

## DÉCLARATION DES PERFORMANCES

### DoP 0191

pour le système fischer Superbond (fixation à scellement pour utilisation dans le béton)

FR

1. <u>Code d'identification unique du type de produit:</u>	<b>DoP 0191</b>
2. <u>Usage(s) prévu(s):</u>	<b>Fixation dans du béton fissuré ou non fissuré.</b> Voir annexes, en particulier les annexes <b>B1- B15</b>
3. <u>Fabricant:</u>	<b>fischerwerke GmbH &amp; Co. KG, Otto-Hahn-Straße 15, 79211 Denzlingen, Allemagne</b>
4. <u>Mandataire:</u>	-
5. <u>Système(s) d'évaluation et de vérification de la constance des performances:</u>	1
6. <u>Document d'évaluation européen:</u> Evaluation Technique Européenne: Organisme d'évaluation technique: Organisme(s) notifié(s):	<b>EAD 330499-01-0601</b> <b>ETA-12/0258; 2020-06-17</b> <b>DBIb- Deutsches Institut für Bautechnik</b> <b>1343 MPA Darmstadt / 2873 TU Darmstadt</b>
7. <u>Performance(s) déclarée(s):</u> <b>Résistance mécanique et stabilité (BWR 1)</b> Résistance caractéristique à la charge de traction (charge statique et quasi-statique):	Résistance à la rupture de l'acier (charge de Résistance à la rupture par extraction glissement: et rupture du cône béton): Annexes C1- C3 Annexes C4- C10 $\tau_{RK,100}$ = NPD Résistance à la rupture du cône béton: Annexes C4 Distance au bord pour éviter la rupture par fendage sous charge: Annexes C4 Robustesse : Annexes C4-C10, C15, C16 Couple de serrage maxi.: Annexes B4- B8 Distance au bord et entraxe mini.: Annexes B4- B8
Résistance caractéristique à la charge de cisaillement (charge statique et quasi-statique):	Résistance à la rupture de l'acier: Annexes C1- C3 Résistance à la rupture par effet de levier: Annexes C4 Résistance à la rupture du béton en bord de dalle: Annexes C4
Résistance caractéristique et déplacements pour les catégories de performance sismique C1 et C2:	Résistance à la charge de traction, catégorie C1: Annexes C13, C14, C15 Résistance à la charge de traction, catégorie C2: Annexes C13, C14, C16 Résistance à la charge de cisaillement, catégorie C1: Annexes C13, C14 Résistance à la charge de cisaillement, catégorie C2: Annexes C13, C14, C16 Facteur espace annulaire: Annexes C13
Déplacements sous charge à court et long terme :	Déplacements sous charge à court et long terme : Annexes C11- C12
-	
<b>Hygiène, santé et environnement (BWR 3)</b> Contenu, émission et/ou rejet de substances dangereuses:	NPA



8. Documentation technique appropriée et/ou documentation technique spécifique: -

Les performances du produit identifié ci-dessus sont conformes aux performances déclarées. Conformément au règlement (UE) no 305/2011, la présente déclaration des performances est établie sous la seule responsabilité du fabricant mentionné ci-dessus.

Signé pour le fabricant et en son nom par:

Thilo Pregartner, Dr.-Ing.  
Tumlingen, 2020-07-01

Peter Schillinger, Dipl.-Ing.

Cette DoP a été préparée en plusieurs langues. En cas de différend relatif à l'interprétation, la version anglaise prévaudra.

L'annexe comprend des informations volontaires et complémentaires en langue anglaise dépassant les exigences légales (spécifiées de manière neutre).

## 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**

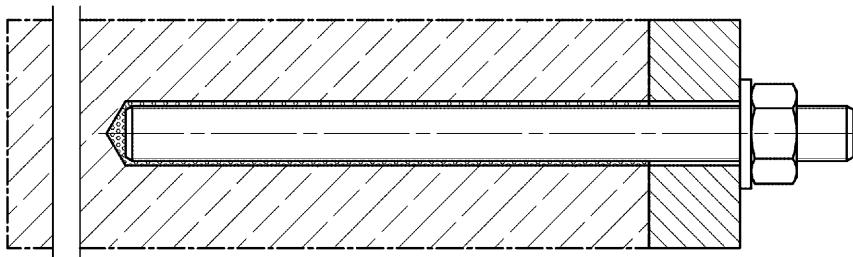
In accordance with the European Assessment Document EAD 330499-01-0601 the applicable European legal act is: [96/582/EC].

The system to be applied is: 1

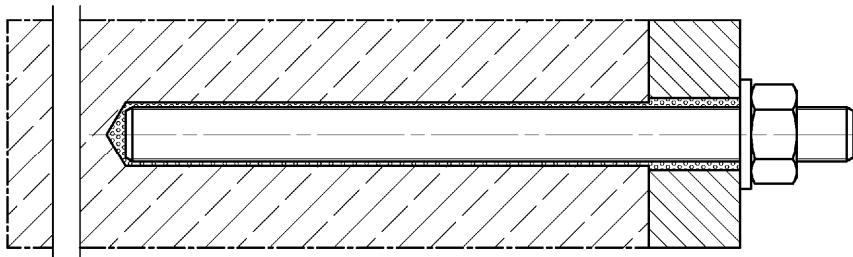
## Installation conditions part 1

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

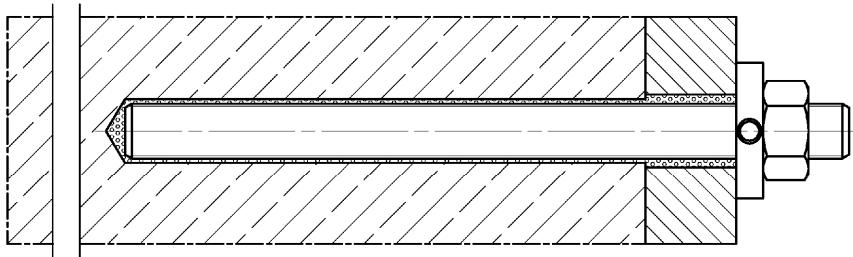
Pre-positioned installation



**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

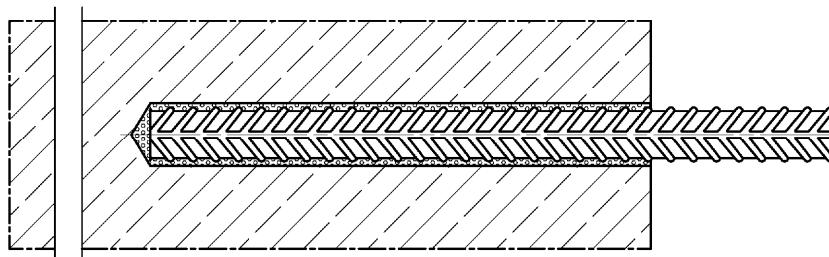
**Product description**  
Installation conditions part 1

**Annex A 1**

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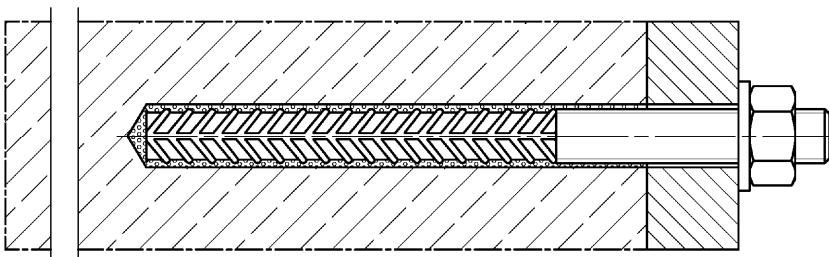
## Installation conditions part 2

### Reinforcing bar with fischer injection system FIS SB

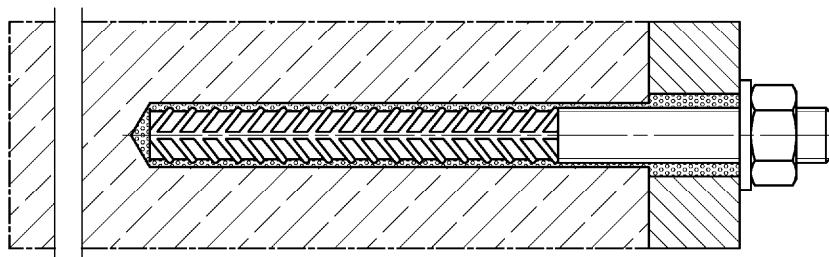


### fischer rebar anchor FRA with fischer injection system FIS SB

#### Pre-positioned installation



#### Push through installation (annular gap filled with mortar)



Figures not to scale

fischer Superbond

**Product description**  
Installation conditions part 2

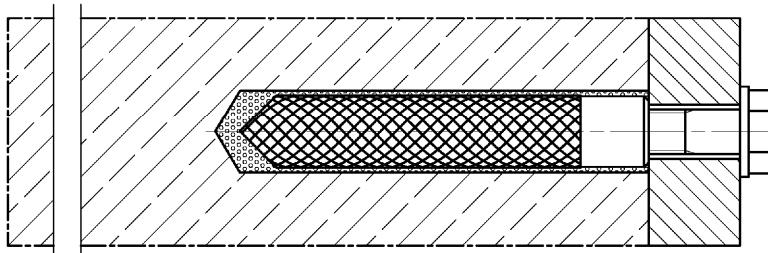
**Annex A 2**

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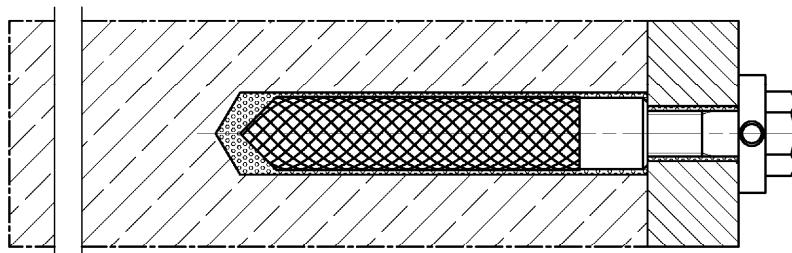
## Installation conditions part 3

