



Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments



European Technical Assessment

ETA-08/0237 of 18 November 2019

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the European Technical Assessment:

Trade name of the construction product

Product family to which the construction product belongs

Manufacturer

Manufacturing plant

This European Technical Assessment contains

This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of

This version replaces

Deutsches Institut für Bautechnik

Chemofast Injection System STVK or STVK Nordic for concrete

Bonded anchor for use in concrete

CHEMOFAST Anchoring GmbH Hanns-Martin-Schleyer-Straße 23 47877 Willich DEUTSCHLAND

CHEMOFAST Anchoring GmbH

31 pages including 3 annexes which form an integral part of this assessment

EAD 330499-01-0601

ETA-08/0237 issued on 7 September 2017



European Technical Assessment ETA-08/0237 English translation prepared by DIBt

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Specific Part

1 Technical description of the product

The "Chemofast Injection System STVK or STVK Nordic for concrete" is a bonded anchor consisting of a cartridge with injection mortar Chemofast STVK or Chemofast STVK Nordic and a steel element. The steel element consists of a commercial threaded rod with washer and hexagon nut in the range of M8 to M30 or reinforcing bar in the range of \emptyset 8 to \emptyset 32 mm or an internal threaded anchor rod IG-M6 to IG-M20.

The steel element is placed into a drilled hole filled with injection mortar and is anchored via the bond between metal part, injection mortar and concrete.

The product description is given in Annex A.

2 Specification of the intended use in accordance with the applicable European Assessment Document

The performances given in Section 3 are only valid if the anchor is used in compliance with the specifications and conditions given in Annex B.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the anchor of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance to tension load (static and quasi-static loading)	See Annex C 1 to C 3, C 5, C 7,
Characteristic resistance to shear load (static and quasi-static loading)	See Annex C 4, C 6, C 8,
Displacements (static and quasi-static loading)	See Anne C 9 to C 11
Characteristic resistance and displacements for seismic performance categories C1 and C2	See Anne C 12 to C 16
Durability	See Annex B 1

3.2 Hygiene, health and the environment (BWR 3)

Essential characteristic	Performance
Content, emission and/or release of dangerous substances	No performance assessed

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

In accordance with the European Assessment Document EAD 330499-01-0601 the applicable European legal act is: [96/582/EC].

The system to be applied is: 1



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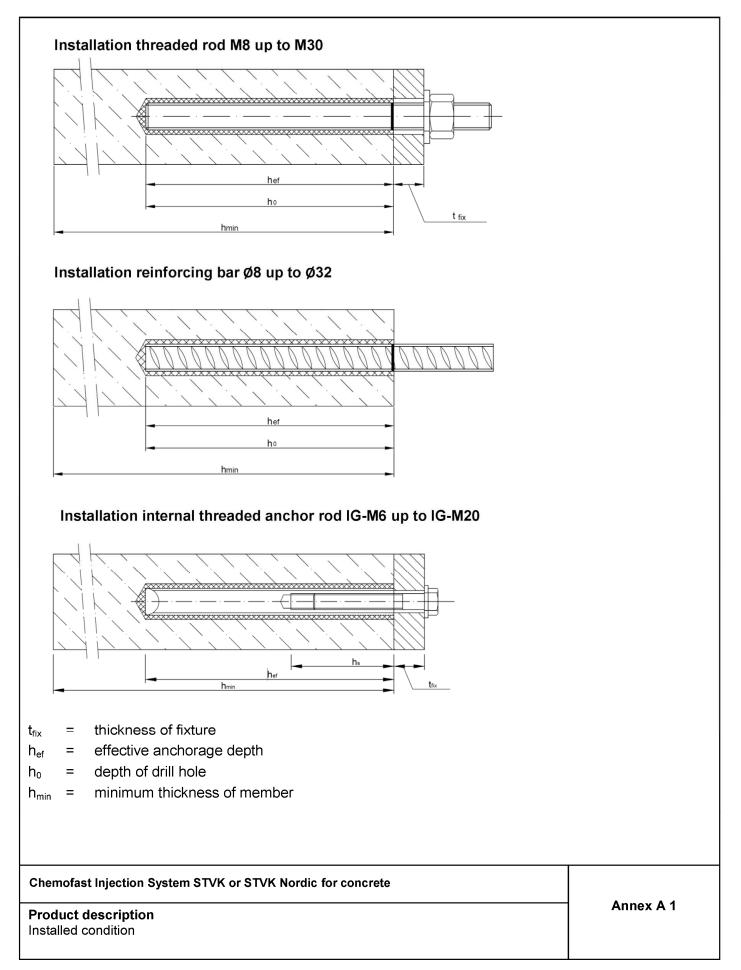
5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

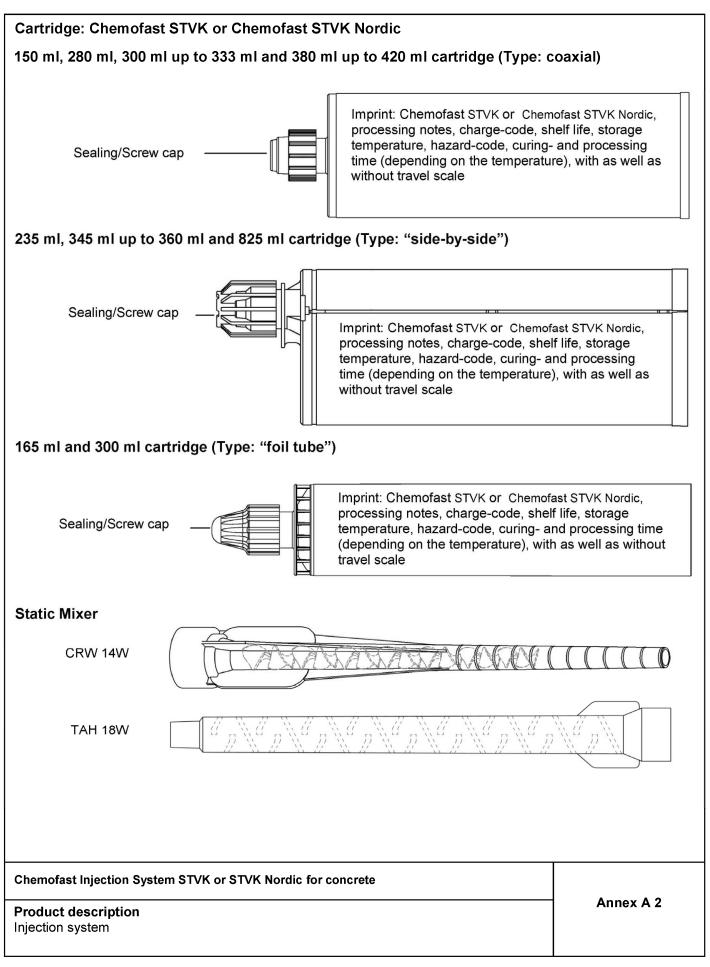
Issued in Berlin on 18 November 2019 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow Head of Department *beglaubigt:* Lange

