



 $\tau_{Rk,100}\text{= NPD}$

ΕN

DECLARATION OF PERFORMANCE

1. Unique identification code of the product-type:

for fischer Superbond (Bonded fastener for use in concrete)

DoP 0191

2. Intended use/es: Post-installed fastening in cracked or uncracked concrete. See appendix, especially annexes B1- B15

3. Manufacturer: fischerwerke GmbH & Co. KG. Otto-Hahn-Straße 15, 79211 Denzlingen, Germany

4. Authorised representative:

5. System/s of AVCP:

6. European Assessment Document: EAD 330499-01-0601 ETA-12/0258; 2020-06-17 European Technical Assessment:

DIBt- Deutsches Institut für Bautechnik Technical Assessment Body: Notified body/ies: 1343 MPA Darmstadt / 2873 TU Darmstadt

7. Declared performance/s:

Mechanical resistance and stability (BWR 1)

Characteristic resistance to tension load (static and quasi-static loading):

Resistance to combined pull- out and concrete

cone failure:

Resistance to steel failure:

Resistance to concrete cone failure: Annex C4 Edge distance to prevent splitting under load: Annexes C4

Robustness: Annex C4-C10, C15, C16

Maximum installation torque: Annexes B4- B8

Minimum edge distance and spacing: Annexes B4- B8

Characteristic resistance to shear load (static and

quasi-static loading):

Resistance to steel failure: Annexes C1- C3 Resistance to pry-out failure: Annex C4 Resistance to concrete edge failure: Annex C4

Characteristic resistance and displacements for seismic performance categories C1 and C2:

Resistance to tension load, displacements, category C1:

Resistance to tension load, displacements,

Annexes C13, C14, C16

Annexes C13, C14, C15

Annexes C13, C14, C16

Annexes C1- C3

Annexes C4- C10

category C2:

Resistance to shear load, displacements, category

Annexes C13, C14

Resistance to shear load, displacements, category

C2:

Factor annular gap:

Annex C13

Displacements under short-term and long-term

loading:

Displacements under short-term and long-term

loading:

Annexes C11- C12

Hygiene, health and the environment (BWR 3)

Content, emission and/or release of dangerous substances:

NPA

Fischer DATA DOP ECs V21.xlsm 1/2





 Appropriate Technical Documentation and/or Specific – Technical Documentation:

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

Signed for and on behalf of the manufacturer by:

Thilo Pregartner, Dr.-Ing.

Tumlingen, 2020-07-01

ppa. The Mx

Peter Schillinger, Dipl.-Ing.

i.V. P. St

This DoP has been prepared in different languages. In case there is a dispute on the interpretation the English version shall always prevail.

The Appendix includes voluntary and complementary information in English language exceeding the (language-neutrally specified) legal requirements.

Fischer DATA DOP_ECs_V21.xlsm 2/2

Specific Part

1 Technical description of the product

The injection system fischer Superbond is a bonded anchor for use in concrete consisting of a cartridge with injection mortar fischer FIS SB or a resin capsule fischer RSB and a steel element according to Annex A 5.

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 resin capsule is placed into the hole and the steel element is driven by machine with simultaneous hammering and turning. The anchor rod is anchored via the bond between steel element, chemical 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 B 4 to B 8, C 1 to C 10
Characteristic resistance to shear load (static and quasi-static loading)	See Annex C 1 to C 4
Displacements under short-term and long-term loading	See Annex C 11 and C 12
Characteristic resistance and displacements for seismic performance categories C1 and C2	See Annex C 13 to C 16

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

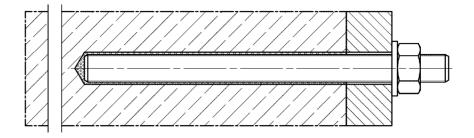
In accordance with the European Assessment Document EAD 330499-01-0601 the applicable European legal act is: [96/582/EC].

The system to be applied is: 1

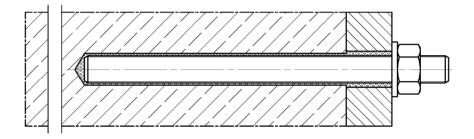
Installation conditions part 1

anchor rod or fischer anchor rod RG M with fischer injection system FIS SB

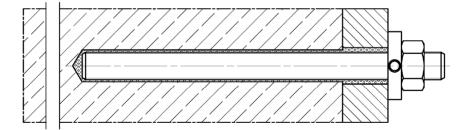
Pre-positioned installation



Push through installation (annular gap filled with mortar)



Pre-positioned or push through installation with subsequently injected fischer filling disc (annular gap filled with mortar)



Figures not to scale

fischer Superbond

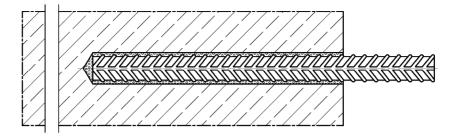
Product descriptionInstallation conditions part 1

Annex A 1

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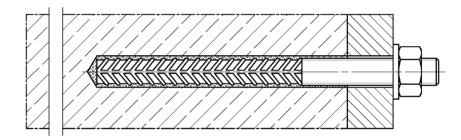
Installation conditions part 2

Reinforcing bar with fischer injection system FIS SB

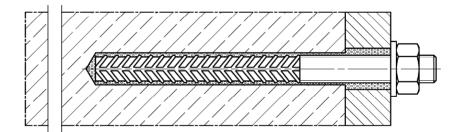


fischer rebar anchor FRA with fischer injection system FIS SB

Pre-positioned installation



Push through installation (annular gap filled with mortar)



Figures not to scale

fischer Superbond

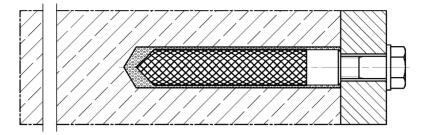
Product description Installation conditions part 2 Annex A 2

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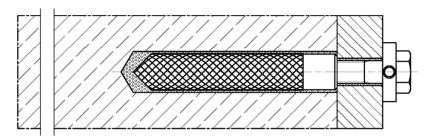
Installation conditions part 3

fischer internal threaded anchor RG MI with fischer resin capsule system RSB or fischer injection system FIS SB

Pre-positioned installation

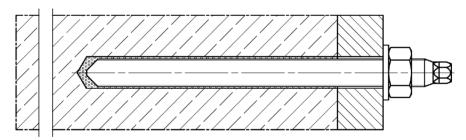


Pre-positioned installation with subsequently injected fischer filling disc (annular gap filled with mortar)

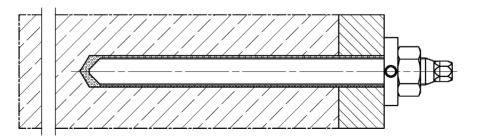


fischer anchor rod RG M with fischer resin capsule system RSB

Pre-positioned installation



Pre-positioned installation with subsequently injected fischer filling disc (annular gap filled with mortar)



Figures not to scale

fischer Superbond

Product description

Installation conditions part 3

Annex A 3

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Overview system components Part 1 Mortar cartridge (shuttle cartridge) with sealing cap; Sizes: 390 ml, 585 ml, 1100 ml, 1500 ml Imprint: fischer FIS SB, FIS SB High Speed, processing notes, shelflife, piston travel scale (optional), curing times and processing times (depending on temperature), hazard code, size, volume Resin capsule Sizes: 8, 10 mini, 10, 12 mini, 12, 16 mini, 16, 16 E, 20, 20 E / 24, 30 Static mixer FIS MR Plus or UMR Injection adapter / extension tube for static mixer Figures not to scale fischer Superbond Annex A 4 **Product description** Overview system components part 1; Appendix 6/40 cartridges / capsule / static mixer / injection adapter

Overview system components Part 2 anchor rod Sizes: M8, M10, M12, M16, M20, M24, M27, M30 fischer anchor rod RG M Sizes: M8, M10, M12, M16, M20, M24, M30 fischer internal threaded anchor RG MI Size: M8, M10, M12, M16, M20 Screw / threaded rod / washer / hexagon nut fischer filling disc with injection adapter Reinforcing bar Nominal diameters: $\phi 8$, $\phi 10$, $\phi 12$, $\phi 14$, $\phi 16$, $\phi 20$, $\phi 25$, $\phi 28$, $\phi 32$ fischer rebar anchor FRA Sizes: M12, M16, M20, M24 Figures not to scale fischer Superbond Annex A 5 **Product description** Overview system components part 2; Appendix 7/40 steel components

Overview system components Part 3 Cleaning brush BS / BSB Blow-out pump ABG or ABP with cleaning nozzle Figures not to scale fischer Superbond Annex A 6 **Product description** Overview system components part 3; Appendix 8/40 cleaning brush / blow-out pump / injection adapter

Part	Designation		Mate	erial			
1	Injection cartridge		Mortar, har				
	,	Steel		ss steel R	High corrosion resistant steel HCR 2)		
	Steel grade	zinc plated	Corrosion re	10088-1:2014 sistance class C III 993-1-4:2015	acc. to EN 10088-1:2014 Corrosion resistance class CRC V acc. to EN 1993-1-4:201		
2 Anchor rod		Property class 4.8, 5.8 or 8.8; EN ISO 898-1:2013 zinc plated \geq 5 µm, ISO 4042:2018/Zn5/An(A2K) or hot dip galvanised \geq 40 µm EN ISO 10684:2004 $f_{uk} \leq$ 1000 N/mm ² $A_5 > 12\%$ fracture elongation	Property class 50, 70 or 80 EN ISO 3506-1:2009 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; 1.4062, 1.4662, 1.4462; EN 10088-1:2014 $f_{uk} \le 1000 \text{ N/mm}^2$ $A_5 > 12\%$		ÉN ISO 3506-1:2009 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; 1.4062, 1.4662, 1.4462; EN 10088-1:2014 f _{uk} ≤ 1000 N/mm ²		Property class 50 or 80 EN ISO 3506-1:2009 or property class 70 with f_{yk} = 560 N/mm² 1.4565; 1.4529; EN 10088-1:2014 $f_{uk} \le 1000 \text{ N/mm}^2$ $A_5 > 12\%$ fracture elongation
		Fracture elongation					
3	Washer ISO 7089:2000	for seismic performance category C zinc plated ≥ 5 μm, ISO 4042:2018/Zn5/An(A2K) or hot dip galvanised ≥ 40 μm EN ISO 10684:2004 for seismic performance category C 1.4401; 1.4404; 1.4578;1.4571; 1.4439; 1.4362; EN 10088-1:2014			C2 1.4565; 1.4529; EN 10088-1:2014		
4	Hexagon nut	Property class 5 or 8; EN ISO 898-2:2012 zinc plated ≥ 5 μm, ISO 4042:2018/Zn5/An(A2K) or hot dip galvanised ≥ 40 μm EN ISO 10684:2004	50, 70 EN ISO 39 1.4401; 1.4 1.4571; 1.4	rty class 0 or 80 506-1:2009 .404; 1.4578; .439; 1.4362; 38-1:2014	Property class 50, 70 or 80 EN ISO 3506-1:2009 1.4565; 1.4529 EN 10088-1:2014		
5	fischer internal threaded anchor RG MI	Property class 5.8 ISO 898-1:2013 zinc plated ≥ 5 μm, ISO 4042:2018/Zn5/An(A2K)	EN ISO 39 1.4401; 1.4 1.4571; 1.4	y class 70 506-1:2009 404; 1.4578; 439; 1.4362; 38-1:2014	Property class 70 EN ISO 3506-1:2009 1.4565; 1.4529; EN 10088-1:2014		
6	Commercial standard screw or threaded rod for fischer internal threaded anchor RG MI	Property class 5.8 or 8.8; EN ISO 898-1:2013 zinc plated \geq 5 μ m, ISO 4042:2018/Zn5/An(A2K), A ₅ > 8 % fracture elongation	EN ISO 35 1.4401; 1.4 1.4571; 1.4 EN 1008	y class 70 506-1:2009 404; 1.4578; 439; 1.4362; 38-1:2014 ture elongation	Property class 70 EN ISO 3506-1:2009 1.4565; 1.4529; EN 10088-1:2014 A ₅ > 8 % fracture elongation		
7	fischer filling disc similar to DIN 6319-G	zinc plated ≥ 5 μm, ISO 4042:2018/Zn5/An(A2K) or hot dip galvanised ≥ 40 μm EN ISO 10684:2004	1.4571; 1.4	.404; 1.4578; .439; 1.4362; 88-1:2014	1.4565;1.4529; EN 10088-1:2014		
8	Reinforcing bar EN 1992-1-1:2004 and AC:2010, Annex C	Bars and de-coiled rods, class f_{yk} and k according to NDP or $f_{uk} = f_{tk} = k \cdot f_{yk}$		j to EN 1992-1-1	/NA		
9	rebar anchor FRA	Rebar part: Bars and de-coiled rods class and k according to NDP or NC 1992-1-1:2004+AC:2010 fuk = ftk = k · fyk	Property class 70 or 80:2009 , 1.4571, 1.4578, 1.4439, acc. to EN 10088-1:2014 stance class CRC III 93-1-4:2015 acc. to EN 10088-1:2014 stance class CRC V 93-1-4:2015				

