

DECLARATION OF PERFORMANCE



DoP: 0135

for fischer injection system FIS EM Plus (Bonded anchor for use in concrete) - EN

1. Unique identification code of the product-type: DoP: 0135

2. Intended use/es: Post-installed fastening in cracked or uncracked concrete, see appendix, especially Annexes B 1 to B 13

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

4. Authorised representative: --

5. System/s of AVCP: 1

6. European Assessment Document: EAD 330499-00-0601

European Technical Assessment: ETA-17/0979; 2018-04-06

Technical Assessment Body: DIBt

Notified body/ies: 1343 - MPA Darmstadt

7. Declared performance/s:

Mechanical resistance and stability (BWR 1)

- Characteristic values under static and quasi-static action, Displacements: See appendix, especially Annexes C 1 to C 10
- Characteristic values for seismic performance categories C1 and C2, Displacements: See appendix, especially Annexes C 11 to C 14

Safety in case of fire (BWR 2)

Reaction to fire: Anchorages satisfy requirements for Class A 1

• Resistance to fire: NPD

Hygiene, health and the environment (BWR 3)

• Content, emission and/or release of dangerous substances: NPD

8. 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:

Andreas Bucher, Dipl.-Ing.

Wolfgang Hengesbach, Dipl.-Ing., Dipl.-Wirtsch.-Ing.

Tumlingen, 2018-04-12

- 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.

1. V. A. Bull i. V. W. Mylal

Specific Part

1 Technical description of the product

The fischer injection system FIS EM Plus is a bonded anchor consisting of a cartridge with injection mortar fischer FIS EM Plus and a steel element according to Annex 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 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 values under static and quasi-static action, displacements	See Annex C 1 to C 10
Characteristic values for seismic performance categories C1 and C2, displacements	See Annex C 11 to C 14

3.2 Hygiene, health and the environment (BWR 3)

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

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

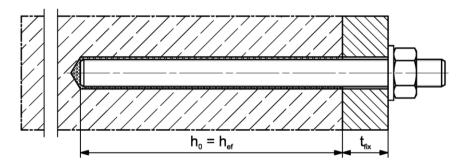
In accordance with EAD 330499 according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011 the applicable European legal act is: [96/582/EC].

The system to be applied is: 1

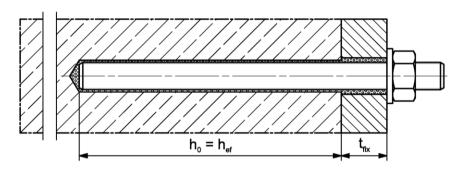
Installation conditions part 1

fischer anchor rod

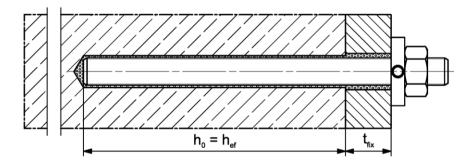
Pre positioned installation



Push through installation (annular gap filled with mortar)



Pre-positioned or push through installation with subsequently pressed filling disk (annular gap filled with mortar)



Figures not to scale

 h_0 = drill hole depth

h_{ef} = effective embedment depth

 t_{fix} = thickness of fixture

fischer injection system FIS EM Plus

Product description

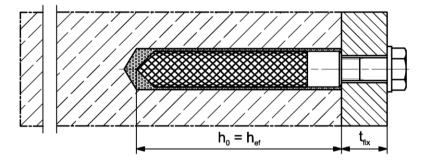
Installation conditions part 1

Annex A 1

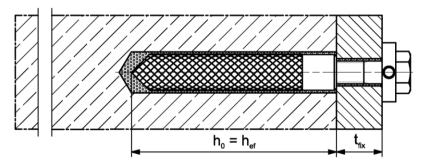
Installation conditions part 2

fischer internal threaded anchor RG MI

Pre positioned installation



Pre-positioned installation with subsequently pressed filling disk (annular gap filled with mortar)



Figures not to scale

 h_0 = drill hole depth

 $h_{ef} = effective embedment depth$

 t_{fix} = thickness of fixture

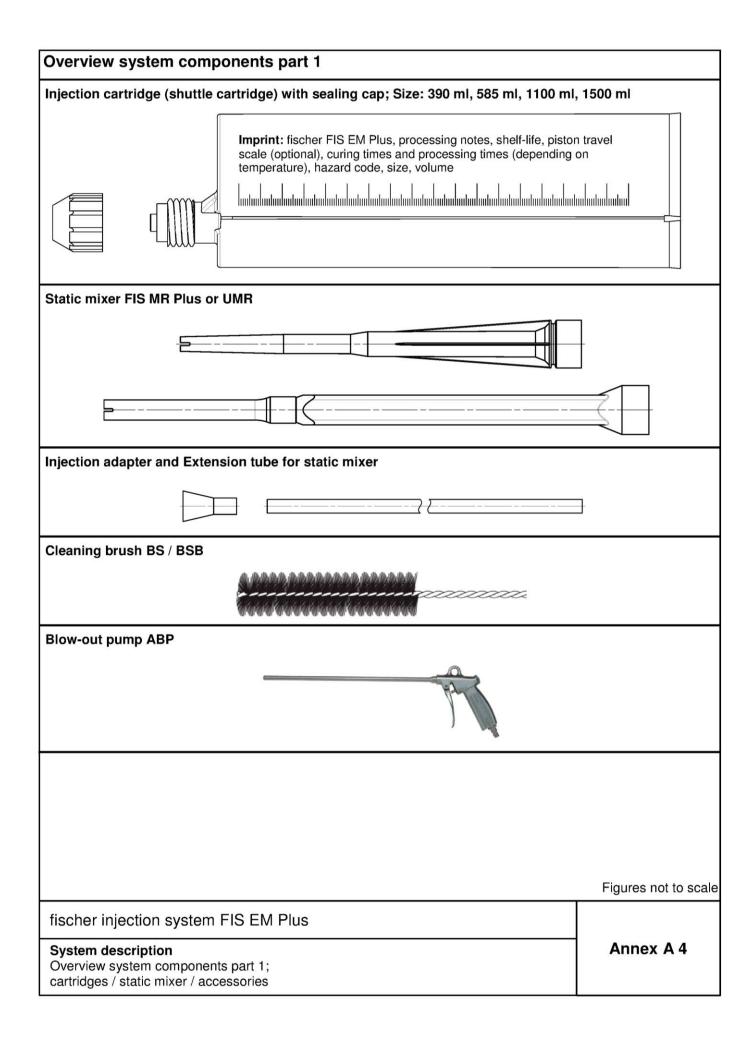
fischer injection system FIS EM Plus

Product description

Installation conditions part 2

Annex A 2

Installation conditions part 3 Reinforcing bar $h_0 = h_{ef}$ fischer rebar anchor FRA Pre positioned installation h_{o} Push through installation (annular gap filled with mortar) h_0 Figures not to scale h_0 = drill hole depth h_{ef} = effective embedment depth t_{fix} = thickness of fixture fischer injection system FIS EM Plus Annex A 3 **Product description** Installation conditions part 3



Overview system components part 2 fischer anchor rod Size: M8, M10, M12, M14, M16, M20, M22, M24, M27, M30 fischer internal threaded anchor RG MI Size: M8, M10, M12, M16, M20 Screw / threaded rod / washer / hexagon nut fischer filling disk FFD with injection adapter Reinforcing bar Nominal diameter: \$\phi8\$, \$\phi10\$, \$\phi12\$, \$\phi14\$, \$\phi16\$, \$\phi18\$, \$\phi20\$, \$\phi22\$, \$\phi24\$, \$\phi25\$, \$\phi26\$, \$\phi26\$, \$\phi28\$, \$\phi30\$, \$\phi32\$, \$\phi34\$, \$\phi36\$, \$\phi40\$ fischer rebar anchor FRA Size: M12, M16, M20, M24 Figures not to scale fischer injection system FIS EM Plus Annex A 5 System description Overview system components part 2;

steel components

Part	Designation		Mate	rial	
1	Injection cartridge		Mortar, hard	lener, filler	
	Steel grade	Steel, zinc plated	Stainles A		High corrosion resistant steel C
2	Anchor rod		EN ISO 898-1:2013 zinc plated ≥ 5 μm, EN ISO 4042:1999 A2K or iot-dip galvanized ≥ 40 μm EN ISO 10684:2004 f_{uk} ≤ 1000 N/mm ² A_5 > 12% $EN ISO 3506-1:2009$ 1.4401; 1.4404; 1.4578; 1.4439; 1.4362; 1.4062, 1.4662, 1.4462; EN 10088-1:2014 f_{uk} ≤ 1000 N/mm ² A_5 > 12%		
3	Washer ISO 7089:2000	zinc plated ≥ 5 μm, EN ISO 4042:1999 A2K or hot-dip galvanised ≥ 40 μm EN ISO 10684:2004	1.4401; 1.4578; 1.4439; EN 1008	1.4571; 1.4362;	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 4042:1999 A2K or hot-dip galvanised ≥ 40 µm EN ISO 10684:2004	50, 70 or 80 50, 7 EN ISO 3506-1:2009 EN ISO 3 1.4401; 1.4404; 1.4578; 1.4565		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 4042:1999 A2K	Property EN ISO 35 1.4401; 1.44 1.4571; 1.44 EN 1008	506-1:2009 104; 1.4578; 139; 1.4362;	Property class 70 EN ISO 3506-1:2009 1.4565; 1.4529; EN 10088-1:2014
6	Commercial standard screw or anchor / 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 4042:1999 A2K A ₅ > 8 % fracture elongation	Property EN ISO 35 1.4401; 1.44 1.4571; 1.44 EN 1008 A ₅ > 8 % fractu	506-1:2009 404; 1.4578; 439; 1.4362; 8-1:2014	Property class 70 EN ISO 3506-1:2009 1.4565; 1.4529; EN 10088-1:2014 $A_5 > 8$ % fracture elongation
7	fischer filling disk FFD similar to DIN 6319-G	zinc plated ≥ 5 μm, EN ISO 4042:1999 A2K or hot-dip galvanised ≥ 40 μm EN ISO 10684:2004	1.4401; 1.44 1.4571; 1.44 EN 1008		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 of $f_{uk} = f_{tk} = k \cdot f_{yk}$		992-1-1:2004+/	AC:2010
9	fischer rebar anchor FRA	70 or 80 :2009 , 1.4401, 1.4404, 1.4571 , 1.4362, 1.4062 14			
Prod	her injection system duct description erials	FIS EM Plus			Annex A 6