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

### Pre-positioned installation

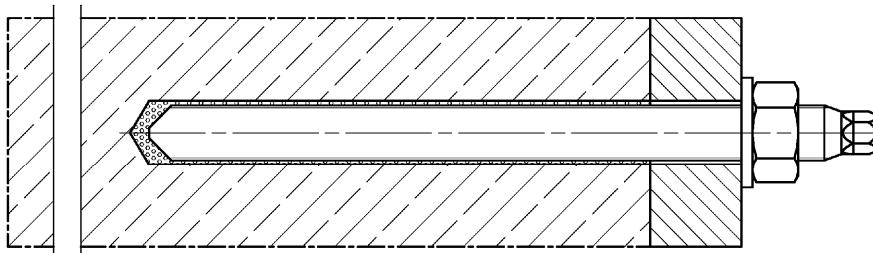


Pre-positioned installation with subsequently injected fischer filling disc (annular gap filled with mortar)

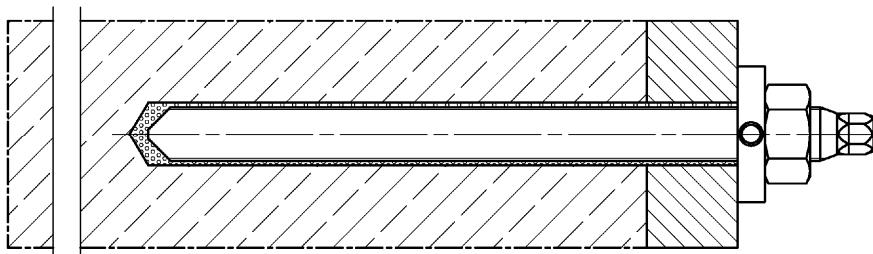


fischer anchor rod RG M with fischer resin capsule system RSB

### 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

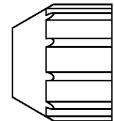
Installation conditions part 3

### Annex A 3

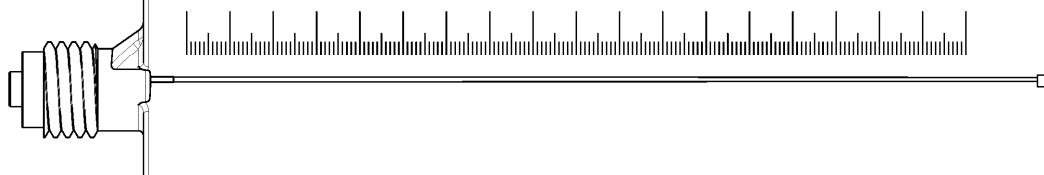
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## Overview system components Part 1

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, shelf-life, piston travel scale (optional), curing times and processing times (depending on temperature), hazard code, size, volume

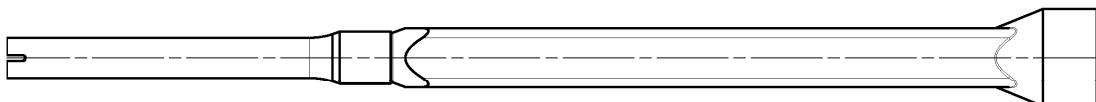
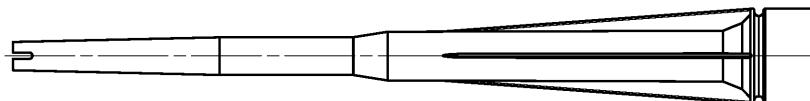


### Resin capsule

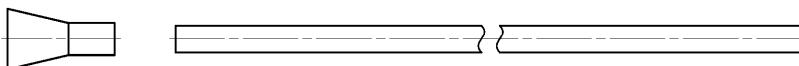
Sizes: 8, 10 mini, 10, 12 mini, 12, 16 mini, 16, 16 E, 20, 20 E / 24, 30



### Static mixer FIS MR Plus or UMR



### Injection adapter / extension tube for static mixer



Figures not to scale

fischer Superbond

#### Product description

Overview system components part 1;  
cartridges / capsule / static mixer / injection adapter

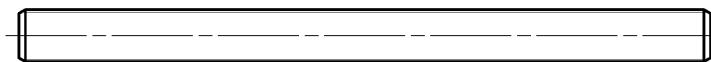
#### Annex A 4

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## Overview system components Part 2

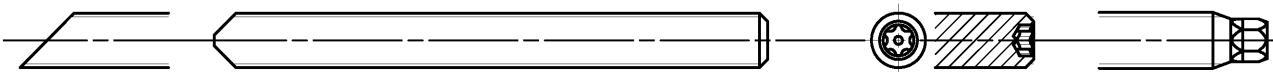
### anchor rod

Sizes: M8, M10, M12, M16, M20, M24, M27, M30



### fischer anchor rod RG M

Sizes: M8, M10, M12, M16, M20, M24, M30

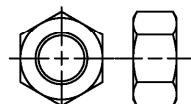
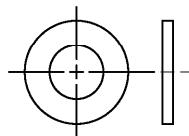
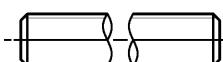
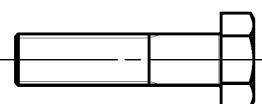


### fischer internal threaded anchor RG MI

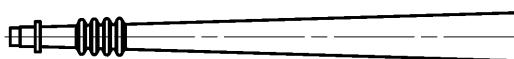
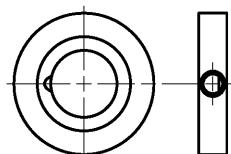
Size: M8, M10, M12, M16, M20



### 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

#### Product description

Overview system components part 2;  
steel components

#### Annex A 5

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## Overview system components Part 3

### Cleaning brush BS / BSB



### Blow-out pump ABG or ABP with cleaning nozzle



Figures not to scale

fischer Superbond

#### Product description

Overview system components part 3;  
cleaning brush / blow-out pump / injection adapter

#### Annex A 6

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**Table A7.1: Materials**

Part	Designation	Material		
1	Injection cartridge	Mortar, hardener, filler		
Steel grade	Steel	Stainless steel R	High corrosion resistant steel HCR <sup>2)</sup>	
	zinc plated	acc. to EN 10088-1:2014 Corrosion resistance class CRC III acc. to EN 1993-1-4:2015	acc. to EN 10088-1:2014 Corrosion resistance class CRC V acc. to EN 1993-1-4:2015	
2	Anchor rod	Property class 4.8, 5.8 or 8.8; EN ISO 898-1:2013 zinc plated $\geq 5 \mu\text{m}$ , ISO 4042:2018/Zn5/An(A2K) or hot dip galvanised $\geq 40 \mu\text{m}$ EN ISO 10684:2004 $f_{uk} \leq 1000 \text{ N/mm}^2$ $A_5 > 12\%$ 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 $f_{uk} \leq 1000 \text{ N/mm}^2$ $A_5 > 12\%$ fracture elongation	Property class 50 or 80 EN ISO 3506-1:2009 or property class 70 with $f_y = 560 \text{ N/mm}^2$ 1.4565; 1.4529; EN 10088-1:2014 $f_{uk} \leq 1000 \text{ N/mm}^2$ $A_5 > 12\%$ fracture elongation
		Fracture elongation $A_5 > 8\%$ , for applications without requirements for seismic performance category C2		
3	Washer ISO 7089:2000	zinc plated $\geq 5 \mu\text{m}$ , ISO 4042:2018/Zn5/An(A2K) or hot dip galvanised $\geq 40 \mu\text{m}$ EN ISO 10684:2004	1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1:2014	1.4565; 1.4529; EN 10088-1:2014
4	Hexagon nut	Property class 5 or 8; EN ISO 898-2:2012 zinc plated $\geq 5 \mu\text{m}$ , ISO 4042:2018/Zn5/An(A2K) or hot dip galvanised $\geq 40 \mu\text{m}$ EN ISO 10684:2004	Property class 50, 70 or 80 EN ISO 3506-1:2009 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1:2014	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 $\geq 5 \mu\text{m}$ , ISO 4042:2018/Zn5/An(A2K)	Property class 70 EN ISO 3506-1:2009 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1:2014	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 $\geq 5 \mu\text{m}$ , ISO 4042:2018/Zn5/An(A2K), $A_5 > 8\%$ fracture elongation	Property class 70 EN ISO 3506-1:2009 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1:2014 $A_5 > 8\%$ fracture 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 $\geq 5 \mu\text{m}$ , ISO 4042:2018/Zn5/An(A2K) or hot dip galvanised $\geq 40 \mu\text{m}$ EN ISO 10684:2004	1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1:2014	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 B or C with $f_{yk}$ and k according to NDP or NCL according to EN 1992-1-1/NA $f_{uk} = f_{lk} = k \cdot f_{yk}$		
9	fischer rebar anchor FRA	Rebar part: Bars and de-coiled rods class B or C with $f_{yk}$ and k according to NDP or NCL of EN 1992-1-1:2004+AC:2010 $f_{uk} = f_{lk} = k \cdot f_{yk}$	Threaded part: Property class 70 or 80 EN ISO 3506-1:2009 1.4401, 1.4404, 1.4571, 1.4578, 1.4439, 1.4362, 1.4062 acc. to EN 10088-1:2014 Corrosion resistance class CRC III acc. to EN 1993-1-4:2015 1.4565; 1.4529 acc. to EN 10088-1:2014 Corrosion resistance class CRC V acc. to EN 1993-1-4:2015	

fischer Superbond

**Product description**  
Materials

**Annex A 7**

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## **Specifications of intended use (part 1)**

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

Anchors subject to		FIS SB with ...												
		anchor rod	fischer internal threaded anchor RG MI	Reinforcing bar	fischer rebar anchor FRA									
Hammer drilling with standard drill bit		all sizes												
Hammer drilling with hollow drill bit (fischer "FHD", Heller "Duster Expert"; Bosch „Speed Clean“, Hilti "TE-CD, TE-YD", DreBo „D-Plus“, DreBo „D-Max“)						Nominal drill bit diameter ( $d_0$ ) 12 mm to 35 mm								
Diamond drilling		not permitted												
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						
Seismic performance category (only hammer drilling with standard / hollow drill bits)	C1 C2	all sizes M12 M16 M20 M24	Tables: C13.1 C14.2 C15.1 Tables: C13.1 C14.2 C16.1	- <sup>1)</sup>	all sizes - <sup>1)</sup>	Tables: C14.1 C14.2 C15.2 - <sup>1)</sup>	- <sup>1)</sup>	- <sup>1)</sup>						
Use category	I1 I2	dry or wet concrete water filled hole	all sizes not permitted											
Installation direction	D3 (downward and horizontal and upwards (overhead) installation)													
Installation method	pre-positioned or push through installation													
Installation temperature	FIS SB: $T_{i,\min} = -15^\circ\text{C}$ to $T_{i,\max} = +40^\circ\text{C}$ FIS SB High Speed: $T_{i,\min} = -20^\circ\text{C}$ to $T_{i,\max} = +40^\circ\text{C}$													
In-service temperature	Temperature range I	-40 °C to +40 °C	$T_{st} = +40^\circ\text{C}$ / $T_{lt} = +24^\circ\text{C}$											
	Temperature range II	-40 °C to +80 °C	$T_{st} = +80^\circ\text{C}$ / $T_{lt} = +50^\circ\text{C}$											
	Temperature range III	-40 °C to +120 °C	$T_{st} = +120^\circ\text{C}$ / $T_{lt} = +72^\circ\text{C}$											
	Temperature range IV	-40 °C to +150 °C	$T_{st} = +150^\circ\text{C}$ / $T_{lt} = +90^\circ\text{C}$											