Product description Materials

Appendix 9/40

Specifications of intended use (part 1)

Table B1.1: Overview use and performance categories, injection mortar system FIS SB

Anchorages subjec	ct to					FIS	SB with .					
		anchor rod fischer internal threaded anchor RG MI						fischer rebar anchor FRA				
Hammer drilling wi standard drill bit	th	P4444000000	all sizes									
Hammer drilling with hollow drill bit (fischer "FHD", Hel "Duster Expert"; Bosch "Speed Clean"; Hilti "TE-C TE-YD", DreBo "D-Plus", DreBo "D-Max")	ller	Ī			Nom		it diametei o 35 mm	· (d ₀)				
Diamond drilling						not pe	rmitted					
Static and quasi static load, in	,.	uncracked concrete cracked concrete	all sizes	Tables: C1.1 C4.1 C5.1 C11.1	all sizes	Tables: C2.1 C4.1 C7.1 C11.2	all sizes	Tables: C3.1 C4.1 C9.1 C12.1	all sizes	Tables: C3.2 C4.1 C10.1 C12.2		
Seismic performan category (only hammer drilling wit		C1	all sizes	Tables: C13.1 C14.2 C15.1	_1)		all sizes Table C14 C15					
standard / hollow c bits)			M12 M16 M20 M24	Tables: C13.1 C14.2 C16.1			_1)	_1)				
Use	l1	dry or wet concrete										
category	12	water filled hole		not permitted								
Installation directio	n		D3	(downwar	d and hori	zontal and	d upwards	(overhead	d) installati	on)		
Installation method	1			•	<u> </u>	· · · ·	sh through		n			
Installation temperature			FIS SI	FIS B High Sp	,		C to T _{i,max} = C to T _{i,max} =					
Tem	pera	ature range I	-40 °C	C to +40 °	C T _{st}	= +40 °C	/ T _{It} = +24	°C				
In-service Temp	oera	ture range II	-40 °C	C to +80 °	C T _{st}	= +80 °C	/ T _{It} = +50	°C				
temperature _{Temp}	erat	ure range III	-40 °C	to +120 °	C T _{st}	= +120 °C	$C / T_{lt} = +7$	2 °C				
<u> </u>		ure range IV	-40 °C	to +150 °	C T _{st}	= +150 °C	$C / T_{lt} = +96$	O °C				
1) No performan	ce a	assessed										
fischer Superb	on											
Intended use									Annex	B 1		
Specifications (pa	art 1), fischer inje	ection mor	tar system	I FIS SB				Appendix 1	10/ 40		

Specifications of intended use (part 2)

Table B2.1: Overview use and performance categories, resin capsule system RSB

Anchorages subjec	t to	RSB with							
		fischer anche	or rod RG M	fischer internal thre	aded anchor RG M				
Hammer drilling with standard drill bit	5444000000	all sizes							
Hammer drilling with hollow drill bit (fischer "FHD", Heller "Duster Expert"; Bosch "Speed Clean"; Hilt "TE-CD, TE-YD", DreBo "D-Plus", DreBo "D-Max")	Ī	Nominal drill bi 12 mm to		all sizes					
Diamond drilling			all si	zes 1)					
Static and quasi	uncracked concrete	all sizes	Tables: C1.1	all sizes	Tables: C2.1				
static load, in	cracked concrete	all sizes 1)	C4.1 C6.1 C11.1	all sizes 1)	C4.1 C8.1 C11.2				
Seismic performance category (only	C1	Tables: C13.1 C14.2 C15.1		ر	2)				
hammer drilling wit standard / hollow drill bits)	C2	_2)							
Use	dry or wet concrete		all s	sizes					
category I2	water filled hole		all s	izes					
Installation directio	า	D3 (downwar	d and horizontal and	d upwards (overhead	d) installation)				
Installation method			only pre-position	oned installation					
Installation tempera	ature		$T_{i,min} = -30$ °C t	to $T_{i,max} = +40 {}^{\circ}C$					
Tem	perature range I	-40 °C to +40 °C	$T_{st} = +40 ^{\circ}C$	/ T _{It} = +24 °C					
	erature range II	-40 °C to +80 °C	$T_{st} = +80 ^{\circ}C$	/ T _{It} = +50 °C					
temperature Tempe	erature range III	-40 °C to +120 °	$T_{st} = +120 °C$	C / T _{It} = +72 °C					
Tempe	erature range IV	-40 °C to +150 °C							

²⁾ No performance assessed

tischer	Super	bond
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Intended use

Specifications (part 2), fischer resin capsule system RSB

Specifications of intended use (part 3)

Base materials:

 Compacted reinforced or unreinforced normal weight concrete without fibres of strength classes C20/25 to C50/60 according to EN 206:2013+A1:2016

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions (zinc coated steel, stainless steel or high corrosion resistant steel).
- For all other conditions according to EN1993-1-4:2015 corresponding to corrosion resistance classes to Annex A 7 table A7.1.

Design:

- Anchorages have to be designed by a responsible engineer with experience of concrete anchor design.
- Verifiable calculation notes and drawings are to be 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 in accordance with: EN 1992-4:2018 and EOTA Technical Report TR 055, Edition February 2018.

Installation:

- Anchor installation is to be carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site
- In case of aborted hole: The hole shall be filled with mortar
- · Anchorage depth should be marked and adhered to on installation
- · Overhead installation is allowed

fischer Superbond	
Intended use	Annex B 3
Specifications (part 3)	Appendix 12/ 40

Table B4.1: Installation parameters for anchor rods in combination with injection mortar system FIS SB

Anchor rods			Thread	M8	M10	M12	M16	M20	M24	M27	M30
Width across flats	3	SW		13	17	19	24	30	36	41	46
Nominal drill hole	diameter	d₀] [10	12	14	18	24	28	30	35
Drill hole depth		h₀			$h_0 = h_{ef}$						
Cff a atily a lamabala		h _{ef, min}		60	60	70	80	90	96	108	120
Effective embedment depth		h _{ef, max}		160	200	240	320	400	480	540	600
Minimum spacing and minimum edge distance		S _{min} = C _{min}	[mm]	40	45	55	65	85	105	120	140
Diameter of the	pre-positioned installation	d _f		9	12	14	18	22	26	30	33
clearance hole of the fixture	push through installation	d _f		11	14	16	20	26	30	33	40
Min. thickness of concrete member h _{min}			h _{ef} +	30 (≥	100)			h _{ef} + 2d)		
Maximum setting	torque	max T _{inst}	[Nm]	10	20	40	60	120	150	200	300



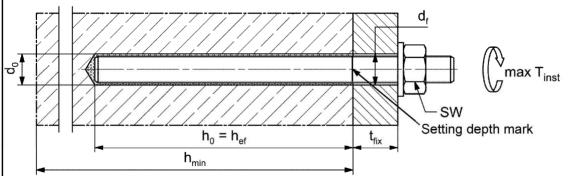


Thread

Marking (on random place) fischer anchor rod:

Steel zinc plated PC ¹⁾ 8.8	• or +	Steel hot-dip PC ¹⁾ 8.8	•
High corrosion resistant steel HCR PC ¹⁾ 50	•	High corrosion resistant steel HCR PC ¹⁾ 70	-
High corrosion resistant steel HCR PC ¹⁾ 80	(Stainless steel R property class 50	۲
Stainless steel R property class 80	*		
Alternatively: Colour coding according to DIN 9	76-1:2016	¹⁾ PC = property	/ class

Installation conditions:



Commercial standard threaded rods, washers and hexagon nuts may also be used if the following requirements are fulfilled:

- Materials, dimensions and mechanical properties according to Annex A 7, Table A7.1
- Inspection certificate 3.1 according to EN 10204:2004, the documents have to be stored
- Setting depth is marked

Figures not to scale

fischer Superbond

Intended use

Installation parameters for anchor rods in combination with injection mortar system FIS SB

Annex B 4

Appendix 13/40

Table B5.1: Installation parameters for fischer anchor rods RG M in combination with resin capsule system RSB

Anchor rod RG M		Thread	M8	M10	M12	M16	M20	M24	M30
Width across flats	SW		13	17	19	24	30	36	46
Nominal drill hole diameter	d₀] [10	12	14	18	25	28	35
Drill hole depth	h ₀] [$h_0 = h_{ef}$			
	h _{ef,1}] [75	75	95			
Effective embedment depth	h _{ef,2}] [80	90	110	125	170	210	280
	h _{ef,3}] [150	150	190	210		
Minimum spacing and minimum edge distance	S _{min} = C _{min}	[mm]	40	45	55	65	85	105	140
Diameter of the pre- clearance hole of positioned the fixture installation	df		9	12	14	18	22	26	33
in. thickness of concrete ember			h _{ef} + 30 (≥ 100)			h _{ef} +	- 2d₀		
Maximum setting torque	max T _{inst}	[Nm]	10	20	40	60	120	150	300

fischer anchor rod RG M



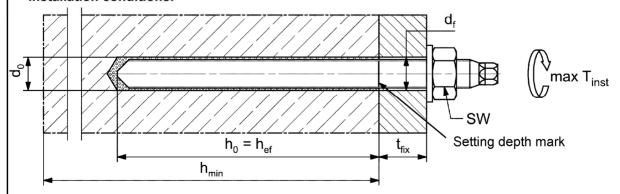
Marking (on random place) fischer anchor rod RG M:

Steel zinc plated PC¹) 8.8	• or +	Steel hot-dip PC ¹⁾ 8.8	•
High corrosion resistant steel HCR PC ¹⁾ 50	•	High corrosion resistant steel HCR PC ¹⁾ 70	-
High corrosion resistant steel HCR PC ¹⁾ 80	(Stainless steel R property class 50	~
Stainless steel R property class 80	*		
Altamatical Colors and in a secondina to DIN C	70 4.0040	1) DC	1

Alternatively: Colour coding according to DIN 976-1:2016

¹⁾ PC = property class

Installation conditions:



Figures not to scale

fischer Superbond

Intended use

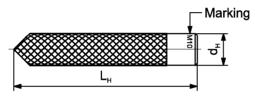
Installation parameters for fischer anchor rods RG M in combination with resin capsule system RSB

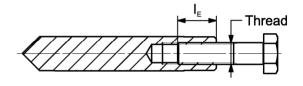
Annex B 5

Appendix 14/40

Table B6.1: Installation parameters for fischer internal threaded anchors RG MI										
Internal threaded anchor RG M		Thread	М8	M10	M12	M16	M20			
Sleeve diameter	$d = d_H$		12	16	18	22	28			
Nominal drill hole diameter	d ₀] [14	18	20	24	32			
Drill hole depth	h ₀	1 [•	$h_0 = h_{ef} = L_H$					
Effective embedment depth $(h_{ef} = L_H)$	h _{ef}		90	90	125	160	200			
Minimum spacing and minimum edge distance	Smin = Cmin	[mm]	55	65	75	95	125			
Diameter of clearance hole in the fixture	df		9	12	14	18	22			
Minimum thickness of concrete member	h _{min}		120	125	165	205	260			
Maximum screw-in depth	I _{E,max}] [18	23	26	35	45			
Minimum screw-in depth	I _{E,min}	1 [8	10	12	16	20			
Maximum installation torque	max T _{inst}	[Nm]	10	20	40	80	120			

fischer internal threaded anchor RG MI





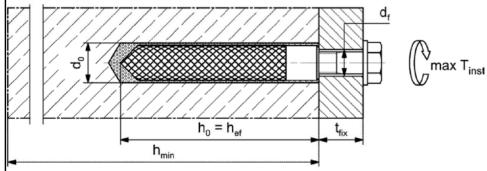
Marking: Anchor size e. g.: M10

Stainless steel → additional R; e.g.: M10 R

High corrosion resistant steel R→ additional C; e.g.: M10 HCR

Retaining bolt or threaded rods (including nut and washer) must comply with the appropriate material and strength class of Annex A 7, Table A7.1

Installation conditions:



Figures not to scale

fischer Superbond

Intended use

Installation parameters for fischer internal threaded anchors RG MI

Annex B 6

Appendix 15/40

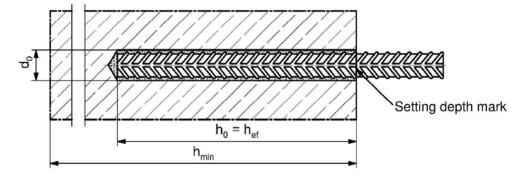
Table B7.1: Installation parameters for reinforcing bars											
Nominal diameter of the bar	ф	8 ¹⁾	10 ¹⁾	12 ¹⁾	14	16	20	25	28	32	
Nominal drill hole diameter	d₀		10 12	12 14	14 16	18	20	25	30	35	40
Drill hole depth						h ₀ = h _e					
h			60	60	70	75	80	90	100	112	128
Effective embedment depth	h _{ef,max}]	160	200	240	280	320	400	500	560	640
Minimum spacing and minimum edge distance		[mm]	40	45	55	60	65	85	110	130	160
$\begin{array}{c c} \text{Minimum thickness of concrete} & & & & h_{\text{ef}} + 30 \\ \text{member} & & & (\geq 100) \end{array}$							h _{ef} + 2	2d ₀			

¹⁾ Both drill hole diameters can be used

Reinforcing bar

- The minimum value of related rib area f_{R,min} must fulfil the requirements of EN 1992-1-1:2004+AC:2010
- The rib height must be within the range: $0.05 \cdot \phi \le h_{rib} \le 0.07 \cdot \phi$ (ϕ = Nominal diameter of the bar, h_{rib} = rib height)

Installation conditions:



Figures not to scale

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1150	1161	Su	DEI	$\nu \sigma$	טווי

Intended use

Installation parameters reinforcing bars

Annex B 7

Appendix 16/40

Table B8.1:	able B8.1: Installation parameters for fischer rebar anchor FRA									
Rebar anchor FR	A		Thread	M1	2 ¹⁾	M16	M20	M24		
Nominal diameter	of the bar	ф		1.	2	16	20	25		
Width across flats	Width across flats SW			1:	9	24	30	36		
Nominal drill hole o	diameter	d ₀		14	16	20	25	30		
Drill hole depth	h ₀				h _{ef}	+ l _e				
Effective analysis	ماديد المريد	h _{ef,min}		7	0	80	90	96		
Effective embedment depth $\frac{-100,10}{h_{ef,m}}$				14	Ю	220	300	380		
Distance concrete welded joint	surface to	l _e	f	100						
Minimum spacing a edge distance	and minimum	Smin = Cmin	[mm]	55 14		65	85	105		
Diameter of	pre-positioned anchorage	≤ d _f				18	22	26		
clearance hole in the fixture	push through anchorage	≤ d _f		18		22	26	32		
Minimum thickness of concrete h		h _{min}		h ₀ + 30			h ₀ + 2d ₀			
Maximum installati	max T _{inst}	[Nm]	4	0	60	120	150			

¹⁾ Both drill hole diameters can be used

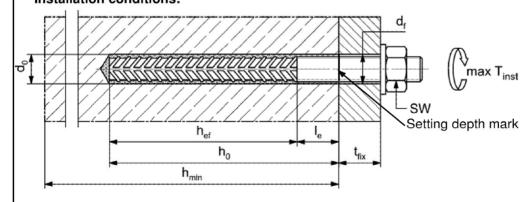
fischer rebar anchor FRA



Marking frontal e. g:

FRA (for stainless steel);
FRA HCR (for high corrosion resistant steel)

Installation conditions:



Figures not to scale

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Intended use

Installation parameters rebar anchor FRA

Annex B 8

Appendix 17/40

Table B9.	Table B9.1: Dimension of resin capsule RSB												
Resin capsu	Resin capsule RSB												
Capsule diameter	dР	[mm]	9,0	10),5	12	2,5		16,5		23	3,0	27,5
Capsule length	L _P	[mm]	85	72	90	72	97	72	95	123	160	190	260



Table B9.2: Assignment of resin capsule RSB to fischer anchor rod RG M

Anchor rod RG M			М8	M10	M12	M16	M20	M24	M30
Effective embedment depth	h _{ef, 1}	[mm]		75	75	95			
Related capsule RSB		[-]		10 mini	12 mini	16 mini			
Effective embedment depth	h _{ef, 2}	[mm]	80	90	110	125	170	210	280
Related capsule RSB		[-]	8	10	12	16	20	20 E/ 24	30
Effective embedment depth	h _{ef, 3}	[mm]		150	150	190	210		
Related capsule RSB		[-]		2 x 10 mini	2 x 12 mini	2 x 16 mini	20 E / 24		

Table B9.3: Assignment of resin capsule RSB to fischer internal threaded anchor RG MI

Internal threaded ancho	МІ	М8	M10	M12	M16	M20	
Effective embedment depth	h _{ef}	[mm]	90	90	125	160	200
Related capsule RSB		[-]	10	12	16	16 E	20 E / 24

Figures not to scale

fischer Superbond

Intended use

Dimensions of the capsules; Assignment of the capsule to the fischer anchor rod RG M and fischer internal threaded anchor RG MI

Annex B 9

Appendix 18/40

Table B10.1: Parameters of the cleaning brush BS / BSB (steel brush with steel bristles)

The size of the cleaning brush refers to the drill hole diameter

Nominal drill hole diameter	d₀		10	12	14	16	18	20	24	25	28	30	32	35	40
Steel brush diameter BS	dь	[mm]	11	14	16	2	0	25	26	27	30		40		-
Steel brush diameter BSB	dь		-	-	-		-	-	-	-	_		-		42



Table B10.2: Maximum processing time of the mortar and minimum curing time (During the curing time of the mortar the concrete temperature may not fall below the listed minimum temperature. Minimal cartridge temperature +5 °C; minimal resin capsule temperature -15 °C)

Temperature at	· .	ocessing time	Mi	inimum curing time t _{cure}			
anchoring base [°C]	FIS SB	FIS SB High Speed	FIS SB	FIS SB High Speed	RSB		
-30 to -20					120 h		
> -20 to -15		60 min		24 h	48 h		
> -15 to -10	60 min	30 min	36 h	8 h	30 h		
> -10 to -5	30 min	15 min	24 h	3 h	16 h		
> -5 to 0	20 min	10 min	8 h	2 h	10 h		
> 0 to 5	13 min	5 min	4 h	1 h	45 min		
> 5 to 10	9 min	3 min	2 h	45 min	30 min		
> 10 to 20	5 min	2 min	1 h	30 min	20 min		
> 20 to 30	4 min	1 min	45 min	15 min	5 min		
> 30 to 40	2 min		30 min		3 min		

Figures not to scale

fischer Superb	ond
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Intended use

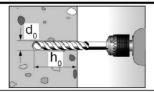
Cleaning brush (steel brush) Processing time and curing time Annex B 10

Appendix 19/40

Installation instructions part 1; Injection mortar system FIS SB

Drilling and cleaning the hole (hammer drilling with standard drill bit)

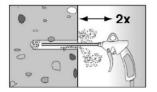
1



Drill the hole.

Nominal drill hole diameter d_0 and drill hole depth h_0 see tables B4.1, B6.1, B7.1, B8.1

2

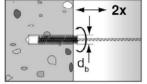


Clean the drill hole:

Blow out the drill hole twice, with oil free compressed air ($p \ge 6$ bar) In uncracked concrete the use of the manual blow-out pump ABG is possible (Installation parameters: $d_0 < 18$ mm and $h_{ef} < 10d$)

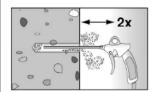


3



Brush the drill hole twice. For drill hole diameter ≥ 30 mm use a power drill. For deep holes use an extension. Corresponding brushes see **table B10.1**

4



Clean the drill hole:

Blow out the drill hole twice, with oil free compressed air ($p \ge 6$ bar) In uncracked concrete the use of the manual blow-out pump ABG is possible (Installation parameters: $d_0 < 18$ mm and $h_{ef} < 10d$)



Go to step 5 (Annex B 12)

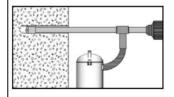
Drilling and cleaning the hole (hammer drilling with hollow drill bit)

1



Check a suitable hollow drill (see **table B1.1**) for correct operation of the dust extraction

2



Use a suitable dust extraction system, e. g. fischer FVC 35 M or a comparable dust extraction system with equivalent performance data.