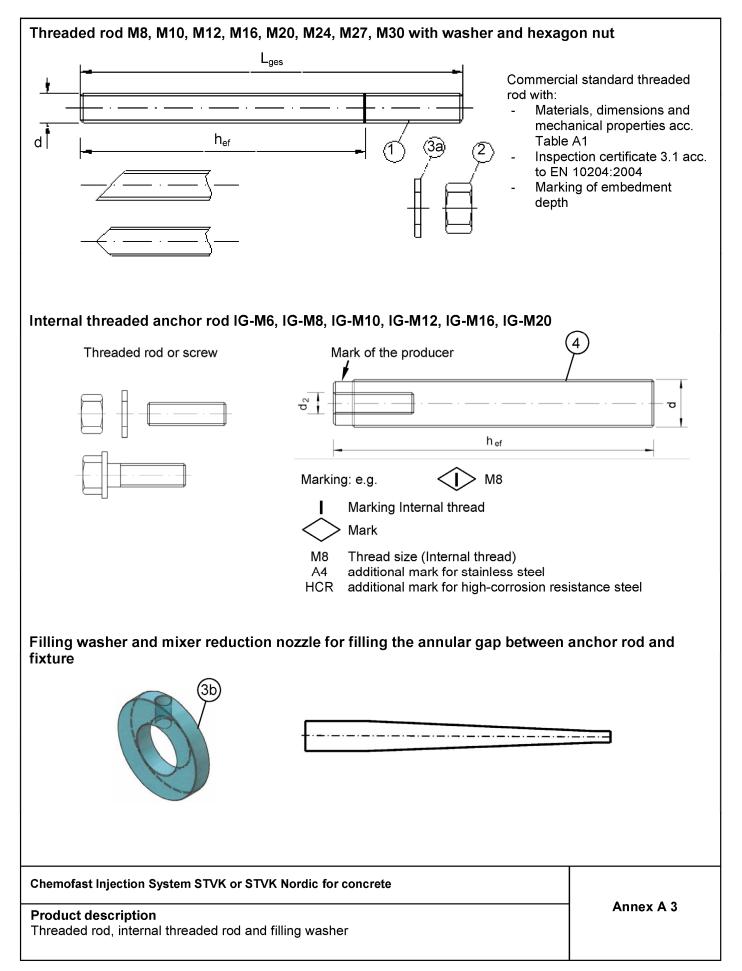














tee zir hc	ot-dip galvanised ≥ 40 μm	acc. to EN ISO 4042:1999	or and EN						
zir hc sh	nc plated ≥ 5 μm bt-dip galvanised ≥ 40 μm	acc. to EN ISO 4042:1999 acc. to EN ISO 1461:2009	or and EN						
sh									
	lerardized ≥ 45 μm_	acc. to EN ISO 17668:2016		I ISO 10684:2004+	AC:2009 or				
1			о́	Characteristic	Characteristic	Elongation at			
1		Property class		tensile strength	yield strength	fracture			
1			4 6	$f_{uk} = 400 \text{ N/mm}^2$					
1	The second second			f _{uk} = 400 N/mm ²	f _{vk} = 320 N/mm	-			
	Threaded rod	acc. to		f _{uk} = 500 N/mm²	,				
		EN ISO 898-1:2013		$f_{uk} = 500 \text{ N/mm}^2$	$f_{vk} = 400 \text{ N/mm}$				
					, j.v.	-			
					1	A5 2 0 %			
2	Hoyagon put	acc. to	4	for threaded rod of					
Z	Hexagon nut	EN ISO 898-2:2012	<u> </u>	5for threaded rod class 5.6 or 5.88for threaded rod class 8.8					
		Steel, zinc plated, hot-di	-						
3a	Washer	(e.g.: EN ISO 887:2006,				EN ISO 7094:20			
3b	Filling washer	Steel, zinc plated, hot-di	ip galva	nised or sherardiz	ed				
		Property class		Characteristic	Characteristic	Elongation at			
4 Internal threaded				tensile strength	yield strength	fracture			
4	anchor rod	acc. to		f _{uk} = 500 N/mm²	f _{yk} = 400 N/mm	-			
		EN ISO 898-1:2013		f _{uk} = 800 N/mm²	f _{yk} = 640 N/mm	² A ₅ > 8%			
24-1-	Lange steel A2 (Material 1.4)				10000 1:0014)				
Stair	nless steel A2 (Material 1.4 nless steel A4 (Material 1.4 ncorrosion resistance stee	401 / 1.4404 / 1.4571 / 1.43	67 or 1 62 or 1	.4541, acc. to EN .4578, acc. to EN to EN 10088-1: 20	10088-1:2014) 14)				
Stair	nless steel A4 (Material 1.4	401 / 1.4404 / 1.4571 / 1.43	67 or 1 62 or 1 5, acc.	.4541, acc. to EN .4578, acc. to EN to EN 10088-1: 20 Characteristic tensile strength	10088-1:2014) 14) Characteristic yield strength	Elongation at fracture			
Stair	nless steel A4 (Material 1.4	401 / 1.4404 / 1.4571 / 1.43 el (Material 1.4529 or 1.4565 Property class	67 or 1 62 or 1 5, acc. 50	.4541, acc. to EN .4578, acc. to EN to EN 10088-1: 20 Characteristic tensile strength f _{uk} = 500 N/mm ²	10088-1:2014) 14) Characteristic yield strength f _{yk} = 210 N/mm	fracture A ₅ \ge 8%			
Stair High	nless steel A4 (Material 1.4) corrosion resistance stee	401 / 1.4404 / 1.4571 / 1.43 el (Material 1.4529 or 1.4568 Property class acc. to	67 or 1 62 or 1 5, acc. 50	.4541, acc. to EN .4578, acc. to EN to EN 10088-1: 20 Characteristic tensile strength	10088-1:2014) 14) Characteristic yield strength	fracture A ₅ \ge 8%			
Stair High	nless steel A4 (Material 1.4) corrosion resistance stee	401 / 1.4404 / 1.4571 / 1.43 el (Material 1.4529 or 1.4565 Property class	67 or 1 62 or 1 5, acc. 50 70	.4541, acc. to EN .4578, acc. to EN to EN 10088-1: 20 Characteristic tensile strength f _{uk} = 500 N/mm ²	10088-1:2014) 14) Characteristic yield strength f _{yk} = 210 N/mm	fracture2 $A_5 \ge 8\%$ 2 $A_5 \ge 8\%$			
Stair High	nless steel A4 (Material 1.4) corrosion resistance stee	401 / 1.4404 / 1.4571 / 1.43 el (Material 1.4529 or 1.4565 Property class acc. to EN ISO 3506-1:2009	67 or 1 62 or 1 5, acc. 50 70	.4541, acc. to EN .4578, acc. to EN to EN 10088-1: 20 Characteristic tensile strength $f_{uk} = 500 \text{ N/mm}^2$ $f_{uk} = 700 \text{ N/mm}^2$	10088-1:2014) 14) Characteristic yield strength $f_{yk} = 210 \text{ N/mm}$ $f_{yk} = 450 \text{ N/mm}$ $f_{yk} = 600 \text{ N/mm}$	fracture2 $A_5 \ge 8\%$ 2 $A_5 \ge 8\%$			
Stair High	nless steel A4 (Material 1.4) corrosion resistance stee	401 / 1.4404 / 1.4571 / 1.43 el (Material 1.4529 or 1.4565 Property class acc. to EN ISO 3506-1:2009 acc. to	67 or 1 62 or 1 5, acc. 50 70 80	.4541, acc. to EN .4578, acc. to EN to EN 10088-1: 20 Characteristic tensile strength $f_{uk} = 500 \text{ N/mm}^2$ $f_{uk} = 700 \text{ N/mm}^2$	10088-1:2014) 14) Characteristic yield strength f_{yk} = 210 N/mm f_{yk} = 450 N/mm f_{yk} = 600 N/mm class 50	fracture2 $A_5 \ge 8\%$ 2 $A_5 \ge 8\%$			
Stair High 1	Threaded rod ¹⁾³⁾	401 / 1.4404 / 1.4571 / 1.43 el (Material 1.4529 or 1.4568 Property class acc. to EN ISO 3506-1:2009 acc. to EN ISO 3506-1:2009	667 or 1 662 or 1 5, acc. 70 80 50 70 80 80	.4541, acc. to EN .4578, acc. to EN to EN 10088-1: 20 Characteristic tensile strength $f_{uk} = 500 \text{ N/mm}^2$ $f_{uk} = 700 \text{ N/mm}^2$ $f_{uk} = 800 \text{ N/mm}^2$ for threaded rod c for threaded rod c	10088-1:2014) 14) Characteristic yield strength $f_{yk} = 210$ N/mm $f_{yk} = 450$ N/mm $f_{yk} = 600$ N/mm class 50 class 70 class 80	fracture2 $A_5 \ge 8\%$ 2 $A_5 \ge 8\%$ 2 $A_5 \ge 8\%$			
Stair ligh 1	Threaded rod ¹⁾³⁾	401 / 1.4404 / 1.4571 / 1.43 el (Material 1.4529 or 1.4565 Property class acc. to EN ISO 3506-1:2009 A2: Material 1.4301 / 1.4 A4: Material 1.4401 / 1.4 HCR: Material 1.4529 or	67 or 1 62 or 1 5, acc. 50 70 80 50 70 80 4307 / 1 4404 / 1 r 1.4565	.4541, acc. to EN .4578, acc. to EN to EN 10088-1: 20 Characteristic tensile strength $f_{uk} = 500 \text{ N/mm}^2$ $f_{uk} = 700 \text{ N/mm}^2$ $f_{uk} = 800 \text{ N/mm}^2$ for threaded rod c for threaded rod c	10088-1:2014) 14) Characteristic yield strength $f_{yk} = 210 \text{ N/mm}$ $f_{yk} = 450 \text{ N/mm}$ $f_{yk} = 600 \text{ N/mm}$ class 50 class 70 class 80 1.4541, acc. to E 1.4578, acc. to E 8-1: 2014	fracture 2 $A_5 ≥ 8\%$ 2 $A_5 ≥ 8\%$ 2 $A_5 ≥ 8\%$ 2 $A_5 ≥ 8\%$ 2 $A_5 ≥ 18\%$ 3 $A_5 ≥ 12014$ N 10088-1:2014 N 10088-1:2014			
Stair High 1 2 3a	hless steel A4 (Material 1.44) corrosion resistance stee Threaded rod ¹⁾³⁾ Hexagon nut ¹⁾³⁾	401 / 1.4404 / 1.4571 / 1.43 el (Material 1.4529 or 1.4565 Property class acc. to EN ISO 3506-1:2009 acc. to EN ISO 3506-1:2009 A2: Material 1.4301 / 1.4 A4: Material 1.4401 / 1.4	67 or 1 62 or 1 5, acc. 50 70 80 50 70 80 4307 / 1 4404 / 1 r 1.4565 EN ISC	.4541, acc. to EN .4578, acc. to EN to EN 10088-1: 20 Characteristic tensile strength $f_{uk} = 500 \text{ N/mm}^2$ $f_{uk} = 700 \text{ N/mm}^2$ $f_{uk} = 800 \text{ N/mm}^2$ for threaded rod c for threaded rod c	10088-1:2014) 14) Characteristic yield strength $f_{yk} = 210 \text{ N/mm}$ $f_{yk} = 450 \text{ N/mm}$ $f_{yk} = 600 \text{ N/mm}$ class 50 class 70 class 80 1.4541, acc. to E 1.4578, acc. to E 8-1: 2014 SO 7093:2000 or	fracture 2 $A_5 ≥ 8\%$ 2 $A_5 ≥ 8\%$ 2 $A_5 ≥ 8\%$ 2 $A_5 ≥ 8\%$ 2 $A_5 ≥ 18\%$ 3 $A_5 ≥ 12014$ N 10088-1:2014 N 10088-1:2014			
Stair High 1	nless steel A4 (Material 1.4- corrosion resistance stee Threaded rod ¹⁾³⁾ Hexagon nut ¹⁾³⁾ Washer	401 / 1.4404 / 1.4571 / 1.43 el (Material 1.4529 or 1.4565 Property class acc. to EN ISO 3506-1:2009 A2: Material 1.4301 / 1.4 A4: Material 1.4401 / 1.4 HCR: Material 1.4529 or (e.g.: EN ISO 887:2006,	67 or 1 62 or 1 5, acc. 50 70 80 50 70 80 4307 / 1 4404 / 1 r 1.4565 EN ISC	.4541, acc. to EN .4578, acc. to EN to EN 10088-1: 20 Characteristic tensile strength $f_{uk} = 500 \text{ N/mm}^2$ $f_{uk} = 700 \text{ N/mm}^2$ $f_{uk} = 800 \text{ N/mm}^2$ for threaded rod c for threaded rod c	10088-1:2014) 14) Characteristic yield strength $f_{yk} = 210$ N/mm $f_{yk} = 450$ N/mm $f_{yk} = 600$ N/mm class 50 class 70 class 80 1.4541, acc. to E 1.4578, acc. to E 8-1: 2014 SO 7093:2000 of 1 Characteristic yield strength	fracture 2 $A_5 ≥ 8\%$ 2 $A_5 ≥ 8\%$ 2 $A_5 ≥ 8\%$ 2 $A_5 ≥ 8\%$ 2 $A_5 ≥ 12014$ N 10088-1:2014 N 10088-1:2014 EN ISO 7094:20 Elongation at fracture			
Stair ligh 1 2 3a	nless steel A4 (Material 1.4- corrosion resistance stee Threaded rod ¹⁾³⁾ Hexagon nut ¹⁾³⁾ Washer	401 / 1.4404 / 1.4571 / 1.43 el (Material 1.4529 or 1.4565 Property class acc. to EN ISO 3506-1:2009 A2: Material 1.4301 / 1.4 A4: Material 1.4401 / 1.4 HCR: Material 1.4401 / 1.4 HCR: Material 1.4529 or (e.g.: EN ISO 887:2006, Stainless steel A4, High	67 or 1 62 or 1 5, acc. 70 80 50 70 80 4307 / 1 4404 / 1 r 1.4565 EN ISC corrosi	.4541, acc. to EN .4578, acc. to EN to EN 10088-1: 20 Characteristic tensile strength $f_{uk} = 500 \text{ N/mm}^2$ $f_{uk} = 700 \text{ N/mm}^2$ $f_{uk} = 800 \text{ N/mm}^2$ for threaded rod c for threaded rod c	10088-1:2014) 14) Characteristic yield strength $f_{yk} = 210$ N/mm $f_{yk} = 450$ N/mm $f_{yk} = 600$ N/mm class 50 class 70 class 80 1.4541, acc. to E 1.4578, acc. to E 8-1: 2014 SO 7093:2000 or 1 Characteristic	fracture 2 $A_5 ≥ 8\%$ 2 $A_5 ≥ 8\%$ 2 $A_5 ≥ 8\%$ 2 $A_5 ≥ 8\%$ 2 $A_5 ≥ 12014$ N 10088-1:2014 N 10088-1:2014 EN ISO 7094:20 Elongation at fracture			



Reir	Reinforcing bar Ø 8, Ø 10, Ø 12, Ø 14, Ø 16, Ø 20, Ø 25, Ø 28, Ø 32									
	h _{ef}									
	 Minimum value of related rip area f_{R,min} ac Rib height of the bar shall be in the range 									
	(d: Nominal diameter of the bar; h: Rip he									
Tabl	e A2: Materials									
Part	Designation	Material								
	orcing bars									
		Dare and do apilled rade class D ar C								
1	Rebar EN 1992-1-1:2004+AC:2010, Annex C	Bars and de-coiled rods class B or C f_{yk} and k according to NDP or NCL of EN $f_{uk} = f_{tk} = k \cdot f_{yk}$	1992-1-1/NA							
Cher	nofast Injection System STVK or STVK Nordic	for concrete								
	luct description erials reinforcing bar		Annex A 5							



Specifications of intended use

Anchorages subject to:

- Static and quasi-static loads: M8 to M30, Rebar Ø8 to Ø32, IG-M6 to IG-M20.
- Seismic action for Performance Category C1: M8 to M30, Rebar Ø8 to Ø32.

