$	[-]	1,5								
Stainless steel A2, A4 and HCR, class 50	$\gamma_{Ms,N}$	[-]	2,86								
Stainless steel A2, A4 and HCR, class 70	$\gamma_{Ms,N}$	[-]	1,87								
Stainless steel A4 and HCR, class 80	$\gamma_{Ms,N}$	[-]	1,6								
Characteristic shear resistance, Steel failure ¹⁾											
Without lever arm	Steel, Property class 4.6 and 4.8	$V_{Rk,s}^0$	[kN]	9 (8)	14 (13)	20	38	59	85	110	135
	Steel, Property class 5.6 and 5.8	$V_{Rk,s}^0$	[kN]	11 (10)	17 (16)	25	47	74	106	138	168
	Steel, Property class 8.8	$V_{Rk,s}^0$	[kN]	15 (13)	23 (21)	34	63	98	141	184	224
	Stainless steel A2, A4 and HCR, class 50	$V_{Rk,s}^0$	[kN]	9	15	21	39	61	88	115	140
	Stainless steel A2, A4 and HCR, class 70	$V_{Rk,s}^0$	[kN]	13	20	30	55	86	124	- ³⁾	- ³⁾
	Stainless steel A4 and HCR, class 80	$V_{Rk,s}^0$	[kN]	15	23	34	63	98	141	- ³⁾	- ³⁾
With lever arm	Steel, Property class 4.6 and 4.8	$M_{Rk,s}^0$	[Nm]	15 (13)	30 (27)	52	133	260	449	666	900
	Steel, Property class 5.6 and 5.8	$M_{Rk,s}^0$	[Nm]	19 (16)	37 (33)	65	166	324	560	833	1123
	Steel, Property class 8.8	$M_{Rk,s}^0$	[Nm]	30 (26)	60 (53)	105	266	519	896	1333	1797
	Stainless steel A2, A4 and HCR, class 50	$M_{Rk,s}^0$	[Nm]	19	37	66	167	325	561	832	1125
	Stainless steel A2, A4 and HCR, class 70	$M_{Rk,s}^0$	[Nm]	26	52	92	232	454	784	- ³⁾	- ³⁾
	Stainless steel A4 and HCR, class 80	$M_{Rk,s}^0$	[Nm]	30	59	105	266	519	896	- ³⁾	- ³⁾
Characteristic shear resistance, Partial factor ²⁾											
Steel, Property class 4.6 and 5.6	$\gamma_{Ms,V}$	[-]	1,67								
Steel, Property class 4.8, 5.8 and 8.8	$\gamma_{Ms,V}$	[-]	1,25								
Stainless steel A2, A4 and HCR, class 50	$\gamma_{Ms,V}$	[-]	2,38								
Stainless steel A2, A4 and HCR, class 70	$\gamma_{Ms,V}$	[-]	1,56								
Stainless steel A4 and HCR, class 80	$\gamma_{Ms,V}$	[-]	1,33								
¹⁾ Values are only valid for the given stress area A_s . Values in brackets are valid for undersized threaded rods with smaller stress area A_s for hot-dip galvanised threaded rods according to EN ISO 10684:2004+AC:2009. ²⁾ in absence of national regulation ³⁾ Anchor type not part of the ETA											
EJOT Chemical Anchor MULTIFIX USF, MULTIFIX USF winter for concrete									Annex C 1		
Performances Characteristic values for steel tension resistance and steel shear resistance of threaded rods											

Table C2: Characteristic values for Concrete cone failure and Splitting with all kind of action

Anchor size			All Anchor types and sizes	
Concrete cone failure				
Non-cracked concrete	$k_{ucr,N}$	[-]	11,0	
Cracked concrete	$k_{cr,N}$	[-]	7,7	
Edge distance	$c_{cr,N}$	[mm]	$1,5 h_{ef}$	
Axial distance	$s_{cr,N}$	[mm]	$2 c_{cr,N}$	
Splitting				
Edge distance	$h/h_{ef} \geq 2,0$	$c_{cr,sp}$	[mm]	$1,0 h_{ef}$
	$2,0 > h/h_{ef} > 1,3$			$2 \cdot h_{ef} \left(2,5 - \frac{h}{h_{ef}} \right)$
	$h/h_{ef} \leq 1,3$			$2,4 h_{ef}$
Axial distance	$s_{cr,sp}$	[mm]	$2 c_{cr,sp}$	

EJOT Chemical Anchor MULTIFIX USF, MULTIFIX USF winter for concrete	Annex C 2
Performances Characteristic values for Concrete cone failure and Splitting with all kind of action	

Table C3: Characteristic values of tension loads under static and quasi-static action													
Anchor size threaded rod				M8	M10	M12	M16	M20	M24	M27	M30		
Steel failure													
Characteristic tension resistance		$N_{Rk,s}$	[kN]	$A_s \cdot f_{uk}$ (or see Table C1)									