Drill the hole with hollow drill bit. The dust extraction system has to extract the drill dust nonstop during the drilling process and must be adjusted to maximum power. Nominal drill hole diameter d_0 and drill hole depth h_0 see tables B4.1, B6.1, B7.1, B8.1

Go to step 5 (Annex B 12)

fischer Superbond

Intended use

Installation instructions part 1; injection mortar system FIS SB

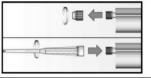
Annex B 11

Appendix 20/40

Installation instructions part 2; injection mortar system FIS SB

Preparing the cartridge

5



Remove the sealing cap

Screw on the static mixer (the spiral in the static mixer must be clearly visible)

6





Place the cartridge into the dispenser

7

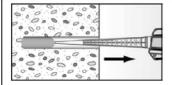




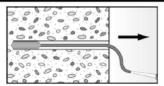
Extrude approximately 10 cm of material out until the resin is evenly grey in colour. Do not use mortar that is not uniformly grey

Injection of the mortar

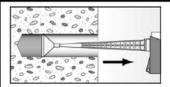
8



Fill approximately 2/3 of the drill hole with mortar. Always begin from the bottom of the hole and avoid bubbles



For drill hole depth ≥ 150 mm use an extension tube



For overhead installation, deep holes ($h_0 > 250$ mm) or drill hole diameter ($d_0 \ge 40$ mm) use an injection-adapter

Go to step 9 (Annex B 13)

fischer Superbond

Intended use

Installation instructions part 2; injection mortar system FIS SB

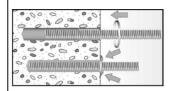
Annex B 12

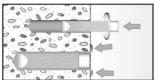
Appendix 21/40

Installation instructions part 3; injection mortar system FIS SB

Installation of anchor rods or fischer internal threaded anchors RG MI

9





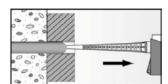
Only use clean and oil-free metal part.

Mark the setting depth of the metal part. Push the anchor rod or fischer internal threaded RG MI anchor down to the bottom of the hole, turning it slightly while doing so.

After inserting the metal part, excess mortar must be emerged around the anchor element. If not, pull out the metal part immediately and reinject mortar.



For overhead installations support the metal part with wedges.
(e. g. fischer centering wedges)



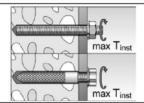
For push through installation fill the annular gap with mortar

11



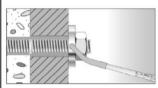
Wait for the specified curing time t_{cure} see table B10.2

12



Mounting the fixture max T_{inst} see **tables B4.1** and **B6.1**

Option

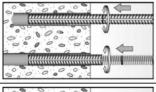


After the minimum curing time is reached, the gap between metal part and fixture (annular clearance) may be filled with mortar via the fischer filling disc. Compressive strength ≥ 50 N/mm² (e.g. fischer injection mortars FIS HB, FIS SB, FIS V, FIS EM Plus)

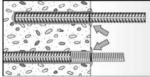
ATTENTION: Using fischer filling disc reduces t_{fix} (usable length of the anchor)

Installation reinforcing bars and fischer rebar anchor FRA

10



Only use clean and oil-free reinforcing bars or fischer FRA. Mark the setting depth. Turn while using force to push the reinforcement bar or the fischer FRA into the filled hole up to the setting depth mark



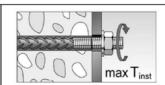
When the setting depth mark is reached, excess mortar must be emerged from the mouth of the drill hole. If not, pull out the anchor element immediately and reinject mortar.

11



Wait for the specified curing time tcure see table B10.2

12



Mounting the fixture max T_{inst} see **table B8.1**

fischer Superbond

Intended use

Installation instructions part 3; injection mortar system FIS SB

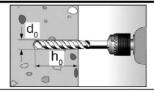
Annex B 13

Appendix 22/40

Installation instructions part 4; resin capsule RSB

Drilling and cleaning the hole (hammer drilling with standard drill bit)

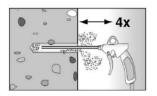
1



Drill the hole.

Nominal drill hole diameter d_0 and drill hole depth h_0 see tables B5.1 and B6.1

2



Clean the drill hole:

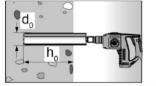
Blow out the drill hole four times, with oil free compressed air ($p \ge 6$ bar) In uncracked concrete the use of the manual blow-out pump ABG is possible (Installation parameters: $d_0 < 18$ mm and $h_{ef} < 10d$)



Go to step 6 (Annex B 15)

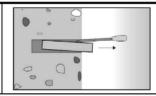
Drilling and cleaning the hole (wet drilling with diamond drill bit)

1



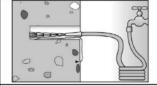
Drill the hole.

Drill hole diameter d_0 and drill hole depth h_0 see tables B5.1 and B6.1



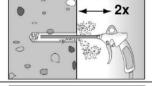
Break the drill core and remove it

2



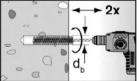
Flush the drill hole with clean water until it flows clear

3



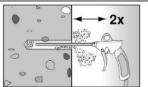
Blow out the drill hole twice, using oil-free compressed air (p > 6 bar)

4



Brush the drill hole twice using a power drill. Corresponding brushes see table B10.1

5



Blow out the drill hole twice, using oil-free compressed air (p > 6 bar)

Go to step 6 (Annex B 15)

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Intended use

Installation instructions part 4; resin capsule RSB

Annex B 14

Appendix 23/40

Installation instructions part 5; resin capsule RSB

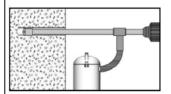
Drilling and cleaning the hole (hammer drilling with hollow drill bit)

1



Check a suitable hollow drill (see **table B2.1**) for correct operation of the dust extraction

2



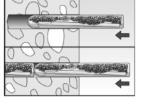
Use a suitable dust extraction system, e. g. fischer FVC 35 M or a comparable dust extraction system with equivalent performance data.

Drill the hole with hollow drill bit. The dust extraction system has to extract the drill dust nonstop during the drilling process and must be adjusted to maximum power. Nominal drill hole diameter \mathbf{d}_0 and drill hole depth \mathbf{h}_0 see tables **B5.1** and **B6.1**

Go to step 6 (Annex B 15)

Installation fischer anchor rod RG M or fischer internal threaded anchor RG MI

6



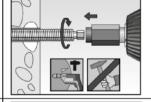
Insert the resin capsule into the drill hole by hand.

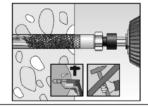
Suitable resin capsule RSB or RSB mini see table B9.2.



Depending on the metal part being installed, use a suitable setting tool

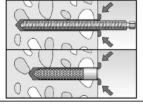
7





Only use clean and grease-free metal parts. Using a suitable adapter, drive the fischer anchor rod RG M or the fischer internal threaded anchor RG MI into the capsule using a hammer drill set on rotary hammer action. Stop when the metal parts reaches the bottom of the hole and is set to the correct embedment depth

8



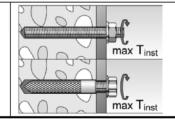
When reaching the correct embedment depth, excess mortar must emerge from the mouth of the drill hole. If not, the metal parts must be pulled out directly and a second resin capsule must be pushed into the drill hole. Setting process must be repeated (Step 7)

9



Wait for the specified curing time, t_{cure} see **table B10.2**

10



Mounting the fixture max T_{inst} see **tables B5.1** and **B6.1**

fischer Superbond

Intended use

Installation instructions part 5; resin capsule RSB

Annex B 15

Appendix 24/40

Table C1.1: Characteristic values for steel failure under tension / shear load of fischer anchor rods and standard threaded rods

										M30		
Beari	ing capacity under ten	ision load	d, ste	el fai	lure 3)							
s,			4.8		15(13)	23(21)	33	63	98	141	184	224
stic Nex	Steel zinc plated	>	5.8		19(17)	29(27)	43	79	123	177	230	281
teri		ropert class	8.8	[kN]	29(27)	47(43)	68	126	196	282	368	449
Characteristic esistance N _{RK,s}	Stainless steel R and	Property class	50	[KIN]	19	29	43	79	123	177	230	281
Ch.	high corrosion	ш	_70		26	41	59	110	172	247	322	393
	resistant steel HCR		80		30	47	68	126	196	282	368	449
Partia	al factors 1)											
			4.8					1,	50			
[호	Steel zinc plated	≥	5.8					1,	50			
ial fac		ropert class	8.8	[_]				1,	50			
Partial factor	Stainless steel R and	Property class	50	[-]					86			
P ₈	high corrosion	_	_70						/ 1,87			
	resistant steel HCR		80					1,	60			
Beari	Bearing capacity under shear load, steel failure 3)											
witho	out lever arm											
O X			4.8		9(8)	14(13)	20	38	59	85	110	135
istic V ^o ri	Steel zinc plated	≥	5.8		11(10)	17(16)	25	47	74	106 138 141 184	168	
nce \		ropert class	8.8 50	[kN]	15(13)	23(21)	34	63	98	141	184	225
ara star	Stainless steel R and	Property class		[14,14]	9	15	21	39	61	89	115	141
Sisis	high corrosion		70		13	20	30	55	86	124	161	197
	resistant steel HCR		80		15	23	34	63	98	141	184	225
	lity factor		k ₇	[-]				1	,0			
with	lever arm											
C X			4.8		15(13)	30(27)	52	133	259	448	665	899
Characteristic resistance M ⁰ Rk,s	Steel zinc plated	t ç	5.8		19(16)	37(33)	65	166	324	560	833	1123
ce		Property class	8.8 50	[Nm]	30(26)	60(53)	105	266	519	896	1333	1797
ara	Stainless steel R and	or cla		[]	19	37	65	166	324	560	833	1123
Ch esis	high corrosion	_	_70		26	52	92	232	454	784	1167	1573
	resistant steel HCR		80		30	60	105	266	519	896	1333	1797
Partia	al factors 1)											
_	0		4.8						25			
, gc (Steel zinc plated	pert	5.8						<u> 25</u>			
Partial factor ‱,∨	Stainless steel R and		5.8 8.8 50	[-]					25 38			
arti]	high corrosion	Pro	70		2.38 1.25 ²⁾ / 1.56							
-	resistant steel HCR		80		1.33							
1) 1												

¹⁾ In absence of other national regulations

fischer Superbond

Performances

Characteristic values for steel failure capacity of fischer anchor rods and standard threaded rods

Annex C 1

Appendix 25/40

Only admissible for high corrosion resistant steel C, with f_{yk} / $f_{uk} \ge 0.8$ and $A_5 > 12$ % (e.g. fischer anchor rods)

³⁾ Values in brackets are valid for undersized threaded rods with smaller stress area A_s for hotdip galvanized standard threaded rods according to EN ISO 10684:2004+AC:2009

Table C2.1: Characteristic values for steel failure under tension / shear load of fischer internal threaded anchors RG MI

