



Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments



European Technical Assessment

ETA-17/0855 of 27 October 2022

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

SCELL-IT X-BRID for concrete

Bonded fastener for use in concrete

SCELL-IT 28 Rue Paul Dubrule 59854 LESQUIN FRANKREICH

Scell-it Plant 1 Germany

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

EAD 330499-01-0601, Edition 04/2020

ETA-17/0855 issued on 22 November 2019

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Specific Part

1 Technical description of the product

The "SCELL-IT X-BRID for concrete" is a bonded fastener consisting of a cartridge with injection mortar Injection mortar X-BRID and a steel element according to Annex A3 and A5.

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 fastener 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 fastener of at least 50 and/or 100 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 B 3, C 1 to C 4, C 6 to C 7, C 9 to C 10
Characteristic resistance to shear load (static and quasi-static loading)	See Annex C 1, C 5, C 8, C 11
Displacements under short-term and long-term loading	See Annex C 12 to C 14
Characteristic resistance and displacements for seismic performance categories C1 and C2	See Annex C 15 to C 23

3.2 Hygiene, health and the environment (BWR 3)

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



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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

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 27 October 2022 by Deutsches Institut für Bautechnik

Dipl.-Ing. Beatrix Wittstock Head of Section *beglaubigt:* Baderschneider



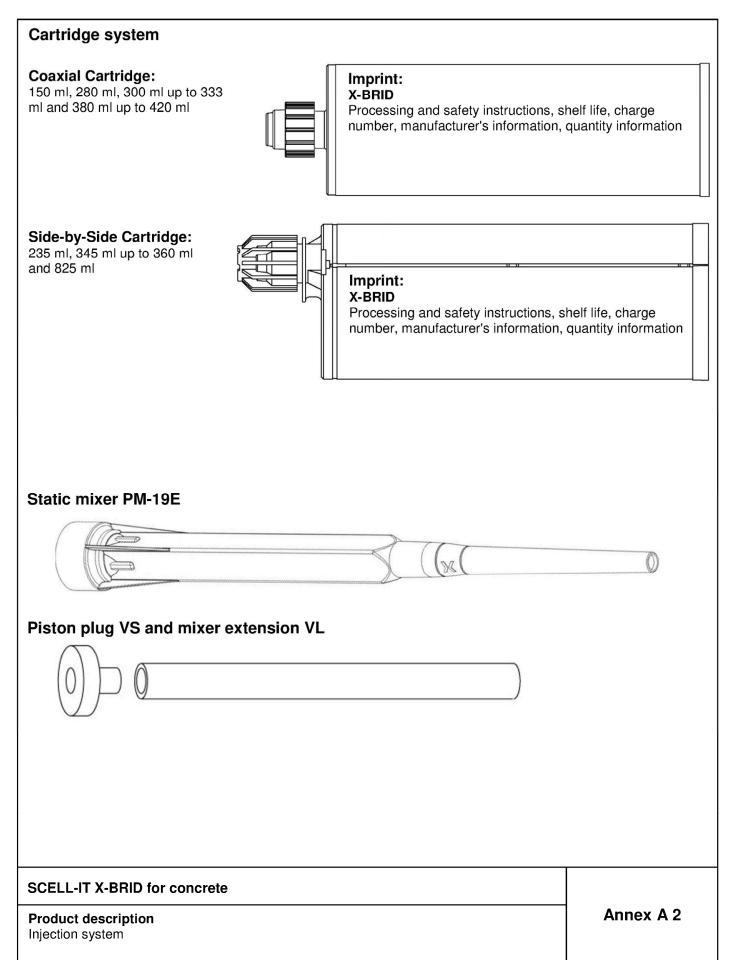
Installation threaded rod M8 up to M30 prepositioned installation or push through installation (annular gap filled with mortar) h_{ef} t_{fix} h₀ h_{min} Installation reinforcing bar Ø8 up to Ø32 h_{ef} ho h_{min} Installation internal threaded anchor rod DF-M6 up to DF-M20 $\langle \$ IIG t_{fix} h_{ef} h_{min} h₀ thickness of fixture nominal drill hole diameter t_{fix} = = h_{ef} Ι_{IG} effective embedment depth thread engagement length = = h_{min} minum thickness of member =

SCELL-IT X-BRID for concrete

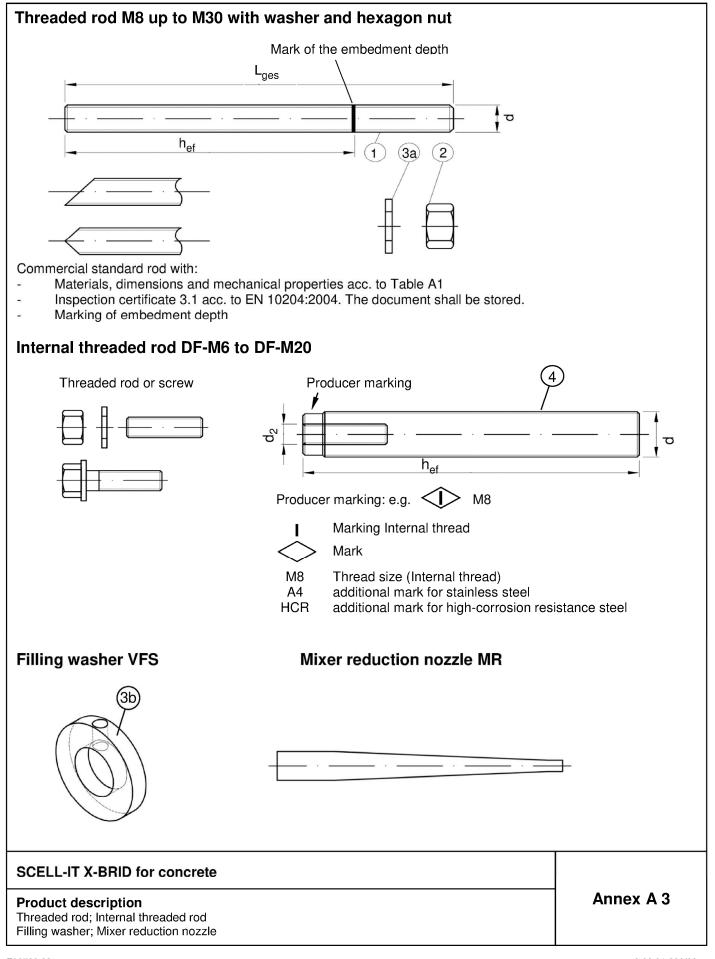
Product description Installed condition

Annex A 1











Jar	t Designation	Material					
	el, zinc plated (Steel	acc. to EN ISO 683-4:2	2018	or EN 10263:2001)			
		5 µm acc. to EN ISO			~~~		
		40 μm acc. to EN ISO 45 μm acc. to EN ISO		1:2009 and EN ISO 10684:	2004+AC:2009 or		
- 3			170	Characteristic steel	Characteristic ste	el El	ongation at
		Property class		ultimate tensile strength	yield strength		acture
				$f_{uk} = 400 \text{ N/mm}^2$	$f_{yk} = 240 \text{ N/mm}^2$		₅ > 8%
1	Threaded rod			f _{uk} = 400 N/mm ²	f _{yk} = 320 N/mm ²		₅ > 8%
÷		acc. to EN ISO 898-1:2013	5.6	f _{uk} = 500 N/mm ²	$f_{yk} = 300 \text{ N/mm}^2$	A	₅ > 8%
		EN 130 090-1.2013	5.8	f _{uk} = 500 N/mm ²	$f_{yk} = 400 \text{ N/mm}^2$	A	5 > 8%
				f _{uk} = 800 N/mm ²	$f_{vk} = 640 \text{ N/mm}^2$	A	₅ ≥ 12% ³⁾
			4	for anchor rod class 4.6 o	r 4.8		,
2	Hexagon nut	acc. to EN ISO 898-2:2012	5	for anchor rod class 5.6 o			
		EN 150 090-2:2012	8	for anchor rod class 8.8			
3a	Washer			galvanised or sherardized			
				EN ISO 7089:2000, EN ISC	7093:2000 or EN	ISO 7094	:2000)
3b	Filling washer		n-aip	galvanised or sherardized Characteristic steel	Characteristic ste		ongation at
		Property class		ultimate tensile strength	yield strength		acture
4	Internal threaded anchor rod	acc. to	5.8	$f_{uk} = 500 \text{ N/mm}^2$	$f_{vk} = 400 \text{ N/mm}^2$		5 > 8%
		EN ISO 898-1:2013		- Description	$f_{vk} = 640 \text{ N/mm}^2$		5 5 > 8%
Cto	inlage steel AQ (Moto			NET IST	J		J
<i></i>	ITTERS STEEL AZ UMATE	vriai 1 4301 / 1 4307 / 1	431	1/1456/or14541 acc t	o EN 10088-1.2014	4)	
				1 / 1.4567 or 1.4541, acc. t 1 / 1.4362 or 1.4578, acc. t			
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Sta	inless steel A4 (Mate	erial 1.4401 / 1.4404 / 1 ce steel (Material 1.45	.457	1 / 1.4362 or 1.4578, acc. t r 1.4565, acc. to EN 10088 Characteristic steel	o EN 10088-1:2014 -1: 2014) Characteristic ste	4) el El	ongation at
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$_{5} > 8\%$ $_{5} > 8\%$



Rib	imum value of related rip area f _{R,min} acco height of the bar shall be in the range 0,0 Nominal diameter of the bar; h _{rib} : Rib heig	$0.5d \le h_{rib} \le 0.07d$ (ht of the bar)
Ta	ble A2: Materials Reinforcing	j bar
	Die A2: Materials Reinforcing	y bar Material
	Designation	