Partial 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, wet concrete	$\tau_{Rk,ucr}$	[N/mm ²]	10	12	12	12	12	11	10	9	
	II: 80°C/50°C				7,5	9	9	9	9	8,5	7,5	6,5	
	III: 120°C/72°C				5,5	6,5	6,5	6,5	6,5	6,5	5,5	5,0	
	I: 40°C/24°C	flooded bore hole			7,5	8,5	8,5	8,5	No Performance Assessed				
	II: 80°C/50°C				5,5	6,5	6,5	6,5					
	III: 120°C/72°C				4,0	5,0	5,0	5,0					
Characteristic bond resistance in cracked concrete C20/25													
Temperature range	I: 40°C/24°C	Dry, wet concrete	$\tau_{Rk,cr}$	[N/mm ²]	4,0	5,0	5,5	5,5	5,5	5,5	6,5	6,5	
	II: 80°C/50°C				2,5	3,5	4,0	4,0	4,0	4,0	4,5	4,5	
	III: 120°C/72°C				2,0	2,5	3,0	3,0	3,0	3,0	3,5	3,5	
	I: 40°C/24°C	flooded bore hole			4,0	4,0	5,5	5,5	No Performance Assessed				
	II: 80°C/50°C				2,5	3,0	4,0	4,0					
	III: 120°C/72°C				2,0	2,5	3,0	3,0					
Reduktion factor ψ_{sus}^0 in cracked and non-cracked concrete C20/25													
Temperature range	I: 40°C/24°C	Dry, wet concrete and flooded bore hole	ψ_{sus}^0	[-]	0,73								
	II: 80°C/50°C				0,65								
	III: 120°C/72°C				0,57								
Increasing factors for concrete 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									
Concrete cone failure													
Relevant parameter				see Table C2									
Splitting													
Relevant parameter				see Table C2									
Installation factor													
for dry and wet concrete		γ_{inst}	[-]	1,0	1,2								
for flooded bore hole				1,4	No Performance Assessed								
EJOT Chemical Anchor MULTIFIX USF, MULTIFIX USF winter for concrete										Annex C 3			
Performances Characteristic values of tension loads under static and quasi-static action													

Table C4: Characteristic values of shear loads under static and quasi-static action											
Anchor size threaded rod			M8	M10	M12	M16	M20	M24	M27	M30	
Steel failure without lever arm											
Characteristic shear resistance Steel, strength class 4.6, 4.8, 5.6 and 5.8	$V_{Rk,s}^0$	[kN]	$0,6 \cdot A_s \cdot f_{uk}$ (or see Table C1)								
Characteristic shear resistance Steel, strength class 8.8 Stainless Steel A2, A4 and HCR, all classes	$V_{Rk,s}^0$	[kN]	$0,5 \cdot A_s \cdot f_{uk}$ (or see Table C1)								
Partial factor	$\gamma_{Ms,V}$	[-]	see Table C1								
Ductility factor	k_7	[-]	1,0								
Steel failure with lever arm											
Characteristic bending moment	$M_{Rk,s}^0$	[Nm]	$1,2 \cdot W_{el} \cdot f_{uk}$ (or see Table C1)								
Elastic section modulus	W_{el}	[mm ³]	31	62	109	277	541	935	1387	1874	
Partial factor	$\gamma_{Ms,V}$	[-]	see Table C1								
Concrete pry-out failure											
Factor	k_8	[-]	2,0								
Installation factor	γ_{inst}	[-]	1,0								
Concrete edge failure											
Effective length of fastener	l_f	[mm]	$\min(h_{ef}; 12 \cdot d_{nom})$						$\min(h_{ef}; 300\text{mm})$		
Outside diameter of fastener	d_{nom}	[mm]	8	10	12	16	20	24	27	30	
Installation factor	γ_{inst}	[-]	1,0								
EJOT Chemical Anchor MULTIFIX USF, MULTIFIX USF winter for concrete								Annex C 4			
Performances Characteristic values of shear loads under static and quasi-static action											

Table C5: Characteristic values of tension loads under static and quasi-static action											
Anchor size internal threaded anchor rods				IG-M6	IG-M8	IG-M10	IG-M12	IG-M16	IG-M20		
Steel failure¹⁾											