<sup>1)</sup> No performance assessed

fischer Superbond

## **Intended use**

Specifications (part 1), fischer injection mortar system FIS SB

Annex B 1

## Specifications of intended use (part 2)

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

Anchorage subject to		RSB with ...											
		fischer anchor rod RG M 	fischer internal threaded anchor RG MI 										
Hammer drilling with standard drill bit 		all sizes											
Hammer drilling with hollow drill bit (fischer "FHD", Heller "Duster Expert"; Bosch "Speed Clean"; Hilti "TE-CD, TE-YD", DreBo "D-Plus", DreBo "D-Max") 		Nominal drill bit diameter ( $d_0$ ) 12 mm to 35 mm		all sizes									
Diamond drilling 		all sizes <sup>1)</sup>											
Static and quasi static load, in	uncracked concrete	all sizes	Tables: C1.1 C4.1 C6.1 C11.1	all sizes	Tables: C2.1 C4.1 C8.1 C11.2								
	cracked concrete	all sizes <sup>1)</sup>		all sizes <sup>1)</sup>									
Seismic performance category (only hammer drilling with standard / hollow drill bits)	C1	all sizes	Tables: C13.1 C14.2 C15.1	<sup>-2)</sup>									
	C2	<sup>-2)</sup>		<sup>-2)</sup>									
Use category	I1 dry or wet concrete	all sizes											
	I2 water filled hole	all sizes											
Installation direction	D3 (downward and horizontal and upwards (overhead) installation)												
Installation method	only pre-positioned installation												
Installation temperature	$T_{i,\min} = -30^\circ\text{C}$ to $T_{i,\max} = +40^\circ\text{C}$												
In-service temperature	Temperature range I	-40 °C to +40 °C	$T_{st} = +40^\circ\text{C}$ / $T_{lt} = +24^\circ\text{C}$										
	Temperature range II	-40 °C to +80 °C	$T_{st} = +80^\circ\text{C}$ / $T_{lt} = +50^\circ\text{C}$										
	Temperature range III	-40 °C to +120 °C	$T_{st} = +120^\circ\text{C}$ / $T_{lt} = +72^\circ\text{C}$										
	Temperature range IV	-40 °C to +150 °C	$T_{st} = +150^\circ\text{C}$ / $T_{lt} = +90^\circ\text{C}$										

<sup>1)</sup> For diamond drilling in cracked concrete only nominal drill bit diameters ( $d_0$ )  $\geq 18$  mm are permitted

<sup>2)</sup> No performance assessed

fischer Superbond

**Intended use**  
Specifications (part 2), fischer resin capsule system RSB

**Annex B 2**

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## 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**  
Specifications (part 3)

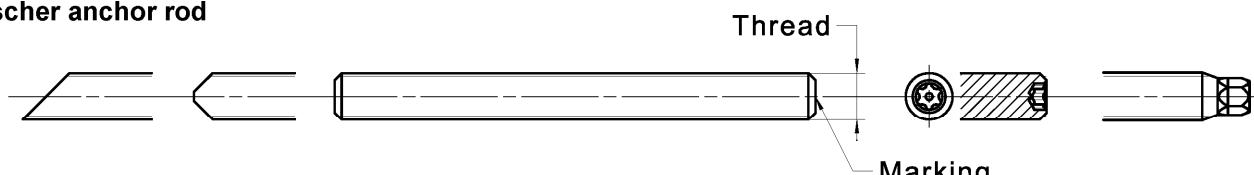
**Annex B 3**

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**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	SW	13	17	19	24	30	36	41	46
Nominal drill hole diameter	$d_0$	10	12	14	18	24	28	30	35
Drill hole depth	$h_0$						$h_0 = h_{ef}$		
Effective embedment depth	$h_{ef}, \text{ min}$	60	60	70	80	90	96	108	120
	$h_{ef}, \text{ max}$	160	200	240	320	400	480	540	600
Minimum spacing and minimum edge distance	$s_{\min} = c_{\min}$	40	45	55	65	85	105	120	140
Diameter of the clearance hole of the fixture	pre-positioned installation	9	12	14	18	22	26	30	33
	push through installation	11	14	16	20	26	30	33	40
Min. thickness of concrete member	$h_{\min}$	$h_{ef} + 30 (\geq 100)$				$h_{ef} + 2d_0$			
Maximum setting torque	max $T_{\text{inst}}$	[Nm]	10	20	40	60	120	150	200
									300

### fischer anchor rod



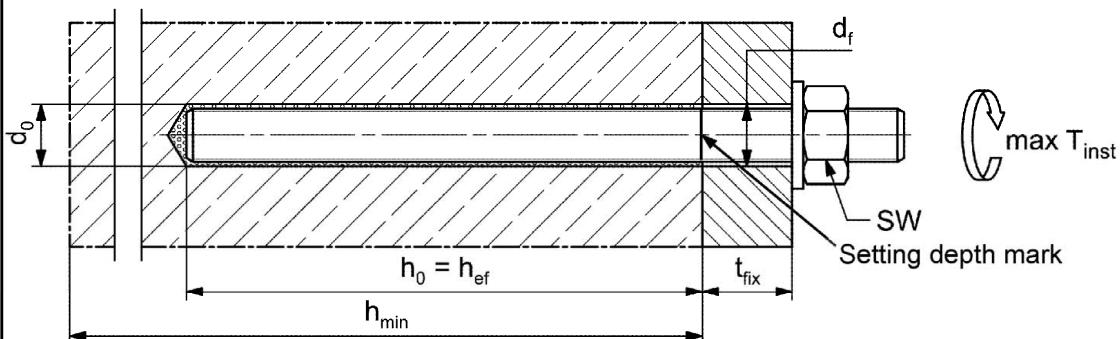
### Marking (on random place) fischer anchor rod:

Steel zinc plated PC <sup>1)</sup> 8.8	• or +	Steel hot-dip PC <sup>1)</sup> 8.8	•
High corrosion resistant steel HCR PC <sup>1)</sup> 50	•	High corrosion resistant steel HCR PC <sup>1)</sup> 70	-
High corrosion resistant steel HCR PC <sup>1)</sup> 80	(	Stainless steel R property class 50	~
Stainless steel R property class 80	*		

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

<sup>1)</sup> 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

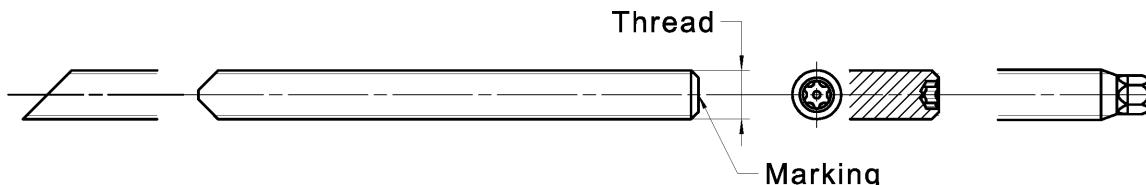
Installation parameters for anchor rods in combination with injection mortar system FIS SB

### Annex B 4

**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	$d_0$	10	12	14	18	25	28	35
Drill hole depth	$h_0$					$h_0 = h_{\text{ref}}$		
	$h_{\text{ref},1}$	---	75	75	95	---	---	---
Effective embedment depth	$h_{\text{ref},2}$	80	90	110	125	170	210	280
	$h_{\text{ref},3}$	---	150	150	190	210	---	---
Minimum spacing and minimum edge distance	$s_{\min} = c_{\min}$	40	45	55	65	85	105	140
Diameter of the pre-clearance hole of the fixture	$d_f$	9	12	14	18	22	26	33
Min. thickness of concrete member	$h_{\min}$			$h_{\text{ref}} + 30$ ( $\geq 100$ )			$h_{\text{ref}} + 2d_0$	
Maximum setting torque	max $T_{\text{inst}}$ [Nm]	10	20	40	60	120	150	300

### fischer anchor rod RG M



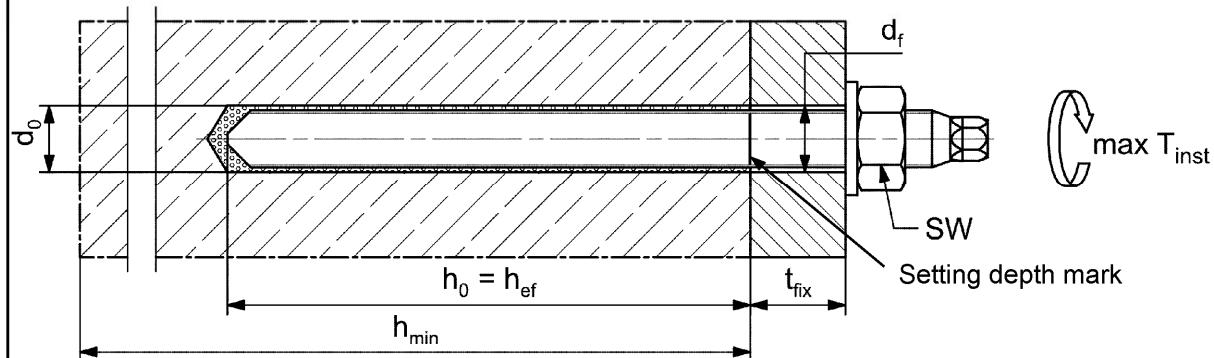
#### Marking (on random place) fischer anchor rod RG M:

Steel zinc plated PC <sup>1)</sup> 8.8	• or +	Steel hot-dip PC <sup>1)</sup> 8.8	•
High corrosion resistant steel HCR PC <sup>1)</sup> 50	•	High corrosion resistant steel HCR PC <sup>1)</sup> 70	-
High corrosion resistant steel HCR PC <sup>1)</sup> 80	(	Stainless steel R property class 50	~
Stainless steel R property class 80	*		

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

<sup>1)</sup> 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

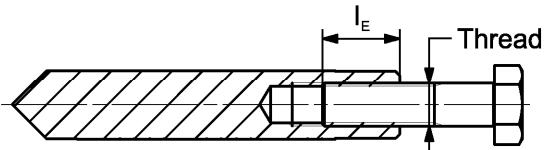
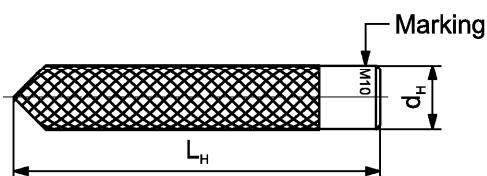
**Annex B 5**

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**Table B6.1:** Installation parameters for **fischer internal threaded anchors RG MI**

Internal threaded anchor RG MI	Thread	M8	M10	M12	M16	M20
Sleeve diameter $d = d_H$	[mm]	12	16	18	22	28
Nominal drill hole diameter $d_0$		14	18	20	24	32
Drill hole depth $h_0$		$h_0 = h_{\text{ef}} = L_H$				
Effective embedment depth ( $h_{\text{ef}} = L_H$ )		90	90	125	160	200
Minimum spacing and minimum edge distance $s_{\text{min}} = c_{\text{min}}$		55	65	75	95	125
Diameter of clearance hole in the fixture $d_f$		9	12	14	18	22
Minimum thickness of concrete member $h_{\text{min}}$		120	125	165	205	260
Maximum screw-in depth $l_{E,\text{max}}$		18	23	26	35	45
Minimum screw-in depth $l_{E,\text{min}}$		8	10	12	16	20
Maximum installation torque $\text{max } T_{\text{inst}}$	[Nm]	10	20	40	80	120

### fischer internal threaded anchor RG MI



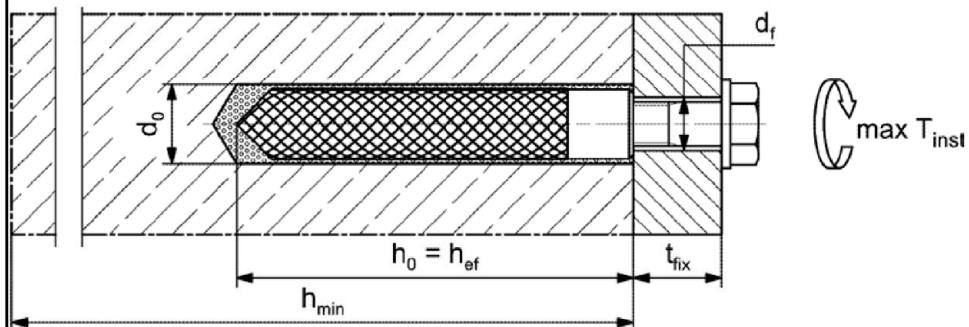
**Marking:** Anchor size e. g.: **M10**

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**

**Table B7.1:** Installation parameters for **reinforcing bars**

Nominal diameter of the bar	$\Phi$	8 <sup>1)</sup>	10 <sup>1)</sup>	12 <sup>1)</sup>	14	16	20	25	28	32			
Nominal drill hole diameter	d <sub>0</sub> [mm]	10	12	12	14	14	16	18	20	25	30	35	40
Drill hole depth								$h_0 = h_{ef}$					
Effective embedment depth		60	60	70	75	80	90	100	112	128			
		160	200	240	280	320	400	500	560	640			
Minimum spacing and minimum edge distance		40	45	55	60	65	85	110	130	160			
Minimum thickness of concrete member		$h_{ef} + 30$ ( $\geq 100$ )			$h_{ef} + 2d_0$								

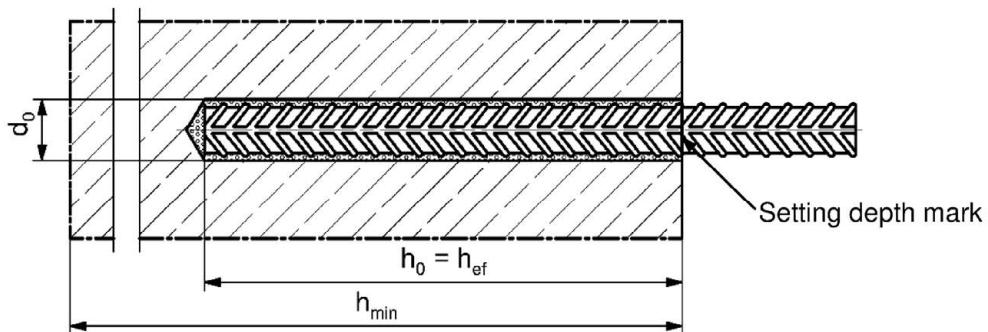
<sup>1)</sup> Both drill hole diameters can be used

### 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:  $0,05 \cdot \phi \leq h_{rib} \leq 0,07 \cdot \phi$   
( $\phi$  = Nominal diameter of the bar,  $h_{rib}$  = rib height)

### Installation conditions:



Figures not to scale

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**Intended use**  
Installation parameters reinforcing bars

**Annex B 7**

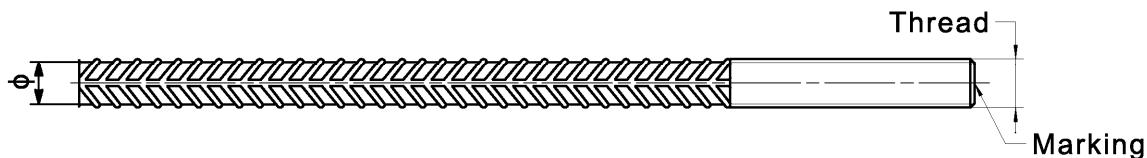
Appendix 16/ 40

**Table B8.1:** Installation parameters for **fischer rebar anchor FRA**

Rebar anchor FRA	Thread	M12 <sup>1)</sup>	M16	M20	M24	
Nominal diameter of the bar	φ SW $d_0$ $h_0$ $h_{ef,min}$ $h_{ef,max}$ $l_e$ $s_{min} = c_{min}$ ≤ $d_f$ ≤ $d_f$	12	16	20	25	
Width across flats		19	24	30	36	
Nominal drill hole diameter		14	16	20	25	
Drill hole depth		$h_{ef} + l_e$				
Effective embedment depth		70	80	90	96	
Distance concrete surface to welded joint		140	220	300	380	
Minimum spacing and minimum edge distance		100				
Diameter of clearance hole in the fixture		55	65	85	105	
Minimum thickness of concrete member		14	18	22	26	
Maximum installation torque		18	22	26	32	
		$h_0 + 30$	$h_0 + 2d_0$			
Maximum installation torque	max $T_{inst}$	[Nm]	40	60	120	150

<sup>1)</sup> Both drill hole diameters can be used

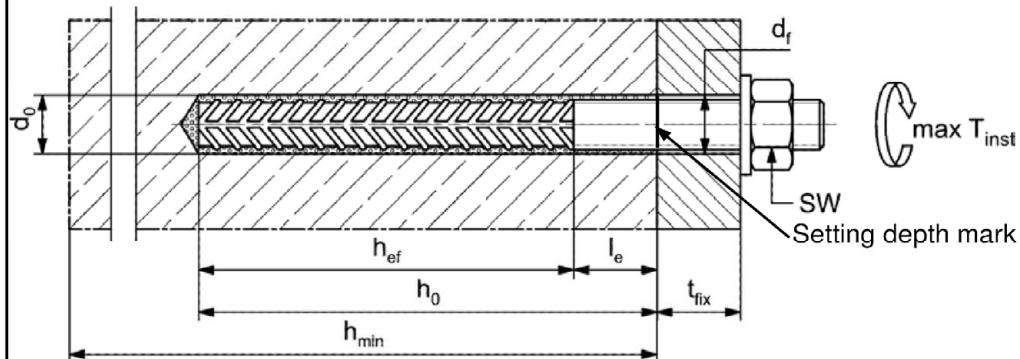
### fischer rebar anchor FRA



Marking frontal e. g.:

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

### Installation conditions:



Figures not to scale

fischer Superbond

**Intended use**  
Installation parameters rebar anchor FRA

**Annex B 8**

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**Table B9.1:** Dimension of resin capsule RSB

Resin capsule RSB		RSB 8	RSB 10 mini	RSB 10	RSB 12 mini	RSB 12	RSB 16 mini	RSB 16	RSB 16 E	RSB 20	RSB 20 E / 24	RSB 30
Capsule diameter $d_p$	[mm]	9,0	10,5		12,5		16,5		23,0		27,5	
Capsule length $L_p$		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		M8	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 anchor RG MI		M8	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

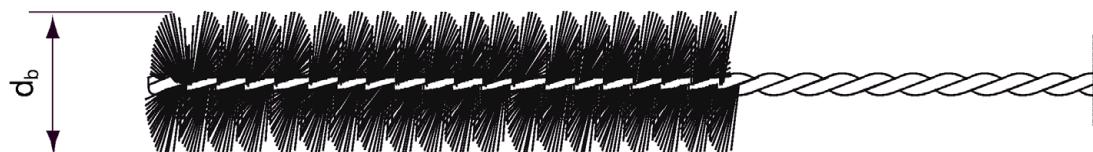
**Annex B 9**

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**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	$d_0$	[mm]	10	12	14	16	18	20	24	25	28	30	32	35	40
Steel brush diameter BS	$d_b$		11	14	16	20		25	26	27	30		40		-
Steel brush diameter BSB	$d_b$		-	-	-	-	-	-	-	-	-	-	-	-	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 anchoring base [°C]	Maximum processing time $t_{work}$		Minimum curing time $t_{cure}$		
	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

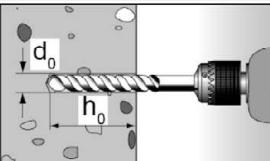
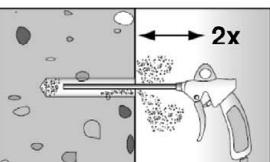
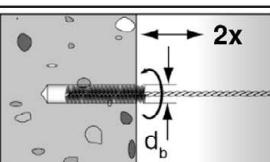
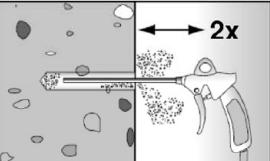
fischer Superbond