Specifications of intended use (part 1) **Table B1.1:** Overview use and performance categories FIS EM Plus with ... Anchorages subject to Anchor rod fischer internal Reinforcing bar fischer rebar threaded anchor anchor **FRA** RG MI KKKKKKKKKKKKKK SKARRIKANIAK ING KARRIKAK KARA Hammer drilling with standard drill all sizes bit Hammer drilling with hollow drill bit (Heller "Duster Nominal drill bit diameter (d₀) Expert"; Bosch 12 mm to 35 mm Speed Clean"; Hilti TE-CD, TE-YD")1) Diamond drilling all sizes Tables: Tables: Tables: Tables: uncracked C1.1 C2.1 C3.1 C3.2 concrete Static and quasi C4.1 all sizes C4.1 C4.1 all sizes C4.1 all sizes all sizes static load, in cracked C8.1 C5.1 C6.1 C7.1 concrete C9.1 C9.2 C10.1 C10.2 Tables: Tables: M10 φ10 C11.1 C12.1 Seismic C1 to to C12.2 C12.2 performance M30 ф32 C13.1 C13.2 category (only hammer drilling with M12 Tables: standard / hollow M16 C11.1 C2 drill bits) M20 C12.2 M24 C14.1 dry or wet 11 all sizes concrete Use category water filled 12 all sizes hole D3 Installation direction (downward and horizontal and upwards (e.g. overhead) installation) Installation $T_{i,min} = 0$ °C to $T_{i,max} = +40$ °C temperature Temperature (max. short term temperature +60 °C; -40 °C to +60 °C range I max. long term temperature +35 °C) In-service temperature Temperature (max. short term temperature +72 °C; -40 °C to +72 °C range II max. long term temperature +50 °C) 1) Further applicable hollow drill bits can be found on the homepage of fischer: www.fischer.de fischer injection system FIS EM Plus Annex B 1 Intended Use Specifications (part 1)

Specifications of intended use (part 2)

Base materials:

 Reinforced or unreinforced normal weight concrete without fibres of strength classes C20/25 to C50/60 according to EN 206-1:2013

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions (zinc coated steel, stainless steel or high corrosion resistant steel)
- Structures subject to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal condition, if no particular aggressive conditions exist (stainless steel or high corrosion resistant steel)
- Structures subject to external atmospheric exposure, to permanently damp internal conditions or in other particular aggressive conditions (high corrosion resistant steel)

Note: Particular aggressive conditions are e. g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e. g. in desulphurization plants or road tunnels where de-icing materials are used)

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 FprEN 1992-4:2017 and EOTA Technical Report TR 055

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 injection system FIS EM Plus	
Intended Use Specifications (part 2)	Annex B 2

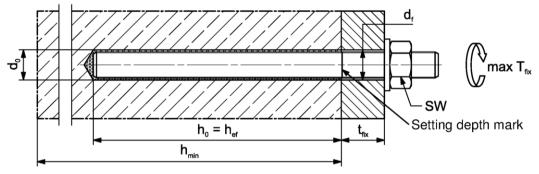
Table B3.1: Installation parameters for anchor rods													
Anchor rods			Thread	М8	M10	M12	M14	M16	M20	M22	M24	M27	M30
Width across flats		SW		13	17	19	22	24	30	32	36	41	46
Nominal drill hole di	ameter	d ₀		10	12	14	16	18	24	25	28	30	35
Drill hole depth		h_0						h ₀ =	h _{ef}				
Effective		$h_{\text{ef, min}}$		60	60	70	75	80	90	93	96	108	120
embedment depth		h _{ef, max}],,[160	200	240	280	320	400	440	480	540	600
Diameter of the clearance hole of	pre positioned installation	d_{f}	[mm]	9	12	14	16	18	22	24	26	30	33
the fixture	push through installation	d_{f}		12	14	16	18	20	26	28	30	33	40
Minimum thickness of concrete h _{min}				n _{ef} + 30 (≥ 100)				h	l _{ef} + 20	l ₀			
Maximum torque mo attachment of the fix		max T _{fix}	[Nm]	10	20	40	50	60	120	135	150	200	300



Marking (on random place) fischer anchor rod:

Property class 8.8, stainless steel, property class 80 and high corrosion resistant steel, property class 80: • Stainless steel A4, property class 50 and high corrosion resistant steel, property class 50: • • Alternatively: Colour coding according to DIN 976-1

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 6, Table A6.1
- Inspection certificate 3.1 according to EN 10204:2004, the documents have to be stored
- Setting depth is marked

Figures not to scale

fischer injection system FIS EM Plus	
Intended Use Installation parameters anchor rods	Annex B 3

Table B4.1: Minimum spacing and minimum edge distance for anchor rods and reinforcing bars											
Anchor rods			M8	M10	M12	M14	M16	-	M20	M22	M24
Reinforcing bars (nominal diame	ter)	ф	8	10	12	14	16	18	20	22	24
Minimum edge distance											
Uncracked / cracked concrete	C _{min} _{Le}	mm]	40	45	45	45	50	55	55	55	60
Minimum spacing	S _{min}	,,,,,,,,,,,,				accordii	ng to Ar	nnex B5	5		
Minimum spacing											
Uncracked / cracked concrete	S _{min}	mm]	40	45	55	60	65	85	85	95	105
Minimum edge distance	C _{min} [i	'''''				accordii	ng to Ar	nnex B5	5		
Required projecting area											
Uncracked concrete	, [1	000	8	13	22	23	24	38,5	38,5	39,5	40
Cracked concrete	A _{sp,req} m	nm²]	6,5	10	16,5	17,5	18,5	29,5	29,5	30	30,5
Cracked concrete Anchor rods	A _{sp,req} m	nm²]	6,5	-	16,5 M27	17,5	18,5 M30	29,5	29,5	30	30,5
		nm²] ф	•	- 26	· ·		·	29,5 - 32	29,5 - 34	30 - 36	30,5 - 40
Anchor rods			-	-	M27	-	M30	-	-	-	-
Anchor rods Reinforcing bars (nominal diame	eter)	ф	-	-	M27	-	M30	-	-	-	-
Anchor rods Reinforcing bars (nominal diame Minimum edge distance	eter)		- 25	- 26	M27 - 75	- 28	M30 30 80	- 32	- 34	- 36	- 40
Anchor rods Reinforcing bars (nominal diame Minimum edge distance Uncracked / cracked concrete	cter)	ф	- 25	- 26	M27 - 75	- 28	M30 30 80	- 32	- 34	- 36	- 40
Anchor rods Reinforcing bars (nominal diame Minimum edge distance Uncracked / cracked concrete Minimum spacing	C _{min} [r	ф mm]-	- 25	- 26	M27 - 75	- 28	M30 30 80	- 32	- 34	- 36	- 40
Anchor rods Reinforcing bars (nominal diame Minimum edge distance Uncracked / cracked concrete Minimum spacing Minimum spacing	C _{min} [r	ф	- 25 75	- 26 75	M27 - 75	- 28 80 accordi	M30 30 80 ng to Ar	- 32 120 nnex B5	- 34 120	- 36	- 40 175
Anchor rods Reinforcing bars (nominal diame Minimum edge distance Uncracked / cracked concrete Minimum spacing Minimum spacing Uncracked / cracked concrete	c _{min} [r	ф mm]-	- 25 75	- 26 75	M27 - 75	- 28 80 accordii	M30 30 80 ng to Ar	- 32 120 nnex B5	- 34 120	- 36	- 40
Anchor rods Reinforcing bars (nominal diame Minimum edge distance Uncracked / cracked concrete Minimum spacing Minimum spacing Uncracked / cracked concrete Minimum edge distance	C _{min} [r	ф mm]-	- 25 75	- 26 75	M27 - 75	- 28 80 accordii	M30 30 80 ng to Ar	- 32 120 nnex B5	- 34 120	- 36	- 40 175

Splitting failure for minimum edge distance and spacing in dependence of the effective embedment depth h_{ef} .