Characteristic tension resistance,	5.8	$N_{Rk,s}$	[kN]	10	17	29	42	76	123		
Steel, strength class	8.8	$N_{Rk,s}$	[kN]	16	27	46	67	121	196		
Partial factor, strength class 5.8 and 8.8	$\gamma_{Ms,N}$		[-]	1,5							
Characteristic tension resistance, Stainless Steel A4 and HCR, Strength class 70 ²⁾		$N_{Rk,s}$	[kN]	14	26	41	59	110	124		
Partial factor	$\gamma_{Ms,N}$		[-]	1,87				2,86			
Combined pull-out and concrete cone failure											
Characteristic bond resistance in non-cracked concrete C20/25											
Temperature range	I: 40°C/24°C	Dry, wet concrete	$\tau_{Rk,ucr}$	[N/mm ²]	12	12	12	12	11	9	
	II: 80°C/50°C				9	9	9	9	8,5	6,5	
	III: 120°C/72°C				6,5	6,5	6,5	6,5	6,5	5,0	
	I: 40°C/24°C	flooded bore hole			8,5	8,5	8,5	No Performance Assessed			
	II: 80°C/50°C				6,5	6,5	6,5				
	III: 120°C/72°C				5,0	5,0	5,0				
Characteristic bond resistance in cracked concrete C20/25											
Temperature range	I: 40°C/24°C	Dry, wet concrete	$\tau_{Rk,cr}$	[N/mm ²]	5,0	5,5	5,5	5,5	5,5	6,5	
	II: 80°C/50°C				3,5	4,0	4,0	4,0	4,0	4,5	
	III: 120°C/72°C				2,5	3,0	3,0	3,0	3,0	3,5	
	I: 40°C/24°C	flooded bore hole			4,0	5,5	5,5	No Performance Assessed			
	II: 80°C/50°C				3,0	4,0	4,0				
	III: 120°C/72°C				2,5	3,0	3,0				
Reduktion factor ψ_{sus}^0 in cracked and non-cracked concrete C20/25											
Temperature range	I: 40°C/24°C	Dry, wet concrete and flooded bore hole	ψ_{sus}^0	[-]	0,73						
	II: 80°C/50°C				0,65						
	III: 120°C/72°C				0,57						
Increasing factors for concrete 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						
Concrete cone failure											
Relevant parameter				see Table C2							
Splitting failure											
Relevant parameter				see Table C2							
Installation factor											
for dry and wet concrete				γ_{inst}	[-]	1,2					
for flooded bore hole						1,4	No Performance Assessed				
¹⁾ Fastenings (incl. nut and washer) must comply with the appropriate material and property class of the internal threaded rod. The characteristic tension resistance for steel failure is valid for the internal threaded rod and the fastening element. ²⁾ For IG-M20 strength class 50 is valid											
EJOT Chemical Anchor MULTIFIX USF, MULTIFIX USF winter for concrete								Annex C 5			
Performances Characteristic values of tension loads under static and quasi-static action											

Table C6: Characteristic values of shear loads under static and quasi-static action									
Anchor size for internal threaded anchor rods				IG-M6	IG-M8	IG-M10	IG-M12	IG-M16	IG-M20
Steel failure without lever arm¹⁾									
Characteristic shear resistance, Steel, strength class	5.8	$V_{Rk,s}^0$	[kN]	5	9	15	21	38	61
	8.8	$V_{Rk,s}^0$	[kN]	8	14	23	34	60	98
Partial factor, strength class 5.8 and 8.8	$\gamma_{Ms,V}$		[-]	1,25					
Characteristic shear resistance, Stainless Steel A4 and HCR, Strength class 70 ²⁾		$V_{Rk,s}^0$	[kN]	7	13	20	30	55	40
	$\gamma_{Ms,V}$		[-]	1,56					2,38
Ductility factor	k_7		[-]	1,0					
Steel failure with lever arm¹⁾									
Characteristic bending moment, Steel, strength class	5.8	$M_{Rk,s}^0$	[Nm]	8	19	37	66	167	325
	8.8	$M_{Rk,s}^0$	[Nm]	12	30	60	105	267	519
Partial factor, strength class 5.8 and 8.8	$\gamma_{Ms,V}$		[-]	1,25					
Characteristic bending moment, Stainless Steel A4 and HCR, Strength class 70 ²⁾		$M_{Rk,s}^0$	[Nm]	11	26	52	92	233	456
	$\gamma_{Ms,V}$		[-]	1,56					2,38