Base materials:

- Compacted, reinforced or unreinforced normal weight concrete without fibres according to EN 206:2013 + A1:2016.
- Strength classes C20/25 to C50/60 according to EN 206:2013 + A1:2016.
- Non-cracked concrete: M8 to M30, Rebar Ø8 to Ø32, IG-M6 to IG-M20.
- Cracked concrete: M8 to M30, Rebar Ø8 to Ø32, IG-M6 to IG-M20.

Temperature Range:

- I: 40 °C to +40 °C (max long term temperature +24 °C and max short term temperature +40 °C)
- II: 40 °C to +80 °C (max long term temperature +50 °C and max short term temperature +80 °C)
- III: 40 °C to +120 °C (max long term temperature +72 °C and max short term temperature +120 °C)

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions (all materials).
- For all other conditions according to EN 1993-1-4:2006+A1:2015 corresponding to corrosion resistance class:
 - Stainless steel Stahl A2 according to Annex A 4, Table A1: CRC II
 - Stainless steel Stahl A4 according to Annex A 4, Table A1: CRC III
 - High corrosion resistance steel HCR according to Annex A 4, Table A1: CRC V

Design:

- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The
 position of the anchor is indicated on the design drawings (e. g. position of the anchor relative to
 reinforcement or to supports, etc.).
- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- The anchorages are designed in accordance to EN 1992-4:2018 and Technical Report TR055, Edition February 2018

Installation:

- Dry or wet concrete: M8 to M30, Rebar Ø8 to Ø32, IG-M6 to IG-M20.
- Flooded holes (not sea water): M8 to M16, Rebar Ø8 to Ø16, IG-M6 to IG-M10.
- Hole drilling by hammer (HD), hollow (HDB) or compressed air drill mode (CD).
- Overhead installation allowed.
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- The injection mortar is assessed for installation at minimum concrete temperature of -10°C resp. -20°C, where subsequently the temperature in the concrete does not rise at a rapid rate, i.e. from the minimum installation temperature to 24°C within a 12-hour period.

Chemofast Injection System STVK or STVK Nordic for concrete

Intended Use Specifications Annex B 1

Deutsches Institut für Bautechnik

Anchor size			M8	<u>м</u>	10	M12	M16		M20	M24	M27	M30
Outer diameter of anchor	d _{nom} [m	n] =	8	1	0	12	16		20	24	27	30
Nominal drill hole diameter	d₀ [m	n] =	10	1	2	14	18		24	28	32	35
Effective embedment depth	h _{ef,min} [m	n] =	60	6	0	70	80		90	96	108	120
	h _{ef,max} [m	m] =	160	20	00	240	320		400	480	540	600
Diameter of clearance hole in the fixture	d _f [m	d _f [mm] ≤		1	2	14	18		22	26	30	33
Diameter of steel brush	d _b [m	m] ≥	12	1	4	16	20		26	30	34	37
Maximum torque moment	T _{inst} [N	m] ≤	10	2	0	40	80		120	160	180	200
Minimum thickness of member h _{min} [n			h _{ef} +	30 mn	n ≥ 100	mm			ł	ղ _{ef} + 2d	0	
linimum spacing s _{min} [m			40	5	0	60	80		100	120	135	150
Minimum edge distance	C _{min} [mm]	40	5	0	60	80		100	120	135	150
Rebar size Outer diameter of anchor	d _{nom} [mm] :	Ø ٤ =		Ø 10 10	Ø 12	Ø 1 14		16	Ø 20 20	Ø 25	5 Ø 2 28	8 Ø 32 32
	d [mm]	_				_						
Nominal drill hole diameter	d ₀ [mm] :			14	16	18		20	24	32	35	40
	h _{ef,min} [mm] :			60	70	75		30	90	100	112	
Effective embedment depth	h _{ef,max} [mm] :	_	50	200	240	280	<mark>) 3</mark>	20	400	500	580	640
Diameter of steel brush	d _b [mm] :	2 1	4	16	18	20		22	26	34	37	41,5
Minimum thickness of member	h _{min} [mm		_{ef} + 30 100 ו						h _{ef} + 2d	l _o		
Minimum spacing	s _{min} [mm] 4	0	50	60	70		30	100	125	140	160
Minimum edge distance	c _{min} [mm] 4	0	50	60	70	8	30	100	125	140	160
Table B3: Installation Size internal threaded anchor	parameters fo	r inte		hread IG-M6		hor ro -M8	od IG-M	10	IG-M1	12 IG	i-M16	IG-M20
Internal diameter of anchor	d	[mm] =	6		8	10		12		16	20
Outer diameter of anchor ¹⁾		. [mm		10		2	16		20		24	30
Nominal drill hole diameter		. [mm	-	12		4	18		22		28	35
Effective embedment depth		. [mm		60 200		'0 40	80 320		90 400		96 480	<u> 120 </u> 600
Diameter of clearance		[mm		7		9	12		14		18	22
	d	-			_	10			40		60	100
hole in the fixture]≤	10	1	0	20 10/25					
hole in the fixture Maximum torque moment Thread engagement length	T _{in}	- ₅t[Nm ₁[mm		10 8/20		20		25	12/30	D 1	6/32	20/40
hole in the fixture Maximum torque moment Thread engagement length min/max	T _{in}	₋ ₅t[Nm] =	8/20 h _{ef} +		20 n		:5		0 1 n _{ef} + 2d		20/40
Diameter of clearance hole in the fixture Maximum torque moment Thread engagement length min/max Minimum thickness of memb Minimum spacing Minimum edge distance	er h	st [Nm] = m] m]	8/20 h _{ef} +	8/ · 30 mr 00 mm	20 n				n _{ef} + 2d		20/40 150 150

Chemofast Injection System STVK or STVK Nordic for concrete

Intended Use Installation parameters

Annex B 2



Table B4:	Paran	neter cleanin	g and settin	g tools							
	199711001010000000000000000000000000000	-	27779799999999								
Threaded Rod	Rebar	Rebar Internal Anchor rod	d₀ Drill bit - Ø HD, HDB, CA	d Brus		d _{b,min} min. Brush - Ø	Piston plug		on direction and u f piston plug		
[mm]	[mm]	[mm]	[mm]		[mm]	[mm]		Ļ	\Rightarrow		
M8			10	RBT10	12	10,5					
M10	8	IG-M6	12	RBT12		12,5		No niston r	Ч		
M12	10	IG-M8	14	RBT14		14,5		No piston plug required			
	12		16	RBT16		16,5					
M16	14	IG-M10	18	RBT18		18,5	VS18				
	16		20	RBT20		20,5	VS20	4			
M20	20	IG-M12	24	RBT24		24,5	VS24	h _{ef} >	h _{ef} >	all	
M24		IG-M16	28	RBT28		28,5	VS28	250 mm	250 mm		
M27	25		32	RBT32		32,5	VS32	230 mm			
M30	28 32	IG-M20	35 40	RBT35 RBT40		35,5 40,5	VS35 VS40				
MAC - Ha	and pump	(volume 7	4 50 ml)		CAC	- Rec. com	pressed	air tool	(min 6 bar	r)	
Drill bit dia Drill hole d		10 mm to 20 < 10 d _{nom}			Drill k	bit diameter (d	d _o): all dia	meters		∃ ↓ d⊾	
installati	ion VS	/erhead or h : 18 mm to 40				eel brush R Il bit diamete		diameters			

Chemofast Injection System STVK or STVK Nordic for concrete

Intended Use Cleaning and setting tools Annex B 3



Installation instruct	ions	
Drilling of the bore	hole	
	1. Drill with hammer drill a hole into the base material to the size and required by the selected anchor (Table B1, B2, or B3), with hammor compressed air (CD) drilling. The use of a hollow drill bit is only sufficient vacuum permitted. In case of aborted drill hole: The drill hole shall be filled with mort	ner (HD), hollow (HDB) y in combination with a
	Attention! Standing water in the bore hole must be removed before	ore cleaning.
MAC: Cleaning for I	pore hole diameter $d_0 \le 20$ mm and bore hole depth $h_0 \le 10d_{nom}$ (und	cracked concrete only!
4x	 2a. Starting from the bottom or back of the bore hole, blow the hole cl (Annex B 3) a minimum of four times. 	lean by a hand pump ¹⁾
********* **	 Check brush diameter (Table B4). Brush the hole with an appropr > d_{b,min} (Table B4) a minimum of four times in a twisting motion. If the bore hole ground is not reached with the brush, a brush ext 	
	2c. Finally blow the hole clean again with a hand pump (Annex B 3) a	a minimum of four times.
4x	¹⁾ It is permitted to blow bore holes with diameter between 14 mm and 20 mm up to 10d _{nom} also in cracked concrete with hand-pump.	and an embedment depth
CAC: Cleaning for a	II bore hole diameter in uncracked and cracked concrete	
4x	2a. Starting from the bottom or back of the bore hole, blow the hole c compressed air (min. 6 bar) (Annex B 3) a minimum of four times stream is free of noticeable dust. If the bore hole ground is not rea extension must be used.	until return air
<u>********</u> ***	 2b. Check brush diameter (Table B4). Brush the hole with an appropriate of the second s	
4x	2c. Finally blow the hole clean again with compressed air (min. 6 bar) minimum of four times until return air stream is free of noticeable ground is not reached an extension must be used.	
	After cleaning, the bore hole has to be protected against re-co an appropriate way, until dispensing the mortar in the bore ho the cleaning has to be repeated directly before dispensing the In-flowing water must not contaminate the bore hole again.	ole. If necessary,
Chemofast Injection	System STVK or STVK Nordic for concrete	
Intended Use	ns	Annex B 4