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

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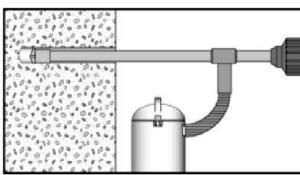
# Installation instructions part 1; Injection mortar system FIS SB

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

1	 <p>Drill the hole. Nominal drill hole diameter <math>d_0</math> and drill hole depth <math>h_0</math> see <b>tables B4.1, B6.1, B7.1, B8.1</b></p>
2	 <p>Clean the drill hole: Blow out the drill hole twice, with oil free compressed air (<math>p \geq 6</math> bar) In uncracked concrete the use of the manual blow-out pump ABG is possible (Installation parameters: <math>d_0 &lt; 18</math> mm and <math>h_{ef} &lt; 10d</math>)</p> 
3	 <p>Brush the drill hole twice. For drill hole diameter <math>\geq 30</math> mm use a power drill. For deep holes use an extension. Corresponding brushes see <b>table B10.1</b></p>
4	 <p>Clean the drill hole: Blow out the drill hole twice, with oil free compressed air (<math>p \geq 6</math> bar) In uncracked concrete the use of the manual blow-out pump ABG is possible (Installation parameters: <math>d_0 &lt; 18</math> mm and <math>h_{ef} &lt; 10d</math>)</p> 

Go to step 5 (Annex B 12)

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

1	 <p>Check a suitable hollow drill (see <b>table B1.1</b>) for correct operation of the dust extraction</p>
2	 <p>Use a suitable dust extraction system, e. g. fischer FVC 35 M or a comparable dust extraction system with equivalent performance data.</p> <p>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 <math>d_0</math> and drill hole depth <math>h_0</math> see <b>tables B4.1, B6.1, B7.1, B8.1</b></p>

Go to step 5 (Annex B 12)

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**Intended use**

Installation instructions part 1; injection mortar system FIS SB

**Annex B 11**

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## 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 $\geq 150$ mm use an extension tube	For overhead installation, deep holes ( $h_0 > 250$ mm) or drill hole diameter ( $d_0 \geq 40$ mm) use an injection-adapter
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Go to step 9 (Annex B 13)

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**Intended use**

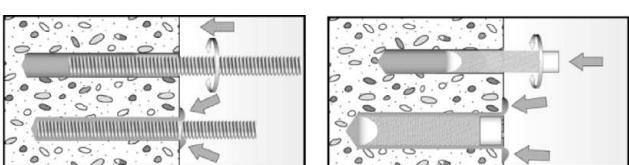
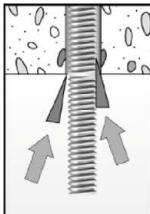
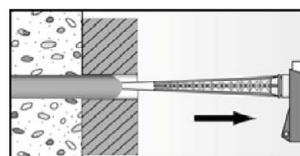
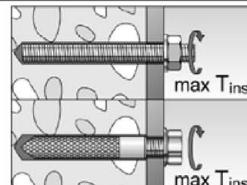
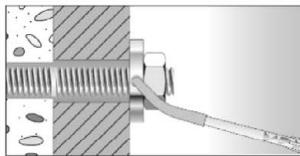
Installation instructions part 2; injection mortar system FIS SB

**Annex B 12**

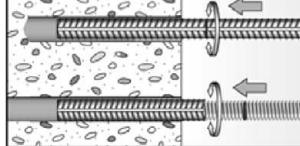
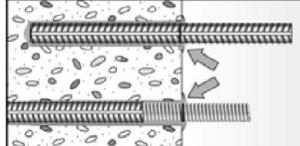
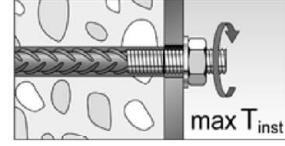
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## Installation instructions part 3; injection mortar system FIS SB

### 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 $t_{\text{cure}}$ see <b>table B10.2</b>	12		Mounting the fixture max $T_{\text{inst}}$ see <b>tables B4.1 and B6.1</b>
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 $\geq 50 \text{ N/mm}^2$ (e.g. fischer injection mortars FIS HB, FIS SB, FIS V, FIS EM Plus) ATTENTION: Using fischer filling disc reduces $t_{\text{fix}}$ (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 $t_{\text{cure}}$ see <b>table B10.2</b>	12		Mounting the fixture max $T_{\text{inst}}$ see <b>table B8.1</b>

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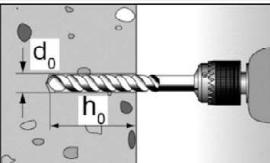
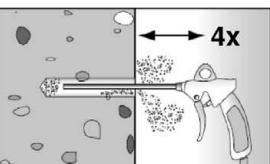
#### Intended use

Installation instructions part 3; injection mortar system FIS SB

**Annex B 13**

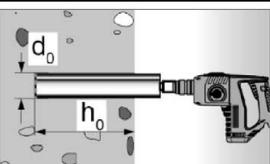
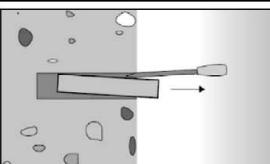
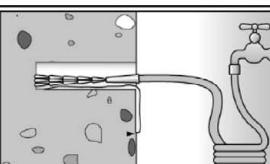
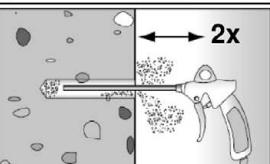
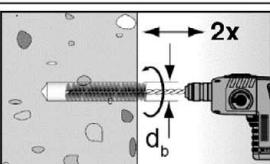
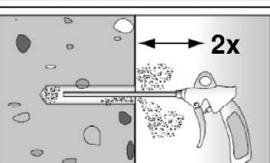
## Installation instructions part 4; resin capsule RSB

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

1	 <p>Drill the hole. Nominal drill hole diameter <math>d_0</math> and drill hole depth <math>h_0</math> see <b>tables B5.1 and B6.1</b></p>
2	 <p>Clean the drill hole: Blow out the drill hole four times, with oil free compressed air (<math>p \geq 6</math> bar) In uncracked concrete the use of the manual blow-out pump ABG is possible (Installation parameters: <math>d_0 &lt; 18</math> mm and <math>h_{ef} &lt; 10d</math>)</p> 

Go to step 6 (Annex B 15)

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

1	 <p>Drill the hole. Drill hole diameter <math>d_0</math> and drill hole depth <math>h_0</math> see <b>tables B5.1 and B6.1</b></p>	 <p>Break the drill core and remove it</p>
2	 <p>Flush the drill hole with clean water until it flows clear</p>	
3	 <p>Blow out the drill hole twice, using oil-free compressed air (<math>p &gt; 6</math> bar)</p>	
4	 <p>Brush the drill hole twice using a power drill. Corresponding brushes see <b>table B10.1</b></p>	
5	 <p>Blow out the drill hole twice, using oil-free compressed air (<math>p &gt; 6</math> bar)</p>	

Go to step 6 (Annex B 15)

fischer Superbond

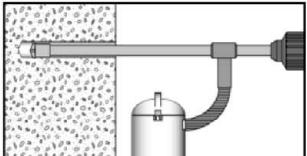
**Intended use**  
Installation instructions part 4; resin capsule RSB

**Annex B 14**

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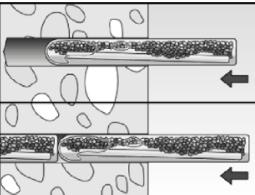
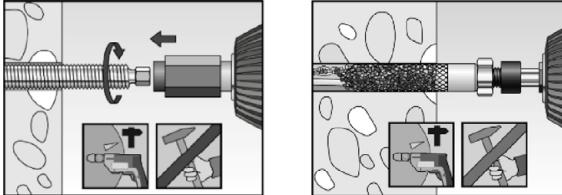
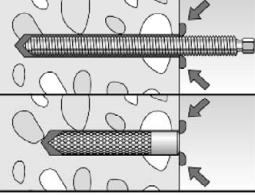
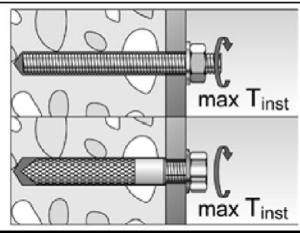
## Installation instructions part 5; resin capsule RSB

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

1		Check a suitable hollow drill (see <b>table B2.1</b> ) for correct operation of the dust extraction
2		<p>Use a suitable dust extraction system, e. g. fischer FVC 35 M or a comparable dust extraction system with equivalent performance data.</p> <p>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 <math>d_0</math> and drill hole depth <math>h_0</math> see <b>tables B5.1</b> and <b>B6.1</b></p>

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 <b>table B9.2</b> .		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 <b>table B10.2</b>	10	

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**Intended use**  
Installation instructions part 5; resin capsule RSB