M8

M10

M12

M16

M20

Bearing capacity under tension load, steel failure												
		Property	5.8		19	29	43	79	123			
Charact.	NI	class	8.8	[kN]	29	47	68	108	179			
resistance with screw	$N_{Rk,s}$	Property	R	[KIN]	26	41	59	110	172			
001011		class 70	HCR		26	41	59	110	172			
Partial factors ¹⁾												
		Property	5.8	1,50								
Partial factors	26.4	class	8.8	[-]			1,50					
r artial lactors	γMs,N	Property	_R	[-]	1,87							
		class 70	HCR				1,87					
Bearing capacit	y unde	r shear load	d, steel	failu	re							
Without lever ar	m											
Charact	V^0_Rk,s	Property	5.8		9,2	14,5	21,1	39,2	62,0			
Charact. resistance with		class	8.8	[kN]	14,6	23,2	33,7	54,0	90,0			
screw	V HK,S	Property	R	[KIN]	12,8	20,3	29,5	54,8	86,0			
		class 70	HCR		12,8	20,3	29,5	54,8	86,0			
Ductility factor			k ₇	[-]			1,0					
With lever arm												
		Property	5.8		20	39	68	173	337			
Charact. resistance with	M ⁰ Rk,s	class	8.8	[Nm]	30	60	105	266	519			
screw	IVI HK,S	Property	R	וויאיון	26	52	92	232	454			
		class 70	HCR		26	52	92	232	454			
Partial factors ¹⁾												
		Property	5.8				1,25					
Partial factors	264.37	class 8.8	[-]			1,25						
i artiar lactors	γMs,V	Property	R		1,56							
			HCR				1,56					

¹⁾ In absence of other national regulations

fischer internal threaded anchors RG MI

fischer Superbond

Performances

Characteristic values for steel failure under tension / shear load fischer internal threaded anchor RG MI

Annex C 2

Appendix 26/40

Table C3.1: Characteris reinforcing		s for	steel	failure	e unde	r tens	ion / s	hear lo	oad of		
Nominal diameter of the bar		ф	8	10	12	14	16	20	25	28	32
Bearing capacity under tension	ı load, ste	el fail	ure					•			
Characteristic resistance	N _{Rk,s}	[kN]					As · fuk1)			
Bearing capacity under shear I	oad, stee	l failui	re								
Without lever arm											
Characteristic resistance	$V_{Rk,s}$	[kN]				0,5	5 · A _s · f	uk ¹⁾			
Ductility factor	k ₇	[-]					1,0				
With lever arm											
Characteristic resistance	M⁰ _{Rk,s}	[Nm]				1,2	· W _{el} ·	f _{uk} 1)			
Table C3.2: Characteris rebar anch			steel	failur	e unde	er tens	ion / s	hear lo	oad of	fische	ı r
ischer rebar anchor FRA			N	/ 112		M16		M20		M2	4
Bearing capacity under tension	ı load, ste	el fail	ure				-		-		
Characteristic resistance	N _{Rk,s}	[kN]	4	63		111		173		270)
Partial factor ¹⁾											
Partial factor	γMs,N	[-]					1,4				
Bearing capacity under shear I	oad, stee	l failui	re								
Without lever arm											
Characteristic resistance	$V_{Rk,s}$	[kN]	;	30		55		86		124	1
Ductility factor	k ₇	[-]					1,0				
With lever arm											
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	,	92		233		454		785	5
Partial factor ¹⁾											
Partial factor	γMs,V	[-]					1,56				
1) In absence of other national	ogulation.										
fischer Superbond Performances Characteristic values for steel fa	ailure unde	er tens	ion / sh	near loa	d of rei	nforcing	bars a	nd		nnex C	

Size							Α	ll si	zes			
Tension load												
Installation facto	or	γinst	[-]		Se	e annex	C 5 to	C	10 and (C 15 to 0	C16	
Factors for the	compressive strer	gth of		ete > C	20/25							
	C25/30							1,0	2			
_	C30/37							1,0	4			
Increasing _	C35/45	Ψ_{c}	_[1]					1,0	7			
factor for τ_{Rk}	C40/50	Tc	[-]					1,0	8			
_	C45/55							1,0	9			
	C50/60							1,1	0			
Splitting failure												
_	h / h _{ef} ≥ 2,0							1,0				
Edge distance _	$2.0 > h / h_{ef} > 1.3$	C _{cr,sp}	[mm]						1,8 h			
	h / h _{ef} ≤ 1,3		-					,26				
Spacing		S _{cr,sp}						2 Ccr	r,sp			
Concrete cone		1.						4 4	^			
Uncracked cond		k _{ucr,N}	[-]					11,				
Cracked concre	te	k _{cr,N}						7,7				
Edge distance Spacing		Ccr,N	[mm]					1,5 l 2 c₀				
	stained tension load	S _{cr,N}						2 Uc	r,N			
Temperature rai		<u>.</u>	[-]	24 °C	/ 40 °C	50 °C	; / 80 °C	<u>. T</u>	72 °C /	120 °C	90 °C /	150 °C
Factor	nge	$\Psi^0_{ extsf{sus}}$	[-]		84),86	+	0,8		0,	
Shear load		1 505	LJ	<u> </u>			,,00		0,0	, ,	0,	3 1
Installation factor	nr	γinst	[-]					1,0	<u> </u>			
Concrete pry-o		Tillst	LJ					• , ,				
Factor for pry-ou		k ₈	[-]					2,0)			
Concrete edge												
Effective length shear loading		lf	[mm]		or d _{nom} ≤ or d _{nom} >					00 mm)		
Calculation dia	meters											
Size				M8	M10	M12	M16	3 T	M20	M24	M27	M30
fischer anchor ro standard thread		d _{nom}		8	10	12	16		20	24	27	30
fischer internal threade	d anchors RG MI	d _{nom}	[mm]	12	16	18	22		28	_1)	_1)	_1)
fischer rebar and	chor FRA	d_{nom}		_1)	_1)	12	16		20	25	_1)	_1)
Size (nominal di	ameter of the bar)		ф	8	10	12	14	16	20	25	28	32
Reinforcing bar		d_{nom}	[mm]	8	10	12	14	16	20	25	28	32
1) Anchor type	e not part of the ETA	١										
fischer Supe												
Performances Characteristic	s values for concrete	ailure	under t	ension /	shear l	oad					nnex (

Table C5.1: Characteristic values for combined pull-out and concrete failure for fischer anchor rods and standard threaded rods in hammer drilled holes in combination with injection mortar FIS SB; uncracked or cracked concrete

	combinat	ion with	n injecti e	on mo	rtar FIS	S SB; u	ncrack	ced or	cracke	d cond	rete	
Anchor r	od / standard thread	led rod		М8	M10	M12	M16	M20	M24	M27	M30	
Combine	d pullout and concr	ete con	e failure									
Thread di	ameter	8	10	12	16	20	24	27	30			
Uncracke	ed concrete											
Characte	ristic bond resistan	ce in un	cracked (concret	e C20/25	5						
Hammer-	drilling with standard	drill bit c	r hollow d	rill bit (d	lry or wet	concret	<u>e)</u>					
	I: 24 °C / 40 °C			12	13	13	13	13	12	10	10	
Tem-	II: 50 °C / 80 °C		[N/mm²]	12	12	12	13	13	12	10	10	
perature [.] range	III: 72 °C / 120 °C	て Rk,ucr		10	11	11	11	11	11	9,0	9,0	
	IV: 90 °C / 150 °C			10	10	10	11	10	10	8,0	8,0	
Installati	on factors								•	•		
Dry or we	t concrete	γinst	[-]	1,0								
Cracked	concrete											
Characte	ristic bond resistan	ce in cr	acked cor	ncrete C	20/25							
<u> Hammer-</u>	drilling with standard	drill bit c	<u>r hollow d</u>	rill bit (d	lry or wet	concret	<u>e)</u>					
	I: 24 °C / 40 °C			6,5	7,0	7,5	7,5	7,5	7,5	7,5	7,5	
Tem-	II: 50 °C / 80 °C		[N]/wa wa 27	6,0	6,5	7,5	7,5	7,5	7,5	7,0	7,0	
perature [.] range	III: 72 °C / 120 °C	$ au_{Rk,cr}$	[N/mm ²]	5,5	6,0	6,5	6,5	6,5	6,5	6,0	6,0	
.	IV: 90 °C / 150 °C			5,0	5,5	6,0	6,0	6,0	6,0	5,5	5,5	
Installati	on factors											

1,0

Dry or wet concrete

Performances

Characteristic values for combined pull-out and concrete failure for fischer anchor rod andstandard threaded rods with injection mortar FIS SB

[-]

γinst

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Table C6.1: Characteristic values for combined pull-out and concrete failure for fischer anchor rods RG M in hammer or diamond drilled holes in combination with resin capsule RSB; uncracked or cracked concrete