Concrete pry-out failure									
Factor	k_B		[-]	2,0					
Installation factor	γ_{inst}		[-]	1,0					
Concrete edge failure									
Effective length of fastener	l_f	[mm]	$\min(h_{ef}; 12 \cdot d_{nom})$					$\min(h_{ef}; 300\text{mm})$	
Outside diameter of fastener	d_{nom}	[mm]	10	12	16	20	24	30	
Installation factor	γ_{inst}		[-]	1,0					
¹⁾ Fastenings (incl. nut and washer) must comply with the appropriate material and property class of the internal threaded rod. The characteristic tension resistance for steel failure is valid for the internal threaded rod and the fastening element. ²⁾ For IG-M20 strength class 50 is valid									
EJOT Chemical Anchor MULTIFIX USF, MULTIFIX USF winter for concrete								Annex C 6	
Performances Characteristic values of shear loads under static and quasi-static action									

Table C7: Characteristic values of tension loads under static and quasi-static action														
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]	$A_s \cdot f_{uk}^{1)}$										
Cross section area		A_s	[mm ²]	50	79	113	154	201	314	491	616	804		
Partial 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, wet concrete	$\tau_{Rk,ucr}$	[N/mm ²]	10	12	12	12	12	12	11	10	8,5	
	II: 80°C/50°C				7,5	9	9	9	9	9	8,0	7,0	6,0	
	III: 120°C/72°C				5,5	6,5	6,5	6,5	6,5	6,5	6,0	5,0	4,5	
	I: 40°C/24°C	flooded bore hole			7,5	8,5	8,5	8,5	8,5	No Performance Assessed				
	II: 80°C/50°C				5,5	6,5	6,5	6,5	6,5					
	III: 120°C/72°C				4,0	5,0	5,0	5,0	5,0					
Characteristic bond resistance in cracked concrete C20/25														
Temperature range	I: 40°C/24°C	Dry, wet concrete	$\tau_{Rk,cr}$	[N/mm ²]	4,0	5,0	5,5	5,5	5,5	5,5	5,5	6,5	6,5	
	II: 80°C/50°C				2,5	3,5	4,0	4,0	4,0	4,0	4,0	4,5	4,5	
	III: 120°C/72°C				2,0	2,5	3,0	3,0	3,0	3,0	3,0	3,0	3,5	3,5
	I: 40°C/24°C	flooded bore hole			4,0	4,0	5,5	5,5	5,5	No Performance Assessed				
	II: 80°C/50°C				2,5	3,0	4,0	4,0	4,0					
	III: 120°C/72°C				2,0	2,5	3,0	3,0	3,0					
Reduktion factor ψ_{sus}^0 in cracked and non-cracked concrete C20/25														
Temperature range	I: 40°C/24°C	Dry, wet concrete and flooded bore hole	ψ_{sus}^0	[-]	0,73									
	II: 80°C/50°C				0,65									
	III: 120°C/72°C				0,57									
Increasing factors for concrete 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												
Concrete cone failure														
Relevant parameter				see Table C2										
Splitting														
Relevant parameter				see Table C2										
Installation factor														
for dry and wet concrete		γ_{inst}	[-]	1,2	1,2									
for flooded bore hole				1,4	No Performance Assessed									
¹⁾ f_{uk} shall be taken from the specifications of reinforcing bars ²⁾ in absence of national regulation														
EJOT Chemical Anchor MULTIFIX USF, MULTIFIX USF winter for concrete										Annex C 7				
Performances Characteristic values of tension loads under static and quasi-static action														

Table C8: Characteristic values of shear loads under static and quasi-static action											
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	$V_{Rk,s}^0$	[kN]	$0,50 \cdot A_s \cdot f_{uk}^{1)}$								
Cross section area	A_s	[mm ²]	50	79	113	154	201	314	491	616	804
Partial factor	$\gamma_{Ms,V}$	[-]	1,5 ²⁾								
Ductility factor	k_7	[-]	1,0								
Steel failure with lever arm											