For the calculation of minimum spacing and minimum edge distance of anchors in combination with different embedment depths and thicknesses of concrete members the following equation shall be fulfilled:

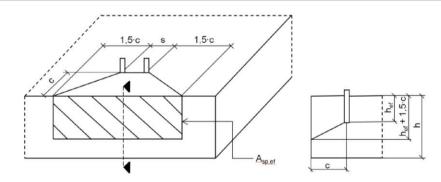
$$A_{sp,req} < A_{sp,t}$$

 $A_{\text{sp,req}} = \text{required projecting area}$

 $A_{sp,t} = A_{sp,ef}$ = effective projecting area (according to Annex B5)

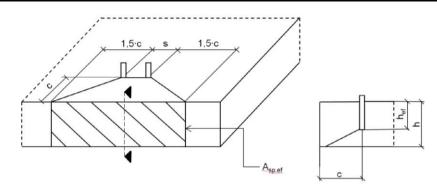
fischer injection system FIS EM Plus	
Intended Use Minimum spacing and edge distance for anchor rods and reinforcing bars	Annex B 4

Table B5.1: Effective projecting area $A_{sp,t}$ with concrete member thickness $h > h_{ef} + 1,5 \cdot c$ and $h \ge h_{min}$



			10	
Single anchor		$A_{sp,t} = (3 \cdot c) \cdot (h_{ef} + 1,5 \cdot c)$	[mm²]	with a > a
Group of anchors with	s > 3 · c	$A_{sp,t} = (6 \cdot c) \cdot (h_{ef} + 1,5 \cdot c)$	[mm²]	with $c \ge c_{min}$
Group of anchors with	s ≤ 3 · c	$A_{sp,t} = (3 \cdot c + s) \cdot (h_{ef} + 1, 5 \cdot c)$	[mm²]	with $c \ge c_{min}$ and $s \ge s_{min}$

Table B5.2: Effektive projecting area $A_{sp,t}$ with concrete member thickness $h \le h_{ef} + 1,5 \cdot c$ and $h \ge h_{min}$



Single anchor		$A_{sp,t} = 3 \cdot c \cdot existing h$	[mm²]	with a > a	
Group of anchors with	s > 3 · c	$A_{sp,t} = 6 \cdot c \cdot existing h$	[mm²]	with c ≥ c _{min}	
Group of anchors with	s ≤ 3 · c	$A_{sp,t} = (3 \cdot c + s) \cdot existing h$	[mm²]	with c ≥ c _{min} and s ≥ s _{min}	

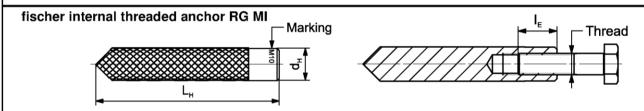
Edge distance and axial spacing shall be rounded to at least 5 mm

Figures not to scale

fischer injection system FIS EM Plus	
Intended Use Minimum thickness of concrete member for anchor rods, minimum spacing and edge distance	Annex B 5

Table B6.1: Installation parameters plus minimum spacing and minimum edge distance for fischer internal threaded anchors RG MI

Internal threaded anchors R	G MI	Thread	М8	M10	M12	M16	M20
Diameter of anchor	$d_{nom} = d_H$		12	16	18	22	28
Nominal drill hole diameter	d_0		14	18	20	24	32
Drill hole depth	h ₀				$h_0 = h_{ef} = L_H$		
Effective embedment depth $(h_{ef} = L_H)$	h _{ef}		90	90	125	160	200
Minimum spacing and minimum edge distance	S _{min} = C _{min}	[mm]	55	65	75	95	125
Diameter of clearance hole in the fixture	d _f		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	$I_{E,min}$		8	10	12	16	20
Maximum torque moment for attachment of the fixture	max T _{fix}	[Nm]	10	20	40	80	120



Marking: Anchor size e. g.: M10

Stainless steel → additional A4; e.g.: M10 A4

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

Retaining bolt or threaded rods (including nut and washer) must comply with the appropriate material and strength class of Annex A 6, Table A6.1

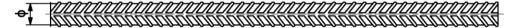
Installation conditions: Installation conditions: Figures not to scale Installation system FIS EM Plus Intended Use Installation parameters internal threaded anchors RG MI Installation parameters internal threaded anchors RG MI

Table B7.1: Installation	param	eters f	or rein	forcing	g bars								
Nominal diameter of the bar		ф	8 ¹⁾	10 ¹⁾	12 ¹⁾	14	16	18	20	22	24		
Nominal drill hole diameter	d ₀		10 12	12 14	14 16	18	20	25	25	30	30		
Drill hole depth	h ₀		$h_0 = h_{ef}$										
Effective	h _{ef,min}	[mm]	60	60	70	75	80	85	90	94	98		
embedment depth	h _{ef,max}	[160	200	240	280	320	360	400	440	480		
Minimum thickness of concrete member	h_{min} $h_{ef} + 30$ $h_{ef} + 2d_0$ $h_{ef} + 2d_0$												
Nominal diameter of the bar		ф	25	26	28	30	32	34	36	40			
Nominal drill hole diameter	d_0		30	35	35	40	40	40	45	55	-		
Drill hole depth	h ₀]					$h_0 = h_{ef}$						
Effective	h _{ef,min}	[mm]	100	104	112	120	128	136	144	160	-		
embedment depth	h _{ef,max}	1 [111111]	500	520	560	600	640	680	720	800	-		
Minimum thickness of concrete member	h _{min}		h _{ef} + 2d ₀										

¹⁾ Both drill hole diameters can be used

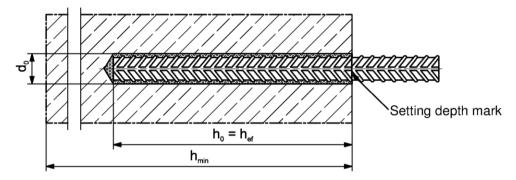
Reinforcing bar

of concrete member



- 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:



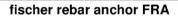
Figures not to scale

fischer injection system FIS EM Plus	
Intended Use Installation parameters reinforcing bars	Annex B 7

Table B8.1:	Installation parameters plus minimum spacing and minimum edge distance
	for fischer rebar anchor FRA

Rebar anchor F	RA		Thread	M1	2 ¹⁾	M16	M20	M24		
Nominal diamete	er of the bar	ф		1	2	16	20	25		
Width across flat	ts	SW]	1	9	24	30	36		
Nominal drill hole	e diameter	d _o]	14	16	20	25	30		
Drill hole depth		h ₀]			h _{ef}	+ l _e			
Effective embed	h _{ef,min}		7	0	80	90	96			
Effective embed	h _{ef,max}		14	Ю	220	300	380			
Distance concret welded joint	te surface to	l _e	[]	100						
Minimum spacing and minimum edge distance		S _{min} = C _{min}	[mm]	55		65	85	105		
Diameter of clearance hole	pre positioned anchorage	≤ d _f		1	14 18 22	22	26			
in the fixture	push through anchorage	≤ d _f		1	18 22 26		32			
Minimum thickne of concrete mem		h _{min}			$h_0 + 30$					
Maximum torque moment for attachment of the fixture		max T _{fix}	[Nm]	4	0	60 120		150		

¹⁾ Both drill hole diameters can be used

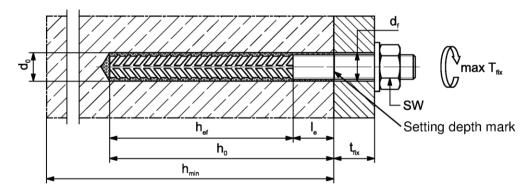


Marking frontal e. g:

FRA (for stainless steel);

> FRA C (for high corrosion resistant steel)

Installation conditions:



Figures not to scale

fischer injection system FIS EM Plus

Intended Use

Installation parameters rebar anchor FRA

Table B9.1: Parameters of the cleaning brush BS (steel brush)

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

Nominal drill hole diameter	d_0	[mm]	10	12	14	16	18	20	24	25	28	30	32	35	40	45	55
Steel brush diameter	d _b	[mm]	11	14	16	2	0	25	26	27	30		40		42	47	58



Table B9.2 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)

Temperature at anchoring base [°C]	Maximum processing time t _{work}	Minimum curing time t _{cure}
±0 to +4	150 min	90 h
+5 to +9	120 min	40 h
+10 to +19	30 min	18 h
+20 to +29	14 min	10 h
+30 to +40	7 min	5 h

¹⁾ In wet concrete or water filled holes the curing times must be doubled

fischer injection system FIS EM Plus	
Intended Use	Annex B 9
Cleaning brush (steel brush)	
Processing time and curing time	

Installation instructions part 1 Drilling and cleaning the hole (hammer drilling with standard drill bit) Drill the hole. Nominal drill hole diameter do and drill hole depth ho 1 see tables B3.1, B6.1, B7.1, B8.1 Cleaning the drill hole: 2 Blow out the drill hole twice, with oil free compressed air (p ≥ 6 bar) Brush the drill hole twice. For drill hole diameter ≥ 30 mm use a power drill. 3 For deep holes use an extension. Corresponding brushes see table B9.1 Cleaning the drill hole: 4 Blow out the drill hole twice, with oil free compressed air (p ≥ 6 bar) Go to step 6 Drilling and cleaning the hole (hammer drilling with hollow drill bit) Check a suitable hollow drill (see table B1.1) 1 for correct operation of the dust extraction Use a suitable dust extraction system, e. g. Bosch GAS 35 M AFC or a comparable dust extraction system with equivalent performance data 2 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 do and drill hole depth ho see tables B3.1, B6.1, B7.1, B8.1 Go to step 6 fischer injection system FIS EM Plus Annex B 10 Intended Use Installation instructions part 1

Installation instructions part 2 Drilling and cleaning the hole (wet drilling with diamond drill bit) Drill the hole. Drill hole diameter do and Break the drill core nominal drill hole depth ho 1 and remove it see tables B3.1, B6.1, B7.1, B8.1 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) Brush the drill hole twice using a power drill. 4 Corresponding brushes see table B9.1 5 Blow out the drill hole twice, using oil-free compressed air (p > 6 bar) Preparing the cartridge Remove the sealing cap 6 Screw on the static mixer (the spiral in the static mixer must be clearly visible) 7 Place the cartridge into the dispenser Extrude approximately 10 cm of material out until 8 the resin is evenly grey in colour. Do not use mortar that is not uniformly grey fischer injection system FIS EM Plus

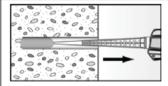
Intended use

Installation instructions part 2

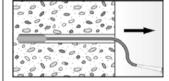
Installation instructions part 3

Injection of the mortar

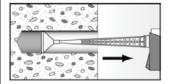
9



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



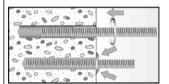
For drill hole depth ≥ 150 mm use an extension tube

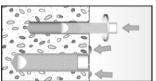


For overhead installation, deep holes ($h_0 > 250$ mm) or drill hole diameter ($d_0 \ge 40$ mm) use an injection-adapter

Installation of anchor rods or fischer internal threaded anchors RG MI

10





Only use clean and oil-free anchor elements. Mark the setting depth of the anchor. 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 anchor element, excess mortar must be emerged around the anchor element.