**Annex B 15**

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

Anchor rod / standard threaded rod		M8	M10	M12	M16	M20	M24	M27	M30				
<b>Bearing capacity under tension load, steel failure <sup>3)</sup></b>													
Characteristic resistance $N_{Rk,s}$	Steel zinc plated	Property class	4.8	[kN]	15(13)	23(21)	33	63	98	141	184	224	
			5.8		19(17)	29(27)	43	79	123	177	230	281	
			8.8		29(27)	47(43)	68	126	196	282	368	449	
			50		19	29	43	79	123	177	230	281	
	Stainless steel R and high corrosion resistant steel HCR		70		26	41	59	110	172	247	322	393	
			80		30	47	68	126	196	282	368	449	
<b>Partial factors <sup>1)</sup></b>													
Partial factor $\gamma_{Ms,N}$	Steel zinc plated	Property class	4.8	[-]							1,50		
			5.8								1,50		
			8.8								1,50		
	Stainless steel R and high corrosion resistant steel HCR		50								2,86		
			70								1,50 <sup>2)</sup> / 1,87		
			80								1,60		
<b>Bearing capacity under shear load, steel failure <sup>3)</sup></b>													
<b>without lever arm</b>													
Characteristic resistance $V_{Rk,s}^0$	Steel zinc plated	Property class	4.8	[kN]	9(8)	14(13)	20	38	59	85	110	135	
			5.8		11(10)	17(16)	25	47	74	106	138	168	
			8.8		15(13)	23(21)	34	63	98	141	184	225	
			50		9	15	21	39	61	89	115	141	
	Stainless steel R and high corrosion resistant steel HCR		70		13	20	30	55	86	124	161	197	
			80		15	23	34	63	98	141	184	225	
Ductility factor	k <sub>7</sub>	[ - ]									1,0		
<b>with lever arm</b>													
Characteristic resistance $M_{Rk,s}^0$	Steel zinc plated	Property class	4.8	[Nm]	15(13)	30(27)	52	133	259	448	665	899	
			5.8		19(16)	37(33)	65	166	324	560	833	1123	
			8.8		30(26)	60(53)	105	266	519	896	1333	1797	
			50		19	37	65	166	324	560	833	1123	
	Stainless steel R and high corrosion resistant steel HCR		70		26	52	92	232	454	784	1167	1573	
			80		30	60	105	266	519	896	1333	1797	
<b>Partial factors <sup>1)</sup></b>													
Partial factor $\gamma_{Ms,V}$	Steel zinc plated	Property class	4.8	[-]							1,25		
			5.8								1,25		
			8.8								1,25		
			50								2,38		
	Stainless steel R and high corrosion resistant steel HCR		70								1,25 <sup>2)</sup> / 1,56		
			80								1,33		
<sup>1)</sup> In absence of other national regulations													
<sup>2)</sup> Only admissible for high corrosion resistant steel C, with $f_{yk} / f_{uk} \geq 0,8$ and $A_5 > 12\%$ (e.g. fischer anchor rods)													
<sup>3)</sup> Values in brackets are valid for undersized threaded rods with smaller stress area $A_s$ for hot-dip galvanized standard threaded rods according to EN ISO 10684:2004+AC:2009													
<b>fischer Superbond</b>								<b>Annex C 1</b>					
<b>Performances</b>													
Characteristic values for steel failure capacity of fischer anchor rods and standard threaded rods								Appendix 25/ 40					

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

fischer internal threaded anchors RG MI			M8	M10	M12	M16	M20						
<b>Bearing capacity under tension load, steel failure</b>													
Charact. resistance with screw $N_{Rk,s}$	$\gamma_{Ms,N}$	Property class 5.8	[kN]	19	29	43	79	123					
		Property class 8.8		29	47	68	108	179					
		Property class R		26	41	59	110	172					
		Property class 70 HCR		26	41	59	110	172					
<b>Partial factors<sup>1)</sup></b>													
Partial factors	$\gamma_{Ms,N}$	Property class 5.8	[-]	1,50									
		Property class 8.8		1,50									
		Property class R		1,87									
		Property class 70 HCR		1,87									
<b>Bearing capacity under shear load, steel failure</b>													
<b>Without lever arm</b>													
Charact. resistance with screw $V^0_{Rk,s}$	$\gamma_{Ms,V}$	Property class 5.8	[kN]	9,2	14,5	21,1	39,2	62,0					
		Property class 8.8		14,6	23,2	33,7	54,0	90,0					
		Property class R		12,8	20,3	29,5	54,8	86,0					
		Property class 70 HCR		12,8	20,3	29,5	54,8	86,0					
Ductility factor	$k_7$	[-]		1,0									
<b>With lever arm</b>													
Charact. resistance with screw $M^0_{Rk,s}$	$\gamma_{Ms,V}$	Property class 5.8	[Nm]	20	39	68	173	337					
		Property class 8.8		30	60	105	266	519					
		Property class R		26	52	92	232	454					
		Property class 70 HCR		26	52	92	232	454					
<b>Partial factors<sup>1)</sup></b>													
Partial factors	$\gamma_{Ms,V}$	Property class 5.8	[-]	1,25									
		Property class 8.8		1,25									
		Property class R		1,56									
		Property class 70 HCR		1,56									
<sup>1)</sup> In absence of other national regulations													
fischer Superbond							<b>Annex C 2</b>						
<b>Performances</b> Characteristic values for steel failure under tension / shear load fischer internal threaded anchor RG MI													
							Appendix 26/ 40						

**Table C3.1:** Characteristic values for **steel failure** under tension / shear load of **reinforcing bars**

Nominal diameter of the bar	$\phi$	8	10	12	14	16	20	25	28	32
<b>Bearing capacity under tension load, steel failure</b>										
Characteristic resistance	$N_{Rk,s}$	[kN]								$A_s \cdot f_{uk}^1)$
<b>Bearing capacity under shear load, steel failure</b>										
<b>Without lever arm</b>										
Characteristic resistance	$V_{Rk,s}$	[kN]								$0,5 \cdot A_s \cdot f_{uk}^1)$
Ductility factor	$k_7$	[-]								1,0
<b>With lever arm</b>										
Characteristic resistance	$M_{Rk,s}^0$	[Nm]								$1,2 \cdot W_{el} \cdot f_{uk}^1)$

<sup>1)</sup>  $f_{uk}$  or  $f_{yk}$  respectively must be taken from the specifications of the reinforcing bar

**Table C3.2:** Characteristic values for **steel failure** under tension / shear load of **fischer rebar anchors FRA**

fischer rebar anchor FRA		M12	M16	M20	M24	
<b>Bearing capacity under tension load, steel failure</b>						
Characteristic resistance	$N_{Rk,s}$	[kN]	63	111	173	270
<b>Partial factor<sup>1)</sup></b>						
Partial factor	$\gamma_{Ms,N}$	[-]				1,4
<b>Bearing capacity under shear load, steel failure</b>						
<b>Without lever arm</b>						
Characteristic resistance	$V_{Rk,s}$	[kN]	30	55	86	124
Ductility factor	$k_7$	[-]				1,0
<b>With lever arm</b>						
Characteristic resistance	$M_{Rk,s}^0$	[Nm]	92	233	454	785
<b>Partial factor<sup>1)</sup></b>						
Partial factor	$\gamma_{Ms,V}$	[-]				1,56

<sup>1)</sup> In absence of other national regulations

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#### Performances

Characteristic values for steel failure under tension / shear load of reinforcing bars and fischer rebar anchors FRA

#### Annex C 3

**Table C4.1:** Characteristic values for **concrete failure** under tension / shear load

Size		All sizes										
<b>Tension load</b>												
Installation factor	$\gamma_{inst}$	[ - ]	See annex C 5 to C 10 and C 15 to C16									
<b>Factors for the compressive strength of concrete &gt; C20/25</b>												
Increasing factor for $\tau_{RK}$	C25/30	$\Psi_c$	[ - ]	1,02								
	C30/37			1,04								
	C35/45			1,07								
	C40/50			1,08								
	C45/55			1,09								
	C50/60			1,10								
<b>Splitting failure</b>												
Edge distance	$h / h_{ref} \geq 2,0$	$C_{cr,sp}$	[mm]	1,0 $h_{ref}$								
	$2,0 > h / h_{ref} > 1,3$			4,6 $h_{ref}$ - 1,8 $h$								
	$h / h_{ref} \leq 1,3$			2,26 $h_{ref}$								
Spacing	$s_{cr,sp}$			2 $C_{cr,sp}$								
<b>Concrete cone failure</b>												
Uncracked concrete	$k_{ucr,N}$	[ - ]		11,0								
Cracked concrete	$k_{cr,N}$			7,7								
Edge distance	$C_{cr,N}$	[mm]		1,5 $h_{ref}$								
Spacing	$s_{cr,N}$			2 $C_{cr,N}$								
<b>Factors for sustained tension load</b>												
Temperature range	[ - ]	24 °C / 40 °C		50 °C / 80 °C		72 °C / 120 °C		90 °C / 150 °C				
Factor	$\Psi_{sus}^0$	[ - ]	0,84		0,86		0,84		0,91			
<b>Shear load</b>												
Installation factor	$\gamma_{inst}$	[ - ]	1,0									
<b>Concrete pry-out failure</b>												
Factor for pry-out failure	$k_8$	[ - ]	2,0									
<b>Concrete edge failure</b>												
Effective length of fastener in shear loading	$l_f$	[mm]	for $d_{nom} \leq 24$ mm: min ( $h_{ref}$ ; 12 $d_{nom}$ ) for $d_{nom} > 24$ mm: min ( $h_{ref}$ ; 8 $d_{nom}$ ; 300 mm)									
<b>Calculation diameters</b>												
Size			M8	M10	M12	M16	M20	M24	M27	M30		
fischer anchor rods and standard threaded rods	$d_{nom}$	[mm]	8	10	12	16	20	24	27	30		
fischer internal threaded anchors RG MI	$d_{nom}$		12	16	18	22	28	- <sup>1)</sup>	- <sup>1)</sup>	- <sup>1)</sup>		
fischer rebar anchor FRA	$d_{nom}$		- <sup>1)</sup>	- <sup>1)</sup>	12	16	20	25	- <sup>1)</sup>	- <sup>1)</sup>		
Size (nominal diameter of the bar)	$\phi$		8	10	12	14	16	20	25	28	32	
Reinforcing bar	$d_{nom}$	[mm]	8	10	12	14	16	20	25	28	32	
<sup>1)</sup> Anchor type not part of the ETA												
fischer Superbond												
<b>Performances</b> Characteristic values for concrete failure under tension / shear load								<b>Annex C 4</b>				
								Appendix 28/ 40				

**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**

Anchor rod / standard threaded rod		M8	M10	M12	M16	M20	M24	M27	M30							
<b>Combined pullout and concrete cone failure</b>																
Thread diameter	d [mm]	8	10	12	16	20	24	27	30							
<b>Uncracked concrete</b>																
<b>Characteristic bond resistance in uncracked concrete C20/25</b>																
Hammer-drilling with standard drill bit or hollow drill bit (dry or wet concrete)																
Tem- perature range	I: 24 °C / 40 °C	$\tau_{Rk,ucr}$ [N/mm <sup>2</sup> ]	12	13	13	13	13	12	10	10						
	II: 50 °C / 80 °C		12	12	12	13	13	12	10	10						
	III: 72 °C / 120 °C		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						
<b>Installation factors</b>																
Dry or wet concrete	$\gamma_{inst}$	[ - ]	1,0													
<b>Cracked concrete</b>																
<b>Characteristic bond resistance in cracked concrete C20/25</b>																
Hammer-drilling with standard drill bit or hollow drill bit (dry or wet concrete)																
Tem- perature range	I: 24 °C / 40 °C	$\tau_{Rk,cr}$ [N/mm <sup>2</sup> ]	6,5	7,0	7,5	7,5	7,5	7,5	7,5	7,5						
	II: 50 °C / 80 °C		6,0	6,5	7,5	7,5	7,5	7,5	7,0	7,0						
	III: 72 °C / 120 °C		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						
<b>Installation factors</b>																
Dry or wet concrete	$\gamma_{inst}$	[ - ]	1,0													
fischer Superbond																
<b>Performances</b>																
Characteristic values for combined pull-out and concrete failure for fischer anchor rod and standard threaded rods with injection mortar FIS SB																
								<b>Annex C 5</b>								
								Appendix 29/ 40								