11	Anchor i	od RG M			М8	M10	M12	M16	M20	M24	M30
Character Star Character	Combine	ed pullout and concr	ete con	e failure		<u>'</u>					
Character Stick bond resistance In uncracked concrete C20/25	Thread d	iameter	d	[mm]	8	10	12	16	20	24	30
Second Process Seco	Uncrack	ed concrete				•					
Female I	Characte	eristic bond resistan	ce in ur	ncracked (concrete	C20/25					
Temperature angle III: 50 °C / 80 °C Temperature III: 72 °C / 120 °C Temperature III: 80 °C / 80 °C Tempera	Hammer-	drilling with standard	drill bit o	r hollow d	rill bit (dr	y or wet c	oncrete a	s well as v	water filled	d hole)	
Table Tabl		I: 24 °C / 40 °C			12	13	13	13	13	12	10
III	Tem-			[N.1/2]	12	12	12	13	13	12	10
IV: 90 °C / 150 °C 10	perature range	III: 72 °C / 120 °C	τ _{Rk,ucr}	[IN/mm ²]	10	11	11	11	11	11	9,0
Fem-perature angle II: 24 °C / 40 °C TRIK, LOF angle III: 50 °C / 80 °C TRIK, LOF angle III: 50 °C / 120 °C TRIK, LOF angle III: 50 °C / 120 °C TRIK, LOF angle III: 12 13 13 14 14 14 13 13 10	J				10	10	10	11	10	10	8,0
Temperature angle III: 50 °C / 80 °C Telk,uor large	Diamond	-drilling (dry or wet co	ncrete a	ıs well as v	water fille	d hole)		I.			
Terrature angle Hill: 72 °C / 120 °C Telk,uor		I: 24 °C / 40 °C			13	13	14	14	14	13	11
III: 72 °C / 120 °C 11 12 12 12 12 11 9,5					12	13	13	14	13	13	10
IV: 90 °C / 150 °C 10		III: 72 °C / 120 °C	$ au_{Rk,ucr}$	ucr [[N/mm²] }	11	12	12	12	12	11	9,5
Statistical processes State Stat	rango				10	11	11	11	11	10	8,5
Vater filled hole Value	Installati	on factors				1			l		,
Tacked concrete Ti,2 Ti,0	Dry or we	et concrete						1,0			
Characteristic bond resistance in cracked concrete C20/25 Chammer-drilling with standard drill bit or hollow drill bit (dry or wet concrete as well as water filled hole)	Water fill	ed hole	γinst	[-]	1	,2			1,0		
I	Cracked	concrete									
Complex content	Characte	eristic bond resistan	ce in cr	acked cor	ncrete C	20/25					
II: 50 °C / 80 °C Telk,cr S,5 S,5 S,0 S,5 S,5 S,0 S,5	Hammer-	drilling with standard	drill bit o	or hollow d	rill bit (dr	y or wet c	oncrete a	s well as v	water filled	d hole)	
$\frac{\text{Noterature ange}}{\text{ange}} = \frac{\text{III: } 30^{\circ} \text{C} / 120^{\circ} \text{C}}{\text{III: } 72^{\circ} \text{C} / 120^{\circ} \text{C}} = \frac{\text{T}_{Rk,cr}}{\text{III: } 72^{\circ} \text{C} / 150^{\circ} \text{C}} = \frac{\text{T}_{Rk,cr}}{\text{III: } 72^{\circ} \text{C} / 150^{\circ} \text{C}} = \frac{\text{T}_{Rk,cr}}{\text{III: } 72^{\circ} \text{C} / 150^{\circ} \text{C}} = \frac{\text{T}_{Rk,cr}}{\text{T}_{Rk,cr}} = \frac{\text{N/mm}^{2}}{\text{III: } 72^{\circ} \text{C} / 120^{\circ} \text{C}} = \frac{\text{III: } 24^{\circ} \text{C} / 40^{\circ} \text{C}}{\text{III: } 72^{\circ} \text{C} / 120^{\circ} \text{C}} = \frac{\text{T}_{Rk,cr}}{\text{T}_{Rk,cr}} = \frac{\text{N/mm}^{2}}{\text{III: } 72^{\circ} \text{C} / 150^{\circ} \text{C}} = \frac{\text{T}_{Rk,cr}}{\text{T}_{Rk,cr}} = \frac{\text{N/mm}^{2}}{\text{III: } 72^{\circ} \text{C} / 150^{\circ} \text{C}} = \frac{\text{N/mm}^{2}}{\text{T}_{Rk,cr}} = \frac{\text{N/mm}^{2}}{\text{N/mm}^{2}} = \frac{\text{N/mm}^{2}}{\text{T}_{Rk,cr}} = \text{N/mm$		I: 24 °C / 40 °C			6,5	7,0	7,5	7,5	7,5	7,5	7,5
III: 72 °C / 120 °C 5,5 6,0 6,5 6,5 6,5 6,5 6,0	Tem-	II: 50 °C / 80 °C	_	[NI/mm ²]	6,0	6,5	7,5	7,5	7,5	7,5	7,0
Columnoid - drilling (dry or wet concrete as well as water filled hole) Columnoid - drilling (dry or wet concrete as well as water filled hole) Columnoid - drilling (dry or wet concrete as well as water filled hole) Columnoid - drilling (dry or wet concrete as well as water filled hole) Columnoid - drilling (dry or wet concrete as well as water filled hole) Columnoid - drilling (dry or wet concrete as well as water filled hole) Columnoid - drilling (dry or wet concrete as well as water filled hole) Columnoid - drilling (dry or wet concrete as well as water filled hole) Columnoid - drilling (dry or wet concrete as well as water filled hole) Columnoid - drilling (dry or wet concrete as well as water filled hole) Columnoid - drilling (dry or wet concrete as well as water filled hole) Columnoid - drilling (dry or wet concrete as well as water filled hole) Columnoid - drilling (dry or wet concrete as well as water filled hole) Columnoid - drilling (dry or wet concrete as well as water filled hole) Columnoid - drilling (dry or wet concrete as well as water filled hole) Columnoid - drilling (dry or wet concrete as well as water filled hole) Columnoid - drilling (dry or wet concrete as well as water filled hole) Columnoid - drilling (dry or wet concrete as well as water filled hole) Columnoid - drilling (dry or wet concrete as well as water filled hole) Columnoid - drilling (dry or wet concrete as well as water filled hole) Columnoid - drilling (dry or wet concrete as well as water filled hole) Columnoid - drilling (dry or wet concrete as well as water filled hole) Columnoid - drilling (dry or wet concrete as well as water filled hole) Columnoid - drilling (dry or wet concrete as well as water filled hole) Columnoid - drilling (dry or wet concrete as well as water filled hole) Columnoid - drilling (dry or wet concrete as well as water filled hole) Columnoid - drilling (dry or wet concrete as well as well as well as water filled hole) Columnoid - drilling (dry or	range	III: 72 °C / 120 °C	Rk,cr	ן ווווווון	5,5	6,0	6,5	6,5	6,5	6,5	6,0
I: 24 °C / 40 °C Temporature angle II: 50 °C / 80 °C Temporature angle III: 50 °C / 120 °C Temporature angle III: 72 °C / 120 °C Temporature angle		IV: 90 °C / 150 °C			5,0	5,5	6,0	6,0	6,0	6,0	5,5
Tem- perature ange	Diamond	-drilling (dry or wet co	ncrete a	ıs well as v	water fille	d hole)		•			
Description of the large angle		I: 24 °C / 40 °C			_1)	_1)	_1)	7,5	7,5	7,5	7,5
ange III: 72 °C / 120 °C	Tem-	II: 50 °C / 80 °C		23	_1)	_1)	_1)	7,5	7,5	7,5	7,0
IV: 90 °C / 150 °C IV: 90 °C / 150 °C IV: 90 °C / 150 °C IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII		III: 72 °C / 120 °C	$ au_{Rk,cr}$	[N/mm²]	_1)	_1)	_1)	6,5	6,5	6,5	6,5
Ory or wet concrete γ _{inst} [-] 1,0 Nater filled hole 1,2 1,0					_1)	_1)	_1)	6,0	6,0	6,0	6,0
Vater filled hole 1,2 1,0	Installati	on factors					ı	1	1	1	•
vater filled flote 1,0	Dry or we	et concrete						1,0			
1) No performance assessed	Water filled hole		γinst	[-]	1	,2			1,0		
	¹⁾ No p	erformance assessed	d								

Characteristic values for combined pull-out and concrete failure for fischer anchor rod RG M with resin capsule RSB $\,$

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Table C7.1: Characteristic values for combined pull-out and concrete failure for fischer internal threaded anchors RG MI in hammer drilled holes in combination with injection mortar FIS SB; uncracked or cracked concrete

Internal	threa	ded anchor RG	МІ		М8	M10	M12	M16	M20
Combine	ed pu	llout and concr	ete con	e failure		<u> </u>			
Sleeve d	iamet	er	d	[mm]	12	16	22	28	
Uncrack	ed co	oncrete					•		
Characte	eristic	c bond resistan	ce in un	cracked o	concrete C2	0/25			
Hammer-	-drillir	ng with standard	drill bit c	r hollow d	rill bit (dry or	wet concrete)		
	l:	24 °C / 40 °C			12	12	11	11	9,5
Tem-		50 °C / 80 °C		[N]/wa wa 21	12	11	11	10	9,0
perature range	III:	72 °C / 120 °C	τ Rk,ucr	[N/mm ²]	11	10	10	9,0	8,0
Ü	IV: 90 °C / 150 °C	-	10	9,5	9,0	8,5	7,5		
Installati	on fa	ctors				•	•	•	
Dry or we	et con	ıcrete	γinst	[-]			1,0		
Cracked	conc	rete							
Characte	eristic	c bond resistan	ce in cr	acked cor	ncrete C20/2	:5			
Hammer-	-drillin	ng with standard	drill bit c	r hollow d	rill bit (dry or	wet concrete)		
	l:	24 °C / 40 °C					5,0		
Tem-		50 °C / 80 °C	_	[N1/mm2]			5,0		
perature range	e ${}$ III: 72 °C / 120 °C $^{}$	$ au_{Rk,cr}$	[N/mm ²]			4,5			
IV: 90 °C / 150 °C						4,0			
Installati	on fa	ctors							
Dry or we	et con	crete	γinst	[-]			1,0		

Characteristic values for combined pull-out and concrete failure for fischer internal threaded anchor RG MI with injection mortar FIS SB

Table C8.1: Characteristic values for combined pull-out and concrete failure for fischer internal threaded anchors RG MI in hammer or diamond drilled holes in combination with resin capsule RSB; uncracked or cracked concrete

Internal	threaded anchor RG	MI		М8	M10	M12	M16	M20			
Combine	ed pullout and conc	rete con	e failure				•				
Sleeve di	iameter	d	[mm]	12	16	18	22	28			
Uncrack	ed concrete										
Characte	eristic bond resistar	nce in ur	cracked o	concrete C2	0/25						
<u> Hammer-</u>	-drilling with standard	drill bit o	r hollow d	<u>rill bit (dry or</u>	wet concrete	as well as wa	ater filled hole)			
	I: 24 °C / 40 °C	_		12	12	11	11	9,5			
Tem- perature	II: 50 °C / 80 °C	_	[N/mm ²]	12	11	11	10	9,0			
range	III: 72 °C / 120 °C	TRk,ucr	[[N/[]]]	11	10	10	9,0	8,0			
IV: 90 °C / 150 °C		_		10	9,5	9,0	8,5	7,5			
Diamond	-drilling (dry or wet co	oncrete a	s well as v	vater filled h	ole)	1	•	•			
	I: 24 °C / 40 °C			13	12	12	11	10			
Tem-	II: 50 °C / 80 °C	_	[N1/m: 22]	13	12	12	11	9,5			
perature range	III: 72 °C / 120 °C	TRk,ucr	[N/mm²]	11	11	10	9,5	8,5			
	IV: 90 °C / 150 °C	-		10	10	9,5	9,0	8,0			
Installati	on factors					1					
Dry or we	et concrete	- 26	[_]			1,0					
Water fille	ed hole	- γinst	[-]	1,2		1	,0				
	concrete										
	eristic bond resistar										
<u>Hammer-</u>	drilling with standard	drill bit o	or hollow d	<u>rill bit (dry or</u>	wet concrete		ater filled hole)			
.	l: 24 °C / 40 °C	_				5,0					
Tem- perature	II: 50 °C / 80 °C	- τ _{Rk,cr}	[N/mm²]	5,0							
range	III: 72 °C / 120 °C	• nk,∪r -		4,5							
	IV: 90 °C / 150 °C					4,0					
<u>Diamond</u>	-drilling (dry or wet co	oncrete a	ıs well as v	vater filled h	<u>ole)</u>						
	I: 24 °C / 40 °C	_		_1)		5	,0				
Tem- perature	II: 50 °C / 80 °C	- T	 [N/mm²]	_1)		5	,0				
range	III: 72 °C / 120 °C	- τ _{Rk,cr}	[[14/11]]	_1)		4	·,5				
IV: 90 °C / 150 °C		_		_1)		4	.,0				
Installati	on factors										
Dry or we	et concrete	- V:1	[-]			1,0					
	ed hole	- γinst	1 1-1 1	1,2	1		,0				

Characteristic values for combined pull-out and concrete failure for fischer internal threaded anchor RG MI with resin capsule RSB