For overhead installations support the anchor rod with wedges. (e. g. fischer centering wedges)

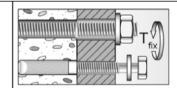
For push through installation fill the annular gap with mortar

11



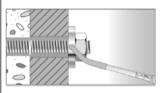
Wait for the specified curing time t_{cure} see **table B9.2**

12



Mounting the fixture max T_{fix} see tables B3.1 and B6.1

Option



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

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

fischer injection system FIS EM Plus

Intended use

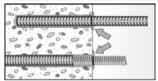
Installation instructions part 3

Installation instructions part 4

Installation reinforcing bars and fischer rebar anchor FRA

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

10



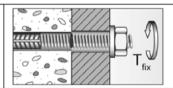
When the setting depth mark is reached, excess mortar must be emerged from the mouth of the drill hole.

11



Wait for the specified curing time t_{cure} see **table B9.2**

12



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

fischer injection system FIS EM Plus

Intended use

Installation instructions part 4

Tabl	Table C1.1: Essential characteristics for the steel bearing capacity under tensile / shear load of fischer anchor rods and standard threaded rods													
Anch	or rod / standard th	readed rod			M8	M10	M12	M14	M16	M20	M22	M24	M27	M30
Beari	ng capacity under t	ensile load	, stee	el failu	ıre									
s,	Otaal sina mlatad		5.8		19	29	43	58	79	123	152	177	230	281
Characterstic esistance N _{Rk,s}	Steel zinc plated		8.8		29	47	68	92	126	196	243	282	368	449
Character esistance	Stainless steel A4	Property	50	[kN]	19	29	43	58	79	123	152	177	230	281
hara iista	and high corrosion	class	70		26	41	59	81	110	172	212	247	322	393
၂၀ နွ	resistant steel C		80	1	30	47	68	92	126	196	243	282	368	449
Partia	al factors 1)													
	5.8									50				
ctor	Steel zinc plated		8.8						1,	50				
al fa	Stainless steel A4	[-]					2,							
artie 7	Steel zinc plated Steel zinc plated													
resistant steel C 80 1,60														
Beari	ng capacity under s	shear load,	steel	failu	'e									
	ut lever arm													
k,s	Stool zine plated		5.8		9	15	21	29	39	61	76	89	115	141
Steel zinc plated		8.8		15	23	34	46	63	98	122	141	184	225	
acte nce	Characterstic Stainless steel A4 and high corrosion resistant steel C	Property class	50	[kN]	9	15	21	29	39	61	76	89	115	141
har			70	1 .	13	20	30	40	55	86	107	124	161	197
CC	resistant steel C		80		15	23	34	46	63	98	122	141	184	225
Ductili	ity factor		k ₇	[-]					1	,0				
with I	ever arm													
×,s	Steel zinc plated		5.8		19	37	65	104	166	324	447	560	833	1123
ct.	Steer zinc plateu	_	8.8		30	60	105	167	266	519	716	896	1333	1797
Charadistance	Stainless steel A4	Property class	50	[Nm]	19	37	65	104	166	324	447	560	833	1123
	and high corrosion		70		26	52	92	146	232	454	626	784	1167	1573
resi	resistant steel C		80		30	60	105	167	266	519	716	896	1333	1797
Partia	al factors ¹⁾													
_	Steel zinc plated		5.8						1,	25				
Partial factor	·		8.8						1,	25				
al fa	Stainless steel A4	Property class	50	[-]					2,	38				
Parti	and high corresion	3.030	70						1,25 ²⁾	/ 1,56				
_	resistant steel C		80						1,	33				
1) In 2) O	¹⁾ In absence of other national regulations ²⁾ Only admissible for steel C, with f_{yk} / $f_{uk} \ge 0.8$ and $A_5 > 12$ % (e.g. fischer anchor rods)													
fisc	her injection syste	em FIS EN	Λ Plu	ıs							Τ			
Esse	Performances Essential characteristics for the steel bearing capacity of fischer anchor rods and standard threaded rods								Annex C 1					

Table C2.1:						el bearing inchors R0	•	nder tensil	e / shear
fischer internal	threade	ed anchors	RG MI		М8	M10	M12	M16	M20
Bearing capacity	y unde	r tensile loa	ad, stee	el fail	ure				
		Property	5.8		19	29	43	79	123
Charact. resistance with	N	class	8.8	[kN]	29	47	68	108	179
screw	$N_{Rk,s}$	Property	A4	נייאן	26	41	59	110	172
		class 70	С		26	41	59	110	172
Partial factors ¹⁾									
		Property	5.8				1,50		
Partial factors		class	8.8] _{.,}			1,50		
Fartial factors	$\gamma_{Ms,N}$	Property	A4	[-]			1,87		
		class 70	С				1,87		
Bearing capacity	y unde	r shear load	d, steel	failu	re				
Without lever ar	m								
		Property	5.8		9,2	14,5	21,1	39,2	62,0
Charact. resistance with	$V^0_{Rk,s}$	class	8.8	וואוז	14,6	23,2	33,7	54,0	90,0
screw	V Rk,s	Property	A4	[kN]	12,8	20,3	29,5	54,8	86,0
00.011		class 70	С		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	${\sf M^0}_{\sf Rk,s}$	class	8.8	 [Nm]	30	60	105	266	519
screw	IVI Rk,s	Property	A4	ַנויאוון 	26	52	92	232	454
		class 70	С		26	52	92	232	454
Partial factors ¹⁾									
		Property	5.8				1,25		
Partial factors		class	8.8	[[1,25		1,25 / 1,50 ²⁾
raniai iaciois	$\gamma_{Ms,V}$	Property	A4	[-]			1,56		
		class 70	С				1,56		

¹⁾ In absence of other national regulations
²⁾ Only for steel failure without lever arm

fischer injection system FIS EM Plus	
Performances Essential characteristics for the steel bearing capacity of fischer internal threaded anchor RG MI	Annex C 2

Table C3.1:	Essential cha				the	ste	eel	bea	arin	g c	ap	aci	ty ι	ınde	er t	ens	ile	/ sh	ear	
Nominal diameter	of the bar		ф	8	10	12	14	16	18	20	22	24	25	26	28	30	32	34	36	40
Bearing capacity (under tensile lo	oad, stee	el failu	ıre																
Characterstic resistance $N_{Rk,s}$ [kN] $A_s \cdot f_{uk}^{1)}$																				
Bearing capacity (under shear lo	ad, steel	failu	re																
Without lever arm																				
Characterstic resist	tance	$V^0_{\rm Rk,s}$	[kN]							C),5 ·	A _s ·	f_{uk}^{-1})						
Ductility factor		k ₇	[-]									0,8								
With lever arm																				
Characteristic resis	tance	M ⁰ _{Rk,s}	[Nm]							1	,2 ·	W _{el}	· f _{uk}	1)						

 $^{^{1)}}$ f_{uk} or f_{yk} respectively must be taken from the specifications of the reinforcing bar

Table C3.2: Essential characteristics for the **steel bearing capacity** under tensile / shear load of **fischer rebar anchors FRA**

fischer rebar anchor FRA			M12	M16	M20	M24				
Bearing capacity under tens	ile load, stee	el failu	ire							
Characterstic resistance	$N_{Rk,s}$	[kN]	63	111	173	270				
Partial factors ¹⁾										
Partial factors	$\gamma_{Ms,N}$	[-]		1	,4					
Bearing capacity under shear load, steel failure										
Without lever arm										
Characterstic resistance	$V^0_{Rk,s}$	[kN]	30	55	86	124				
Ductility factor	k_7	[-]		1	,0					
With lever arm										
Characteristic resistance	${\sf M^0}_{\sf Rk,s}$	[Nm]	92	233	454	785				
Partial factors ¹⁾				•	•					
Partial factors $\gamma_{Ms,V}$ [-] 1,56										

¹⁾ In absence of other national regulations

fischer injection system	FIS	EM	Plus

Performances

Essential characteristics for the steel bearing capacity of reinforcing bars and fischer rebar anchors FRA