**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**

<sup>1)</sup> No performance assessed

fischer Superbond

## Performances

Characteristic values for combined pull-out and concrete failure for fischer anchor rod BG M with resin capsule RSB

Annex C 6

**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**

**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		M8	M10	M12	M16	M20					
<b>Combined pullout and concrete cone failure</b>											
Sleeve diameter	d	[mm]	12	16	18	22					
<b>Uncracked concrete</b>											
<b>Characteristic bond resistance in uncracked concrete C20/25</b>											
Hammer-drilling with standard drill bit or hollow drill bit (dry or wet concrete as well as water filled hole)											
Tem- pera- ture range	I: 24 °C / 40 °C	$\tau_{Rk,ucr}$ [N/mm <sup>2</sup> ]	12	12	11	11					
	II: 50 °C / 80 °C		12	11	11	10					
	III: 72 °C / 120 °C		11	10	10	9,0					
	IV: 90 °C / 150 °C		10	9,5	9,0	8,5					
Diamond-drilling (dry or wet concrete as well as water filled hole)											
Tem- pera- ture range	I: 24 °C / 40 °C	$\tau_{Rk,ucr}$ [N/mm <sup>2</sup> ]	13	12	12	11					
	II: 50 °C / 80 °C		13	12	12	11					
	III: 72 °C / 120 °C		11	11	10	9,5					
	IV: 90 °C / 150 °C		10	10	9,5	9,0					
<b>Installation factors</b>											
Dry or wet concrete	$\gamma_{inst}$ [-]	[-]	1,0								
Water filled hole			1,2	1,0							
<b>Cracked concrete</b>											
<b>Characteristic bond resistance in cracked concrete C20/25</b>											
Hammer-drilling with standard drill bit or hollow drill bit (dry or wet concrete as well as water filled hole)											
Tem- pera- ture range	I: 24 °C / 40 °C	$\tau_{Rk,cr}$ [N/mm <sup>2</sup> ]	5,0								
	II: 50 °C / 80 °C		5,0								
	III: 72 °C / 120 °C		4,5								
	IV: 90 °C / 150 °C		4,0								
Diamond-drilling (dry or wet concrete as well as water filled hole)											
Tem- pera- ture range	I: 24 °C / 40 °C	$\tau_{Rk,cr}$ [N/mm <sup>2</sup> ]	-1)	5,0							
	II: 50 °C / 80 °C		-1)	5,0							
	III: 72 °C / 120 °C		-1)	4,5							
	IV: 90 °C / 150 °C		-1)	4,0							
<b>Installation factors</b>											
Dry or wet concrete	$\gamma_{inst}$ [-]	[-]	1,0								
Water filled hole			1,2	1,0							

<sup>1)</sup> No performance assessed

fischer Superbond

### Performances

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

Annex C 8

**Table C9.1:** Characteristic values for **combined pull-out** and concrete failure for **reinforcing bars** in hammer drilled holes in combination with **injection mortar FIS SB**; uncracked or cracked concrete

Nominal diameter of the bar	$\phi$	8	10	12	14	16	20	25	28	32								
<b>Combined pullout and concrete cone failure</b>																		
Bar diameter	d	[mm]	8	10	12	14	16	20	25	32								
<b>Uncracked concrete</b>																		
<b>Characteristic bond resistance in uncracked concrete C20/25</b>																		
Hammer-drilling with standard drill bit or hollow drill bit (dry or wet concrete)																		
Tem- perature range	I: 24 °C / 40 °C	$\tau_{Rk,ucr}$ [N/mm <sup>2</sup> ]	8,0	8,5	9,0	9,5	9,5	10	9,5	9,0	7,5							
	II: 50 °C / 80 °C		8,0	8,5	9,0	9,0	9,5	9,5	9,0	8,5	7,5							
	III: 72 °C / 120 °C		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							
<b>Installation factors</b>																		
Dry or wet concrete	$\gamma_{inst}$	[-]	1,0															
<b>Cracked concrete</b>																		
<b>Characteristic bond resistance in cracked concrete C20/25</b>																		
Hammer-drilling with standard drill bit or hollow drill bit (dry or wet concrete)																		
Tem- perature range	I: 24 °C / 40 °C	$\tau_{Rk,cr}$ [N/mm <sup>2</sup> ]	4,5	6,0	6,0	6,0	7,0	6,0	6,0	6,0	6,0							
	II: 50 °C / 80 °C		4,5	5,5	5,5	5,5	6,5	6,0	6,0	6,0	6,0							
	III: 72 °C / 120 °C		4,0	5,0	5,0	5,0	6,0	5,5	5,5	5,5	5,5							
	IV: 90 °C / 150 °C		3,5	4,5	4,5	4,5	5,5	5,0	5,0	5,0	5,0							
<b>Installation factors</b>																		
Dry or wet concrete	$\gamma_{inst}$	[-]	1,0															
fischer Superbond																		
<b>Performances</b>																		
Characteristic values for combined pull-out and concrete failure for reinforcing bars with injection mortar FIS SB																		
										<b>Annex C 9</b>								
										Appendix 33/ 40								

**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

fischer rebar anchor FRA		M12	M16	M20	M24	
<b>Combined pullout and concrete cone failure</b>						
Bar diameter	d [mm]	12	16	20	25	
<b>Uncracked concrete</b>						
<b>Characteristic bond resistance in uncracked concrete C20/25</b>						
Hammer-drilling with standard drill bit or hollow drill bit (dry or wet concrete)						
Tem- perature range	I: 24 °C / 40 °C	$\tau_{Rk,ucr}$ [N/mm <sup>2</sup> ]	9,0	9,5	10	9,5
	II: 50 °C / 80 °C		9,0	9,5	9,5	9,0
	III: 72 °C / 120 °C		8,0	8,5	8,5	8,0
	IV: 90 °C / 150 °C		7,0	7,5	8,0	7,5
<b>Installation factors</b>						
Dry or wet concrete	$\gamma_{inst}$ [-]			1,0		
<b>Cracked concrete</b>						
<b>Characteristic bond resistance in cracked concrete C20/25</b>						
Hammer-drilling with standard drill bit or hollow drill bit (dry or wet concrete)						
Tem- perature range	I: 24 °C / 40 °C	$\tau_{Rk,cr}$ [N/mm <sup>2</sup> ]	6,0	7,0	6,0	6,0
	II: 50 °C / 80 °C		5,5	6,5	6,0	6,0
	III: 72 °C / 120 °C		5,0	6,0	5,5	5,5
	IV: 90 °C / 150 °C		4,5	5,5	5,0	5,0
<b>Installation factors</b>						
Dry or wet concrete	$\gamma_{inst}$ [-]			1,0		
fischer Superbond						
<b>Performances</b>						
Characteristic values for combined pull-out and concrete failure for fischer rebar anchors FRA with injection mortar FIS SB						
<b>Annex C 10</b>						
Appendix 34/ 40						

**Table C11.1: Displacements for anchor rods**

Anchor rod	M8	M10	M12	M16	M20	M24	M27	M30
<b>Displacement-Factors for tension load<sup>1)</sup></b>								
<b>Uncracked or cracked concrete; Temperature range I, II, III, IV</b>								
δN₀-Factor	[mm/(N/mm²)]	0,07	0,08	0,09	0,10	0,11	0,12	0,13
δN∞-Factor		0,13	0,14	0,15	0,17	0,17	0,18	0,19
<b>Displacement-Factors for shear load<sup>2)</sup></b>								
<b>Uncracked or cracked concrete; Temperature range I, II, III, IV</b>								
δv₀-Factor	[mm/kN]	0,18	0,15	0,12	0,09	0,07	0,06	0,05
δv∞-Factor		0,27	0,22	0,18	0,14	0,11	0,09	0,08

1) Calculation of effective displacement:

$$\delta N_0 = \delta N_0\text{-Factor} \cdot \tau_{Ed}$$

$$\delta N_\infty = \delta N_\infty\text{-Factor} \cdot \tau_{Ed}$$

(τ<sub>Ed</sub>: Design value of the applied tensile stress)

2) Calculation of effective displacement:

$$\delta v_0 = \delta v_0\text{-Factor} \cdot V_{Ed}$$

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

(V<sub>Ed</sub>: Design value of the applied shear force)**Table C11.2: Displacements for fischer internal threaded anchors RG MI**

Internal threaded anchor RG MI	M8	M10	M12	M16	M20
<b>Displacement-Factors for tension load<sup>1)</sup></b>					
<b>Uncracked or cracked concrete; Temperature range I, II, III, IV</b>					
δN₀-Factor	[mm/(N/mm²)]	0,09	0,10	0,10	0,11
δN∞-Factor		0,13	0,15	0,15	0,17
<b>Displacement-Factors for shear load<sup>2)</sup></b>					
<b>Uncracked or cracked concrete; Temperature range I, II, III, IV</b>					
δv₀-Factor	[mm/kN]	0,12	0,09	0,08	0,07
δv∞-Factor		0,18	0,14	0,12	0,10

1) Calculation of effective displacement:

$$\delta N_0 = \delta N_0\text{-Factor} \cdot \tau_{Ed}$$

$$\delta N_\infty = \delta N_\infty\text{-Factor} \cdot \tau_{Ed}$$

(τ<sub>Ed</sub>: Design value of the applied tensile stress)

2) Calculation of effective displacement:

$$\delta v_0 = \delta v_0\text{-Factor} \cdot V_{Ed}$$

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

(V<sub>Ed</sub>: Design value of the applied shear force)

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**Performances**

Displacements for anchor rods and fischer internal threaded anchors RG MI

**Annex C 11**

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**Table C12.1: Displacements for reinforcing bars**