Installation instruc	tions (continuation)	
	3 Attach the supplied static-mixing nozzle to the cartridge and load th correct dispensing tool. Cut off the foil tube clip before use. For every working interruption longer than the recommended work well as for new cartridges, a new static-mixer shall be used.	
her .	4. Prior to inserting the anchor rod into the filled bore hole, the positio depth shall be marked on the anchor rods.	n of the embedment
min. 3 full stroke	5 Prior to dispensing into the anchor hole, squeeze out separately a r strokes and discard non-uniformly mixed adhesive components unt consistent grey colour. For foil tube cartridges it must be discarded strokes.	il the mortar shows a
	6. Starting from the bottom or back of the cleaned anchor hole, fill the approximately two-thirds with adhesive. Slowly withdraw the static r hole fills to avoid creating air pockets. If the bottom or back of the a reached, an appropriate extension nozzle must be used. Observe the given in Annex B 6.	nixing nozzle as the nchor hole is not
	 Piston plugs and mixer nozzle extensions shall be used according to following applications: Horizontal assembly (horizontal direction) and ground erection direction): Drill bit-Ø d₀ ≥ 18 mm and embedment depth h_{ef} > 2 Overhead assembly (vertical upwards direction): Drill bit-Ø d₀ ≥ 	(vertical downwards 250mm
	8. Push the threaded rod or reinforcing bar into the anchor hole while ensure positive distribution of the adhesive until the embedment de	
	The anchor shall be free of dirt, grease, oil or other foreign material	
	9. Be sure that the anchor is fully seated at the bottom of the hole and visible at the top of the hole. If these requirements are not maintain to be renewed. For overhead application the anchor rod shall be fix	ned, the application has
+20°C	10. Allow the adhesive to cure to the specified time prior to applying ar not move or load the anchor until it is fully cured (attend Annex B 6	
Tirst.	11. After full curing, the add-on part can be installed with up to the max (Table B1 or B3) by using a calibrated torque wrench. It can be opt gap between anchor and fixture with mortar. Therefor substitute the washer and connect the mixer reduction nozzle to the tip of the mix filled with mortar, when mortar oozes out of the washer.	tional filled the annular e washer by the filling
Chemofast Injection	System STVK or STVK Nordic for concrete	
Intended Use		Annex B 5

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Concrete	e temp	erature	Gelling- / working time	Minimum curing time in dry concrete ¹⁾
-10 °C	to	-6°C	90 min ²⁾	24 h ²⁾
-5 °C	to	-1°C	90 min	14 h
0 °C	to	+4°C	45 min	7 h
+5 °C	to	+9°C	25 min	2 h
+ 10 °C	to	+19°C	15 min	80 min
+ 20 °C	to	+29°C	6 min	45 min
+ 30 °C	to	+34°C	4 min	25 min
- 35 °C	to	+39°C	2 min	20 min
	- 40 °C		1,5 min	15 min
+	-40 C		1,0 1111	
Cartridge In wet cone Cartridge t	e tempo crete th empera Ma	erature ne curing time n ature must be a	+5°C to nust be doubled. t min. +15°C. ng time and minimum curing time	」 ⇒ +40°C
Cartridge In wet cone Cartridge t	e tempe crete th empera Ma Ch	erature ne curing time n ature must be a aximum workin nemofast STVP	+5°C to nust be doubled. t min. +15°C. ng time and minimum curing time	
Cartridge In wet cond Cartridge t able B6:	e tempe crete th empera Ma Ch	erature ne curing time n ature must be a aximum workin nemofast STVP	+5°C to nust be doubled. t min. +15°C. ng time and minimum curing time K Nordic	Minimum curing time
Cartridge In wet cone Cartridge t able B6: Concrete	e temper crete th emper Ma Ch	erature ne curing time n ature must be a aximum workin nemofast STVP erature	+5°C to nust be doubled. t min. +15°C. ng time and minimum curing time K Nordic Gelling- / working time	Minimum curing time in dry concrete ¹⁾
Cartridge In wet cond Cartridge t fable B6: Concrete -20 °C	e temper crete th empera Ma Ch e temper to	erature ne curing time n ature must be a aximum workin nemofast STVP erature -16°C	+5°C to nust be doubled. t min. +15°C. ng time and minimum curing time K Nordic Gelling- / working time 75 min	Minimum curing time in dry concrete ¹⁾ 24 h
Cartridge In wet cond Cartridge t able B6: Concrete -20 °C -15 °C	e tempor crete th empera Ma Cr e tempor to to	erature he curing time n ature must be a aximum workin hemofast STVR erature -16°C -11°C	+5°C to nust be doubled. It min. +15°C. Ing time and minimum curing time K Nordic Gelling- / working time 75 min 55 min	Minimum curing time in dry concrete ¹⁾ 24 h 16 h
Cartridge In wet cond Cartridge t able B6: Concrete -20 °C -15 °C -10 °C	e tempor crete the emperative Ma Ch Ch e tempor to to to	erature ne curing time n ature must be a aximum workin nemofast STVR erature -16°C -11°C -6°C	+5°C to nust be doubled. t min. +15°C. ng time and minimum curing time C Nordic Gelling- / working time 75 min 55 min 35 min	Minimum curing time in dry concrete ¹⁾ 24 h 16 h 10 h
Cartridge In wet cond Cartridge t Table B6: Concrete -20 °C -15 °C -10 °C -5 °C	e tempor crete the emperative Ma Che tempor to to to to	erature ne curing time n ature must be a aximum working nemofast STVF erature -16°C -11°C -6°C -1°C	+5°C to nust be doubled. It min. +15°C. Ing time and minimum curing time K Nordic Gelling- / working time 75 min 55 min 35 min 20 min	Minimum curing time in dry concrete ¹⁾ 24 h 16 h 10 h 5 h
Cartridge In wet cond Cartridge t able B6: Concrete -20 °C -15 °C -10 °C -5 °C 0 °C +5 °C	e tempor crete the emperative Ma Cr e tempor to to to to to to to	erature ne curing time n ature must be a aximum workin nemofast STVP erature -16°C -11°C -6°C -1°C +4°C	+5°C to nust be doubled. It min. +15°C. Ing time and minimum curing time (Nordic Gelling- / working time 75 min 55 min 35 min 20 min 10 min	Minimum curing time in dry concrete ¹⁾ 24 h 16 h 10 h 5 h 2,5 h

Chemofast Injection System STVK or STVK Nordic for concrete

Intended Use Curing time Annex B 6

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Size)			M8	M10	M12	M16	M20	M24	M27	M30
Cros	ss section area	A _s	[mm²]	36,6	58	84,3	157	245	353	459	561
Cha	racteristic tension resistance, Steel failure	e ¹⁾									
Stee	el, Property class 4.6 and 4.8	N _{Rk,s}	[kN]	15 (13)	23 (21)	34	63	98	141	184	224
Stee	el, Property class 5.6 and 5.8	N _{Rk,s}	[kN]	18 (17)	29 (27)	42	78	122	176	230	280
Stee	el, Property class 8.8	N _{Rk,s}	[kN]	29 (27)	46 (43)	67	125	196	282	368	449
Stair	nless steel A2, A4 and HCR, class 50	N _{Rk,s}	[kN]	18	29	42	79	123	177	230	281
Stair	nless steel A2, A4 and HCR, class 70	N _{Rk,s}	[kN]	26	41	59	110	171	247	-	-
	nless steel A4 and HCR, class 80	N _{Rk,s}	[kN]	29	46	67	126	196	282	-	-
Cha	racteristic tension resistance, Partial facto	or ²⁾	_								
Stee	el, Property class 4.6 and 5.6	γMs,N	[-]				2,0)			
Stee	el, Property class 4.8, 5.8 and 8.8	Y _{Ms,N}	[-]				1,5	5			
Stair	nless steel A2, A4 and HCR, class 50	Y _{Ms,N}	[-]				2,8	6			
Stair	nless steel A2, A4 and HCR, class 70	Y _{Ms,N}	[-]				1,8	7			
Stair	nless steel A4 and HCR, class 80	Y _{Ms,N}	[-]				1,6	3			
Cha	racteristic shear resistance, Steel failure	1)									•
E	Steel, Property class 4.6 and 4.8	V ⁰ _{Rk,s}	[kN]	9 (8)	14 (13)	20	38	59	85	110	135
arm	Steel, Property class 5.6 and 5.8	V ⁰ Rk,s	[kN]	11 (10)	17 (16)	25	47	74	106	138	168
Sel S	Steel, Property class 8.8	V ⁰ Rk.s	[kN]	15 (13)	23 (21)	34	63	98	141	184	224
e e	Stainless steel A2, A4 and HCR, class 50	V ⁰ _{Rk,s}	[kN]	9	15	21	39	61	88	115	140
Without lever	Stainless steel A2, A4 and HCR, class 70	V ⁰ _{Rk,s}	[kN]	13	20	30	55	86	124	-	-
< s	Stainless steel A4 and HCR, class 80	V ⁰ _{Rk,s}	[kN]	15	23	34	63	98	141	-	-
S	Steel, Property class 4.6 and 4.8	M ⁰ Rk,s	[Nm]	15 (13)	30 (27)	52	133	260	449	666	900
arm	Steel, Property class 5.6 and 5.8	M ⁰ _{Rk,s}	[Nm]	19 (16)	37 (33)	65	166	324	560	833	1123
	Steel, Property class 8.8	M ⁰ Rk,s	[Nm]	30 (26)	60 (53)	105	266	519	896	1333	1797
With lever	Stainless steel A2, A4 and HCR, class 50	M ⁰ Rk,s	[Nm]	19	37	66	167	325	561	832	1125
1 N N	Stainless steel A2, A4 and HCR, class 70	M ⁰ Rk,s	[Nm]	26	52	92	232	454	784	-	-
S	Stainless steel A4 and HCR, class 80	M ⁰ Rk,s	[Nm]	30	59	105	266	519	896	-	-
Cha	racteristic shear resistance, Partial factor	2)									
Stee	el, Property class 4.6 and 5.6	γMs,V	[-]	1,67							
Stee	el, Property class 4.8, 5.8 and 8.8	Y _{Ms,V}	[-]				1,2	5			
Stair	nless steel A2, A4 and HCR, class 50	Y _{Ms,∨}	[-]				2,3	8			
Stair	nless steel A2, A4 and HCR, class 70	Y _{Ms,} ∨	[-]				1,5	6			
Stair	nless steel A4 and HCR, class 80	Y _{Ms,} ∨	[-]				1,3	3			-

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

Chemofast Injection System STVK or STVK Nordic for concrete

Performances

Characteristic values for steel tension resistance and steel shear resistance of threaded rods

Annex C 1



Table C2: 0	Characteristic values	for Concrete	cone failure	and Splitting with all kind of action
Anchor size				All Anchor types and sizes
Concrete cone f	ailure			
Non-cracked con	crete	k _{ucr,N}	[-]	11,0
Cracked concrete	e	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				
	h/h _{ef} ≥ 2,0			1,0 h _{ef}
Edge distance	2,0 > h/h _{ef} > 1,3	C _{cr,sp}	[mm]	$2 \cdot h_{ef} \left(2,5 - \frac{h}{h_{ef}} \right)$
	h/h _{ef} ≤ 1,3			2,4 h _{ef}
Axial distance		s _{cr,sp}	[mm]	2 c _{cr,sp}