SCELL-IT X-BRID for concrete

Product description Materials reinforcing bar Annex A 5



	Working life	e 50 years	Working life 100 years					
Base material	uncracked concrete	cracked concrete	uncracked concrete	cracked concrete				
HD: Hammer drilling HDB: Hammer drilling with hollow drill bit CD: Compressed air drilling	M8 to Ø8 to DF-M6 to	Ø32,	e e	M8 to M30, Ø8 to Ø32, DF-M6 to DF-M20				
Temperature Range:	III: - 40 °C	$\begin{array}{rrrr} to & +40 \ ^{\circ}C^{1)} \\ to & +80 \ ^{\circ}C^{2)} \\ to & +120 \ ^{\circ}C^{3)} \\ to & +160 \ ^{\circ}C^{4)} \end{array}$		°C to +40 °C ¹⁾ °C to +80 °C ²⁾				
Fasteners subject to (seismic ac								
	Performance	Category C1	Performa	ance Category C2				
Base material		Cracked and ur	cracked concrete)				
HD: Hammer drilling HDB: Hammer drilling with hollow drill bit CD: Compressed air drilling	M8 to Ø8 to		M12 to M24					
Temperature Range:	II: - 40 °C III: - 40 °C	$\begin{array}{rrrr} to & +40 \ ^{\circ}C^{1)} \\ to & +80 \ ^{\circ}C^{2)} \\ to +120 \ ^{\circ}C^{3)} \ ^{5)} \\ to +160 \ ^{\circ}C^{4)} \ ^{5)} \end{array}$	II: - 40 III: - 40) °C to +40 °C ¹)) °C to +80 °C ²)) °C to+120 °C ³ ⁵)) °C to+160 °C ⁴ ⁵)				
 (max. long-term temperature +24°C - 2) (max. long-term temperature +50°C (max. long-term temperature +72°C - 4) (max. long-term temperature +100°C Only for working life of 50 years Base materials: Compacted, reinforced or un EN 206:2013 + A1:2016. Strength classes C20/25 to C 	and max. short-term te and max. short-term te and max. short-term t reinforced normal we	emperature +80°C) mperature +120°C) temperature +160°C) eight concrete witho		ng to				
Use conditions (Environmental o	conditions):							
 Structures subject to dry inte For all other conditions acco class: Stainless steel Stahl A Stainless steel Stahl A High corrosion resista 	rding to EN 1993-1-4 A2 according to Anne A4 according to Anne	4:2006+Å1:2015 cor ex A 4, Table A1: CF ex A 4, Table A1: CF	RC II RC III					
SCELL-IT X-BRID for concrete								
Intended Use				Annex B 1				



Design:

- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the fastener is indicated on the design drawings (e. g. position of the fastener relative to reinforcement or to supports, etc.).
- Fasteners are designed under the responsibility of an engineer experienced in fasteners and concrete work.
- The fasteners are designed in accordance to EN 1992-4:2018 and Technical Report TR 055, Edition February 2018

Installation:

- Dry, wet concrete or flooded bore holes (not sea-water).
- Hole drilling by hammer (HD), hollow (HDB), compressed air (CD) or diamond drill mode (DD).
- Overhead installation allowed.
- Fastener installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Installationtemperature in concrete:
- -5°C up to +40°C for the standard variation of temperature after installation.

SCELL-IT X-BRID for concrete

Intended Use Specifications (Continued)

Deutsches Institut für Bautechnik

Table B1: Installation parameters for threaded rod												
Threaded rod				M8	M10	M12	M16	M20	M24	M27	M30	
Diameter of element	t	$d = d_{nom}$	[mm]	8	10	12	16	20	24	27	30	
Nominal drill hole di	ameter	d ₀	[mm]	10	12	14	18	22	28	30	35	
Effective embedmer	at donth	h _{ef,min}	[mm]	60	60	70	80	90	96	108	120	
Effective embedmer	it depth	h _{ef,max}	[mm]	160	200	240	320	400	480	540	600	
Diameter of	Prepositioned ins	stallation $d_{f} \leq$	[mm]	9	12	14	18	22	26	30	33	
clearance hole in the fixture ¹⁾	Push through installation d _f		[mm]	12	14	16	20	24	30	33	40	
Maximum installatio	n torque	max T _{inst}	[Nm]	10	20	40 ²⁾	60	100	170	250	300	
Minimum thickness of member		h _{min}	[mm]	-	h _{ef} + 30 mm ≥ 100 mm			h _{ef} + 2d ₀				
Minimum spacing		s _{min}	[mm]	40	50	60	75	95	115	125	140	
Minimum edge dista	ince	c _{min}	[mm]	35	40	45	50	60	65	75	80	
1)					S		2 225					

1) For application under seismic loading the diameter of clearance hole in the fixture shall be at maximum d₁ + 1mm or alternatively the annular gap between fixture and threaded rod shall be filled force-fit with mortar.

²⁾ Maximum installation torque for M12 with steel Grade 4.6 is 35 Nm

Table B2: Installation parameters for reinforcing bar

Reinforcing bar						Ø 14	Ø 16	Ø 20	Ø 241)	Ø 25 ¹⁾	Ø 28	Ø 32
Diameter of element	d = d _{nom}	[mm]	8	10	12	14	16	20	24	25	28	32
Nominal drill hole diameter	d ₀	[mm]	10 12	12 14	14 16	18	20	25	30 32	30 32	35	40
Effective embedment denth	h _{ef,min}	[mm]	60	60	70	75	80	90	96	100	112	128
Effective embedment depth	h _{ef,max}	[mm]	160	200	240	280	320	400	480	500	560	640
Minimum thickness of member	h _{min}	[mm]		30 mm)0 mm	2			h _e	_f + 2d ₀			
Minimum spacing s _{min} [mm]				50	60	70	75	95	120	120	130	150
Minimum edge distance C _{min} [mm]			35	40	45	50	50	60	70	70	75	85
1) both nominal drill bala diama	tor oon ho ur	ad										

1) both nominal drill hole diameter can be used

Table B3: Installation parameters for Internal threaded anchor rod

Internal threaded anchor rod			DF-M6	DF-M8	DF-M10	DF-M12	DF-M16	DF-M20						
Internal diameter of anchor rod	d ₂	[mm]	6	8	10	12	16	20						
Outer diameter of anchor rod ¹⁾	d = d _{nom}	[mm]	10	12	16	20	24	30						
Nominal drill hole diameter	d ₀	[mm]	12	14	18	22	28	35						
	h _{ef,min}	[mm]	60	70	80	90	96	120						
Effective embedment depth	h _{ef,max}		200	240	320	400	480	600						
Diameter of clearance hole in the fixture	d _f ≤	[mm]	7	9	12	14	18	22						
Maximum installation torque	max T _{inst}	[Nm]	10	10	20	40	60	100						
Thread engagement length min/max	l _{IG}	[mm]	8/20	8/20	10/25	12/30	16/32	20/40						
Minimum thickness of member	h _{min}	[mm]	h _{ef} + 3 ≥ 100	30 mm) mm		h _{ef} +	- 2d ₀							
Minimum spacing	s _{min}	[mm]	50	60	75	95	115	140						
Minimum edge distance	C _{min}	[mm]	40	45	50	60	65	80						
1) With metric threads according to	EN 1993-1-8:2	2005+AC	C:2009	¹) With metric threads according to EN 1993-1-8:2005+AC:2009										