Characteristic bending moment	$M_{Rk,s}^0$	[Nm]	$1,2 \cdot W_{el} \cdot f_{uk}^{1)}$								
Elastic section modulus	W_{el}	[mm ³]	50	98	170	269	402	785	1534	2155	3217
Partial factor	$\gamma_{Ms,V}$	[-]	1,5 ²⁾								
Concrete pry-out failure											
Factor	k_8	[-]	2,0								
Installation factor	γ_{inst}	[-]	1,0								
Concrete edge failure											
Effective length of fastener	l_f	[mm]	$\min(h_{ef}; 12 \cdot d_{nom})$						$\min(h_{ef}; 300\text{mm})$		
Outside diameter of fastener	d_{nom}	[mm]	8	10	12	14	16	20	25	28	32
Installation factor	γ_{inst}	[-]	1,0								
¹⁾ f_{uk} shall be taken from the specifications of reinforcing bars ²⁾ in absence of national regulation											
EJOT Chemical Anchor MULTIFIX USF, MULTIFIX USF winter for concrete									Annex C 8		
Performances Characteristic values of shear loads under static and quasi-static action											

Table C9: Displacements under tension load¹⁾ (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_{ND} -factor	[mm/(N/mm ²)]	0,021	0,023	0,026	0,031	0,036	0,041	0,045	0,049
	δ_{Ncr} -factor	[mm/(N/mm ²)]	0,030	0,033	0,037	0,045	0,052	0,060	0,065	0,071
Temperature range II: 80°C/50°C	δ_{ND} -factor	[mm/(N/mm ²)]	0,050	0,056	0,063	0,075	0,088	0,100	0,110	0,119
	δ_{Ncr} -factor	[mm/(N/mm ²)]	0,072	0,081	0,090	0,108	0,127	0,145	0,159	0,172
Temperature range III: 120°C/72°C	δ_{ND} -factor	[mm/(N/mm ²)]	0,050	0,056	0,063	0,075	0,088	0,100	0,110	0,119
	δ_{Ncr} -factor	[mm/(N/mm ²)]	0,072	0,081	0,090	0,108	0,127	0,145	0,159	0,172
Cracked concrete C20/25 under static and quasi-static action										
Temperature range I: 40°C/24°C	δ_{ND} -factor	[mm/(N/mm ²)]	0,090		0,070					
	δ_{Ncr} -factor	[mm/(N/mm ²)]	0,105		0,105					
Temperature range II: 80°C/50°C	δ_{ND} -factor	[mm/(N/mm ²)]	0,219		0,170					
	δ_{Ncr} -factor	[mm/(N/mm ²)]	0,255		0,245					
Temperature range III: 120°C/72°C	δ_{ND} -factor	[mm/(N/mm ²)]	0,219		0,170					
	δ_{Ncr} -factor	[mm/(N/mm ²)]	0,255		0,245					
¹⁾ Calculation of the displacement $\delta_{ND} = \delta_{ND}\text{-factor} \cdot \tau$; τ : action bond stress for tension $\delta_{Ncr} = \delta_{Ncr}\text{-factor} \cdot \tau$;										
Table C10: Displacements under shear load¹⁾ (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										
All temperature ranges	δ_{V0} -factor	[mm/kN]	0,06	0,06	0,05	0,04	0,04	0,03	0,03	0,03
	δ_{Vcr} -factor	[mm/kN]	0,09	0,08	0,08	0,06	0,06	0,05	0,05	0,05
Cracked concrete C20/25 under static and quasi-static action										
All temperature ranges	δ_{V0} -factor	[mm/kN]	0,12	0,12	0,11	0,10	0,09	0,08	0,08	0,07
	δ_{Vcr} -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 $\delta_{Vcr} = \delta_{Vcr}\text{-factor} \cdot V$;										
EJOT Chemical Anchor MULTIFIX USF, MULTIFIX USF winter for concrete								Annex C 9		
Performances Displacements (threaded rods)										

Table C11: Displacements under tension load¹⁾ (Internal threaded anchor rod)								
Anchor size Internal threaded anchor rod			IG-M6	IG-M8	IG-M10	IG-M12	IG-M16	IG-M20
Non-cracked concrete C20/25 under static and quasi-static action								
Temperature range I: 40°C/24°C	δ_{ND} -factor	[mm/(N/mm ²)]	0,023	0,026	0,031	0,036	0,041	0,049
	δ_{Ncr} -factor	[mm/(N/mm ²)]	0,033	0,037	0,045	0,052	0,060	0,071
Temperature range II: 80°C/50°C	δ_{ND} -factor	[mm/(N/mm ²)]	0,056	0,063	0,075	0,088	0,100	0,119
	δ_{Ncr} -factor	[mm/(N/mm ²)]	0,081	0,090	0,108	0,127	0,145	0,172