Chemofast Injection System STVK or STVK Nordic for concrete

Performances

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

Annex C 2



	or size threaded ro	d			M8	M10	M12	M16	M20	M24	M27	M30
Steel f			N	IL-NI1			A . f	_{Jk} (or s	oo Tab			
-	cteristic tension resi	stance	N _{Rk,s}	[kN]								
	factor		γMs,N	[-]	see Table C1							
	ined pull-out and o			<u>C20/25</u>								
Chara	cteristic bond resist			620/25								
0	l: 40°C/24°C				10	12	12	12	12	11	10	9
Temperature range	II: 80°C/50°C	Dry, wet concrete			7,5	9	9	9	9	8,5	7,5	6,5
gure	III: 120°C/72°C			r [N/mm²] -	5,5	6,5	6,5	6,5	6,5	6,5	5,5	5,0
berat	l: 40°C/24°C		^T Rk,ucr		7,5	8,5	8,5	8,5				
Tem	II: 80°C/50°C	flooded bore hole			5,5	6,5	6,5	6,5			ormanc ed (NP/	
•	III: 120°C/72°C				4,0	5,0	5,0	5,0				.,
Chara	cteristic bond resist	ance in cracked	concrete C20	/25	1	1						
	l: 40°C/24°C				4,0	5,0	5,5	5,5	5,5	5,5	6,5	6,5
ange	II: 80°C/50°C	Dry, wet concrete			2,5	3,5	4,0	4,0	4,0	4,0	4,5	4,5
Temperature range	III: 120°C/72°C		^τ Rk,cr	[N/mm²] -	2,0	2,5	3,0	3,0	3,0	3,0	3,5	3,5
beratı	l: 40°C/24°C	flooded bore			4,0	4,0	5,5	5,5	No Performance Assessed (NPA)			
Temp	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	Assessed (NPA)			
Reduk	tion factor ψ^0_{sus} in	cracked and no	n-cracked cor	ncrete C20/25	1		1	1				
nre	l: 40°C/24°C	Dry, wet			0,73							
Temperature range	II: 80°C/50°C	concrete and flooded bore	Ψ^{0} sus	[-]	0,65							
Tem	III: 120°C/72°C	hole			0,57							
			C25/30					1	02			
			C30/37						04			
Increa	sing factors for con	crete	C35/45		1,07							
Ψ_{c}			C40/50		1,08							
			C45/55		1,09							
			C50/60					1,	10			
	rete cone failure ant parameter							500 To	ble C2			
Splitti					I			300 18				
	ant parameter							see Ta	ble C2			
	ation factor											
	and wet concrete				1,0				1,2			
	oded bore hole		γinst	[-]	, 	1	,4		,	NI	PA	

Chemofast Injection System STVK or STVK Nordic for concrete	
Performances Characteristic values of tension loads under static and quasi-static action	Annex C 3



Table C4: Characteristic values	s of shea	ar loads	s under	static	and qua	asi-stat	tic actio	on		
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 ⁰ Rk,s	[kN]			0,6 •	A _s ∙f _{uk}	(or see	Table C	1)	
Characteristic shear resistance Steel, strength class 8.8 Stainless Steel A2, A4 and HCR, all classes	V ⁰ _{Rk,s}	[kN]			0,5 ·	A _s ∙f _{uk}	(or see	Table C	1)	
Partial factor	γMs,∨	[-]				see	Table C	1		
Ductility factor	k ₇	[-]					1,0			
Steel failure with lever arm	1	II								
Characteristic bending moment	M ⁰ _{Rk,s}	[Nm]			1,2 • \	W _{el} ∙ f _{uł}	(or see	Table C	21)	
Elastic section modulus	W _{el}	[mm³]	31	62	109	277	541	935	1387	1874
Partial factor	γMs,V	[-]				see	Table C	1		
Concrete pry-out failure	•									
Factor	k ₈	[-]					2,0			
Installation factor	γinst	[-]					1,0			
Concrete edge failure										
Effective length of fastener	۱ _f	[mm]		'n	nin(h _{ef} ; 1	2 · d _{nor}	m)		min(h _{ef} ;	300mm)
Outside diameter of fastener	d _{nom}	[mm]	8	10	12	16	20	24	27	30
Installation factor	γ _{inst}	[-]					1,0			-

Performances

Characteristic values of shear loads under static and quasi-static action

Annex C 4



Steel failure ¹⁹ Characteristic tension resistance, 5.8 MRk,s [kN] 10 17 29 42 76 Partial factor, strength class 5.8 and 8.8 NRk,s [kN] 16 27 46 67 121 The partial factor, strength class 5.8 and 8.8 NRk,s [kN] 14 26 41 59 110 Partial factor, strength class 70 20 NRk,s [kN] 14 26 41 59 110 Data factor, strength class 70 20 Partial factor 1.80°C/S0°C Combined pull-out and concrete concrete concrete C20/25 Combined pull-out and concrete concrete C20/25 Combined pull-out and concrete concrete C20/25 Combined pull-out and concrete concrete C20/25 Contracteristic bond resistance in non-cracked concrete C20/25 Contracteristic bond resistance in cracked concrete C20/25 Characteristic bond resistance in cracked concrete C20/25 I: 40°C/24°C Dry, wet concrete C20/25 I: 40°C/24°C Dry, wet concrete concrete c20/25 I: 40°C/24°C<	nchor size internal threaded	anchor rods			IG-M6	IG-M8	IG-M10	IG-M12	IG-M16	IG-M20																																																																																																																																																																																																																																						
Steel, strength class 8.8 N _{Rk.s} [kN] 16 27 46 67 121 Partial factor, strength class 5.8 and 8.8 $\gamma_{Ms,N}$ [-] 1.5 1.5 Characteristic tension resistance, Stainless N _{Rk,s} [kN] 14 26 41 59 110 Partial factor Yms,N [-] 1.87 1.87 1.87 1.87 Combined pull-out and concrete cone failure Oncrete concrete C20/25 6.5 <th>teel failure¹⁾</th> <th></th> <th>1</th> <th>1</th> <th></th> <th>1</th> <th>1</th> <th></th> <th>1</th> <th>. </th>	teel failure ¹⁾		1	1		1	1		1	. 																																																																																																																																																																																																																																						
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 ²⁷ N _{Rk,S} [kN] 14 26 41 59 110 Partial factor $\gamma_{MS,N}$ [-] 1,5 59 110 59 110 Combined pull-out and concrete cone failure Tomorracked concrete C20/25 12 12 12 12 12 11 10 Generateristic bond resistance in non-cracked concrete C20/25 Tr, wet 18,5 8,5 8,5 8,5 8,5 No Performance Ass (NPA) Characteristic bond resistance in cracked concrete C20/25 Dry, wet 5,0 5,5 <	haracteristic tension resistanc	e, <u>5.8</u>	N _{Rk,s}	[kN]	10	17	29	42	76	123																																																																																																																																																																																																																																						
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$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	artial factor, strength class 5.8	3 and 8.8	γMs,N	[-]			1	,5																																																																																																																																																																																																																																								
Other / Ar and (PC), Steright Case / V YMs, N [-] 1,87 Combined pull-out and concrete cone failure Characteristic bond resistance in non-cracked concrete C20/25 12 12 12 12 11 12 12 12 11 137 Open for the second resistance in non-cracked concrete C20/25 12 12 12 12 12 12 12 11 137 136 Open for the second resistance in non-cracked concrete C20/25 12 12 12 12 12 12 12 12 137 136					14	26	11	59	110	124																																																																																																																																																																																																																																						
Combined pull-out and concrete cone failure Image of the pull out and concrete cone failure Characteristic bond resistance in non-cracked concrete C20/25 Image of the pull out and concrete concrete Image of the pull out and concrete concrete Image of the pull out and concrete Image of the		ass 70 ²⁾			14	20																																																																																																																																																																																																																																										
Characteristic bond resistance in non-cracked concrete C20/25				[-]			1,87			2,86																																																																																																																																																																																																																																						
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III: 120°C/72°C Inc. 5,0 5,0 5,0 5,0 600 y Characteristic bond resistance in cracked concrete C20/25 Or C/24°C III: 120°C/72°C Dry, wet concrete 3,5 4,0 <		Dry, wet								9 6,5																																																																																																																																																																																																																																						
III: 120°C/72°C Intervention 5,0 5,5 5,	E E III 120°C/72°C	concrete	-		6.5					5,0																																																																																																																																																																																																																																						
III: 120°C/72°C Intervention 5,0 5,5 5,	a a 1 40°C/24°C		^τ Rk,ucr	[N/mm ²]					_																																																																																																																																																																																																																																							
III: 120°C/72°C Inc. 5,0 5,0 5,0 5,0 600 y Characteristic bond resistance in cracked concrete C20/25 Or C/24°C III: 120°C/72°C Dry, wet concrete 3,5 4,0 <	₩ <u>₩</u> ₩ <u>₩</u> ₩							No Perf		ssessec																																																																																																																																																																																																																																						
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$ \begin{array}{c c c c c c } \hline C25/30 & 1,02 \\ \hline C30/37 & 1,04 \\ \hline C35/45 & 1,07 \\ \hline C40/50 & 1,08 \\ \hline C45/55 & 1,09 \\ \hline C50/60 & 1,10 \\ \hline \end{array} \\ \hline \rule{0ex}{3ee}{7ee}{7ee}{7ee}{7ee}{7ee}{7ee}{7ee$	ມີອຸດິດ ມີເມື່ອ ມີ ມີ ມີ ມີ ມີ ມີ ມີ ມີ ມີ ມີ ມີ ມີ ມີ	flooded bore	Ψ^0 sus	[-]			0,	65																																																																																																																																																																																																																																								
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 ¹⁾ Fastenings (incl. nut and washer) must comply with the appropriate material and property class of the internal threaded 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 	The characteristic tension resi	stance for steel								d rod.																																																																																																																																																																																																																																						

Chemofast Injection System STVK or STVK Nordic for concrete

Annex C 5

Performances

Characteristic values of tension loads under static and quasi-static action

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Table C6: Characteristic	*01053	Ji Shedi	10003			ישמטו־טומו			1
Anchor size for internal threade	ed anch	or rods		IG-M6	IG-M8	IG-M10	IG-M12	IG-M16	IG-M20
Steel failure without lever arm ¹⁾									
Characteristic shear resistance,	5.8	V ⁰ Rk,s	[kN]	5	9	15	21	38	61
Steel, strength class	8.8	V ⁰ _{Rk,s}	[kN]	8	14	23	34	60	98
Partial factor, strength class 5.8 a	ind 8.8	γ _{Ms,V}	[-]				1,25		
Characteristic shear resistance, Stainless Steel A4 and HCR, Strength class 70 ²⁾		V ⁰ Rk,s	[kN]	7	13	20	30	55	40
Partial factor		γ _{Ms,V}	[-]			1,56			2,38
Ductility factor		k ₇	[-]				1,0		
Steel failure with lever arm ¹⁾									
Characteristic bending moment,	5.8	M ⁰ _{Rk,s}	[Nm]	8	19	37	66	167	325
Steel, strength class	8.8	M ⁰ _{Rk,s}	[Nm]	12	30	60	105	267	519
Partial factor, strength class 5.8 a	ind 8.8	γ _{Ms,V}	[-]			·	1,25		•
Characteristic bending moment, Stainless Steel A4 and HCR, Strength class 70 ²⁾		M ⁰ _{Rk,s}	[Nm]	11	26	52	92	233	456
Partial factor		γMs,∨	[-]			1,56			2,38
Concrete pry-out failure									
Factor		k ₈	[-]				2,0		
Installation factor		γ _{inst}	[-]				1,0		
Concrete edge failure		ł	1	1					
Effective length of fastener		۱ _f	[mm]		min	(h _{ef} ; 12 ⋅ d	nom)		min (h _{ef} ; 300mn
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 The characteristic tension resista ²⁾ For IG-M20 strength class 50 is 	ance for s	omply with steel failure	the appr is valid	opriate ma for the inte	aterial and ernal threa	property cl: ded rod an	ass of the i d the faste	internal thr ning eleme	eaded rod. ent.