SCELL-IT X-BRID for concrete

Intended Use
Installation parameters



Rod Inforcing Interaced anchor rod Drill bit $-\mathcal{O}$ Brush $-\mathcal{O}$ min. Brush $-\mathcal{O}$ plug of piston plug [mm] [REFERRA					teletetetek																
M8 8 10 RB10 11.5 10.5 M10 8/10 DF-M6 12 RB12 13.5 12.5 No plug required M12 10/12 DF-M8 14 RB14 15.5 14.5 No plug required M16 14 DF-M10 18 RB18 20.0 18.5 VS18 VS18 M20 DF-M10 18 RB18 20.0 18.5 VS18 VS18 M20 DF-M12 22 RB22 27.0 25.5 VS22 VS25 Mef > 250 mm Aff > aff > 250 mm aff > 250 mm aff > 250 mm aff > aff > 250 mm aff > 250 mm aff > aff > <th>Threaded Rod</th> <th>inforcing</th> <th>inforcing</th> <th>inforcing</th> <th>inforcing</th> <th>inforcing</th> <th>inforcing</th> <th>inforcing bar</th> <th>inforcing bar</th> <th>inforcing</th> <th>inforcing</th> <th>inforcing</th> <th>inforcing</th> <th>threaded</th> <th>Drill bit - Ø</th> <th></th> <th></th> <th>min.</th> <th></th> <th></th> <th></th> <th colspan="2"></th>	Threaded Rod	inforcing	inforcing	inforcing	inforcing	inforcing	inforcing	inforcing bar	inforcing bar	inforcing	inforcing	inforcing	inforcing	threaded	Drill bit - Ø			min.					
M10 8 / 10 DF-M6 12 RB12 13,5 12,5 No plug required M12 10 / 12 DF-M8 14 RB14 15,5 14,5 Independence Indepnence	[mm]	[mm]	[mm]	[mm]		[mm]	[mm]		Ļ	\rightarrow	t												
M12 10 / 12 DF-M8 14 RB14 15,5 14,5 No plug required M16 14 DF-M10 18 RB18 20,0 18,5 VS18 M20 DF-M12 22 RB22 24,0 22,5 VS22 M20 DF-M12 22 RB22 24,0 22,5 VS22 M24 DF-M16 28 RB28 30,0 28,5 VS28 M27 24/25 30 RB30 31,8 30,5 VS30 M30 28 DF-M20 35 RB35 37,0 35,5 VS36 M30 28 DF-M20 35 RB35 37,0 35,5 VS36 VS40 The hollow drill system consists of Heller Duster Experihollow drill system consists of Heller Duster Experihollow drill bit and a class M hoover with a minimum negative pressure of 253 hPa and a flow rate of minimu The hollow drill system consists of Heller Duster Experihollow drill bit and a class M hoover with a minimum The hollow drill system consists of Heller Duster Experihollow drill bit and a class M hoover with a minimum M30 28 DF-M20	M8	8		10	RB10	11,5	10,5																
M12 10 / 12 DF-M8 14 RB14 15,5 14,5 No plug required M16 14 DF-M10 18 RB16 17,5 16,5 VS18 h_{cf} VS20 M20 DF-M12 22 RB22 24,0 22,5 VS22 VS22 h_{ef} 20 Prime h_{ef} 25 RB26 27,0 25,5 VS26 VS28 h_{ef} 250 mm h_{ef} h_{ef} h_{ef} h_{ef} h_{ef} h_{ef} h_{ef} h_{ef} <td>M10</td> <td>8 / 10</td> <td>DF-M6</td> <td>12</td> <td></td> <td></td> <td></td> <td>]</td> <td>Nonlin</td> <td>rogulaci</td> <td></td>	M10	8 / 10	DF-M6	12]	Nonlin	rogulaci													
M16 14 DF-M10 18 RB18 20,0 18,5 VS18 M20 DF-M12 22 RB20 22,0 20,5 VS20 M24 DF-M16 28 RB28 30,0 28,5 VS28 M27 24/25 32 RB32 34,0 32,5 VS30 24/25 32 RB32 34,0 32,5 VS32 M30 28 DF-M20 35 RB35 37,0 35,5 VS35 M30 28 DF-M20 35 RB35 37,0 35,5 VS36 Cleaning and installation tools RB40 43,5 40,5 VS40 VS40 The hollow drill system consists of Heller Duster Expering the work of the system consists of Heller Duster Expering the work of the system consists of Heller Duster Expering the work of the system consists of Heller Duster Expering the work of the system consists of Heller Duster Expering the work of the system consists of Heller Duster Expering the work of the system consists of Heller Duster Expering the work of the system consists of Heller Duster Expering the work of the system consists of Heller Duster Expering the work of the system consists of Heller Duster Expering the work of the system consists of Heller Duster Expering the work of the system consists of Heller Duster Expering	M12	10 / 12	DF-M8	14	RB14				No plug	required													
16 20 RB20 22,0 20,5 VS20 20 25 RB22 24,0 22,5 VS22 M24 DF-M16 28 RB28 20,0 22,5 VS28 M27 24/25 30 RB30 31,8 30,5 VS28 M30 28 DF-M20 35 RB35 37,0 35,5 VS32 M30 28 DF-M20 35 RB35 37,0 35,5 VS30 250 mm 250 mm 250 mm 250 mm 250 mm 40 40 40,5 40,5 VS40 40,5 250 mm 250 mm 40 40 40,5 40,5 VS40 40,5 40,5 VS40 40 40,5 40,5 40,5 VS40 40 40 40,5 40,5 40,5 40,5 <td></td>																							
M20 DF-M12 22 RB22 24,0 22,5 VS22 M24 DF-M16 28 RB28 30,0 28,5 VS23 h_{ef} > 250 mm h_{ef} >	M16		DF-M10																				
20 25 RB25 27,0 25,5 VS25 h_{ef} > 250 mm h_{ef} > 100 mm h_{ef} > <td></td> <td>16</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>		16																					
M24 DF-M16 28 RB28 30,0 28,5 VS28 n_{ef} n_{ef} n_{ef} n_{ef} n_{ef} n_{ef} 250 mm a M30 28 DF-M20 35 RB32 34,0 32,5 VS32 VS32 VS32 VS32 VS33 VS40 VS40 <td>M20</td> <td></td> <td>DF-M12</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	M20		DF-M12																				
M24 DP-W18 28 HB20 30,0 23,0 VS20 250 mm 250 m		20							his	his													
M27 24/25 30 HB30 31,8 33,5 VS30 24/25 32 RB32 34,0 32,5 VS32 M30 28 DF-M20 35 RB32 34,0 32,5 VS35 M30 28 DF-M20 35 RB32 34,0 32,5 VS35 M30 28 DF-M20 35 RB32 40,5 VS40 Cleaning and installation tools HDB - Hollow drill bit system The hollow drill bit and a class M hoover with a minimum negative pressure of 253 hPa and a flow rate of minimu 150 m%/h (42 l/s). Hand pump (Volume 750 ml, h_0 ≥ 10 d_s, d_0 ≤ 20mm) Compressed air tool (min 6 bar) Description Piston Plug VS Description Piston Plug VS Description Description Brush RB Piston Plug VS Description Description Brush extension RBL Description			DF-M16						2000		all												
M3028DF-M2035RB3537,035,5VS353240RB4043,540,5VS40Cleaning and installation toolsThe hollow drill bit systemThe hollow drill system consists of Heller Duster Expert hollow drill bit and a class M hoover with a minimum negative pressure of 253 hPa and a flow rate of minimu 150 m³/h (42 l/s).Hand pump (Volume 750 ml, h_0 ≥ 10 d_s, d_0 ≤ 20mm)Compressed air tool (min 6 bar)Piston Plug VSBrush RBPiston Plug VSBrush RBPiston Plug VSBrush extension RBL	M27									230 1111													
32 40 RB40 43,5 40,5 VS40 Cleaning and installation tools The hollow drill system consists of Heller Duster Experiments The hollow drill system consists of Heller Duster Experiments The hollow drill system consists of Heller Duster Experiments Mand pump (Volume 750 ml, h₀ ≥ 10 d₅, d₀ ≤ 20mm) Compressed air tool Mine B Piston Plug VS Diameter BL Diameter BL									_														
Cleaning and installation tools HDB – Hollow drill bit system Image: the top of t	M30		DF-M20						_														
Hand pump (Volume 750 ml, $h_0 \ge 10 d_g, d_0 \le 20 mm$) Compressed air tool (min 6 bar) Image: State of the	HDB – Ho	llow drill bit	t system		5		hollow drill bit a negative press	and a class ure of 253	s M hoover v	vith a minimu	m												
Brush extension RBL			d _s , d _o ≤20mm)	AND A		(Compressed	,															
Brush extension RBL						3																	
Brush extension RBL	Brush RB		14/1/28/11/2000 - 4000 - 4000 - 4000	and PERSON & Real Products		ļ	Piston Plug	vs															
			innin a	m,																			
		ension RBL																					
						UUUU		22222															

Annex B 4

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Table B5:	Workin	g time and cu	ring time	
Tempera	ature in bas	e material	Maximum working time	Minimum curing time ¹⁾
	Т		t _{work}	t _{cure}
- 5°C	to	- 1 °C	50 min	5 h
0°C	to	+ 4 °C	25 min	3,5 h
+ 5 °C	to	+ 9 °C	15 min	2 h
+ 10°C	to	+ 14 °C	10 min	1 h
+ 15°C	to	+ 19°C	6 min	40 h
+ 20 °C	to	+ 29 °C	3 min	30 min
+ 30 °C	to	+ 40 °C	2 min	30 min
Carl	ridge tempe	erature	+5°C to) +40°C
\ 		in a selection line for a slow s		

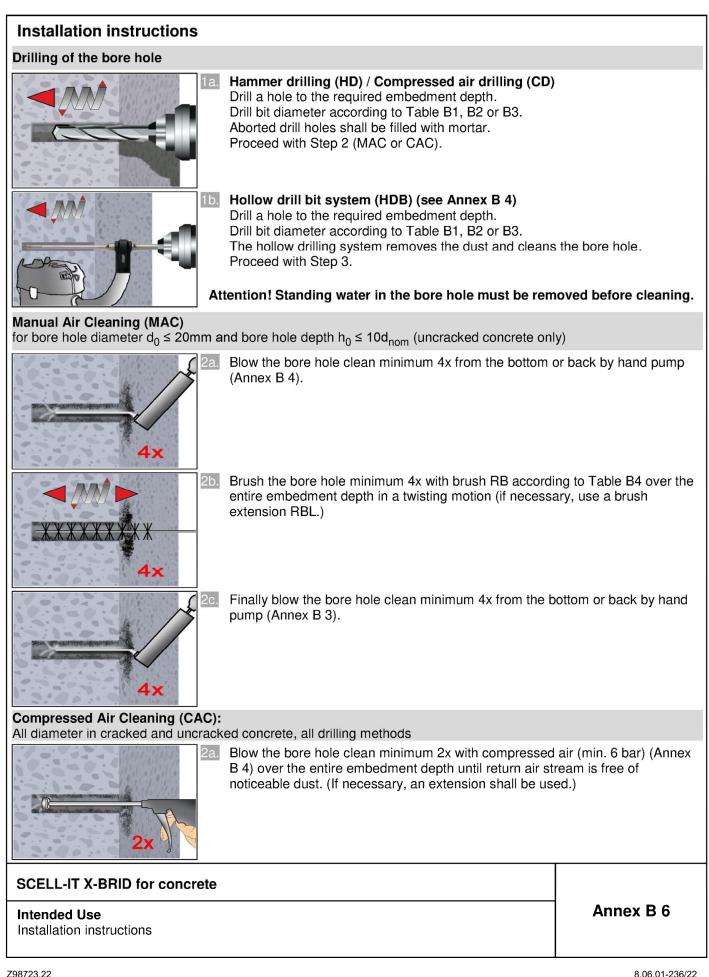
1) The minimum curing time is only valid for dry base material.

In wet base material the curing time must be doubled.

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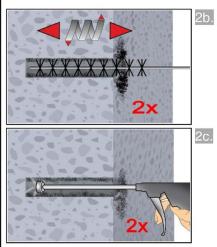
Intended Use Working time and curing time





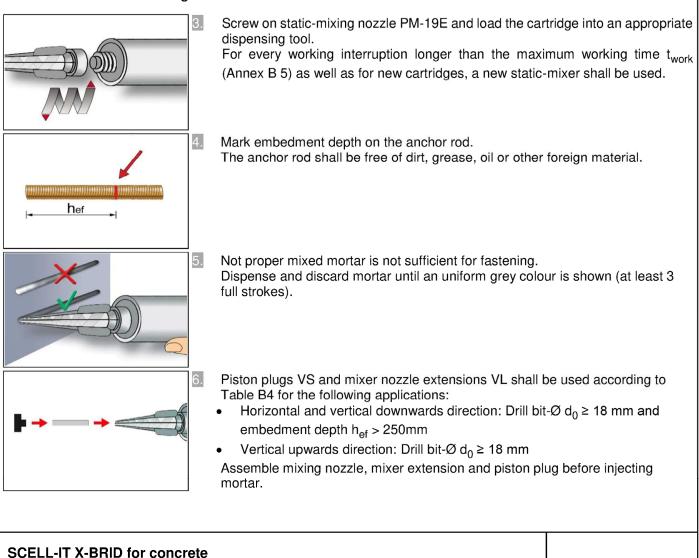


Installation instructions (continuation)