Temperature range III: 120°C/72°C	δ_{ND} -factor	[mm/(N/mm ²)]	0,056	0,063	0,075	0,088	0,100	0,119
	δ_{Ncr} -factor	[mm/(N/mm ²)]	0,081	0,090	0,108	0,127	0,145	0,172
Cracked concrete C20/25 under static and quasi-static action								
Temperature range I: 40°C/24°C	δ_{ND} -factor	[mm/(N/mm ²)]	0,090			0,070		
	δ_{Ncr} -factor	[mm/(N/mm ²)]	0,105			0,105		
Temperature range II: 80°C/50°C	δ_{ND} -factor	[mm/(N/mm ²)]	0,219			0,170		
	δ_{Ncr} -factor	[mm/(N/mm ²)]	0,255			0,245		
Temperature range III: 120°C/72°C	δ_{ND} -factor	[mm/(N/mm ²)]	0,219			0,170		
	δ_{Ncr} -factor	[mm/(N/mm ²)]	0,255			0,245		
¹⁾ Calculation of the displacement $\delta_{ND} = \delta_{ND}\text{-factor} \cdot \tau$; τ : action bond stress for tension $\delta_{Ncr} = \delta_{Ncr}\text{-factor} \cdot \tau$;								
Table C12: Displacements under shear load¹⁾ (Internal threaded anchor rod)								
Anchor size Internal threaded anchor rod			IG-M6	IG-M8	IG-M10	IG-M12	IG-M16	IG-M20
Non-cracked and cracked concrete C20/25 under static and quasi-static action								
All temperature ranges	δ_{VD} -factor	[mm/kN]	0,07	0,06	0,06	0,05	0,04	0,04
	δ_{Vcr} -factor	[mm/kN]	0,10	0,09	0,08	0,08	0,06	0,06
¹⁾ Calculation of the displacement $\delta_{VD} = \delta_{VD}\text{-factor} \cdot V$; V: action shear load $\delta_{Vcr} = \delta_{Vcr}\text{-factor} \cdot V$;								
EJOT Chemical Anchor MULTIFIX USF, MULTIFIX USF winter for concrete							Annex C 10	
Performances Displacements (Internal threaded anchor rod)								

Table C13: Displacements under tension load¹⁾ (rebar)											
Anchor size reinforcing bar			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_{ND} -factor	[mm/(N/mm ²)]	0,021	0,023	0,026	0,028	0,031	0,036	0,043	0,047	0,052
	δ_{Ncr} -factor	[mm/(N/mm ²)]	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_{ND} -factor	[mm/(N/mm ²)]	0,050	0,056	0,063	0,069	0,075	0,088	0,104	0,113	0,126
	δ_{Ncr} -factor	[mm/(N/mm ²)]	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_{ND} -factor	[mm/(N/mm ²)]	0,050	0,056	0,063	0,069	0,075	0,088	0,104	0,113	0,126
	δ_{Ncr} -factor	[mm/(N/mm ²)]	0,072	0,081	0,090	0,099	0,108	0,127	0,149	0,163	0,181
Cracked concrete C20/25 under static and quasi-static action											
Temperature range I: 40°C/24°C	δ_{ND} -factor	[mm/(N/mm ²)]	0,090				0,070				
	δ_{Ncr} -factor	[mm/(N/mm ²)]	0,105				0,105				
Temperature range II: 80°C/50°C	δ_{ND} -factor	[mm/(N/mm ²)]	0,219				0,170				
	δ_{Ncr} -factor	[mm/(N/mm ²)]	0,255				0,245				
Temperature range III: 120°C/72°C	δ_{ND} -factor	[mm/(N/mm ²)]	0,219				0,170				
	δ_{Ncr} -factor	[mm/(N/mm ²)]	0,255				0,245				
¹⁾ Calculation of the displacement $\delta_{ND} = \delta_{ND}$ -factor $\cdot \tau$; τ : action bond stress for tension $\delta_{Ncr} = \delta_{Ncr}$ -factor $\cdot \tau$;											
Table C14: Displacement under shear load¹⁾ (rebar)											
Anchor size reinforcing bar			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											
All temperature ranges	δ_{VD} -factor	[mm/kN]	0,06	0,05	0,05	0,04	0,04	0,04	0,03	0,03	0,03
	δ_{Vcr} -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 under static and quasi-static action											
All temperature ranges	δ_{VD} -factor	[mm/kN]	0,12	0,12	0,11	0,11	0,10	0,09	0,08	0,07	0,06