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Table C	<u>`0 1</u>	Characto	riotio vo	duoc for	aamk	sinod i	م الب	ut and	conor	oto foi	iluro fo		
Ianie	J. I	: Characte reinforci											
		mortar F	_							/II vv ici.	mjee.		
Nominal	dian	neter of the bar		ф	8	10	12	14	16	20	25	28	32
Combined pullout and concrete cone failure													
Bar diameter d [m			[mm]	8	10	12	14	16	20	25	28	32	
Uncracked concrete													
Characteristic bond resistance in uncracked concrete C20/25													
<u>Hammer-</u>	drillir	ng with standard	drill bit o	r hollow d	rill bit (d	dry or w	et conc	rete)		.	1	Т	
	l:	24 °C / 40 °C			8,0	8,5	9,0	9,5	9,5	10	9,5	9,0	7,5
Tem-	II:	50 °C / 80 °C	_	[N/mm²]	8,0	8,5	9,0	9,0	9,5	9,5	9,0	8,5	7,5
perature range	III:	72 °C / 120 °C	τ Rk,ucr		7,0	7,5	8,0	8,0	8,5	8,5	8,0	7,5	6,5
	IV:	90 °C / 150 °C			6,5	7,0	7,0	7,5	7,5	8,0	7,5	7,0	6,0
Installati	on fa	actors											
Dry or we	et cor	ncrete	γinst	[-]	1,0								
Cracked													
		c bond resistan											
<u>Hammer-</u>		ng with standard	drill bit o	r hollow d	rill bit (d	dry or w	et conc	rete)	I	Γ	ı	ı	
	l:	24 °C / 40 °C			4,5	6,0	6,0	6,0	7,0	6,0	6,0	6,0	6,0
Tem- perature	II:	50 °C / 80 °C	T =:	[N/mm²]	4,5	5,5	5,5	5,5	6,5	6,0	6,0	6,0	6,0
range	:	72 °C / 120 °C	$ au_{Rk,cr}$		4,0	5,0	5,0	5,0	6,0	5,5	5,5	5,5	5,5
	IV: 90 °C / 150 °C					4,5	4,5	4,5	5,5	5,0	5,0	5,0	5,0
Installation factors													
Dry or we	et cor	ncrete	γinst	[-]					1,0				

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Characteristic values for combined pull-out and concrete failure for reinforcing bars with injection mortar FIS SB

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Table C10.1: Characteristic values for combined pull-out and concrete failure for fischer rebar anchors FRA in hammer drilled holes in combination with injection mortar FIS SB; uncracked or cracked concrete

	IIIOItai F	13 30,	uncracr	Neu of Clacke	ed Concrete		
fischer r	ebar anchor FRA			M12	M16	M20	M24
Combine	ed pullout and conci	ete cone	failure				
Bar diam	eter	d	[mm]	12	16	20	25
Uncrack	ed concrete						
Characte	eristic bond resistan	ce in un	cracked o	concrete C20/25	5		
<u>Hammer-</u>	-drilling with standard	drill bit o	r hollow d	rill bit (dry or wet	t concrete)		
	I: 24 °C / 40 °C	_		9,0	9,5	10	9,5
Tem-	II: 50 °C / 80 °C	_	[N1/mm2]	9,0	9,5	9,5	9,0
perature range	III: 72 °C / 120 °C	τ _{Rk,ucr}	[N/mm ²]	8,0	8,5	8,5	8,0
_	IV: 90 °C / 150 °C			7,0	7,5	8,0	7,5
Installati	on factors						
Dry or we	et concrete	γinst	[-]		1	,0	
Cracked	concrete						
Characte	eristic bond resistan	ce in cra	cked cor	ncrete C20/25			
<u>Hammer-</u>	-drilling with standard	drill bit o	r hollow d	rill bit (dry or wet	t concrete)		
	I: 24 °C / 40 °C	_		6,0	7,0	6,0	6,0
Tem-	II: 50 °C / 80 °C	_	[N/mm ²]	5,5	6,5	6,0	6,0
perature - range	III: 72 °C / 120 °C	τ _{Rk,cr}		5,0	6,0	5,5	5,5
IV: 90 °C / 150 °C			4,5	5,5	5,0	5,0	
Installati	on factors				•	•	•
Dry or we	et concrete	γinst	[-]		1	.0	

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Characteristic values for combined pull-out and concrete failure for fischer rebar anchors FRA with injection mortar FIS SB

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Anchor	rod	М8	M10	M12	M16	M20	M24	M27	M30		
Displace	ement-Factors	for tension	ı load ¹⁾								
Jncracked or cracked concrete; Temperature range I, II, III, IV											
δ _{N0-Factor}	[mm/(N/mm²)]	0,07	0,08	0,09	0,10	0,11	0,12	0,12	0,13		
δ _{N∞-Factor}	[[[]]]	0,13	0,14	0,15	0,17	0,17	0,18	0,19	0,19		
Displace	ement-Factors	for shear I	oad ²⁾								
Uncrack	ed or cracked	concrete;	Temperatu	re range I,	II, III, IV						
δv0-Factor	[100 mg /l+N]]	0,18	0,15	0,12	0,09	0,07	0,06	0,05	0,05		
δv∞-Factor	[mm/kN]	0,27	0,22	0,18	0,14	0,11	0,09	0,08	0,07		

1) Calculation of effective displacement:

²⁾ Calculation of effective displacement:

 $\delta_{\text{N0}} = \delta_{\text{N0-Factor}} \cdot \tau_{\text{Ed}}$

 $\delta_{V0} = \delta_{V0\text{-Factor}} \cdot V_{Ed}$

 $\delta_{N\infty} = \delta_{N\infty\text{-Factor}} \cdot \tau_{Ed}$

 $\delta_{V\infty} = \delta_{V\infty\text{-Factor}} \cdot V_{Ed}$

 $(\tau_{Ed}$: Design value of the applied tensile stress)

(V_{Ed}: Design value of the applied shear force)

Table C11.2: Displacements for fischer internal threaded anchors RG MI

Internal anchor F	threaded RG MI	М8	M10	M12	M16	M20				
Displace	ement-Factors	for tension load ¹⁾								
Uncrack	ed or cracked	concrete; Tempe	rature range I, II,	III, IV						
δ _{N0-Factor}	[mm/(N/mm²)]	0,09	0,10	0,10	0,11	0,19				
δ _{N∞-Factor}	[[[]]]	0,13	0,15	0,15	0,17	0,19				
Displace	ement-Factors	for shear load ²⁾								
Uncrack	ed or cracked	concrete; Tempe	rature range I, II,	III, IV						
δ V0-Factor	[mm/kN]]	0,12	0,09	0,08	0,07	0,05				
δv∞-Factor	[mm/kN]	0,18	0,14	0,12	0,10	0,08				

¹⁾ Calculation of effective displacement:

²⁾ Calculation of effective displacement:

 $\delta_{\text{N0}} = \delta_{\text{N0-Factor}} \cdot \tau_{\text{Ed}}$

 $\delta_{V0} = \delta_{V0\text{-Factor}} \cdot V_{Ed}$

 $\delta_{N\infty} = \delta_{N\infty\text{-Factor}} \cdot \tau_{\text{Ed}}$

 $\delta_{V\infty} = \delta_{V\infty\text{-Factor}} \cdot V_{Ed}$

 $(\tau_{Ed}$: Design value of the applied tensile stress)

(V_{Ed}: Design value of the applied shear force)

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Displacements for anchor rods and fischer internal threaded anchors RG MI

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Nominal of the ba	diameter ar	8	10	12	14	16	20	25	28	32
Displace	ment-Factor	s for tens	ion load ¹⁾							
Uncrack	ed or cracke	d concret	e; Tempera	ature rang	e I, II, III, I	٧				
δ N0-Factor	[100 100 // N L/100 100 2	0,07	0,08	0,09	0,09	0,10	0,11	0,12	0,13	0,13
δ _{N∞-Factor}	[mm/(N/mm²	0,11	0,13	0,13	0,15	0,16	0,16	0,18	0,20	0,20
Displace	ment-Factor	s for shea	r load ²⁾	·						
Uncrack	ed or cracke	d concret	e; Tempera	ature rang	e I, II, III, I	٧				
δvo-Factor		0,18	0,15	0,12	0,10	0,09	0,07	0,06	0,05	0,05
δv∞-Factor	[mm/kN]	0,27	0,22	0,18	0,16	0,14	0,11	0,09	0,08	0,06

1) Calculation of effective displacement:

²⁾ Calculation of effective displacement:

 $\delta_{\text{V0}} = \delta_{\text{V0-Factor}} \cdot V_{\text{Ed}}$

 $\delta v_{\infty} = \delta v_{\infty\text{-Factor}} \cdot V_{Ed}$

$$\begin{split} \delta_{\text{N0}} &= \delta_{\text{N0-Factor}} \, \cdot \, \tau_{\text{Ed}} \\ \delta_{\text{N}\infty} &= \delta_{\text{N}\infty\text{-Factor}} \, \cdot \, \tau_{\text{Ed}} \end{split}$$

fischer rebar anchor

(V_{Ed}: Design value of the applied shear force)

(τ_{Ed} : Design value of the applied tensile stress)

Table C12.2: Displacements for fischer rebar anchors FRA

FRA		M12	M16	M20	M24								
Displace	ement-Factors	for tension load1)											
Uncrack	Uncracked or cracked concrete; Temperature range I, II, III, IV												
$\delta_{\text{N0-Factor}}$	[mm/(N/mm²)]	0,09	0,10	0,11	0,12								
δ _{N∞-Factor} [IIIIII/(IN/IIIIII-)]		0,13	0,15	0,16	0,18								

Displacement-Factors for shear load²⁾

Uncrack	ea or crackea	concrete; remperatu	re range i, ii, iii, iv		
δv0-Factor	[mm/kN]]	0,12	0,09	0,07	0,06
δv∞-Factor	[mm/kN]	0.18	0.14	0.11	0.09

¹⁾ Calculation of effective displacement:

 $\delta_{\text{N0}} = \delta_{\text{N0-Factor}} \cdot \tau_{\text{Ed}}$

 $\delta_{V0} = \delta_{V0\text{-Factor}} \cdot V_{Ed}$

 $\delta_{N\infty} = \delta_{N\infty\text{-Factor}} \cdot \tau_{Ed}$

 $\delta_{V\infty} = \delta_{V\infty\text{-Factor}} \cdot V_{Ed}$

 $(\tau_{Ed}$: Design value of the applied tensile stress)

(V_{Ed}: Design value of the applied shear force)

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Displacements for reinforcing bars and fischer rebar anchors FRA

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²⁾ Calculation of effective displacement:

Table C13.1: Characteristic values for steel failure under tension / shear load of fischer anchor rods and standard threaded rods under seismic action performance category C1 or C2