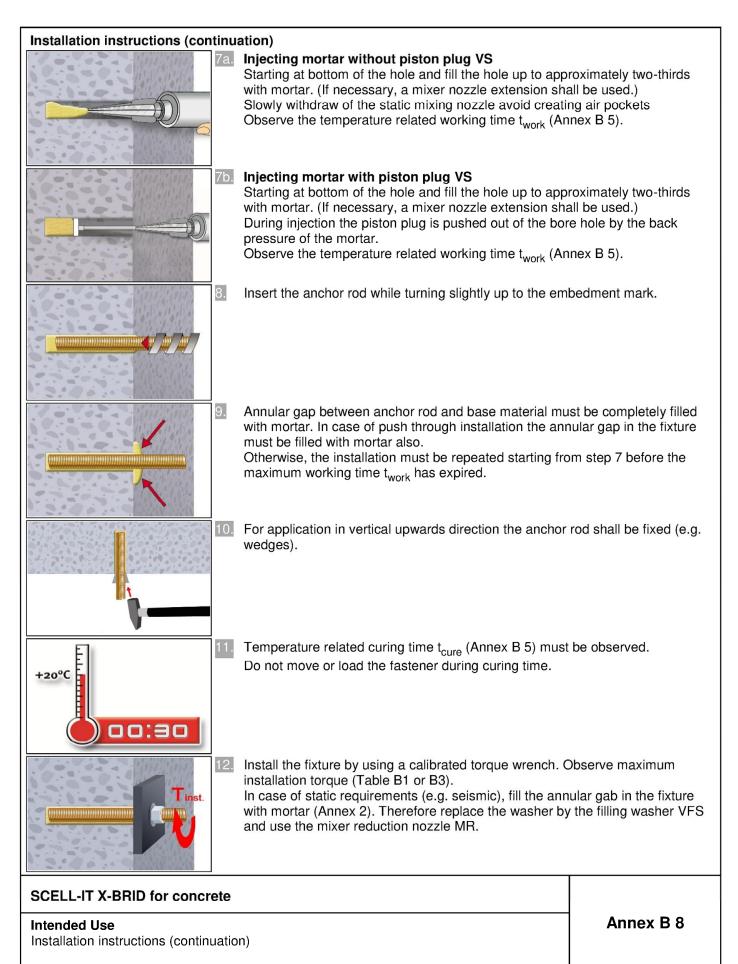
- Brush the bore hole minimum 2x with brush RB according to Table B4 over the entire embedment depth in a twisting motion. (If necessary, a brush extension shall be used .RBL)
- Finally blow the bore hole clean minimum 2x with compressed air (min. 6 bar) (Annex B 4) over the entire embedment depth until return air stream is free of noticeable dust. (If necessary, an extension shall be used.)

Cleaned bore hole has to be protected against re-contamination in an appropriate way, If necessary, repeat cleaning process directly before dispensing the mortar. In-flowing water must not contaminate the bore hole again.



Intended Use Installation instructions (continuation)







Т		racteristic values			ension	resist	ance	and s	teel s	hear		
Th	nreaded rod				M8	M10	M12	M16	M20	M24	M27	M30
Cr	ross section area		A _s	[mm ²]	36,6	58	84,3	157	245	353	459	561
Cł	haracteristic tension i	resistance, Steel failu	re ¹⁾	-								
Sec. 11								184	224			
St	eel, 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				[kN]	29 (27)	46 (43)	67	125	196	282	368	449
St	ainless steel A2, A4 an	d HCR, class 50	N _{Rk,s}	[kN]	18	29	42	79	123	177	230	281
St	ainless steel A2, A4 an	d HCR, class 70	N _{Rk,s}	[kN]	26	41	59	110	171	247	_3)	_3)
St	ainless steel A4 and H	CR, class 80	N _{Rk,s}	[kN]	29	46	67	126	196	282	_3)	_3)
Cł	haracteristic tension i	resistance, Partial fac	tor ²⁾			··· ·· ··						
St	eel, Property class 4.6	and 5.6	γ _{Ms,N}	[-]				2,0	0			
St	eel, Property class 4.8	5.8 and 8.8	γ _{Ms,N}	[-]				1,	5			
St	ainless steel A2, A4 an	d HCR, class 50	γ _{Ms,N}	[-]				2,8	36			
St	ainless steel A2, A4 an	d HCR, class 70	γ _{Ms,N}	[-]				1,8	37			
St	ainless steel A4 and H	CR, class 80	γ _{Ms,N}	[-]				1,6	6			
Cł	haracteristic shear re	sistance, Steel failure	, 1)		-							
F	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
evel	Steel, Property class	8.8	V ⁰ Rk,s	[kN]	15 (13)	23 (21)	34	63	98	141	184	224
out le	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	_3)	_3)
5	Stainless steel A4 and	d HCR, class 80	V ⁰ Rk,s	[kN]	15	23	34	63	98	141	_3)	_3)
	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
		8.8	M ⁰ Rk,s	[Nm]	30 (26)	60 (53)	105	266	519	896	1333	1797
th lever	Stainless steel A2, A4	and HCR, class 50	M ⁰ Rk,s	[Nm]	19	37	66	167	325	561	832	1125
With	Stainless steel A2, A4	and HCR, class 70	M ⁰ Rk,s	[Nm]	26	52	92	232	454	784	_3)	_3)
	Stainless steel A4 and	d HCR, class 80	M ⁰ Rk,s	[Nm]	30	59	105	266	519	896	_3)	_3)
Cł	haracteristic shear rea	sistance, Partial facto	or ²⁾			i. 15						
St	eel, Property class 4.6	and 5.6	γ _{Ms,V}	[-]				1,6	67			
St	eel, Property class 4.8,	5.8 and 8.8	γ _{Ms,V}	[-]				1,2	25			
St	ainless steel A2, A4 an	d HCR, class 50	γ _{Ms,V}	[-]				2,3	88			
St	ainless steel A2, A4 an	d HCR, class 70	γ _{Ms,V}	[-]				1,5	6			
St	ainless steel A4 and H	CR, class 80	γ _{Ms,V}	[-]				1,3	33			
1) Values are only valid for	or the given stress area	As. Value	s in bra	ackets are	e valid for	unders	ized thre	eaded r	ods with	smaller	r

 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) Fastener type not part of the ETA

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Performances

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



Table C2: Characteristic values of tension loads under static and quasi-static action for a working life of 50 and 100 years Fastener All Anchor types and sizes Concrete cone failure k_{ucr,N} Uncracked concrete [-] 11,0 7,7 Cracked concrete k_{cr,N} [-] Edge distance 1,5 h_{ef} C_{cr,N} [mm] 2 c_{cr,N} Axial distance s_{cr,N} [mm] Splitting 1,0 h_{ef} $h/h_{ef} \ge 2,0$ 2 · h_{ef} h $2,0 > h/h_{ef} > 1,3$ 2,5 C_{cr,sp} Edge distance [mm] 2,4 h_{ef} $h/h_{ef} \le 1,3$ 2 c_{cr,sp} Axial distance s_{cr,sp} [mm]

SCELL-IT X-BRID for concrete

Performances

Characteristic values of tension loads under static and quasi-static action for a working life of 50 and 100 years



Tabl		acteristic va working life			s und	der st	atic a	and q	uasi-	static	actio	on
Thread	ded rod				M8	M10	M12	M16	M20	M24	M27	M30
Steel f	ailure		1	1								
Charac	cteristic tension resi	stance	N _{Rk,s}	[kN]				_{uk} (or s		le C1)		
Partial			γ _{Ms,N}	[-]				see Ta	ble C1			
	ined pull-out and on the content of		d concrete C20	/25								
					17	4-7	10	4.5		10	10	10
Temperature range	I: 40°C/24°C	Dry, wet	^τ Rk,ucr	[N/mm ²]	17	17	16	15	14	13	13	13
ature	II: 80°C/50°C	concrete and	^τ Rk,ucr	[N/mm ²]	17	17	16	15	14	13	13	13
pera	III: 120°C/72°C	flooded bore hole	^τ Rk,ucr	[N/mm ²]	15	14	14	13	12	12	11	11
Terr	IV: 160°C/100°C		^τ Rk,ucr	[N/mm ²]	12	11	11	10	9,5	9,0	9,0	9,0
	cteristic bond resist	ance in cracked o	oncrete C20/2	5								
ange	I: 40°C/24°C		^τ Rk,cr	[N/mm ²]	7,0	7,5	8,0	9,0	8,5	7,0	7,0	7,0
Temperature range	II: 80°C/50°C	Dry, wet concrete and	^τ Rk,cr	[N/mm²]	7,0	7,5	8,0	9,0	8,5	7,0	7,0	7,0
perat	III: 120°C/72°C	flooded bore hole	^τ Rk,cr	[N/mm ²]	6,0	6,5	7,0	7,5	7,0	6,0	6,0	6,0
Tem	IV: 160°C/100°C		^τ Rk,cr	[N/mm ²]	5,5	5,5	6,0	6,5	6,0	5,5	5,5	5,5
Redukt	tion factor ψ^0_{sus} in	cracked and unc	racked concret	e C20/25								
nge	I: 40°C/24°C							0,9	90			
re ra	II: 80°C/50°C	Dry, wet concrete and						0,	87			
eratu	III: 120°C/72°C	flooded bore hole	Ψ ⁰ sus	[-]				0,	75			
Temperature range	IV: 160°C/100°C							0,	66			
Increas	sing factors for cond	crete	Ψc	[-]				(f _{ck} / 2	20) ^{0,1}			
Charac	cteristic bond resista	ance depending		τ _{Rk,ucr} =			Ψc	• ^τ Rk,u	cr,(C20/	(25)		
	concrete strength c			τ _{Rk,cr} =				c ^{•τ} Rk,o				
Concr	ete cone failure											
	int parameter							see Ta	ble C2			
Splitti	ng Int parameter							see Ta				
	ation factor							See Ta				
		MAC					1,2			No Per	formar essed	ice
for dry	and wet concrete	CAC	_ γinst	[-]				1	,0	d55	esseu	
		HDB							,2			
for floo	ded bore hole	CAC						1	,4			
Perfo Chara	LL-IT X-BRID for rmances acteristic values of te vorking life of 50 yea	nsion loads under	static and quas	i-static actio	n					Anne	x C 3	