	δ_{Vcr} -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 $\delta_{VD} = \delta_{VD}$ -factor $\cdot V$; V : action shear load $\delta_{Vcr} = \delta_{Vcr}$ -factor $\cdot V$;											
EJOT Chemical Anchor MULTIFIX USF, MULTIFIX USF winter for concrete										Annex C 11	
Performances Displacements (rebar)											

Table C15: Characteristic values of tension loads under seismic action (performance category C1)																																																																												
Anchor size threaded rod				M8	M10	M12	M16	M20	M24	M27	M30																																																																	
Steel failure																																																																												
Characteristic tension resistance		$N_{Rk,s,eq,C1}$	[kN]	$1,0 \cdot N_{Rk,s}$																																																																								
Partial factor		$\gamma_{Ms,N}$	[-]	see Table C1																																																																								
Combined pull-out and concrete failure																																																																												
Characteristic bond resistance in non-cracked and cracked concrete C20/25																																																																												
Temperature range	I: 40°C/24°C	Dry, wet concrete	$\tau_{Rk,eq,C1}$	[N/mm ²]	2,5	3,1	3,7	3,7	3,7	3,8	4,5	4,5																																																																
	II: 80°C/50°C				1,6	2,2	2,7	2,7	2,7	2,8	3,1	3,1																																																																
	III: 120°C/72°C				1,3	1,6	2,0	2,0	2,0	2,1	2,4	2,4																																																																
	I: 40°C/24°C	flooded bore hole			2,5	2,5	3,7	3,7	No Performance Assessed																																																																			
	II: 80°C/50°C				1,6	1,9	2,7	2,7																																																																				
	III: 120°C/72°C				1,3	1,6	2,0	2,0																																																																				
Increasing factors for concrete ψ_C		C25/30 to C50/60		1,0																																																																								
Installation factor																																																																												
for dry and wet concrete		γ_{inst}	[-]	1,0	1,2																																																																							
for flooded bore hole				1,4	No Performance Assessed																																																																							
<p>Table C16: Characteristic values of shear loads under seismic action (performance category C1)</p> <table border="1"> <thead> <tr> <th colspan="4">Anchor size threaded rod</th> <th>M8</th> <th>M10</th> <th>M12</th> <th>M16</th> <th>M20</th> <th>M24</th> <th>M27</th> <th>M30</th> </tr> </thead> <tbody> <tr> <td colspan="13">Steel failure without lever arm</td> </tr> <tr> <td colspan="2">Characteristic shear resistance (Seismic C1)</td> <td>$V_{Rk,s,eq,C1}$</td> <td>[kN]</td> <td colspan="9">$0,70 \cdot V_{Rk,s}^0$</td> </tr> <tr> <td colspan="2">Partial factor</td> <td>$\gamma_{Ms,V}$</td> <td>[-]</td> <td colspan="9">see Table C1</td> </tr> <tr> <td colspan="2">Factor for annular gap</td> <td>α_{gap}</td> <td>[-]</td> <td colspan="9">0,5 (1,0)¹⁾</td> </tr> </tbody> </table> <p>¹⁾ Value in brackets valid for filled annular gap between anchor and clearance hole in the fixture. Use of special filling washer Annex A 3 is required</p>													Anchor size threaded rod				M8	M10	M12	M16	M20	M24	M27	M30	Steel failure without lever arm													Characteristic shear resistance (Seismic C1)		$V_{Rk,s,eq,C1}$	[kN]	$0,70 \cdot V_{Rk,s}^0$									Partial factor		$\gamma_{Ms,V}$	[-]	see Table C1									Factor for annular gap		α_{gap}	[-]	0,5 (1,0) ¹⁾								