Size		racter	istics	und	der	ten	sile	e/s	hea	ar le	oad								
T											All	siz	es						
Tensile load																			
Uncracked cond	rete	k _{ucr,N}										11,()						
Cracked concre	te	k _{cr,N}	[-]									7,7							
Factors for the	compressive strer	gth of	concr	ete	> C	20/2	5												
	C25/30											1,02	2						
	C30/37											1,04	1						
Increasing	C35/45	Ψ_{c}	_{[1}									1,06	6						
factor for τ_{Rk}	C40/50	Ψ_{c}	[-]									1,07	7						
	C45/55											1,08	3						
	C50/60											1,09	9						
Splitting failure)																		
	h / h _{ef} ≥ 2,0										1	,0 h	ef						
Edge distance	$2.0 > h / h_{ef} > 1.3$	$\mathbf{c}_{cr,sp}$	[mm]								4,6 h	ef -	1,8 ł	า					
	h / h _{ef} ≤ 1,3		_ [i]									26							
Spacing		$S_{cr,sp}$									2	Ccr	sp						
Concrete cone	failure																		
Edge distance		$c_{\text{cr},N}$	[mm]								1	,5 h	l _{ef}						
Spacing		$s_{\text{cr},N}$	[]								2	Ccr	,N						
Shear load																			
Robustness fac	tor	γ_{inst}	[-]									1,0							
Concrete pry-o	ut failure																		
Factor for pry-or	ut failure	k_8	[-]									2,0							
Calculation dia	meters																		
Size				M	8	M10		M12	M ²	14	M16	3	M20	M	22	M24	4	M27	M30
fischer anchor re standard thread		d_{nom}		8		10		12	1	4	16		20	2	2	24		27	30
fischer internal threade	d anchors RG MI	d_{nom}	[mm]	12	2	16		18	-		22		28		-	-		-	-
fischer rebar an	chor FRA	d_{nom}		-		-		12	-		16		20		-	25		-	-
Size (nominal d	ameter of the bar)		ф	8	10	12	14	16	18	20	22	24	25	26	28	30	32	34	36 40
Reinforcing bar		d_{nom}	[mm]	8	10	12	14	16	18	20	22	24	25	26	28	30	32	34	36 40

Performances

Essential characteristics under tensile / shear load

stand	ntial charad dard thread acked or c	ded rod	s in h	amme						nor ro	ods ar	nd
Anchor rod / standard th			M8	M10	M12	M14	M16	M20	M22	M24	M27	M30
Combined pullout and c		failure	IVIO	IVITO	IVITZ	10114	WITO	IVIZO	IVIZZ	IVIZ4	IVIZI	IVISO
Calculation diameter	d	[mm]	8	10	12	14	16	20	22	24	27	30
Uncracked concrete	<u> </u>	[]		10	12	14	10	20		24	21	30
Characteristic bond resi	stance in un	cracked (concre	te C20)/25							
Hammer-drilling with stand						ncrete						
Tem- I: 35 °C / 60			18	18	18	17	17	16	15	15	15	14
perature II: 50 °C / 72	τ _{Rk μοτ}	[N/mm ²]	18	17	17	16	16	15	14	14	14	13
Hammer-drilling with stand	dard drill bit o	r hollow d	rill bit (water	filled h	ole)			•			
Tem- I: 35 °C / 60	°C	2	16	16	15	13	13	11	11	10	10	9
perature II: 50 °C / 72	°C $\tau_{Rk,ucr}$	[N/mm ²]	15	14	14	13	12	11	10	10	9	9
range II: 50 °C / 72 Diamond-drilling (dry or w		s well as y				_ '	'-	_ ' '	_ ''	_ 10		
Tem- I: 35 °C / 60		s well as	16	15	13	12	12	10	10	10	9	9
perature	TDk war	[N/mm ²]										
range II: 50 °C / 72	<u></u>		15	14	12	11	11	10	9	9	8	8
Robustness factors		I										
Dry or wet concrete	γ _{inst}	[-]						,0				
Water filled hole	,						1	,4				
Cracked concrete Characteristic bond resi	stance in cra	acked co	ncrete	C20/2	 5							
Hammer-drilling with stand						ncrete	<u> </u>					
Tem- I: 35 °C / 60			7,5	7,5	9	8,5	8,5	8,5	8,5	8,5	8,5	8,5
perature	T _{Rk cr}	[N/mm ²]			9	8,5	8,5	8,5	8,5	8,5		
range			7,5	7,5	9	0,5	0,5	0,5	0,5	0,5	8,5	8,5
Diamond - drilling (dry or v			_	_					Ι_	_	_	
perature — 65 67 66	τ _{Rk cr}	[N/mm²]	7	7	7	7	6	6	7	7	7	7
range II: 50 °C / 72	°C		7	7	7	7	6	6	7	7	7	7
Hammer-drilling with stand	dard drill bit o	r hollow d	rill bit a	and dia	mond-	drilling	(water	filled	nole)			
Tem- I: 35 °C / 60		 [N/mm²]	6	7,5	7,5	7	6	6	6	6	6	6
perature II: 50 °C / 72	°C $ au_{Rk,cr}$	[[14/11111]	6	7	7	7	6	6	6	6	6	6
Robustness factors		1	ı					ı				
Dry or wet concrete		[]					1	,0				
Water filled hole		[-]			1,2					1,4		
fischer injection syst Performances Essential characteristics threaded rods			or fisch	er anch	nor rod	and st	andard	ı		Ann	ex C	5

nternal threaded a Combined pullout Calculation diamete Uncracked concret Characteristic bon Hammer-drilling with					ond drilled		r internal th racked or o	
Calculation diamete Uncracked concret Characteristic bon		/II		M8	M10	M12	M16	M20
Uncracked concrete Characteristic bon	and concre	te con	e failure					
Characteristic bon	r	d	[mm]	12	16	18	22	28
	ie							
Hammer-drilling with	d resistance	e in un	cracked o	concrete C20)/25			
	ı standard dı	<u>rill bit o</u>	r hollow d	rill bit (dry or	wet concrete)	1		
Гет- I: 35°C) / 60 °C		2-	15	14	14	13	12
perature — — — — — — — — — — — — — — — — — — —		$ au_{Rk,ucr}$	[N/mm²]	14	13	13	12	11
Hammer-drilling with	n standard dr	rill bit o	r hollow d	rill bit (water t	filled hole)			
Гет- I: 35 °C				14	12	12	11	10
perature — II: 50 °C		$ au_{Rk,ucr}$	[N/mm²]	13	12	11	10	9
Diamond-drilling (dr		crete a	s well as v			-		
Гет- I: 35 °C	•			13	12	11	10	9
perature II: 50 °C		$ au_{Rk,ucr}$	[N/mm²]	12	11	10	9	8
Robustness factor	s							
Dry or wet concrete						1,0		
Nater filled hole		γ_{inst}	[-]			1,4		
Cracked concrete								
Characteristic bon	d resistance	e in cra	acked cor	crete C20/2	5			
Hammer-drilling with	ı standard dı	rill bit o	r hollow d	rill bit and dia	mond-drilling	(dry or wet c	<u>oncrete)</u>	
Гет- I: 35°C			[N]/21	7	6	6	7	7
perature — — — — — — — — — — — — — — — — — — —	72 °C	$ au_{Rk,cr}$	[N/mm²]	7	6	6	7	7
Hammer-drilling with	standard d	rill bit o	r hollow d	rill bit and dia	mond-drilling	(water filled	hole)	
Гет- I: 35 °С	C / 60 °C		2	7	6,5	6	6	6
1: 35 °C		$\tau_{\text{Rk,cr}}$	[N/mm²]	7	6	6	6	6
perature 50 c	; / 72 °C							
perature ———								
perature II: 50 °C			[-]			1,0		

	Essential hammer o														_					
Nominal diameter	of the bar		φ	8	10	12	14	16	18	20	22	24	25	26	28	30	32	34	36	40
Combined pullout	and concr	ete con	e failure																	
Calculation diamete	er	d	[mm]	8	10	12	14	16	18	20	22	24	25	26	28	30	32	34	36	40
Uncracked concre	te																			
Characteristic bon	nd resistan	ce in un	cracked	con	cre	te C	20/2	25												
Hammer-drilling wit	h standard	drill bit c	r hollow c	irill t	oit (d	dry c	r w	et co	ncre	ete)										
	C / 60 °C		2-	16	15	15	14	14	13	13	13	12	12	12	12	12	12	11	11	11
perature II: 50 °C	C / 72 °C	$\tau_{Rk,ucr}$	[N/mm ²]	15	14	14	13	13	12	12	12	12	11	11	11	11	11	11	10	10
Hammer-drilling wit		drill bit o	r hollow c																	
	C / 60 °C	dilli bit c	11011044 0			14				11	11	10	10	10	10	9	9	9	8	8
perature		$\tau_{Rk,ucr}$	[N/mm ²]																	
range	C / 72 °C			15	14		12		11	11	10	10	9	9	9	9	8	8	8	8
Diamond-drilling (dr	•	ncrete a	s well as					_												
Tem- I: 35 °C	C / 60 °C	τ	[N/mm²]	16	15	13	12	12	11	10	10	10	9	9	9	9	8	8	8	7
range II: 50 °C	C / 72 °C	$ au_{Rk,ucr}$	[[14/11111]	15	14	12	11	11	10	10	9	9	9	8	8	8	8	7	7	7
Robustness factor	rs																			
Dry or wet concrete)		r 1									1,0								
Water filled hole		γinst	[-]									1,4								
Cracked concrete																				
Characteristic bon	nd resistan	ce in cra	acked co	ncre	ete	C20/	25													
Hammer-drilling wit	h standard	drill bit o	r hollow c	irill t	oit (d	dry c	r w	et co	ncre	ete)										
	C / 60 °C		22	7	7	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
perature II: 50 °C	C / 72 °C	$ au_{Rk,cr}$	[N/mm ²]	7	7	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Diamond-drilling (dr	rv or wet co	ncrete)																		
_	C / 60 °C	<u>,</u>		7	7	7	7	6	6	6	7	7	7	7	7	7	5	5	5	5
perature ———		$\tau_{Rk,cr}$	[N/mm ²]	_								7	7	_			5			5
	C / 72 °C		<u> </u>	7	7	7	7	6	6	6	7	′		7	7	7	5	5	5	Э
Hammer-drilling wit		drill bit c	r hollow c								i					_		_	_	_
Tem- I: 35 °C	C / 60 °C	$ au_{Rk,cr}$	 [N/mm²]	6	7,5	6,5	6,5	6,5	6	6	6	6	6	6	6	6	5	5	5	5
range II: 50 °C	C / 72 °C	•HK,Cr	[6	6,5	6,5	6	6	6	6	6	6	6	6	6	6	5	5	5	5
Robustness factor	rs																			
Dry or wet concrete)	2/.	[-]									1,0								
Water filled hole		γinst	[]			1	,2								1,4					
							,								•					
fischer injection Performances Essential characte				or re	info	rcinç	g ba	rs								An	ne	x C	7	