Z98723.22



Threaded rod				M8	M10	M12	M16	M20	M24	M27	M30
Steel failure		1									
Characteristic tension res	istance	N _{Rk,s}	[kN]			Α _s ・f _ι	_{ık} (or s	ee Tab	le C1)		
Partial factor		γ _{Ms,N}	[-]				see Ta	ble C1			
Combined pull-out and	concrete failure										
Characteristic bond resist	ance in uncracke	d concrete C20)/25								
Temperature range II: 40°C/24°C II: 40°C/20°C	Dry, wet concrete and	^τ Rk,ucr,100	[N/mm ²]	17	17	16	15	14	13	13	13
50	flooded bore hole	^τ Rk,ucr,100	[N/mm²]	17	17	16	15	14	13	13	13
Characteristic bond resist	ance in cracked c	concrete C20/2	5								
I: 40°C/24°C	Dry, wet concrete and	^τ Rk,cr,100	[N/mm²]	5,5	6,0	6,5	6,5	6,5	6,5	6,5	6,5
ຍີ່ ພິສີ II: 80°C/50°C	flooded bore hole	^τ Rk,cr,100	[N/mm²]	5,5	6,0	6,5	6,5	6,5	6,5	6,5	6,5
Increasing factors for con-	crete	Ψc	[-]				(f _{ck} / 2	20) ^{0,1}			
Characteristic bond resist on the concrete strength of			k,ucr,100 =					,100,(C2			
	1855	τ	Rk,cr,100 =			Ψ c ・	^τ Rk,cr,	100,(C2	0/25)		
Concrete cone failure							T-				
Relevant parameter Splitting							see la	ble C2			
Relevant parameter								ble C2			
Installation factor							000 10				
	MAC					1,2				rformar sessed	nce
for dry and wet concrete	CAC	γ _{inst}	[-]				1	,0			
	HDB							,2			
for flooded bore hole	CAC						1	,4			

SCELL-IT X-BRID for concrete

Performances

Characteristic values of tension loads under static and quasi-static action for a working life of 100 years (threaded rod) $\,$

Annex C 4

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Table C5: Characteristic for a working I					nder st	tatic a	nd qu	asi-sta	atic acti	on
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 and 5.6, 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 strength classes	V ⁰ Rk,s	[kN]			0,5 ·	A _s ∙f _{uk}	(or see	Table C	1)	
Partial factor	γ _{Ms,V}	[-]				see	Table C	:1		
Ductility factor	k7	[-]					1,0			
Steel failure with lever arm										
Characteristic bending moment	M ⁰ Rk,s	[Nm]			1,2 • \	W _{el} ∙f _{uk}	(or see	Table C	51)	
Elastic section modulus	W _{el}	[mm³]	31	62	109	277	541	935	1387	1874
Partial factor	γ _{Ms,V}	[-]				see	Table C	:1		
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]		m	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	γinst	[-]					1,0			

SCELL-IT X-BRID for concrete

Performances

Characteristic values of shear loads under static and quasi-static action (threaded rod)



Interna	I threaded anchor	rods				DF-M6	DF-M8	DF-M10	DF-M12	DF-M16	DF-M20
Steel fa	ailure ¹⁾								1		
Charac	teristic tension resi	stance,	5.8	N _{Rk,s}	[kN]	10	17	29	42	76	123
Steel, s	strength class		8.8	N _{Rk,s}	[kN]	16	27	46	67	121	196
Partial f	factor, strength clas	ss 5.8 and 8	8.8	γMs,N	[-]			. 1	,5		
	teristic tension resi 4 and HCR, Streng			N _{Rk,s}	[kN]	14	26	41	59	110	124
Partial f	factor			γMs,N	[-]			1,87			2,86
	ned pull-out and o										
	teristic bond resista	ance in unci	racked co								
Temperature range	I: 40°C/24°C	Dry wat a	norato	^τ Rk,ucr	[N/mm ²]	17	16	15	14	13	13
iperat ange	II: 80°C/50°C	Dry, wet co and	oncrete	^τ Rk,ucr	[N/mm ²]	17	16	15	14	13	13
ra	III: 120°C/72°C	flooded bo	re hole	^τ Rk,ucr	[N/mm ²]	14	14	13	12	12	11
	IV: 160°C/100°C			^τ Rk,ucr	[N/mm ²]	11	11	10	9,5	9,0	9,0
	teristic bond resista	ance in crac	ked cond	crete C20)/25						
Temperature range	I: 40°C/24°C			^τ Rk,cr	[N/mm ²]	7,5	8,0	9,0	8,5	7,0	7,0
iperat ange	II: 80°C/50°C	Dry, wet co and	oncrete	^τ Rk,cr	[N/mm ²]	7,5	8,0	9,0	8,5	7,0	7,0
mpe rar	III: 120°C/72°C	flooded bo	re hole	^τ Rk,cr	[N/mm ²]	6,5	7,0	7,5	7,0	6,0	6,0
Те	IV: 160°C/100°C			^τ Rk,cr	[N/mm ²]	5,5	6,0	6,5	6,0	5,5	5,5
Redukt	ion factor ψ^0 sus in	cracked and	d uncracl	ked conc	rete C20/2	5					
Ire	I: 40°C/24°C							0,	90		
iperatu ange	II: 80°C/50°C	Dry, wet co	oncrete	0				0,	87		
Temperature range	III: 120°C/72°C	and flooded bo	re hole	Ψ^0 sus	[-]			0,	75		
Ter	IV: 160°C/100°C							0,	66		
Increas	ing factors for cond	rete		Ψc	[-]			(f _{ck} /)	20) ^{0,1}		
	teristic bond resista		ding on		τ _{Rk,ucr} =				ucr,(C20/25)		
	crete strength clas		ang on		τ _{Rk,cr} =				cr,(C20/25)		
Concre	ete cone failure				-nk,01			τ υ ΄ ηκ,	ci,(020/20)		
	nt parameter							see Ta	able C2		
	ig failure										
	nt parameter							see Ta	able C2		
Installa	ation factor			1							
fordure		MAC		-			1,2	-	Contraction of the second seco	ormance a	issessed
for ary a	and wet concrete	CAC HDB		γinst	[-]				,0 ,2		
for floor	ded bore hole	CAC		-					, <u>2</u> ,4		
1) Fast The	tenings (incl. nut and characteristic tensio DF-M20 strength cla	d washer) m on resistance	e for stee					erty class o	of the inter		ed rod.
	L-IT X-BRID for	concrete								Annex (2.6



Internal threaded ancho	r rods			DF-M6	DF-M8	DF-M10	DF-M12	DF-M16	DF-M20
Steel failure ¹⁾									
Characteristic tension resi	istance, 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 clas	ss 5.8 and 8.8	γ _{Ms,N}	[-]			1	,5		
Characteristic tension resi Steel A4 and HCR, Streng		N _{Rk,s}	[kN]	14	26	41	59	110	124
Partial factor		γ _{Ms,N}	[-]			1,87			2,86
Combined pull-out and o	concrete cone fail	ure							
Characteristic bond resista	ance in uncracked	concrete C2	20/25			1		1	
Temperature ange I: 40°C/24°C II: 80°C/50°C	Dry, wet concrete	^τ Rk,ucr,100	[N/mm²]	17	16	15	14	13	13
е Ш: 80°С/50°С	flooded bore hole	^τ Rk,ucr,100	[N/mm²]	17	16	15	14	13	13
Characteristic bond resista	ance in cracked cor	ncrete C20/	25						
Temperature range I: 40°C/2°C C 2°C/2°C C	Dry, wet concrete	^τ Rk,cr,100	[N/mm²]	6,0	6,5	6,5	6,5	6,5	6,5
م ال: 80°C/50°C T	flooded bore hole	^τ Rk,cr,100	[N/mm²]	6,0	6,5	6,5	6,5	6,5	6,5
Increasing factors for cond	crete	Ψc	[-]			(f _{ck} /	20) ^{0,1}		
Characteristic bond resista	ance depending	^τ Bk.ι	icr,100 =		ų	[/] c [•] [⊤] Rk,uci	r.100.(C20/2	25)	
on the concrete strength c			,cr,100 =			Ψc • ^τ Rk,cr			
Concrete cone failure		110	,01,100				,100,(020/2	.5/	
Relevant parameter						see Ta	able C2		
Splitting failure									
Relevant parameter						see Ta	able C2		
Installation factor									
	MAC				1,2		1	ormance a	issessed
for dry and wet concrete	CAC	γinst	[-]				,0		
fau flaadad baya bala	HDB						,2		
for flooded bore hole ¹⁾ Fastenings (incl. nut and	CAC						,4		

SCELL-IT X-BRID for concrete

Performances Characteristic values of tension loads under static and quasi-static action for a working life of 100 years (internal threaded anchor rod)



Internal threaded anchor rods				DF-M6	DF-M8	DF-M10	DF-M12	DF-M16	DF-M20
Steel failure without lever arm ¹⁾)					1			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	nd 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	nd 8.8	γ _{Ms,V}	[-]				1,25		1
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		γ _{Ms,V}	[-]			1,56			2,38
Concrete pry-out failure									
Factor		k ₈	[-]				2,0		
Installation factor		γinst	[-]				1,0		
Concrete edge failure									
Effective length of fastener		۱ _f	[mm]		min	h _{ef} ; 12 • c	n _{om})		min(h _{ef} ; 300mm
Outside diameter of fastener		d _{nom}	[mm]	10	12	16	20	24	30
Installation factor		γ _{inst}	[-]				1,0		
 Fastenings (incl. nut and washe The characteristic tension resist ²) For DF-M20 strength class 50 is 	tance for								

SCELL-IT X-BRID for concrete

Performances

Characteristic values of shear loads under static and quasi-static action (internal threaded anchor rod) $% \left(\frac{1}{2}\right) =0$