Anchor size threaded rod				M8	M10	M12	M16	M20	M24	M27	M30																																																																	
Steel failure without lever arm																																																																												
Characteristic shear resistance (Seismic C1)		$V_{Rk,s,eq,C1}$	[kN]	$0,70 \cdot V_{Rk,s}^0$																																																																								
Partial factor		$\gamma_{Ms,V}$	[-]	see Table C1																																																																								
Factor for annular gap		α_{gap}	[-]	0,5 (1,0) ¹⁾																																																																								
EJOT Chemical Anchor MULTIFIX USF, MULTIFIX USF winter for concrete										Annex C 12																																																																		
Performances Characteristic values of tension loads and shear loads under seismic action (performance category C1)																																																																												

Table C17: Characteristic values of tension loads under 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	$N_{Rk,s,eq,C1}$	[kN]	$1,0 \cdot A_s \cdot f_{uk}^{1)}$											
Cross section area	A_s	[mm ²]	50	79	113	154	201	314	491	616	804			
Partial factor	$\gamma_{Ms,N}$	[-]	1,4 ²⁾											
Combined pull-out and concrete failure														
Characteristic bond resistance in non-cracked and cracked concrete C20/25														
Temperature range	I: 40°C/24°C	Dry, wet concrete	$\tau_{Rk, eq,C1}$	[N/m ²]	2,5	3,1	3,7	3,7	3,7	3,7	3,8	4,5	4,5	
	II: 80°C/50°C				1,6	2,2	2,7	2,7	2,7	2,7	2,8	3,1	3,1	
	III: 120°C/72°C				1,3	1,6	2,0	2,0	2,0	2,0	2,1	2,4	2,4	
	I: 40°C/24°C	flooded bore hole			2,5	2,5	3,7	3,7	3,7	No Performance Assessed				
	II: 80°C/50°C				1,6	1,9	2,7	2,7	2,7					
	III: 120°C/72°C				1,3	1,6	2,0	2,0	2,0					
Increasing factors for concrete ψ_c		C25/30 to C50/60	1,0											
Installation factor														
for dry and wet concrete		γ_{inst}	[-]	1,2	1,2									
for flooded bore hole				1,4	No Performance Assessed									
¹⁾ f_{uk} shall be taken from the specifications of reinforcing bars ²⁾ in absence of national regulation														
Table C18: Characteristic values of shear loads under 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	$V_{Rk,s,eq,C1}$	[kN]	$0,35 \cdot A_s \cdot f_{uk}^{2)}$											
Cross section area	A_s	[mm ²]	50	79	113	154	201	314	491	616	804			
Partial factor	$\gamma_{Ms,V}$	[-]	1,5 ²⁾											
Factor for annular gap	α_{gap}	[-]	0,5 (1,0) ³⁾											
¹⁾ f_{uk} shall be taken from the specifications of reinforcing bars ²⁾ in absence of national regulation ³⁾ Value in brackets valid for filled annular gap between anchor and clearance hole in the fixture. Use of special filling washer Annex A.3 is required														
EJOT Chemical Anchor MULTIFIX USF, MULTIFIX USF winter for concrete										Annex C 13				
Performances Characteristic values of tension loads and shear loads under seismic action (performance category C1)														