ischer rebar anchor FRA			M12	M16	M20	M24
Combined pullout and conc	rete con	e failure				
Calculation diameter	d	[mm]	12	16	20	25
Incracked concrete						
Characteristic bond resistar	nce in ur	cracked	concrete C20/25	5		
Hammer-drilling with standard	drill bit o	r hollow d	rill bit (dry or we	t concrete)		
Tem- I: 35 °C / 60 °C		[N/mm ²]	15	14	13	12
perature ————————————————————————————————————	- τ _{Rk,ucr}	[14/11111]	14	13	12	12
Hammer-drilling with standard	drill bit o	r hollow d	rill bit (water fille	d hole)		
Tem- I: 35 °C / 60 °C			14	12	11	10
perature II: 50 °C / 72 °C	- τ _{Rk,ucr}	[N/mm ²]	13	12	11	9
ange II: 50 °C / 72 °C Diamond-drilling (dry or wet co	ncrete a	e well as v			.,	
Tem- I: 35 °C / 60 °C	onorete a	- Well as	13	12	10	9
perature 50 07 00 0	- τ _{Rk,ucr}	[N/mm ²]				
range II: 50 °C / 72 °C			12	11	10	9
Robustness factors					0	
Ory or wet concrete Water filled hole	- γ _{inst}	[-]			,0	
				1	,4	
Cracked concrete						
Characteristic bond resistar Hammer-drilling with standard				and-drilling (dry o	r wet concrete)	
Tem- I: 35 °C / 60 °C	drill bit c	THOHOW C	8	8	8	8
perature —	- τ _{Rk,cr}	[N/mm ²]				
range II: 50 °C / 72 °C			8	8	8	8
Hammer-drilling with standard	drill bit o	r hollow d	rill bit and diamo	<u> </u>	<u>r filled hole)</u>	
Tem- I: 35 °C / 60 °C	- τ _{Rk,cr}	[N/mm²]	7	6	6	6
range II: 50 °C / 72 °C	VHK,Cr	[. 4/]	7	6	6	6
Robustness factors						•
Ory or wet concrete	- 26	[_1		1	,0	
Water filled hole	Yinst	[-]	1	,2		1,4
Ory or wet concrete	- Yinst	[-]	1		1	1,4

Table (C9.1: Dis	placem	ents for	ancho	r rods						
Anchor	rod	M8	M10	M12	M14	M16	M20	M22	M24	M27	M30
Displace	ement-Factors	for tensi	le load ¹⁾								
Uncrack	ed or cracked	concrete	; Tempe	rature ra	nge I, II						
$\delta_{\text{N0-Factor}}$	[mm/(N/mm²)]	0,07	0,08	0,09	0,09	0,10	0,11	0,11	0,12	0,12	0,13
$\delta_{\text{N}\infty\text{-Factor}}$	[[[]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]	0,11	0,12	0,13	0,14	0,15	0,16	0,17	0,18	0,19	0,19
Displace	ment-Factors	for shea	r load ²⁾								
Uncrack	ed or cracked	concrete	; Tempe	rature ra	nge I, II						
$\delta_{\text{V0-Factor}}$	[mm/kN]	0,18	0,15	0,12	0,10	0,09	0,07	0,07	0,06	0,05	0,05
δ _{V∞-Factor}	[mm/kN]	0,27	0,22	0,18	0,16	0,14	0,11	0,10	0,09	0,08	0,07

¹⁾ Calculation of effective displacement:

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

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

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

²⁾ Calculation of effective displacement:

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

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

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

Table C9.2: Displacements for fischer internal threaded anchors RG MI

Internal anchor F	threaded RG MI	М8	M10	M12	M16	M20
Displace	ment-Factors	for tensile load1)				
Uncrack	ed or cracked	concrete; Tempe	rature range I, II			
$\delta_{\text{N0-Factor}}$	[mm/(N/mm²)]	0,09	0,10	0,10	0,11	0,13
$\delta_{\text{N}\infty\text{-Factor}}$	[[[[[[]]/([]/[[[]]]]]]	0,13	0,15	0,16	0,17	0,19
Displace	ment-Factors	for shear load ²⁾				
Uncrack	ed or cracked	concrete; Tempe	rature range I, II			
$\delta_{\text{V0-Factor}}$	[mm/kN]]	0,12	0,09	0,08	0,07	0,05
$\delta_{V\infty ext{-Factor}}$	[mm/kN]	0,18	0,14	0,12	0,10	0,08

¹⁾ Calculation of effective displacement:

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

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

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

²⁾ Calculation of effective displacement:

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

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

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

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Displacements for anchor rods and fischer internal threaded anchors RG MI

Table (C10.1:	Dis	plac	eme	nts	or re	einfo	rcin	g ba	rs									
Nominal of the ba	diameter ar	ф	8	10	12	14	16	18	20	22	24	25	26	28	30	32	34	36	40
Displace	ment-Fac	tors	for te	ensile	load	1)													
Uncrack	ed or crac																		
S _{N0-Factor}	[mm/(N/m	m ² \1	0,07	0,08	0,09	0,09	0,10	0,10	0,11	0,11	0,12	0,12	0,12	0,13	0,13	0,13	0,14	0,14	0,15
N∞-Factor	[111117/(13/111	''' /]	0,11	0,12	0,13	0,14	0,15	0,16	0,16	0,17	0,18	0,18	0,18	0,19	0,19	0,20	0,20	0,21	0,22
<u> </u>	ment-Fac																		
Jncrack	ed or crac	ked							<u> </u>										
V0-Factor	[mm/kN	J1					_	_	_	0,07				_		_		_	_
V∞-Factor		٠,	0,27	0,22	0,18	0,16	0,14	0,12	0,11	0,10	0,09	0,09	0,08	0,08	0,07	0,07	0,06	0,06	0,05
1) Calcu	ılation of ef	fecti	ve dis	splace	ement	t:			²⁾ C	Calcul	ation	of eff	ective	displ	acem	ent:			
$\delta_{N0} =$	$\delta_{\text{N0-Factor}} \cdot \tau$	Ed							3	$S_{V0} = \delta$	V0-Fact	$_{ ext{tor}}\cdotV_{E}$	Ēd						
	$\delta_{N^\infty\text{-Factor}}$.									$S_{V\infty} = \delta$									
(τ _{Ed} : I	Design valı	ue of	the a	applie	d ten	sile si	tress)		(V _{Ed} : [Desig	n valu	e of t	he ap	plied	shea	r forc	e)	
Table (C10.2:	Dis	plac	eme	nts 1	or fi	sche	er re	bar a	anch	ors	FRA							
ischer r	ebar anch	or		M	112				M16				M20)			M2	24	
Displace	ment-Fac	tors	for te	ensile	load	¹⁾													
Jncrack	ed or crac	ked	conc	rete;	Tem	perat	ure ra	ange	I, II										
N0-Factor	 [mm/(N/m	m ² \1		0	,09				0,10				0,11				0,1	2	
N∞-Factor	` `	, <u>-</u>			,13				0,15				0,16	5			0,1	8	
	ment-Fac																		
Jncrack	ed or crac	ked	conc			perat	ure ra												
S _{V0-Factor}	[mm/kN	J1			,12				0,09		\perp		0,07				0,0		
Sv∞-Factor		٠,		0	,18				0,14				0,11				0,0)9	
1) Calcu	ılation of ef	fecti	ve dis	splace	ement	t:				²⁾ Ca	culati	on of	effec	tive d	isplad	ceme	nt:		
$\delta_{N0} =$	$\delta_{\text{N0-Factor}}$. 1	Ed								δ_{V0}	$=\delta_{V0}$	-Factor	$\cdot V_{Ed}$						
	$\delta_{N^{\infty}\text{-}Factor}\cdot$											∞-Factor							
(τ _{Ed} : Ι	Design valı	ue of	the a	applie	d ten	sile st	tress)			$(V_E$	d: De	sign v	/alue	of the	appl	ied sł	near f	orce)	
fische	r injectior	ı sy	stem	FIS	EM	Plus													
Perform Displac	nances ements for	rein	forcin	g bar	s and	l fisch	er rel	oar ar	nchors	s FRA						An	nex	C 10)
opia0	231113 101	. 5111	. 0. 0111	5 2u	5 4110			a ul	.0,1010										