Tabl		acteristic working			n Ioa	ds u	nder	stati	c and	d qua	asi-si	tatic	actio	n
Reinfo	rcing bar				Ø8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 24	Ø 25	Ø 28	Ø 32
Steel f	ailure					1								
Charac	cteristic tension resi	stance	N _{Rk,s}	[kN]					A _s ·	f _{uk} 1)				
Cross s	section area		A _s	[mm ²]	50	79	113	154	201	314	452	491	616	804
Partial	factor		γ _{Ms,N}	[-]	-				1,	4 ²⁾				
-	ined pull-out and o													
Charac	cteristic bond resista	ance in uncra	icked concre	1										
nre	I: 40°C/24°C	Dry, wet	^τ Rk,ucr	[N/mm ²]	14	14	14	14	13	13	13	13	13	13
nperati range	II: 80°C/50°C	concrete and	^τ Rk,ucr	[N/mm ²]	14	14	14	14	13	13	13	13	13	13
Temperature range	III: 120°C/72°C	flooded	^τ Rk,ucr	[N/mm ²]	13	12	12	12	12	11	11	11	11	11
Te	IV: 160°C/100°C	bore hole	^τ Rk,ucr	[N/mm ²]	9,5	9,5	9,5	9,0	9,0	9,0	9,0	9,0	8,5	8,5
Charac	cteristic bond resista	ance in crack	ed concrete	C20/25										
an	I: 40°C/24°C	Dry, wet	^τ Rk,cr	[N/mm ²]	5,5	5,5	6,0	6,5	6,5	6,5	6,5	7,0	7,0	7,0
nperatu range	II: 80°C/50°C	concrete and	^τ Rk,cr	[N/mm ²]	5,5	5,5	6,0	6,5	6,5	6,5	6,5	7,0	7,0	7,0
Temperature range	III: 120°C/72°C	flooded	^τ Rk,cr	[N/mm ²]	4,5	5,0	5,0	5,5	5,5	5,5	5,5	6,0	6,0	6,0
Te	IV: 160°C/100°C	bore hole	^τ Rk,cr	[N/mm ²]	4,0	4,5	4,5	5,0	5,0	5,0	5,0	5,0	5,0	5,0
Redukt	tion factor ψ^0_{sus} in	cracked and	uncracked o	concrete C	20/25			-			-			
	I: 40°C/24°C	Dry, wet							0,	90				
nperatur range	II: 80°C/50°C	concrete	0	, T.					0,	87				
Temperature range	III: 120°C/72°C	and flooded	Ψ^0 sus	[-]					0,	75				
Ĕ	IV: 160°C/100°C	bore hole							0,	66				
Increas	sing factors for cond	crete	Ψc	[-]					(f _{ck} / 2	20) ^{0,1}				
	teristic bond resista			$\tau_{Rk,ucr} =$				Ψ_{c}	• ^τ Rk,ι	icr,(C20)/25)			
class	ding on the concrete	e strengtn		τ _{Rk,cr} =				Ψ_{c}	• τ _{Rk,}	cr,(C20	/25)			
	ete cone failure										,			
Releva	int parameter								see Ta	ble C2	2			
Splittin	ng													
Releva	int parameter							;	see Ta	ble C2	2			
Installa	ation factor													
		MAC	_				1,2				Perfor	mance	asses	ssed
for dry	and wet concrete	CAC	γ _{inst}	[-]						,0				
for floo	ded bore hole	HDB CAC	-							,2 ,4				
				ing horo					1	,+				
	shall be taken from t bsence of national re			cing bars										
		guaton												
SCEI	_L-IT X-BRID for	concrete												

Characteristic values of tension loads under static and quasi-static action for a working life of 50 years (rebar)



Table		acteristic working l			n Ioa	ds u	nder	stati	c an	d qua	asi-s	tatic	actio	n
Reinfo	rcing bar				Ø8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 24	Ø 25	Ø 28	Ø 32
Steel fa	ailure		1											
Charac	teristic tension res	istance	N _{Rk,s}	[kN]					A _s ·	• f _{uk} 1)			0	
Cross s	section area		A _s	[mm ²]	50	79	113	154	201	314	452	491	616	804
Partial f	factor		γ _{Ms,N}	[-]					1	,4 ²⁾				
Combi	ned pull-out and o	concrete failu												
Charac	teristic bond resist	ance in uncra	cked concre	te C20/25										
Temperature range	I: 40°C/24°C	Dry, wet concrete and	⁷ Rk,ucr,100	[N/mm ²]	14	14	14	14	13	13	13	13	13	13
Temp ra	II: 80°C/50°C	flooded bore hole	^τ Rk,ucr,100	[N/mm²]	14	14	14	14	13	13	13	13	13	13
Charac	teristic bond resist	ance in crack	ed concrete	C20/25	•									
Temperature range	I: 40°C/24°C	Dry, wet concrete and	⁷ Rk,cr,100	[N/mm ²]	4,5	4,5	4,5	4,5	4,5	4,0	4,0	4,0	4,0	4,0
Temperar	II: 80°C/50°C	flooded bore hole	⁷ Rk,cr,100	[N/mm²]	4,5	4,5	4,5	4,5	4,5	4,0	4,0	4,0	4,0	4,0
Increas	sing factors for con	crete	Ψc	[-]					(f_{ck})	20) ^{0,1}				
	teristic bond resist		τ _{Bk}	,ucr,100 =				Ψc•	^τ Bk.uc	r,100,(C	20/25)			
class	ding on the concret	e strength		k,cr,100 =						,100,(C				
	ete cone failure				1									
	nt parameter								see Ta	able C	2			
Splittin					[-					
	nt parameter								see la	able C	2			
Installa	ation factor	MAC					1,2			No	Porfor	mance		read
for dry	and wet concrete	CAC	-				1,2		1	,0	Fenor	mance	e asse:	sseu
ior ary i		HDB	γinst	[-]						,0				
for floor	ded bore hole	CAC								,4				
1) f _{uk} s	shall be taken from t	he specificatio	ons of reinford	cing bars										
	bsence of national r													
Perfor Charac	L-IT X-BRID for mances cteristic values of te vorking life of 100 ye	nsion loads ur	nder static an	d quasi-sta	atic act	ion					Α	nnex	C 10)



Table C11: Characterist for a workin					Inder	r stat	tic ai	nd q	uasi-	static	actio	า
Reinforcing bar			Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 24	Ø 25	Ø 28	Ø 32
Steel failure without lever arm			1	1								
Characteristic shear resistance	V ⁰ Rk,s	[kN]					0,50	• A _s ·	f _{uk} 1)			
Cross section area	A _s	[mm ²]	50	79	113	154	201	314	452	491	616	804
Partial factor	γ _{Ms,V}	[-]						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	1357	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]			min(h _e	_{ef} ; 12 ∙	d _{nom})		min(h _{ef} ; 300	mm)
Outside diameter of fastener	d _{nom}	[mm]	8	10	12	14	16	20	24	25	28	32
Installation factor	γ_{inst}	[-]						1,0				
 ¹⁾ f_{uk} shall be taken from the specific ²⁾ in absence of national regulation 	ations of reinf	orcing bar	S									

SCELL-IT X-BRID for concrete

Performances

Characteristic values of shear loads under static and quasi-static action (rebar)



Threaded rod			M8	M10	M12	M16	M20	M24	M27	M30
Uncracked concrete C	20/25 under s	tatic and quasi-s	tatic acti	on for a	working	g life of	50 and 1	00 year	s	
Temperature range	δ _{N0} -factor	[mm/(N/mm ²)]	0,031	0,032	0,034	0,037	0,039	0,042	0,044	0,046
I: 40°C/24°C II: 80°C/50°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,040	0,042	0,044	0,047	0,051	0,054	0,057	0,060
Temperature range	δ _{N0} -factor	[mm/(N/mm ²)]	0,032	0,034	0,035	0,038	0,041	0,044	0,046	0,048
III: 120°C/72°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,042	0,044	0,045	0,049	0,053	0,056	0,059	0,062
Temperature range	δ_{N0} -factor	[mm/(N/mm ²)]	0,121	0,126	0,131	0,142	0,153	0,163	0,171	0,17
IV: 160°C/100°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,124	0,129	0,135	0,146	0,157	0,168	0,176	0,18
Cracked concrete und	ler static and o	quasi-static actio	n for a w	orking I	ife of 50	and 10) years			
Temperature range	δ_{N0} -factor	[mm/(N/mm ²)]	0,081	0,083	0,085	0,090	0,095	0,099	0,103	0,10
I: 40°C/24°C II: 80°C/50°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,104	0,107	0,110	0,116	0,122	0,128	0,133	0,13
Temperature range	δ _{N0} -factor	[mm/(N/mm ²)]	0,084	0,086	0,088	0,093	0,098	0,103	0,107	0,110
III: 120°C/72°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,108	0,111	0,114	0,121	0,127	0,133	0,138	0,14
Temperature range	δ_{N0} -factor	[mm/(N/mm ²)]	0,312	0,321	0,330	0,349	0,367	0,385	0,399	0,412
IV: 160°C/100°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,321	0,330	0,340	0,358	0,377	0,396	0,410	0,424
	;	ction bond stress fo	r load¹)	1	M12	M16	MOO	MQ4	M97	Ma
δN∞ = δN∞-factor · τ Table C13: Dis Threaded rod	splacement	s under shea	r load ¹⁾ M8	M10	M12	M16	M20	M24	M27	M30
$\delta_{N\infty} = \delta_{N\infty}$ -factor $\cdot \tau$ Table C13: Dis Threaded rod Uncracked and cracked	splacements	s under shear	r load ¹⁾ M8 Jasi-stati	M10 c action	for a w	orking l	ife of 50	and 100) years	
δN∞ = δN∞-factor · τ Table C13: Dis Threaded rod Uncracked and cracke All temperature $ δ$	splacement ed concrete un vo ⁻ factor	s under shear	r load ¹⁾ M8 Jasi-stati	M10 c action 0,06	for a w	orking l 0,04	ife of 50	and 100) years 0,03	0,03
$\delta_{N\infty} = \delta_{N\infty}$ -factor $\cdot \tau$ Table C13: Dis Threaded rod Uncracked and cracked All temperature δ_{ranges} 1) Calculation of the dis	splacements ed concrete un _{V0} -factor _{v∞} -factor placement	s under shear nder static and qu [mm/kN] [mm/kN]	r load ¹⁾ M8 Jasi-stati	M10 c action	for a w	orking l	ife of 50	and 100) years	
$ δN∞ = δN∞-factor · τ $ Table C13: Dis Threaded rod Uncracked and cracke All temperature ranges $ δ_{N∞}$	splacements ed concrete un $V0^{-}$ factor $V\infty^{-}$ factor placement ; V: a	s under shear	r load ¹⁾ M8 Jasi-stati	M10 c action 0,06	for a w	orking l 0,04	ife of 50	and 100) years 0,03	0,03