Chemofast Injection System STVK or STVK Nordic for concrete

Annex C 6

Performances

Characteristic values of shear loads under static and quasi-static action

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Table C7: Characteristic va	lues of tensio	n loads ui	nder s	tatic a	nd qua	asi-sta	tic act	ion			
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 ∙f _{uk}	1)			
Cross section area	A _s	[mm²]	50	79	113	154	201	314	491	616	804
Partial factor	γ _{Ms,N}	[-]					1,4 ²⁾				
Combined pull-out and concrete	failure										
Characteristic bond resistance in n	on-cracked conc	rete C20/2			-						
$\underline{\underline{e}}$ $\underline{\underline{l:}}$ 40°C/24°C Dry, we	t l		10	12	12	12	12	12	11	10	8,5
II: 80°C/50°C Div, we III: 120°C/72°C concrete			7,5 5,5	9 6,5	9 6,5	9 6,5	9 6,5	9 6,5	8,0 6,0	7,0 5,0	6,0 4,5
	^τ Rk,ucr	[N/mm ²]	7,5	8,5	8,5	8,5	8,5			. <u> </u>	•
[[] [] [] [] [] [] [] [] [] [5,5	6,5	6,5	6,5	6,5		lo Perf		
III: 120°C/72°C			4,0	5,0	5,0	5,0	5,0		ssesse	ea (NPA	4)
Characteristic bond resistance in c	racked concrete	C20/25		1							
$\underline{\mathfrak{U}}$ $\frac{1: 40^{\circ} \text{C}/24^{\circ} \text{C}}{11. 80^{\circ} \text{C}/50^{\circ} \text{C}}$ Dry, we	t		4,0	5,0	5,5	5,5	5,5	5,5	5,5	6,5	6,5
II: 80°C/50°C Div, we III: 120°C/72°C concrete			2,5 2,0	3,5 2,5	4,0 3,0	4,0 3,0	4,0 3,0	4,0 3,0	4,0 3,0	4,5 3,5	4,5 3,5
	^{−−−} ^τ Rk,cr	[N/mm ²]	4,0	4,0	5,5	5,5	5,5				
<u> </u>			2,5	3,0	4,0	4,0	4,0		lo Perf		
□ □ □ 00 0/00 0 bore hol	e		2,0	2,5	3,0	3,0	3,0		ssesse	a (NP/	\)
Reduktion factor ψ^0_{sus} in cracked	and non-cracked	d concrete	C20/2	5							
ຍ I: 40°C/24°C Dry, wei							0,73				
e e II: 80°C/50°C and flooded	Ψ ⁰ sus	[-]					0,65				
L: 40°C/24°C Dry, weight concrete and flooded flooded bore holds.							0,57				
	C25	/30					1,02				
	C30	/37					1,04				
Increasing factors for concrete	C35						1,07				
Ψ_{c}	C40						1,08				
	C45 C50						<u>1,09</u> 1,10				
Concrete cone failure		/60					1,10				
Relevant parameter						see	e Table	C2			
Splitting											
Relevant parameter						see	e Table	C2			
Installation factor											
for dry and wet concrete	<u>γ</u>	[-]	1,2				1	,2			
for flooded bore hole	γ _{inst}				1,4				N	PA	
¹⁾ f _{uk} shall be taken from the specific ²⁾ in absence of national regulation	auons of reinford	ng bars									
Chemofast Injection System STVI Performances Characteristic values of tension load				on					Anne	ex C 7	



Table C8: Characteristic values	s of shear	loads u	nder s	tatic a	nd qua	asi-sta	tic act	ion			
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 ⁰ Rk,s	[kN]				0,5	0∙A _s •	f _{uk} ¹⁾			
Cross section area	A _s	[mm²]	50	79	113	154	201	314	491	616	804
Partial factor	γMs,∨	[-]					1,5 ²⁾				
Ductility factor	k ₇	[-]					1,0				
Steel failure with lever arm											
Characteristic bending moment	M ⁰ Rk,s	[Nm]				1.2	• W _{el} •	f _{uk} 1)			
Elastic section modulus	W _{el}	[mm³]	50	98	170	269	402	785	1534	2155	3217
Partial factor	γ _{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	۱ _f	[mm]		miı	n(h _{ef} ; 1	2 • d _{nor}	m)		min(h _{ef} ; 300	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

Annex C 8



Table C9: Dis	placement	s under tension loa	ad ¹⁾ (thread	led rod))					
Anchor size thread	led rod		M8	M10	M12	M16	M20	M24	M27	M30
Non-cracked concre	ete C20/25 u	nder static and qua	si-static ac	tion						
Temperature range	δ_{N0} -factor	[mm/(N/mm²)]	0,021	0,023	0,026	0,031	0,036	0,041	0,045	0,049
l: 40°C/24°C	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,030	0,033	0,037	0,045	0,052	0,060	0,065	0,071
Temperature range	δ_{N0} -factor	[mm/(N/mm²)]	0,050	0,056	0,063	0,075	0,088	0,100	0,110	0,119
II: 80°C/50°C	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,072	0,081	0,090	0,108	0,127	0,145	0,159	0,172
Temperature range	δ_{N0} -factor	[mm/(N/mm²)]	0,050	0,056	0,063	0,075	0,088	0,100	0,110	0,119
III: 120°C/72°C	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,072	0,081	0,090	0,108	0,127	0,145	0,159	0,172
Cracked concrete C	20/25 under	static and quasi-st	atic action							
Temperature range	δ_{N0} -factor	[mm/(N/mm²)]	0,0	90			0,0	070		
l: 40°C/24°C	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,1	05			0,1	05		
Temperature range	δ_{N0} -factor	[mm/(N/mm²)]	0,2	19			0,1	70		
II: 80°C/50°C	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,2	255			0,2	245		
Temperature range	δ_{N0} -factor	[mm/(N/mm²)]	0,2	19			0,1	70		
III: 120°C/72°C	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,2	55			0,2	245		

¹⁾ Calculation of the displacement

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

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

Table C10: Displacements under shear load¹⁾ (threaded rod)

Anchor Size time	aded rod		M8	M10	M12	M16	M20	M24	M27	M30
Non-cracked con	crete C20/25 u	Inder static and qu	asi-static ac	tion						
All temperature	δ_{V0} -factor	[mm/kN]	0,06	0,06	0,05	0,04	0,04	0,03	0,03	0,03
ranges	$\delta_{V\infty}$ -factor	[mm/kN]	0,09	0,08	0,08	0,06	0,06	0,05	0,05	0,05
Cracked concrete	e C20/25 unde	static and quasi-	static action							
All temperature	δ_{V0} -factor	[mm/kN]	0,12	0,12	0,11	0,10	0,09	0,08	0,08	0,07
ranges	$\delta_{V\infty}$ -factor	[mm/kN]	0,18	0,18	0,17	0,15	0,14	0,13	0,12	0,10
2 - 2 feets										
$\delta_{V\infty} = \delta_{V\infty}$ -facto	or · ∨;									

Displacements (threaded rods)



Table C11: Dis	splacements ι	under tension loa	ad ¹⁾ (Intern	al threade	d anchor r	od)		
Anchor size Intern	al threaded a	nchor rod	IG-M6	IG-M8	IG-M10	IG-M12	IG-M16	IG-M20
Non-cracked concre	ete C20/25 und	ler static and qua	si-static a	tion		·		
Temperature range	δ_{N0} -factor	[mm/(N/mm ²)]	0,023	0,026	0,031	0,036	0,041	0,049
l: 40°C/24°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,033	0,037	0,045	0,052	0,060	0,071
Temperature range	δ_{N0} -factor	[mm/(N/mm ²)]	0,056	0,063	0,075	0,088	0,100	0,119
II: 80°C/50°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,081	0,090	0,108	0,127	0,145	0,172
Temperature range	δ_{N0} -factor	[mm/(N/mm ²)]	0,056	0,063	0,075	0,088	0,100	0,119
III: 120°C/72°C	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,081	0,090	0,108	0,127	0,145	0,172
Cracked concrete C	20/25 under s	tatic and quasi-st	atic action			•		
Temperature range	δ_{N0} -factor	[mm/(N/mm²)]	0,090			0,070		
l: 40°C/24°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,105			0,105		
Temperature range	δ_{N0} -factor	[mm/(N/mm²)]	0,219			0,170		
II: 80°C/50°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,255			0,245		
Temperature range	δ_{N0} -factor	[mm/(N/mm ²)]	0,219			0,170		
III: 120°C/72°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,255			0,245		
	-		•	•				

¹⁾ Calculation of the displacement

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

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

Table C12: Displacements under shear load¹⁾ (Internal threaded anchor rod)

Anchor size Inte	ernal threaded	anchor rod	IG-M6	IG-M8	IG-M10	IG-M12	IG-M16	IG-M20
Non-cracked and	I cracked conc	rete C20/25 unde	r static and	quasi-stati	c action			
All temperature	δ_{V0} -factor	[mm/kN]	0,07	0,06	0,06	0,05	0,04	0,04
ranges	$\delta_{V\infty}$ -factor	[mm/kN]	0,10	0,09	0,08	0,08	0,06	0,06

¹⁾ Calculation of the displacement

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

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

Annex C 10

Performances Displacements (Internal threaded anchor rod)