Table C11.1: Essential characteristics for the steel bearing capacity under tensile / shear load of fischer anchor rods and standard threaded rods under seismic action performance category C1 or C2

	action	performa	nce	cate	gory C	1 or C	2						
Anch	or rod / standard th	readed rod			M10	M12	M14	M16	M20	M22	M24	M27	M30
Beari	ng capacity under t	ensile load	, stee	el failu	ıre ¹⁾								
fisch	er anchor rods and	standard th	iread	led ro	ds, pei	formar	ice cate	egory C	1				
stic Rk.s.C1	Stool zine plated		5.8		29	43	58	79	123	152	177	230	281
erstic N _{RK.}	Steel zinc plated		8.8		47	68	92	126	196	243	282	368	449
acte	Stainless steel A4	Property class	50	[kN]	29	43	58	79	123	152	177	230	281
Characterstic resistance N _{RLs.}	and high corrosion	Giass	70]	41	59	81	110	172	212	247	322	393
C	resistant steel C		80]	47	68	92	126	196	243	282	368	449
fisch	er anchor rods and	standard th	read	led ro	ds, per	formar	ce cate	egory C	2				
5,0	Ota al ele a el ata el		5.8		-	39	-	72	108	-	177	-	-
erstic N _{Rk,s,C2}	Steel zinc plated		8.8]	-	61	-	116	173	-	282	-	-
Characterstic sistance N _{Rk.s.}	Stainless steel A4	Property class	50	[-]	-	39	-	72	108	-	177	-	-
Characte resistance	and high corrosion	Ciass	70]	-	53	-	101	152	-	247	-	-
O resi	resistant steel C		80		-	61	-	116	173	-	282	-	-
Beari	ng capacity under s	hear load,	steel	failu	re with	out leve	er arm ¹)					
	er anchor rods, perf												
S, C1			5.8		15	21	29	39	61	76	89	115	141
erstic V ^o rk.	Steel zinc plated		8.8		23	34	46	63	98	122	141	184	225
	Stainless steel A4	Property class	50	[kN]	15	21	29	39	61	76	89	115	141
Charact esistance	and high corrosion	Old O	70]	20	30	40	55	86	107	124	161	197
Ciresii	resistant steel C		80]	23	34	46	63	98	122	141	184	225
Stand	dard threaded rods,	performan	се са	tegor	y C1								
s, C1	Stool zine plated		5.8		11	15	20	27	43	53	62	81	99
erstic V ^o rk.	Steel zinc plated		8.8		16	24	32	44	69	85	99	129	158
iaracterstic ance V ⁰ Rk.s	Stainless steel A4	Property class	50	[kN]	11	15	20	27	43	53	62	81	99
Char		Ciass	70]	14	21	28	39	60	75	87	113	138
Cha resista	resistant steel C		80		16	24	32	44	69	85	99	129	158
fisch	er anchor rods and	standard th	read	led ro	ds, per	formar	ice cate	egory C	2				
s, C2			5.8		-	14	-	27	43	-	62	-	-
Characterstic istance Vorkis.	Steel zinc plated		8.8		-	22	-	44	69	-	99	-	-
acte	Stainless steel A4	Property class	50	[-]	-	14	-	27	43	-	62	-	-
Charact resistance	and high corrosion	Class	70		-	20	-	39	60	-	87	-	-
C resi	resistant steel C		80		-	22	-	44	69	-	99	-	-
1) P	artial safety factors for fischer anchor rods	or performar FIS A / RG	nce c M the	ategoi e facto	ry C1 o	r C2 sec	e table (C12.2;					
							,	-		$\overline{}$			
TISC	her injection syste	em FIS EN	/I PIL	JS									

Essential characteristics for the steel bearing capacity for fischer anchor rods and standard threaded rods under seismic action (performance category C1 / C2)

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Table C12.1: Essential characteristics for the **steel bearing capacity** under tensile / shear load of **reinforcing bars (B500B)** under seismic action performance category

Nominal diameter of the bar ϕ 10 12 14 16 18 20 22 24 25 26 28 30 32

Bearing capacity under tensile load, steel failure1)

Reinforcing bar B500B acc. to DIN 488-2:2009-08, performance category C1

Characterstic resistance N_{Rk,s,C1} [kN] 44 63 85 111 140 173 209 249 270 292 339 389 443

Bearing capacity under shear load, steel failure without lever arm¹⁾

Reinforcing bar B500B acc. to DIN 488-2:2009-08, performance category C1

Characterstic resistance V⁰_{Rk,s,C1} [kN] 15 | 22 | 30 | 39 | 49 | 61 | 74 | 88 | 95 | 102 | 119 | 137 | 155

Table C12.2: Partial factors for fischer anchor rods, standard threaded rods and reinforcing bars (B500B) under seismic action performance category C1 or C2

Anch	or rod / standard th	readed ro	d		M10) (/ 112	M14	N	116	M20	M2	22	M24	M2	7	M30
Nom	inal diameter of the	bar		ф	10	12	14	16	18	20	22	24	25	26	28	30	32
Tens	ile load, steel failure	,1)															
z	Stool zine plated		5.8								1,50						
YMs,I	Steel zinc plated		8.8								1,50						
ctor	Stainless steel A4	Property class	50	r 1							2,86						
al fa	and high corrosion		70	[-]						1,5	$50^{2)} / 1$,87					
Partial factor _{Yms, N}	resistant steel C		80								1,60						
"	Reinforcing bar		B500B								1,40						
Shea	r load, steel failure ¹⁾																
>	Steel zinc plated		5.8								1,25						
YMs,	Steer zinc plated		8.8								1,25						
ctor	Stainless steel A4	Property class	50	r 1							2,38						
al fa	and high corrosion	o a do	70	[-]						1,2	25 ²⁾ / 1	,56					
Partial factor ‱,	resistant steel C		80								1,33						
	Reinforcing bar		B500B								1,50						

¹⁾ In absence of other national regulations

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Essential characteristics for the steel bearing capacity for reinforcing bars under seismic action (performance category C1); partial safety factors (performance category C1 / C2)