Internal threaded	anchor rods		DF-I	VI6 DF-I	/18 DF-M1) DF-M12	DF-M16	DF-M20
Uncracked concr	ete under static a	nd quasi-static	action for	a working	life of 50 and	100 years		
Temperature ra		[mm/(N/mn	n²)] 0,03	32 0,03	34 0,037	0,039	0,042	0,046
I: 40°C/24°C II: 80°C/50°C		r [mm/(N/mn	n²)] 0,04	42 0,04	4 0,047	0,051	0,054	0,060
Temperature ra	S factor	-				0,041	0,044	0,048
III: 120°C/72°		-		10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		0,053	0,056	0,062
Temperature ra	S fasta		n²)] 0,12	26 0,13	0,142	0,153	0,163	0,179
IV: 160°C/100		r [mm/(N/mn	n²)] 0,12	29 0,13	0,146	0,157	0,168	0,184
Cracked concrete	under static and	quasi-static act	tion for a v	orking life	of 50 and 1	00 years		
Temperature ra		[mm/(N/mn	n²)] 0,08	33 0,08	0,090	0,095	0,099	0,106
I: 40°C/24°C II: 80°C/50°C		r [mm/(N/mn	n²)] 0,1	70 0,11	0 0,116	0,122	0,128	0,137
Temperature ra	S 44-	[mm/(N/mn	n²)] 0,08	36 0,08	8 0,093	0,098	0,103	0,110
III: 120°C/72°		r [mm/(N/mn	n²)] 0,1 ⁻	11 0,11	4 0,121	0,127	0,133	0,143
Temperature ra		[mm/(N/mn	n²)] 0,32	21 0,33	0,349	0,367	0,385	0,412
IV: 160°C/100	°C δ _{N∞} -facto	r [mm/(N/mn	n²)] 0,33	30 0,34	0,358	0,377	0,396	0,424
1) Calculation of th $\delta_{N0} = \delta_{N0}$ -facto $\delta_{N\infty} = \delta_{N\infty}$ -facto Table C15:	r · τ; τ: or · τ; Displacemen	action bond stress	ar load ¹)	DE-M10	DE-M12	DE-M16	DE-M20
δ _{N0} = δ _{N0} -facto δ _{N∞} = δ _{N∞} -facto Table C15: Internal threaded	r · τ; τ: or · τ; Displacemen anchor rods	ts under she	ar load ¹ DF-M6	DF-M8	DF-M10	DF-M12	DF-M16	DF-M20
$\delta_{N0} = \delta_{N0} - facto$ $\delta_{N\infty} = \delta_{N\infty} - facto$ Table C15:	r · τ; τ: or · τ; Displacement anchor rods racked concrete ι	ts under she	ar load ¹ DF-M6	DF-M8				
$\begin{split} \delta_{N0} &= \delta_{N0} \text{-} \text{factor} \\ \delta_{N\infty} &= \delta_{N\infty} \text{-} \text{factor} \end{split}$ Table C15: Internal threaded Uncracked and contracted All temperature	r · τ; τ: or · τ; Displacemen anchor rods	ts under she	ar load ¹ DF-M6	DF-M8				
$\delta_{N0} = \delta_{N0}$ -facto $\delta_{N\infty} = \delta_{N\infty}$ -facto Table C15: Internal threaded Uncracked and controls All temperature ranges ¹⁾ Calculation of the	r · τ; τ: r · τ; τ: Displacement anchor rods racked concrete to δ_{V0} -factor $\delta_{V\infty}$ -factor e displacement	ts under she	ear load ¹ DF-M6 quasi-stat	DF-M8	or a working	life of 50 a	nd 100 year	'S
$\delta_{N0} = \delta_{N0}$ -facto $\delta_{N\infty} = \delta_{N\infty}$ -facto Table C15: Internal threaded Uncracked and co All temperature ranges	r · τ; τ: Displacemen anchor rods racked concrete u δ_{V0} -factor $\delta_{V\infty}$ -factor e displacement r · V; V:	ts under she	ear load ¹ DF-M6 quasi-stat 0,07) DF-M8 ic action fo 0,06	or a working 0,06	life of 50 a	nd 100 year 0,04	's 0,04

Displacements under static and quasi-static action for a working life of 50 and 100 years (internal threaded anchor rod)



		ments unde	r tens	ion loa	ad ¹⁾							
Reinforcing bar			Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 24	Ø 25	Ø 28	Ø 3
Uncracked conc	rete under st	atic and quasi-	static a	ction fo	r a worl	king life	of 50 a	and 100	years			
Temperature range	δ_{N0} -factor	[mm/(N/mm ²)]	0,031	0,032	0,034	0,035	0,037	0,039	0,042	0,043	0,045	0,04
I: 40°C/24°C II: 80°C/50°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,040	0,042	0,044	0,045	0,047	0,051	0,054	0,055	0,058	0,06
Temperature	δ _{N0} -factor	[mm/(N/mm ²)]	0,032	0,034	0,035	0,036	0,038	0,041	0,044	0,045	0,047	0,05
range III: 120°C/72°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,042	0,044	0,045	0,047	0,049	0,053	0,056	0,057	0,060	0,06
Temperature	δ _{N0} -factor	[mm/(N/mm ²)]	0,121	0,126	0,131	0,137	0,142	0,153	0,163	0,164	0,172	0,18
range IV: 160°C/100°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,124	0,129	0,135	0,141	0,146	0,157	0,168	0,169	0,177	0,19
Cracked concre		c and quasi-sta	tic actio	on for a	workin	g life of	f 50 and	d 100 ye	ears			
Temperature range	δ _{N0} -factor	[mm/(N/mm ²)]	0,081	0,083	0,085	0,087	0,090	0,095	0,099	0,099	0,103	0,10
I: 40°C/24°C II: 80°C/50°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,104	0,107	0,110	0,113	0,116	0,122	0,128	0,128	0,133	0,14
Temperature	δ _{N0} -factor	[mm/(N/mm ²)]	0,084	0,086	0,088	0,090	0,093	0,098	0,103	0,103	0,107	0,11
range III: 120°C/72°C	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,108	0,111	0,114	0,118	0,121	0,127	0,133	0,133	0,138	0,14
Temperature	δ _{N0} -factor	[mm/(N/mm ²)]	0,312	0,321	0,330	0,340	0,349	0,367	0,385	0,385	0,399	0,42
range	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0,321	0,330	0,340	0,349	0,358	0,377	0,396	0,396	0,410	0,44
IV: 160°C/100°C 1) Calculation of the second state of the second	the displaceme tor · τ; tor · τ;	1										
1) Calculation of f $\delta_{N0} = \delta_{N0}$ -fact $\delta_{N\infty} = \delta_{N\infty}$ -fact Table C17:	the displaceme tor · τ; tor · τ;	nt τ: action bond	r shea	ır load	1)	Ø 14	Ø 16	Ø 20	Ø 24	Ø 25	Ø 28	Ø3
1) Calculation of f $\delta_{N0} = \delta_{N0}$ -fact $\delta_{N\infty} = \delta_{N\infty}$ -fact Table C17: Reinforcing bar	the displaceme tor · τ; tor · τ; Displace	nt τ: action bond	r shea Ø 8	ø 10	1) Ø 12			Ø 20	Ø 24	Ø 25	Ø 28	Ø3
¹⁾ Calculation of f $δ_{N0} = δ_{N0}$ -fac $δ_{N∞} = δ_{N∞}$ -fac Table C17: Reinforcing bar Uncracked and o	the displaceme tor · τ; Displace	nt τ: action bond ments unde	rshea Ø8 cand q	ø 10 Ø 10	1) Ø 12 atic acti	on for a	a worki	ng life	of 50 ai	nd 100	years	Ø 3:
¹⁾ Calculation of f $\delta_{N0} = \delta_{N0}$ -fact $\delta_{N\infty} = \delta_{N\infty}$ -fact Table C17: Reinforcing bar Uncracked and of All temperature	the displaceme tor $\cdot \tau$; Displace Cracked conc δ_{V0} -factor $\delta_{V\infty}$ -factor	rete under stati [mm/kN] [mm/kN]	r shea Ø 8	Ø 10 Ø 10 uasi-sta	1) Ø 12 atic acti 0,05	on for a						0,0
1) Calculation of f $\delta_{N0} = \delta_{N0}$ -fact $\delta_{N\infty} = \delta_{N\infty}$ -fact Table C17: Reinforcing bar Uncracked and o All temperature ranges	the displacement tor $\cdot \tau$; Displace Displace cracked conc δ_{V0} -factor $\delta_{V\infty}$ -factor he displacement or \cdot V;	rete under stati [mm/kN] [mm/kN]	r shea Ø 8 c and q 0,06 0,09	Ø 10 Ø 10 uasi-sta	1) Ø 12 atic acti 0,05	on for a	a worki 0,04	ng life 0,04	of 50 ai 0,03	nd 100	years 0,03	Ø 3

Displacements under static and quasi-static action for a working life of 50 and 100 years (rebar)



Table C18:Characteristic values of tension loads under seismic action
(performance category C1) for a working life of 50 years

	4		•••		•							
Thread	led rod				M8	M10	M12	M16	M20	M24	M27	M30
Steel f	ailure											
Charac	cteristic tension resist	N _{Rk,s,eq,C1}	[kN]	1,0 • N _{Rk,s}								
Partial factor			γ _{Ms,N}	[-]				see Ta	able C1			
Combi	ined pull-out and co	oncrete failure										
Charac	cteristic bond resistar	nce in cracked a	nd uncracked o	concrete C2	0/25							
Ire	I: 40°C/24°C	Dry wet	^τ Rk,eq,C1	[N/mm ²]	7,0	7,5	8,0	9,0	8,5	7,0	7,0	7,0
nperatu range	II: 80°C/50°C	Dry, wet concrete and flooded bore	^τ Rk,eq,C1	[N/mm ²]	7,0	7,5	8,0	9,0	8,5	7,0	7,0	7,0
Temperature range	III: 120°C/72°C		^τ Rk,eq,C1	[N/mm ²]	6,0	6,5	7,0	7,5	7,0	6,0	6,0	6,0
Te	IV: 160°C/100°C	hole	^τ Rk,eq,C1	[N/mm ²]	5,5	5,5	6,0	6,5	6,0	5,5	5,5	5,5
Increas	sing factors for concr	ete	Ψc	1,0	1,0							
	cteristic bond resistar concrete strength cla		τ	Rk,eq,C1 =	Ψc ^{• τ} Rk,eq,C1,(C20/25)							
Installa	ation factor											
for dry	and wet concrete	CAC	_		1,0							
		HDB	γ _{inst}	[-]					,2			
for flooded bore hole CAC								1	,4			

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Characteristic values of tension loads under seismic action (performance category C1) for a working life of 50 years (threaded rod)



Table C19:Characteristic values of tension loads under seismic action
(performance category C1) for a working life of 100 years