Anchor size reinfo	orcing bar		Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32
Non-cracked conc	rete C20/28	under static ar	nd quasi	-static a	ction	I	1	1			1
Temperature	δ_{N0} -factor	[mm/(N/mm ²)]	0,021	0,023	0,026	0,028	0,031	0,036	0,043	0,047	0,052
range I: 40°C/24°C	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,030	0,033	0,037	0,041	0,045	0,052	0,061	0,071	0,07
Temperature	δ_{N0} -factor	[mm/(N/mm²)]	0,050	0,056	0,063	0,069	0,075	0,088	0,104	0,113	0,120
range II: 80°C/50°C	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,072	0,081	0,090	0,099	0,108	0,127	0,149	0,163	0,18
Temperature	δ_{N0} -factor	[mm/(N/mm²)]	0,050	0,056	0,063	0,069	0,075	0,088	0,104	0,113	0,12
range III: 120°C/72°C	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,072	0,081	0,090	0,099	0,108	0,127	0,149	0,163	0,18
Cracked concrete	C20/25 und	ler static and qu	uasi-stat	ic actior	1						
Temperature	δ_{N0} -factor	[mm/(N/mm²)]	0,0	090				0,070			
range I: 40°C/24°C	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,1	105				0,105			
Temperature	δ_{N0} -factor	[mm/(N/mm²)]	0,2	219				0,170			
range II: 80°C/50°C	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,2	255				0,245			
Temperature range III:	δ_{N0} -factor	[mm/(N/mm²)]	0,2	219				0,170			
120°C/72°C	$\delta_{N\infty}$ -factor	[mm/(N/mm²)]	0,2	255				0,245			
	τ; τ; isplaceme	nent ∵ action bond nt under shear	load ¹⁾ (i	rebar)					I	I	I
$\begin{split} \delta_{N0} &= \delta_{N0} \text{-factor} \\ \delta_{N\infty} &= \delta_{N\infty} \text{-factor} \end{split}$ Table C14: D	τ; τ; isplaceme	τ: action bond			Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32
$\begin{array}{l} \delta_{N0} = \delta_{N0} \text{-factor} \\ \delta_{N\infty} = \delta_{N\infty} \text{-factor} \end{array}$ Table C14: Display Content of the second seco	τ; τ; isplaceme orcing bar	τ: action bond nt under shear	load ¹⁾ (I Ø 8	rebar) Ø 10		Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32
$\begin{array}{lll} \delta_{N0} = \delta_{N0} \mbox{-} factor \\ \delta_{N\infty} = \delta_{N\infty} \mbox{-} factor \end{array}$	τ; τ; isplaceme orcing bar	τ: action bond nt under shear i under static ar	load ¹⁾ (I Ø 8	rebar) Ø 10		Ø 14 0,04	Ø 16 0,04	Ø 20 0,04	Ø 25 0,03	Ø 28 0,03	Ø 32 0,03
$\begin{array}{l} \delta_{N0} = \delta_{N0} \text{-factor} \\ \delta_{N\infty} = \delta_{N\infty} \text{-factor} \end{array}$ Table C14: Display Content of the second seco	τ; τ; splaceme prcing bar rete C20/28 $δ_{V0}$ -factor $\delta_{V\infty}$ -	τ: action bond nt under shear i under static ar	load ¹⁾ (i Ø 8 nd quasi	rebar) Ø 10 -static a	ction						0,03
$\begin{split} \delta_{N0} &= \delta_{N0} \text{-factor} \\ \delta_{N\infty} &= \delta_{N\infty} \text{-factor} \end{split}$	τ; τ; brcing bar rete C20/28 $δ_{V0}$ -factor $δ_{V\infty}$ - factor	τ: action bond nt under shear i under static ar [mm/kN] [mm/kN]	load ¹⁾ (n Ø 8 nd quasi 0,06 0,09	rebar) Ø 10 -static a 0,05 0,08	ction 0,05 0,08	0,04	0,04	0,04	0,03	0,03	0,03
$\begin{split} \delta_{N0} &= \delta_{N0} \text{-factor} \\ \delta_{N\infty} &= \delta_{N\infty} \text{-factor} \end{split}$ Table C14: Di Anchor size reinformation in the second	τ; τ; brcing bar rete C20/28 $δ_{V0}$ -factor $δ_{V\infty}$ - factor	r: action bond nt under shear i under static ar [mm/kN] [mm/kN] ler static and qu	load ¹⁾ (n Ø 8 nd quasi 0,06 0,09	rebar) Ø 10 -static a 0,05 0,08	ction 0,05 0,08	0,04	0,04	0,04	0,03	0,03	
$\delta_{N0} = \delta_{N0}$ -factor $\delta_{N\infty} = \delta_{N\infty}$ -factor Table C14: Di Anchor size reinfo Non-cracked conce All temperature ranges Cracked concrete All temperature ranges ¹⁾ Calculation of th	τ; τ; isplaceme prcing bar rete C20/28 $δ_{V0}$ -factor $\delta_{V\infty}$ - factor C20/25 unc δ_{V0} -factor $\delta_{V\infty}$ - factor he displaceme	t: action bond nt under shear i under static ar [mm/kN] [mm/kN] [er static and qu [mm/kN] [mm/kN]	load ¹⁾ (r Ø 8 nd quasi 0,06 0,09 uasi-stat 0,12 0,18	rebar) Ø 10 -static a 0,05 0,08 ic action	ction 0,05 0,08	0,04 0,06	0,04	0,04	0,03	0,03	0,03
$\delta_{N0} = \delta_{N0} - \text{factor}$ $\delta_{N\infty} = \delta_{N\infty} - \text{factor}$ Table C14: Di Anchor size reinfo Anchor size reinfo Non-cracked concr All temperature ranges Cracked concrete All temperature ranges	τ; τ; isplaceme prcing bar rete C20/28 $δ_{V0}$ -factor $\delta_{V\infty}$ - factor C20/25 unc δ_{V0} -factor $\delta_{V\infty}$ - factor he displaceme	r: action bond nt under shear i under static ar [mm/kN] [mm/kN] ler static and qu [mm/kN] [mm/kN] [mm/kN]	load ¹⁾ (r Ø 8 nd quasi 0,06 0,09 uasi-stat 0,12 0,18	rebar) Ø 10 -static a 0,05 0,08 ic action 0,12	ction 0,05 0,08 0 0,11	0,04 0,06 0,11	0,04 0,06 0,10	0,04 0,05 0,09	0,03 0,05 0,08	0,03 0,04 0,07	0,03

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	or size threaded ro	d			M8	M10	M12	M16	M20	M24	M27	M30
<u>Steel f</u>								10.	NI			
-	cteristic tension resi	stance	N _{Rk,s,eq}	[kN]				1,0 •				
	l factor		γMs,N	[-]				see Ta	ble C1			
	bined pull-out and or cteristic bond resist		ked and cracl	ked concrete (220/25							
onara	l: 40°C/24°C				2,5	3,1	3,7	3,7	3,7	3,8	4,5	4,5
ge	II: 80°C/50°C	Dry, wet			1,6	2,2	2,7	2,7	2,7	2,8	-,5 3,1	3,1
Temperature range	III: 120°C/72°C	concrete			1,3	1,6	2,0	2,0	2,0	2,1	2,4	2,4
eratur	l: 40°C/24°C		^τ Rk,eq	[N/mm²]	2,5	2,5	3,7	3,7	2,0	- , ·	<u> </u>	, .
empe	II: 80°C/50°C	flooded bore			1,6	1,9	2,7	2,7		lo Perfo		
Ĕ	$\begin{array}{c c} \hline m & or or or of $			1,3	1,6	2,0	2,0	A	ssesse	d (NPA	۹)	
Reduk		cracked and no	l n-cracked cor	ncrete C20/25		- , -	_,_	_,_				
	l: 40°C/24°C	Dry, wet						0,7	73			
Temperature range	II: 80°C/50°C	concrete and flooded bore	ψ^0 sus	[-]				0,6	35			
Tem	III: 120°C/72°C	hole						0,9	57			
Increa	sing factors for con	crete ψ _c	C25/30 to C	C50/60				1,	0			
Concr	rete cone failure											
	ant parameter							see Ta	ble C2			
Splitti Releva	ant parameter							see Ta	ble C2			
	lation factor							000 10	510 02			
for dry	and wet concrete				1,0				1,2			
	oded bore hole		γinst	[-]		1	,4			NF	PA	

Chemofast Injection System STVK or STVK Nordic for concrete

Performances

Characteristic values of tension loads under seismic action (performance category C1)

Annex C 12

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Anchor size threaded rod			M8	M10	M12	M16	M20	M24	M27	M30	
Steel failure without lever arm		I		1		1					
Characteristic shear resistance (Seismic C1)	V _{Rk,s,eq}	[kN]	0,70 • √ ⁰ _{Rk,s}								
Partial factor	γ _{Ms,} ∨	[-]				see	Table C	:1			
Ductility factor	k ₇	[-]					1,0				
Steel failure with lever arm											
Characteristic bending moment	M ⁰ _{Rk,s,eq}	[Nm]			No Pe	rforman	ce Asse	ssed (N	PA)		
Concrete pry-out failure											
Factor	k ₈	[-]					2,0				
Installation factor	γinst	[-]					1,0				
Concrete edge failure											
Effective length of fastener	۱ _f	[mm]		m	nin(h _{ef} ; ´	l2•d _{no}	m)		min(h _{ef} ;	300mm)	
Outside diameter of fastener	d _{nom}	[mm]	8 10 12 16 20 24 27							30	
Installation factor	γ_{inst}	[-]		1		1	1,0			4	
Factor for annular gap	α _{gap}	[-]				0,	5 (1,0) ¹⁾				
¹⁾ Value in brackets valid for filled a Annex A 3 is required	nnular gab betwe	een anch	or and o	clearanc	e hole in	the fixt	ure. Use	of speci	al filling w	asher	

Chemofast Injection System STVK or STVK Nordic for concrete

Performances

Characteristic values of shear loads under seismic action (performance category C1)

Annex C 13



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	[LN]				1.0	• A _s • f	: 1)					
	N _{Rk,s,eq}	[kN]	50	70	440				404	0.4.0	004		
Cross section area	A _s	[mm²]	50	79	113	154	201 1,4 ²⁾	314	491	616	804		
Partial factor	γMs,N	[-]					1,4-/						
Combined pull-out and concrete fail Characteristic bond resistance in non-o		cracked co	ncrete	C20/24	5								
			2,5	3,1	3,7	3,7	3,7	3,7	3,8	4,5	4,5		
■ <u>II: 80°C/50°C</u> Dry, wet			1,6	2,2	2,7	2,7	2,7	2,7	2,8	3,1	3,1		
III: 120°C/72°C concrete III: 120°C/24°C floodod	τ	[NI/mm2]	1,3	1,6	2,0	2,0	2,0	2,0	2,1	2,4	2,4		
	^τ Rk, eq	[N/mm²]	2,5	2,5	3,7	3,7	3,7	N	No Performance				
■ <u>II: 80°C/50°C</u> bore hole			1,6	1,9	2,7	2,7	2,7	A					
			1,3	1,6	2,0	2,0	2,0			•	,		
Reduktion factor $\psi^0{}_{sus}$ in cracked and	I non-cracke	d concrete	C20/25	5									
I: 40°C/24°C Dry, wet			0,73										
ມີ ອີດເຊັ່ມ: 80°C/50°C and flooded													
ຍັດ E II: 80°C/50°C and flooded	Ψ^0 sus	[-]	0,65										
endingI:40°C/24°CDry, wet concreteundII:80°C/50°Cand floodedIII:120°C/72°Cbore hole							0,57						
ncreasing factors for concrete ψ_{c}	C25/30 to	C50/60					1,0						
Concrete cone failure							,						
Relevant parameter						see	Table	C2					
Splitting													
Relevant parameter						see	Table	C2					
nstallation factor													
or dry and wet concrete	γ _{inst}	[-]	1,2				1	2					
or flooded bore hole	Tinst				1,4				NF	PA			

Chemofast Injection System STVK or STVK Nordic for concrete

Performances

Characteristic values of tension loads under seismic action (performance category C1)