Anchor	rod / standard thread	ed rod			M8	M10	M12	M16	M20	M24	M27	M30
Bearing	capacity under tension	n load	l, ste	el fai	lure ¹⁾							
fischer a	anchor rods and stand	dard th	read	led ro	ds, perf	ormanc	e catego	ory C1 ²⁾				
ပ	Ctool =inc ploted		5.8		19(17)	29(27)	43	79	123	177	230	281
Characteristic resistance NRK,S,C1	Steel zinc plated	s S	8.8		29(27)	47(43)	68	126	196	282	368	449
aracteris esistanc N _{Rk,s,C1}	Stainless steel R and	Property class	50	[kN]	19	29	43	79	123	177	230	281
hara resi N	O .	Pro	_70		26	41	59	110	172	247	322	393
	resistant steel HCR		80		30	47	68	126	196	282	368	449
fischer a	anchor rods and stand	led ro	ds, perf	ormanc	e catego	ory C2 2)						
ا <u>نے</u> ا	Steel zinc plated		5.8		_4)	_4)	39	72	108	177	_4)	_4)
Characteristic resistance NRK,S,C2		erty s	8.8		_4)	_4)	61	116	173	282	_4)	_4)
aracteris esistance N _{Rk,s,C2}	Stainless steel R and	Property class	_50	[-]	_4)	_4)	39	72	108	177	_4)	_4)
har res	riigir corrosion	P	_70		_4)	_4)	53	101	152	247	_4)	_4)
O	resistant steel HCR		80		_4)	_4)	61	116	173	282	_4)	_4)
Bearing	capacity under shear	load,	steel	failu	re witho	ut lever	arm ¹⁾					
fischer a	anchor rods, performa	ince ca	atego	ory C	²⁾							
. <u>S</u>	Steel zinc plated		5.8		11(10)	17(16)	25	47	74	106	138	168
haracteristi resistance V _{Rk,s,C1}		arty s	8.8		15(13)	23(21)	34	63	98	141	184	225
aracteris esistano V _{Rk,s,C1}	Stainless steel R and	Property class	50	[kN]	9	15	21	39	61	89	115	141
Characteristic resistance VRK,S,C1		Pro	70		13	20	30	55	86	124	161	197
_	resistant steel HCR		80		15	23	34	63	98	141	184	225
Standar	d threaded rods, perfo	ormano	ce ca	tego	y C1 ²⁾							
<u>.</u>	Stool zine plated		5.8		8(7)	12(11)	17	33	52	74	97	118
rristi of	Steel zinc plated	, rţ	8.8		11	16(14)	24	44	69	99	129	158
Characteristic resistance VRK,S,C1	Stainless steel R and	Property class	50	[kN]	6	11	15	27	43	62	81	99
hara resi	high corrosion	Pro c	70		9	14	21	39	60	87	113	138
ᅙ	resistant steel HCR		80		11	16	24	44	69	99	129	158
fischer a	anchor rods and stand	dard th	read	led ro					ı	I		
			5.8		_4)	_4)	14	27	43	62	_4)	_4)
risti Ice	Steel zinc plated	ي بخ			_4)	_4)	22	44	69	99	_4)	_4)
Steel zinc plated Stainless steel R and high corrosion resistant steel HCR	Property class	8.8 50	[-]	_4)	_4)	14	27	43	62	_4)	_4)	
mara Tesit	high corrosion	Prc cl	70	1 -	_4)	_4)	20	39	60	87	_4)	_4)
ひ	resistant steel HCR		80]	_4)	_4)	22	44	69	99	_4)	_4)
Facto	r for the annular gap	αgap		[-]				0,5 (1,0) ³⁾	•		
1) Parti	ial factors for performar		anon-		r C2 se	table C	14 2·	`				

¹⁾ Partial factors for performance category C1 or C2 see table C14.2; for fischer anchor rods FIS A / RG M the factor for steel ductility is 1,0

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Performances

Characteristic values for steel failure under tension / shear load for fischer anchor rods and standard threaded rods under seismic action (performance category C1 / C2)

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²⁾ Values in brackets are valid for undersized threaded rods with smaller stress area A_s for hot dip galvanised standard threaded rods according to EN ISO 10684:2004+AC:2009.

³⁾ Values in brackets are valid for filled annular gaps between the anchor rod and the through-hole in the attachment. It is necessary to use the fischer filling disc according to Annex A 1 and A 3

⁴⁾ No performance assessed

Table C14.1: Characteristic values for steel failure under tension / shear load for of reinforcing bars (B500B) under seismic action performance category C1												
Nominal diamete	r of the bar		ф	8	10	12	14	16	20	25	28	32
Bearing capacity	Bearing capacity under tension load, steel failure ¹⁾											
Reinforcing bar I	B500B acc. to	DIN 488-2:20	009-0	8, perf	orman	ce cate	gory C	1				
Characteristic res	istance	$N_{Rk,s,C1}$	[kN]	28	44	63	85	111	173	270	339	443
Bearing capacity under shear load, steel failure without lever arm ¹⁾												
Reinforcing bar I	Reinforcing bar B500B acc. to DIN 488-2:2009-08, performance category C1											

22

15

39

61

95

119

155

Characteristic resistance

Table C14.2: Partial factors for fischer anchor rods, standard threaded rods and reinforcing bars (B500B) under seismic action performance category C1 or C2

10

[kN]

 $V_{Rk,s,C1}$

Ancl	nor rod / standard threa	ded rod			М8	M10	M12	2 1	M16	M20		M24	M27	M30
Nom	inal diameter of the bar			ф	8	10	12	14	1	6 2	20	25	28	32
Tens	sion load, steel failure1)													
z	Steel zinc plated		5.8						1,5	50				
Partial factor _{Yмs,N}	Steel zilic plated	Property class	8.8						1,5	50				
ctor	Stainless steel R and	50	r 1					2,8	36					
a fa	high corrosion	70	[-]					1,50 ²⁾	/ 1,87					
arti	resistant steel HCR		80		1,60									
	Reinforcing bar	B5	500B		1,40									
Shea	ar load, steel failure ¹⁾													
>	Stool zing plated		5.8		1,25									
γMs,	Steel zinc plated	<u>}</u> ,	8.8						1,2	25				
ctor	Steel zinc plated Stainless steel R and high corrosion resistant steel HCR								2,3	38				
high corrosion				[-]					1,25 ²⁾	/ 1,56				
resistant steel HCR			80	1,33										
	Reinforcing bar						1,5	50						

¹⁾ In absence of other national regulations

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Characteristic values for steel failure under tension / shear load for reinforcing bars under seismic action (performance category C1); partial factors (performance category C1 / C2)

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¹⁾ Partial factors for performance category C1 see table C14.2

²⁾ Only admissible for high corrosion resistant steel HCR, with f_{yk} / $f_{uk} \ge 0.8$ and $A_5 > 12$ % (e.g. fischer anchor rods)

Characteristic values for combined pull-out and concrete failure for fischer Table C15.1: anchor rods and standard threaded rods in hammer drilled holes with injection mortar FIS SB or resin capsule RSB under seismic action performance category C1

Anchor r	od /	standard thread	led rod		М8	M10	M12	M16	M20	M24	M27 ¹⁾	M30
Characte	eristi	c bond resistan	ce, com	bined pul	llout an	d concre	ete cone	failure				
		ing with standar oncrete; resin ca					illed hol	es)				
	l:	24 °C / 40 °C			4,6	5,0	5,6	5,6	5,6	5,6	5,6	6,4
Tem- perature	II:	50 °C / 80 °C	_	[N/mm ²]	4,3	4,6	5,6	5,6	5,6	5,6	5,3	6,0
range	III:	72 °C / 120 °C	τ _{Rk,C1}	[14/111111-]	3,9	4,3	4,9	4,9	4,9	4,9	4,5	5,1
	IV:	90 °C / 150 °C			3,6	3,9	4,5	4,5	4,5	4,5	4,1	4,7
Installati	on fa	actors										
Dry or wet concrete			26	[_]	·			1,	,0			
Water fille	later filled hole		γinst	[-]	1,2	2 ²⁾			1,0) ²⁾		

¹⁾ Only use with injection mortar FIS SB

Table C15.2: Characteristic values for combined pull-out and concrete failure for reinforcing bars in hammer drilled holes with injection mortar FIS SB under seismic action performance category C1

Nominal	dian	neter of the bar		ф	8	10	12	14	16	20	25	28	32
Characte	eristi	c bond resistan	ce, com	bined pul	llout an	d cond	rete co	ne fail	ure				
Hammer	lammer-drilling with standard drill bit or hollow drill bit (dry or wet concrete)												
	I:	24 °C / 40 °C			3,2	4,3	4,5	4,5	5,3	4,5	4,5	4,5	5,1
Tem-	II:	50 °C / 80 °C	_	[N/mm²]	3,2	3,9	4,1	4,1	4,9	4,5	4,5	4,5	5,1
perature range	III:	72 °C / 120 °C	τ _{Rk,C1}		2,8	3,6	3,8	3,8	4,5	4,1	4,1	4,1	4,7
	IV:	90 °C / 150 °C			2,5	3,2	3,4	3,4	4,1	3,8	3,8	3,8	4,3
Installati	stallation factors												
Dry or we	Dry or wet concrete γ_{inst} [-] 1,0												

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Characteristic values for combined pull-out and concrete failure under seismic action (performance category C1) for fischer anchor rods, standard threaded rods and reinf. bars Annex C 15

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²⁾ Only use with resin capsule RSB in water filled hole

Table C16.1: Characteristic values for combined pull-out and concrete failure for for fischer anchor rods and standard threaded rods in hammer drilled holes with injection mortar FIS SB under seismic action performance category C2

Anchor r	od /	standard threa	ded rod		M12	M16	M20	M24		
Characte	risti	c bond resistan	ice, com	bined pu	llout and concre	ete cone failure				
Hammer	-drill	ing with standa	rd drill b	it or holl	ow drill bit (dry	or wet concrete	·)			
	1:	24 °C / 40 °C			4,5	3,2	2,6	3,0		
Tem-	II:	50 °C / 80 °C	_	[N]/21	4,5	3,2	2,6	3,0		
perature range	III:	72 °C / 120 °C	TRk,C2	[N/mm ²]	3,9	2,7	2,3	2,6		
J	IV:	90 °C / 150 °C	-		3,6	2,5	2,1	2,4		
Installati	on fa	actors	-							
Dry or we	et cor	ncrete	γinst	[-]		1	,0			
Displace	men	t-Factors for te	nsion loa	ad ¹⁾						
δn,c2 (DLS)-	Factor		[100 top // N	1/22/22/21	0,09	0,10	0,11	0,12		
δ N,C2 (ULS)-	Factor		[mm/(r	N/mm²)]	0,15	0,17	0,17	0,18		
Displacement-Factors for shear load ²⁾										
δ v,c2 (DLS)-	Factor		F	/L N 17	0,18	0,10	0,07	0,06		
δ v,c2 (ULS)-	Factor		[mm	n/kN]	0,25	0,14	0,11	0,09		

1) Calculation of effective displacement:

 $\delta_{\text{N,C2 (DLS)}} = \delta_{\text{N,C2 (DLS)-Factor}} \cdot \tau_{\text{Ed}}$

 $\delta_{N,C2}$ (ULS) = $\delta_{N,C2}$ (ULS)-Factor · τ_{Ed}

 $(\tau_{Ed}$: Design value of the applied tensile stress)

²⁾ Calculation of effective displacement:

 $\delta_{V,C2 \, (DLS)} = \delta_{V,C2 \, (DLS)\text{-Factor}} \cdot V_{Ed}$

 $\delta_{V,C2\;(ULS)} = \delta_{V,C2\;(ULS)\text{-Factor}} \cdot V_{Ed}$

(V_{Ed}: Design value of the applied shear force)

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Performances

Characteristic values for combined pull-out and concrete failure under seismic action (performance category C2) for fischer anchor rods and standard threaded rods

Annex C 16

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