Thread	ed rod				M8	M10	M12	M16	M20	M24	M27	M30
Steel fa	ilure											
Charact	eristic tension resist	N _{Rk,s,eq,C1}	[kN]	1,0 • N _{Rk,s}								
Partial factor			γ _{Ms,N}	[-]				see Ta	able C1			
Combir	ned pull-out and co	ncrete failure	-									
Charact	teristic bond resistar	nce in cracked a	nd uncracked o	concrete C2	0/25							
	l: 40°C/24°C	Dry, wet concrete and	⁷ Rk,eq,C1	[N/mm²]	5,5	6	6,5	6,5	6,5	6,5	6,5	6,5
Temperature range	II: 80°C/50°C	flooded bore hole	⁷ Rk,eq,C1	[N/mm²]	5,5	6	6,5	6,5	6,5	6,5	6,5	6,5
Increasi	ing factors for concre	ete	Ψc	1,0	1,0							
Characteristic bond resistance depending on the concrete strength class			τ	Rk,eq,C1 =	= Ψc * ^τ Rk,eq,C1,(C20/25)							
Installa	tion factor											
for dry and wet concrete HDB		γ _{inst}	[-]	1,0								
for flood	led bore hole	CAC							,4			

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Characteristic values of tension loads under seismic action (performance category C1) for a working life of 100 years (threaded rod)



Table C20:	C20: Characteristic values of shear loads under seismic action (performance category C1) for a working life of 50 and 100 years											
Threaded rod				M8	M10	M12	M16	M20	M24	M27	M30	
Steel failure												
Characteristic shea (Seismic C1)	ear resistance V _{Rk,s,eq,C1} [kN] 0,70 · V ⁰ _{Rk,s}											
Partial factor		γ _{Ms,V}	[-]				see	Table C	:1			
Factor for annular	gap	α_{gap}	[-]				0,5	5 (1,0) ¹⁾				
 Value in brackets Annex A 3 is rec 		ular gab betwee	en faste	ener and	l clearan	ce hole	in the fix	ture. Us	e of spe	cial filling v	vasher	

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



Table C21: Characteristic values of tension loads under seismic action (performance category C1) for a working life of 50 years Reinforcing bar Ø 8 Ø 10 Ø 12 Ø 14 Ø 16 Ø 20 Ø 24 Ø 25 Ø 28 Ø 32 Steel failure $1,0 \cdot A_{s} \cdot f_{uk}^{1}$ N_{Rk,s,eq,C1} Characteristic tension resistance [kN] As 50 113 154 201 314 452 491 616 Cross section area [mm²] 79 804 1.42) Partial factor γMs,N [-] Combined pull-out and concrete failure Characteristic bond resistance in cracked and uncracked concrete C20/25 emperature range I: 40°C/24°C 5,5 [N/mm²] 5,5 6,0 6,5 6,5 6,5 6,5 7,0 7,0 7,0 ^τRk,eq,C1 Dry, wet II: 80°C/50°C concrete [N/mm²] 5.5 5.5 6.0 6.5 6.5 6.5 6.5 7,0 7.0 7.0 ^τRk,eq,C1 and III: 120°C/72°C [N/mm²] 4,5 5,0 5.0 5,5 5,5 5,5 5,5 6,0 6,0 6,0 flooded ^τRk,eq,C1 bore hole IV: 160°C/100°C 4.0 4.5 4.5 5.0 5,0 5.0 5.0 5.0 5.0 5.0 [N/mm²] ^τRk,eq,C1 Increasing factors for concrete Ψc 1,0 1,0 Characteristic bond resistance depending on the concrete strength $\tau_{Rk,eq,C1} =$ Ψc • ^τRk,eq,C1,(C20/25) class Installation factor CAC 1,0 for dry and wet concrete HDB Yinst [-] 1,2 for flooded bore hole CAC 1,4 ¹⁾ $f_{\mu k}$ shall be taken from the specifications of reinforcing bars 2) in absence of national regulation

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Characteristic values of tension loads under seismic action (performance category C1) for a working life of 50 years (rebar)



Table C22: Characteristic values of tension loads under seismic action (performance category C1) for a working life of 100 years Reinforcing bar Ø 8 Ø 10 Ø 12 Ø 14 Ø 16 Ø 20 Ø 24 Ø 25 Ø 28 Ø 32 Steel failure $1,0 \cdot A_{s} \cdot f_{uk}^{1}$ N_{Rk,s,eq,C1} Characteristic tension resistance [kN] As 50 79 113 154 201 314 452 491 616 Cross section area [mm²] 804 1.4^{2} Partial factor γMs,N [-] Combined pull-out and concrete failure Characteristic bond resistance in cracked and uncracked concrete C20/25 emperature Dry, wet I: 40°C/24°C 4,5 4,0 [N/mm²] 4,5 4,5 4,5 4,5 4,0 4,0 4,0 4,0 ^τRk,eq,C1 concrete range and II: 80°C/50°C 4,5 flooded ^τRk,eq,C1 [N/mm²] 4,5 4,5 4,5 4,5 4,0 4,0 4,0 4,0 4,0 bore hole Increasing factors for concrete 1.0 Ψc 1.0 Characteristic bond resistance depending on the concrete strength τ Rk,eq,C1 = Ψc [•] ^τRk,eq,C1,(C20/25) class Installation factor CAC 1,0 for dry and wet concrete HDB 1,2 [-] γinst for flooded bore hole CAC 1.4 ¹⁾ f_{uk} shall be taken from the specifications of reinforcing bars 2) in absence of national regulation

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Performances

Characteristic values of tension loads under seismic action (performance category C1) for a working life of 100 years (rebar)

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Table C23:	Characteristic (performance		100 No.	2012	5 G. G.			S	100 0 100	10 A	ears		
Reinforcing bar				Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 24	Ø 25	Ø 28	Ø 32
Steel failure							5						
Characteristic she	ar resistance	V _{Rk,s,eq}	[kN]					0,35	۰A _s ・	f _{uk} 1)			
Cross section area	1	A _s	[mm²]	50	79	113	154	201	314	452	491	616	804
Partial factor		γ _{Ms,V}	[-]						1,5 ²⁾				
Factor for annula	r gap	α_{gap}	[-]					0,	5 (1,0) ³⁾			
¹⁾ f _{uk} shall be take	en from the specificat	ions of reinfo	rcing bars	3									

²⁾ in absence of national regulation

³⁾ Value in brackets valid for filled annular gab between fastener and clearance hole in the fixture. Use of special filling washer Annex A 3 is recommended

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Performances

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



hreaded rod				M12	M16	M20	M24		
Steel failure									
Characteristic tension resist Steel, strength class 8.8 Stainless Steel A4 and HCF Strength class ≥70		N _{Rk,s,eq,C2}	[kN]	1,0 • N _{Rk,s}					
Partial factor		γ _{Ms,N}	[-]		see Ta	ble C1			
Combined pull-out and co									
Characteristic bond resistan	ice in cracked a		T T	ale con transmission					
e l: 40°C/24°C	Dry, wet	^τ Rk,eq,C2	[N/mm ²]	3,6	3,5	3,3	2,3		
B II: 80°C/50°C	concrete and flooded bore hole	^τ Rk,eq,C2	[N/mm ²]	3,6	3,5	3,3	2,3		
		^τ Rk,eq,C2	[N/mm ²]	3,1	3,0	2,8	2,0		
⊢ [™] IV: 160°C/100°C		^τ Rk,eq,C2	[N/mm ²]	2,5	2,7	2,5	1,8		
ncreasing factors for concre		Ψc	1,0	1,0					
Characteristic bond resistan			^τ Rk,eq,C2 =		Ψc ^{• τ} Rk,eq	,C2,(C20/25)			
nstallation factor	CAC	1			<u>्</u> म	0			
or dry and wet concrete	HDB	γinst	[-]	1,0					
or flooded bore hole	CAC					, <u>4</u>			

SCELL-IT X-BRID for concrete

Performances

Characteristic values of tension loads under seismic action (performance category C2) for a working life of 50 years (threaded rod)



Threaded rod				M12	M16	M20	M24				
Steel failure											
Characteristic tension resis Steel, strength class 8.8 Stainless Steel A4 and HCF Strength class ≥70		N _{Rk,s,eq,C2}	[kN]	1,0 • N _{Rk,s}							
Partial factor		γ _{Ms,N}	[-]	see Table C1							
Combined pull-out and co											
Characteristic bond resistar	nce in cracked a	nd uncracked	concrete C20/	/25							
Emperature emperature II: 40°C/24°C II: 40°C/50°C	Dry, wet concrete and	^τ Rk,eq,C2	[N/mm²]	3,6	3,5	3,3	2,3				
ق ق اا: 80°C/50°C	flooded bore hole	^τ Rk,eq,C2	[N/mm²]	3,6	3,5	3,3	2,3				
ncreasing factors for concr	ete	Ψc	1,0		1	,0					
Characteristic bond resistant on the concrete strength cla			^τ Rk,eq,C2 =		Ψc ^{• τ} Rk,eq	,C2,(C20/25)					
nstallation factor	0.00					2					
or dry and wet concrete	CAC HDB	 				,0 ,2					
or flooded bore hole	CAC	γinst	[-]			, <u>2</u> ,4					

Performances

Characteristic values of tension loads under seismic action (performance category C2) for a working life of 100 years (threaded rod)



Table C26:Characteristic values of shear loads under seismic action
(performance category C2) for a working life of 50 and 100 years

Threaded rod			M12	M16	M20	M24		
Steel failure								
Characteristic shear resistance Steel, strength class 8.8 Stainless Steel A4 and HCR, Strength class ≥70	V _{Rk,s,eq,C2}	[kN]	0,70 ∙ V ⁰ _{Rk,s}					
Partial factor	γ _{Ms,V}	[-]	see Table C1					
Factor for annular gap	α_{gap}	[-]		0,5 (1,0) ¹⁾			

1) Value in brackets valid for filled annular gab between fastener and clearance hole in the fixture. Use of special filling washer Annex A 3 is recommended

Table C27: Displacements under tension load

Threaded rod			M12	M16	M20	M24				
Cracked concrete under seismic action (performance category C2) for a working life of 50 and 100 years										
All temperature	$\delta_{N,eq,C2(DLS)}$	[mm]	0,24	0,27	0,29	0,27				
ranges	$\delta_{N,eq,C2(ULS)}$	[mm]	0,55	0,51	0,50	0,58				

Table C28: Displacements under shear load

			M12	M16	M20	MOA				
Threaded rod					IVIZU	M24				
Cracked concrete under seismic action (performance category C2) for a working life of 50 and 100 years										
All temperature	$\delta_{V,eq,C2(DLS)}$	[mm]	3,6	3,0	3,1	3,5				
ranges	δ _{V,eq,C2(ULS)}	[mm]	7,0	6,6	7,0	9,3				

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Performances Characteristic values of shear loads Displacements under seismic action (performance category C2) for a working life of 50 and 100 years (threaded rod)