Annex C 14



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}	[kN]	$0,35 \cdot A_{s} \cdot f_{uk}^{2}$									
Cross section area	A _s	[mm²]	50 79 113 154 201 314 491 6 [.]						616	804		
Partial factor	γMs,∨	[-]	1,5 ²⁾									
Ductility factor	k ₇	[-]					1,0					
Steel failure with lever arm												
Characteristic bending moment	M ⁰ Rk,s,eq	[Nm]			No Pe	erforma	nce As	sessed	I (NPA)			
Concrete pry-out failure												
Factor	k ₈	[-]	2,0									
Installation factor	γ_{inst}	[-]	1,0									
Concrete edge failure												
Effective length of fastener	I _f	[mm]	min(h _{ef} ; 12 · d _{nom}) min(h _{ef} ; 300mm)									
Outside diameter of fastener	d _{nom}	[mm]	8	10	12	14	16	20	25	28	32	
Installation factor	γ_{inst}	[-]					1,0					
Factor for annular gap	$lpha_{\sf gap}$	[-]				(D,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 gab between anchor and clearance hole in the fixture. Use of special filling washer Annex A 3 is required

Annex C 15

Performances

Characteristic values of shear loads under seismic action (performance category C1)



Anchor size threa	ded rod			M8	M10	M12	M16	M20	M24	M27	M30	
Cracked and non-c	racked con	crete C20/25 un	der seis	smic C1	action		•	•		1		
Temperature range	δ_{N0} -factor	[mm/(N/mm²)]	0,	090			0,0	0,070			
l: 40°C/24°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,	105			0,	0,105			
Temperature range	δ_{N0} -factor	[mm/(N/mm ²)]	0,	219	0,170						
II: 80°C/50°C	δ _{N∞} -factor	[mm/(N/mm²)]	0,	255	0,245						
Temperature range	δ _{N0} -factor	[mm/(N/mm ²)]	0,	219	0,170						
III: 120°C/72°C	δ _{N∞} -factor	[mm/(N/mm ²)	-	0,	255			0,2	245			
Table C20: Di	splacement	ts under tensio	on load	¹⁾ (rebar	·)							
Anchor size reinfo	•		Ø8	Ø 10	, Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32	
Cracked and non-c	racked cond	crete C20/25 un	der seis	smic C1	action						1	
Temperature range	δ_{N0} -factor	[mm/(N/mm²)]	0.0	090				0,070				
l: 40°C/24°C	δ _{N∞} -factor	[mm/(N/mm ²)]	· ·	105				0,105				
Temperature range	δ_{N0} -factor	[mm/(N/mm ²)]	-	219	,		0,170					
II: 80°C/50°C	δ _{N∞} -factor	[mm/(N/mm ²)]	· · ·					0,245				
Temperature range	δ _{N0} -factor	[mm/(N/mm ²)]		0,255				0,170				
III: 120°C/72°C												
¹⁾ Calculation of th $\delta_{N0} = \delta_{N0}$ -factor $\delta_{N\infty} = \delta_{N\infty}$ -factor	· τ;	[mm/(N/mm²)] nt τ: action bond s		255 r tension				0,245				
¹⁾ Calculation of th $\delta_{N0} = \delta_{N0}$ -factor $\delta_{N\infty} = \delta_{N\infty}$ -factor	e displaceme · τ; · τ;	nt	stress for	r tension	ed rod)			0,245				
¹⁾ Calculation of th $\delta_{N0} = \delta_{N0}$ -factor $\delta_{N\infty} = \delta_{N\infty}$ -factor Table C21: Di	e displaceme · τ; · τ; splacement	nt τ: action bond :	stress for	r tension	ed rod) M10	M12	M16	0,245	M24	M27	M30	
¹⁾ Calculation of th $\delta_{N0} = \delta_{N0}$ -factor $\delta_{N\infty} = \delta_{N\infty}$ -factor Table C21: Di Anchor size threa	e displaceme · τ; · τ; splacement ded rod	nt τ: action bond s ts under shear	stress for	r tension (threade M8	M10	M12	M16	1	M24	M27	M30	
¹⁾ Calculation of th $\delta_{N0} = \delta_{N0}$ -factor $\delta_{N\infty} = \delta_{N\infty}$ -factor	e displaceme · τ; · τ; splacement ded rod	nt τ: action bond s ts under shear	stress for	r tension (threade M8	M10	M12	M16	1	M24	M27	M30 0,07	
¹⁾ Calculation of th $\delta_{N0} = \delta_{N0}$ -factor $\delta_{N\infty} = \delta_{N\infty}$ -factor Table C21: Di Anchor size thread Cracked and non-c All temperature	e displaceme · τ; · τ; splacement ded rod racked cone	nt τ: action bond s ts under shear	stress for	r tension (threade M8 smic C1	M10 action		I	M20		I	0,07	
¹⁾ Calculation of th $\delta_{N0} = \delta_{N0}$ -factor $\delta_{N\infty} = \delta_{N\infty}$ -factor Table C21: Di Anchor size threat Cracked and non-c All temperature ranges	e displaceme $\cdot \tau;$ $\cdot \tau;$ splacement ded rod racked cond δ_{V0} -factor $\delta_{V\infty}$ -factor	nt τ: action bond a ts under shear crete C20/25 un [mm/kN]	stress for ' load ²⁾ (ider seis	r tension (thread) M8 smic C1 0,12 0,18	M10 action	0,11	0,10	M20	0,08	0,08		
¹⁾ Calculation of th $\delta_{N0} = \delta_{N0}$ -factor $\delta_{N\infty} = \delta_{N\infty}$ -factor Table C21: Di Anchor size threat Cracked and non-c All temperature ranges Table C22: Di	e displaceme $\cdot \tau;$ $\cdot \tau;$ splacement ded rod racked cone δ_{V0} -factor $\delta_{V\infty}$ -factor splacement	nt τ: action bond a ts under shear crete C20/25 un [mm/kN] [mm/kN]	stress for ' load ²⁾ (ider seis	r tension (thread) M8 smic C1 0,12 0,18	M10 action	0,11	0,10	M20	0,08	0,08	0,07	
¹⁾ Calculation of th $\delta_{N0} = \delta_{N0}$ -factor $\delta_{N\infty} = \delta_{N\infty}$ -factor Table C21: Di Anchor size threat Cracked and non-c All temperature ranges Table C22: Di Anchor size reinfo	e displaceme $\cdot \tau;$ $\cdot \tau;$ splacement ded rod racked cond δ_{V0} -factor $\delta_{V\infty}$ -factor splacement prcing bar	nt τ: action bond s ts under shear crete C20/25 un [mm/kN] [mm/kN] t under shear l	stress for load ²⁾ der seis	r tension (thread) M8 smic C1 0,12 0,12 0,18 rebar) Ø 10	M10 action 0,12 0,18	0,11	0,10	M20 0,09 0,14	0,08	0,08	0,07	
¹⁾ Calculation of th $\delta_{N0} = \delta_{N0}$ -factor $\delta_{N\infty} = \delta_{N\infty}$ -factor Table C21: Di Anchor size thread Cracked and non-c All temperature ranges Table C22: Di Anchor size reinfo Cracked and non-c	e displaceme $\cdot \tau;$ $\cdot \tau;$ splacement ded rod racked cond δ_{V0} -factor $\delta_{V\infty}$ -factor splacement prcing bar	nt τ: action bond s ts under shear crete C20/25 un [mm/kN] [mm/kN] t under shear l	stress for load ²⁾ der seis	r tension (thread) M8 smic C1 0,12 0,12 0,18 rebar) Ø 10	M10 action 0,12 0,18	0,11	0,10	M20 0,09 0,14	0,08	0,08	0,07 0,10 Ø 32	
¹⁾ Calculation of th $\delta_{N0} = \delta_{N0}$ -factor $\delta_{N\infty} = \delta_{N\infty}$ -factor Table C21: Di Anchor size threa Cracked and non-c All temperature ranges Table C22: Di Anchor size reinfo Cracked and non-c All temperature	e displaceme $\cdot \tau;$ $\cdot \tau;$ splacement ded rod racked cond δ_{V0} -factor δ_{V0} -factor splacement prcing bar racked cond	nt τ: action bond a ts under shear crete C20/25 un [mm/kN] t under shear l crete C20/25 un	stress for load ²⁾ der seis	r tension (threado M8 smic C1 0,12 0,12 0,18 rebar) Ø 10 smic C1	M10 action 0,12 0,18 Ø 12 action	0,11 0,17 Ø 14	0,10 0,15 Ø 16	M20 0,09 0,14 Ø 20	0,08 0,13 Ø 25	0,08 0,12 Ø 28	0,07 0,10 Ø 32 0,06	
¹⁾ Calculation of th $\delta_{N0} = \delta_{N0}$ -factor $\delta_{N\infty} = \delta_{N\infty}$ -factor Table C21: Di Anchor size threa Cracked and non-c All temperature ranges Table C22: Di Anchor size reinfo Cracked and non-c All temperature	e displaceme $\cdot \tau;$ $\cdot \tau;$ splacement ded rod racked cond δ_{V0} -factor splacement prcing bar racked cond δ_{V0} -factor δ_{V0} -factor δ_{V0} -factor δ_{V0} -factor δ_{V0} -factor δ_{V0} -factor δ_{V0} -factor δ_{V0} -factor δ_{V0} -factor δ_{V0} -factor	nt τ: action bond s ts under shear crete C20/25 un [mm/kN] t under shear l crete C20/25 un [mm/kN]	stress for load ²⁾ der seis oad ¹⁾ (r Ø 8 der seis 0,12 0,18	r tension (threado M8 smic C1 0,12 0,18 rebar) Ø 10 smic C1 0,12	M10 action 0,12 0,18 Ø 12 action 0,11	0,11 0,17 Ø 14 0,11	0,10 0,15 Ø 16 0,10	M20 0,09 0,14 Ø 20	0,08 0,13 Ø 25 0,08	0,08 0,12 Ø 28 0,07	0,07	
¹⁾ Calculation of th $\delta_{N0} = \delta_{N0}$ -factor $\delta_{N\infty} = \delta_{N\infty}$ -factor Table C21: Di Anchor size thread Cracked and non-c All temperature ranges Table C22: Di Anchor size reinfo Cracked and non-c Anchor size reinfo Cracked and non-c All temperature ranges ¹⁾ Calculation of th $\delta_{V0} = \delta_{V0}$ -factor	e displaceme $\cdot \tau$; $\cdot \tau$; splacement ded rod racked cone δ_{V0} -factor splacement prcing bar racked cone δ_{V0} -factor brcing bar racked cone δ_{V0} -factor e displaceme $\cdot V$; $\cdot V$;	nt τ: action bond s ts under shear crete C20/25 un [mm/kN] [mm/kN] t under shear I crete C20/25 un [mm/kN] [mm/kN] [mm/kN] [mm/kN] [mm/kN]	stress for load ²⁾ (ider seis 0,12 0,12 0,18 load	r tension (threade m8 smic C1 0,12 0,12 0,18 Ø 10 smic C1 0,12 0,18	M10 action 0,12 0,18 Ø 12 action 0,11 0,17	0,11 0,17 Ø 14 0,11	0,10 0,15 Ø 16 0,10	M20 0,09 0,14 Ø 20	0,08 0,13 Ø 25 0,08	0,08 0,12 Ø 28 0,07	0,07 0,10 Ø 32 0,06	