¹⁾ Partial factors for performance category C1 see table C12.2

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

stan	ntial charac dard threa rmance ca	ded rod	s in ha											
Anchor rod / standard t	readed rod		M10	M12	M14	М	16	M20	M2	22	M24	M2	7	M30
Characteristic bond res		bined pu	llout ar	nd cond		_	$\overline{}$	re						
Hammer-drilling with st	-													
Tem- perature I: 35 °C / 60	τ _{Pk C1}	[N/mm ²]	7,0	7,0	6,7	+-	,0	5,7	6,	_	6,7	6,7	-	6,7
range II: 50 °C / 72	°C		7,0	7,0	6,7		,7	5,7	6,	7	6,7	6,	7	6,7
Hammer-drilling with st	andard drill l	oit or holl	ow dril	ll bit (w	ater fi	lled h	iole)							
Tem- perature I: 35 °C / 60	TPk C1	[N/mm ²]	7,5	7,5	6,5		,7	5,7	5,	_	5,7	5,7	-	5,7
range II: 50 °C / 72	°C		6,8	6,8	6,5	5	,7	5,7	5,	7	5,7	5,7	7	5,7
Robustness factors														
tensile load														
Dry or wet concrete	—— γ _{inst}	[-]						1,0						
Water filled hole	Inst	.,		1	,2						1,4			
shear load		T	1											
All installation conditions	γinst	[-]						1,0						
drille	ntial charad d holes und	der seisn	nic act	tion pe	rform	ance	e ca	tego	ry C	1				
	d holes und bar	der seisn Φ	nic act	tion pe 12 14	rform 16	18	e ca 20	tego 22			ham 26	mer 28	30	32
drille Nominal diameter of the	d holes und bar istance, com	der seisn ф bined pu	nic act	tion pe 12 14 nd cond	16 crete o	18 cone	e ca 20 failu	tego 22 re	ry C	1				32
Nominal diameter of the Characteristic bond res Hammer-drilling with statement 1: 35 °C / 60 perature	bar istance, com andard drill I	der seisn ф bined pu	10 10 10 10 10 10 10 10 10 10 10 10 10 1	tion pe 12 14 nd cond Il bit (di 7,0 6,7	16 crete of 5,7	18 cone vet co	e ca 20 failu oncre 5,7	22 re ete)	ry C 24 6,7	1 25 6,7	26 6,7	28 6,7	30 6,7	4,8
Nominal diameter of the Characteristic bond res Hammer-drilling with statement Temperature I: 35 °C / 60	bar istance, com andard drill I °C °C TRK,C1	φ bined pu oit or holl [N/mm²]	10 10 10 10 10 10 10 10 10 10 10 10 10 1	tion per 12 14 14 14 15 16 17 17 17 17 17 17 17	16 crete c y or w 5,7 5,7	18 cone /et co	20 failu oncre 5,7	tego 22 re ete) 6,7 6,7	ry C 24	25	26	28	30	4,8
Nominal diameter of the Characteristic bond res Hammer-drilling with statement	bar istance, com andard drill I °C °C	φ bined pu oit or holl [N/mm²]	10 10 10 10 10 10 10 10 10 10 10 10 10 1	tion per 12 14 14 14 15 15 15 15 15	16 crete cry or w 5,7 5,7 ater fi	18 cone /et co 5,7 5,7 lled h	20 failu oncre 5,7	tego 22 re ete) 6,7 6,7	6,7 6,7	1 25 6,7 6,7	6,7 6,7	6,7 6,7	30 6,7	4,8
Nominal diameter of the Characteristic bond res Hammer-drilling with statement of the Statement of the Characteristic bond res Hammer-drilling with statement of the Characteristic bond res Hammer-drilling with statement of the Characteristic bond res Tem- I: 35 °C / 60	bar istance, com andard drill I °C TRIK,C1 andard drill I	φ bined pu bit or holl [N/mm²] bit or holl	10 10 10 10 10 10 10 10 10 10 10 10 10 1	tion per 12 14 14 14 15 16 17 17 17 17 17 17 17	16 crete cry or w 5,7 5,7 ater fi	18 cone /et co	20 failu oncre 5,7	tego 22 re ete) 6,7 6,7	ry C 24 6,7	1 25 6,7	26 6,7	28 6,7	30 6,7	4,8
Nominal diameter of the Characteristic bond res Hammer-drilling with statement	bar istance, com andard drill I °C °C TRK,C1 andard drill I	φ bined pu oit or holl [N/mm²]	10 10 10 10 10 10 10 10 10 10 10 10 10 1	tion per 12 14 14 14 15 15 15 15 15	16 crete cry or w 5,7 5,7 ater fi 5,7	18 cone /et co 5,7 5,7 lled h	20 failu oncre 5,7 5,7	tego 22 re ete) 6,7 6,7	6,7 6,7	1 25 6,7 6,7	6,7 6,7	6,7 6,7	6,7 6,7	4,8
Mominal diameter of the Characteristic bond res Hammer-drilling with st Tem- I: 35 °C / 60 perature range II: 50 °C / 72 Hammer-drilling with st Tem- I: 35 °C / 60 perature II: 35 °C / 60	bar istance, com andard drill I °C °C TRK,C1 andard drill I	φ bined pu bit or holl [N/mm²] bit or holl	10 10 10 10 10 10 10 10 10 10 10 10 10 1	tion per 12 14 14 14 15 15 15 15 15	16 crete cry or w 5,7 5,7 ater fi 5,7	18 cone /et co 5,7 lled h	20 failu 5,7 5,7 nole)	tego 22 re ete) 6,7 6,7	6,7 6,7	6,7 6,7	6,7 6,7 5,7	6,7 6,7 5,7	6,7 6,7	4,8
Nominal diameter of the Characteristic bond res Hammer-drilling with statement of the Statement of the Characteristic bond res Hammer-drilling with statement of the Statement of the Character o	bar istance, com andard drill I °C °C TRK,C1 andard drill I	φ bined pu bit or holl [N/mm²] bit or holl	10 10 10 10 10 10 10 10 10 10 10 10 10 1	tion per 12 14 14 14 15 15 15 15 15	16 crete cry or w 5,7 5,7 ater fi 5,7	18 cone /et co 5,7 lled h	20 failu 5,7 5,7 nole)	tego 22 re ete) 6,7 6,7	6,7 6,7	6,7 6,7	6,7 6,7 5,7	6,7 6,7 5,7	6,7 6,7	4,8
Nominal diameter of the Characteristic bond res Hammer-drilling with statement of the Statement of the Characteristic bond res Hammer-drilling with statement of the Statement o	bar istance, com andard drill I °C °C andard drill I °C TRK,C1 C TRK,C1	der seisn phined pu pit or holl [N/mm²] [N/mm²]	10 10 10 10 10 10 10 10 10 10 10 10 10 1	tion per 12 14 14 14 15 15 15 15 15	16 crete cry or w 5,7 5,7 ater fi 5,7	18 cone /et co 5,7 lled h	20 failu 5,7 5,7 nole)	tego 22 re ete) 6,7 6,7	6,7 6,7	6,7 6,7	6,7 6,7 5,7	6,7 6,7 5,7	6,7 6,7	4,8
Nominal diameter of the Characteristic bond res Hammer-drilling with statement of the Statement of the Characteristic bond res Hammer-drilling with statement of the Statement o	bar istance, com andard drill I °C °C TRK,C1 andard drill I	φ bined pu bit or holl [N/mm²] bit or holl	10 10 10 10 10 10 10 10 10 10 10 10 10 1	tion per 12 14 14 14 15 15 15 15 15	16 crete cry or w 5,7 5,7 ater fi 5,7 5,8	18 cone /et co 5,7 lled h	20 failu 5,7 5,7 nole)	tego 22 re ete) 6,7 6,7 5,7	6,7 6,7	6,7 6,7 5,7	6,7 6,7 5,7	6,7 6,7 5,7	6,7 6,7	4,8
Mominal diameter of the Characteristic bond res Hammer-drilling with statement of the State	bar istance, com andard drill I °C °C andard drill I °C TRK,C1 C TRK,C1	der seisn phined pu pit or holl [N/mm²] [N/mm²]	10 10 10 10 10 10 10 10 10 10 10 10 10 1	tion per 12 14 14 14 15 15 15 15 15	16 crete cry or w 5,7 5,7 ater fi 5,7 5,8	18 cone /et co 5,7 lled h	20 failu 5,7 5,7 nole)	tego 22 re ete) 6,7 6,7 5,7	6,7 6,7	6,7 6,7 5,7	6,7 6,7 5,7 5,7	6,7 6,7 5,7	6,7 6,7	4,8
Mominal diameter of the Characteristic bond res Hammer-drilling with statement of the State	bar istance, com andard drill I °C °C andard drill I °C TRK,C1 C TRK,C1	der seisn phined pu pit or holl [N/mm²] [N/mm²]	10 10 10 10 10 10 10 10 10 10 10 10 10 1	tion per 12 14 14 14 15 15 15 15 15	16 crete cry or w 5,7 5,7 ater fi 5,7 5,8	18 cone /et co 5,7 lled h	20 failu 5,7 5,7 nole)	tego 22 re ete) 6,7 6,7 5,7	6,7 6,7	6,7 6,7 5,7	6,7 6,7 5,7 5,7	6,7 6,7 5,7	6,7 6,7	4,
Mominal diameter of the Characteristic bond res Hammer-drilling with statement of the State	bar istance, com andard drill I °C °C andard drill I °C TRK,C1 C TRK,C1	der seisn phined pu pit or holl [N/mm²] [N/mm²]	10 10 10 10 10 10 10 10 10 10 10 10 10 1	tion per 12 14 14 14 15 15 15 15 15	16 crete cry or w 5,7 5,7 ater fi 5,7 5,8	18 cone /et co 5,7 lled h	20 failu 5,7 5,7 nole)	tego 22 re ete) 6,7 6,7 5,7	6,7 6,7	6,7 6,7 5,7	6,7 6,7 5,7 5,7	6,7 6,7 5,7	6,7 6,7	4,
Nominal diameter of the Characteristic bond res Hammer-drilling with statement of the Statement of the Characteristic bond res Hammer-drilling with statement of the Statement o	d holes und bar istance, com andard drill I andard	der seisn phined pu pit or holl [N/mm²] [N/mm²]	10 10 10 10 10 10 10 10 10 10 10 10 10 1	tion per 12 14 14 14 15 15 15 15 15	16 crete cry or w 5,7 5,7 ater fi 5,7 5,8	18 cone /et co 5,7 lled h	20 failu 5,7 5,7 nole)	tego 22 re ete) 6,7 6,7 5,7 1,0	6,7 6,7	6,7 6,7 5,7	6,7 6,7 5,7 5,7	6,7 6,7 5,7	6,7 6,7	4,

Table C14.1: Essential characteristics of **resistance** for **fischer anchor rods** and **standard threaded rods** in hammer drilled holes under seismic action performance category **C2**

Anchor rod / standard threaded rod				M12	M16	M20	M24
Characte	ristic bond resistanc	e, com	bined pu	llout and concre	ete cone failure		
Hammer-	drilling with standar	d drill b	oit or holl	ow drill bit (dry	or wet concrete)	
Tem-	I: 35 °C / 60 °C		[N/mm²]	2,2	3,5	1,8	2,4
perature - range	II: 50 °C / 72 °C	τ _{Rk,C2}		2,2	3,5	1,8	2,4
Hammer-	drilling with standar	d drill b	oit or holl	ow drill bit (wat	er filled hole)		
Tem-	I: 35 °C / 60 °C	_	[N/mm²]	2,3	3,5	1,8	2,1
perature – range	II: 50 °C / 72 °C	τ _{Rk,C2}		2,3	3,5	1,8	2,1
Robustne	ss factors						
Tensile lo	ad						
Dry or wet concrete		.,	[-]	1,0			
Water filled hole		γinst		1,2		1,4	
Shear Ioa	d						
All installation conditions		γ_{inst}	[-]	1,0			
Displacer	nent-Factors for ten	sile loa	d ¹⁾				
$\delta_{N,(DLS) ext{-}Factor}$		[mm/(N/mm²)]		0,09	0,10	0,11	0,12
$\delta_{N,(ULS) ext{-}Factor}$				0,15	0,17	0,17	0,18
Displacer	nent-Factors for she	ar loac	l2)				
$\delta_{ m V,(DLS)}$ -Factor		[mm/kN]		0,18	0,10	0,07	0,06
δ V,(ULS)-Factor		[III	III/KIN]	0,25	0,14	0,11	0,09

¹⁾ Calculation of effective displacement:

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

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

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

²⁾ Calculation of effective displacement:

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

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

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

fischer injection system FIS EM Plus

Performances

Essential characteristics under seismic action (performance category C2) for fischer anchor rods and standard threaded rods