Nominal diameter of the bar	φ	8	10	12	14	16	20	25	28	32
<b>Displacement-Factors for tension load<sup>1)</sup></b>										
<b>Uncracked or cracked concrete; Temperature range I, II, III, IV</b>										
δN₀-Factor	[mm/(N/mm²)]	0,07	0,08	0,09	0,09	0,10	0,11	0,12	0,13	0,13
δN∞-Factor		0,11	0,13	0,13	0,15	0,16	0,16	0,18	0,20	0,20
<b>Displacement-Factors for shear load<sup>2)</sup></b>										
<b>Uncracked or cracked concrete; Temperature range I, II, III, IV</b>										
δv₀-Factor	[mm/kN]	0,18	0,15	0,12	0,10	0,09	0,07	0,06	0,05	0,05
δv∞-Factor		0,27	0,22	0,18	0,16	0,14	0,11	0,09	0,08	0,06

1) Calculation of effective displacement:

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

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

(τ<sub>Ed</sub>: Design value of the applied tensile stress)

2) Calculation of effective displacement:

$$\delta_{v0} = \delta_{v0\text{-Factor}} \cdot V_{Ed}$$

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

(V<sub>Ed</sub>: Design value of the applied shear force)**Table C12.2: Displacements for fischer rebar anchors FRA**

fischer rebar anchor FRA	M12	M16	M20	M24	
<b>Displacement-Factors for tension load<sup>1)</sup></b>					
<b>Uncracked or cracked concrete; Temperature range I, II, III, IV</b>					
δN₀-Factor	[mm/(N/mm²)]	0,09	0,10	0,11	0,12
δN∞-Factor		0,13	0,15	0,16	0,18
<b>Displacement-Factors for shear load<sup>2)</sup></b>					
<b>Uncracked or cracked concrete; Temperature range I, II, III, IV</b>					
δv₀-Factor	[mm/kN]	0,12	0,09	0,07	0,06
δv∞-Factor		0,18	0,14	0,11	0,09

1) Calculation of effective displacement:

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

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

(τ<sub>Ed</sub>: Design value of the applied tensile stress)

2) Calculation of effective displacement:

$$\delta_{v0} = \delta_{v0\text{-Factor}} \cdot V_{Ed}$$

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

(V<sub>Ed</sub>: Design value of the applied shear force)

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**Performances**

Displacements for reinforcing bars and fischer rebar anchors FRA

**Annex C 12**

**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 threaded rod			M8	M10	M12	M16	M20	M24	M27	M30								
<b>Bearing capacity under tension load, steel failure<sup>1)</sup></b>																		
<b>fischer anchor rods and standard threaded rods, performance category C1<sup>2)</sup></b>																		
Characteristic resistance N <sub>Rk,s,C1</sub>	Steel zinc plated	Property class [kN]	5.8	19(17)	29(27)	43	79	123	177	230	281							
			8.8	29(27)	47(43)	68	126	196	282	368	449							
	Stainless steel R and high corrosion resistant steel HCR		50	19	29	43	79	123	177	230	281							
			70	26	41	59	110	172	247	322	393							
			80	30	47	68	126	196	282	368	449							
<b>fischer anchor rods and standard threaded rods, performance category C2<sup>2)</sup></b>																		
Characteristic resistance N <sub>Rk,s,C2</sub>	Steel zinc plated	Property class [-]	5.8	- <sup>4)</sup>	- <sup>4)</sup>	39	72	108	177	- <sup>4)</sup>	- <sup>4)</sup>							
			8.8	- <sup>4)</sup>	- <sup>4)</sup>	61	116	173	282	- <sup>4)</sup>	- <sup>4)</sup>							
	Stainless steel R and high corrosion resistant steel HCR		50	- <sup>4)</sup>	- <sup>4)</sup>	39	72	108	177	- <sup>4)</sup>	- <sup>4)</sup>							
			70	- <sup>4)</sup>	- <sup>4)</sup>	53	101	152	247	- <sup>4)</sup>	- <sup>4)</sup>							
			80	- <sup>4)</sup>	- <sup>4)</sup>	61	116	173	282	- <sup>4)</sup>	- <sup>4)</sup>							
<b>Bearing capacity under shear load, steel failure without lever arm<sup>1)</sup></b>																		
<b>fischer anchor rods, performance category C1<sup>2)</sup></b>																		
Characteristic resistance V <sub>Rk,s,C1</sub>	Steel zinc plated	Property class [kN]	5.8	11(10)	17(16)	25	47	74	106	138	168							
			8.8	15(13)	23(21)	34	63	98	141	184	225							
	Stainless steel R and high corrosion resistant steel HCR		50	9	15	21	39	61	89	115	141							
			70	13	20	30	55	86	124	161	197							
			80	15	23	34	63	98	141	184	225							
<b>Standard threaded rods, performance category C1<sup>2)</sup></b>																		
Characteristic resistance V <sub>Rk,s,C1</sub>	Steel zinc plated	Property class [kN]	5.8	8(7)	12(11)	17	33	52	74	97	118							
			8.8	11	16(14)	24	44	69	99	129	158							
	Stainless steel R and high corrosion resistant steel HCR		50	6	11	15	27	43	62	81	99							
			70	9	14	21	39	60	87	113	138							
			80	11	16	24	44	69	99	129	158							
<b>fischer anchor rods and standard threaded rods, performance category C2</b>																		
Characteristic resistance V <sub>Rk,s,C2</sub>	Steel zinc plated	Property class [-]	5.8	- <sup>4)</sup>	- <sup>4)</sup>	14	27	43	62	- <sup>4)</sup>	- <sup>4)</sup>							
			8.8	- <sup>4)</sup>	- <sup>4)</sup>	22	44	69	99	- <sup>4)</sup>	- <sup>4)</sup>							
	Stainless steel R and high corrosion resistant steel HCR		50	- <sup>4)</sup>	- <sup>4)</sup>	14	27	43	62	- <sup>4)</sup>	- <sup>4)</sup>							
			70	- <sup>4)</sup>	- <sup>4)</sup>	20	39	60	87	- <sup>4)</sup>	- <sup>4)</sup>							
			80	- <sup>4)</sup>	- <sup>4)</sup>	22	44	69	99	- <sup>4)</sup>	- <sup>4)</sup>							
Factor for the annular gap	$\alpha_{\text{gap}}$	[-]	0,5 (1,0) <sup>3)</sup>															
<sup>1)</sup> 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																		
<sup>2)</sup> 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.																		
<sup>3)</sup> 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																		
<sup>4)</sup> No performance assessed																		
fischer Superbond									Annex C 13									
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)									Appendix 37/ 40									

**Table C14.1:** Characteristic values for **steel failure** under tension / shear load for of **reinforcing bars (B500B)** under seismic action performance category **C1**

Nominal diameter of the bar	$\phi$	8	10	12	14	16	20	25	28	32	
<b>Bearing capacity under tension load, steel failure<sup>1)</sup></b>											
<b>Reinforcing bar B500B acc. to DIN 488-2:2009-08, performance category C1</b>											
Characteristic resistance	$N_{Rk,s,C1}$	[kN]	28	44	63	85	111	173	270	339	443
<b>Bearing capacity under shear load, steel failure without lever arm<sup>1)</sup></b>											
<b>Reinforcing bar B500B acc. to DIN 488-2:2009-08, performance category C1</b>											
Characteristic resistance	$V_{Rk,s,C1}$	[kN]	10	15	22	30	39	61	95	119	155

<sup>1)</sup> Partial factors for performance category C1 see table C14.2

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

Anchor rod / standard threaded rod		M8	M10	M12	M16	M20	M24	M27	M30	
Nominal diameter of the bar	$\phi$	8	10	12	14	16	20	25	28	32
<b>Tension load, steel failure<sup>1)</sup></b>										
Partial factor $\gamma_{Ms,N}$	Steel zinc plated	5.8	Property class [-]							1,50
		8.8								1,50
	Stainless steel R and high corrosion resistant steel HCR	50								2,86
		70								1,50 <sup>2)</sup> / 1,87
		80								1,60
Reinforcing bar	B500B									1,40
<b>Shear load, steel failure<sup>1)</sup></b>										
Partial factor $\gamma_{Ms,V}$	Steel zinc plated	5.8	Property class [-]							1,25
		8.8								1,25
	Stainless steel R and high corrosion resistant steel HCR	50								2,38
		70								1,25 <sup>2)</sup> / 1,56
		80								1,33
Reinforcing bar	B500B									1,50

<sup>1)</sup> In absence of other national regulations

<sup>2)</sup> Only admissible for high corrosion resistant steel HCR, with  $f_{yk} / f_{uk} \geq 0,8$  and  $A_5 > 12\%$  (e.g. fischer anchor rods)

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#### Performances

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

**Annex C 14**

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**Table C15.1:** Characteristic values for **combined pull-out** and concrete failure for **fischer 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 rod / standard threaded rod		M8	M10	M12	M16	M20	M24	M27 <sup>1)</sup>	M30
<b>Characteristic bond resistance, combined pullout and concrete cone failure</b>									
<b>Hammer-drilling with standard drill bit or hollow drill bit (dry or wet concrete; resin capsule RSB additional in water filled holes)</b>									
Tem- pera- ture range	I: 24 °C / 40 °C	$\tau_{Rk,C1}$ [N/mm <sup>2</sup> ]	4,6	5,0	5,6	5,6	5,6	5,6	6,4
	II: 50 °C / 80 °C		4,3	4,6	5,6	5,6	5,6	5,6	6,0
	III: 72 °C / 120 °C		3,9	4,3	4,9	4,9	4,9	4,9	5,1
	IV: 90 °C / 150 °C		3,6	3,9	4,5	4,5	4,5	4,5	4,7
<b>Installation factors</b>									
Dry or wet concrete	$\gamma_{inst}$	[ <sup>-</sup> ]	1,0						
Water filled hole			1,2 <sup>2)</sup>	1,0 <sup>2)</sup>					

<sup>1)</sup> Only use with injection mortar FIS SB

<sup>2)</sup> Only use with resin capsule RSB in water filled hole

**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 diameter of the bar	$\Phi$	8	10	12	14	16	20	25	28	32
<b>Characteristic bond resistance, combined pullout and concrete cone failure</b>										
<b>Hammer-drilling with standard drill bit or hollow drill bit (dry or wet concrete)</b>										
Tem- pera- ture range	I: 24 °C / 40 °C	$\tau_{Rk,C1}$ [N/mm <sup>2</sup> ]	3,2	4,3	4,5	4,5	5,3	4,5	4,5	5,1
	II: 50 °C / 80 °C		3,2	3,9	4,1	4,1	4,9	4,5	4,5	5,1
	III: 72 °C / 120 °C		2,8	3,6	3,8	3,8	4,5	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	4,3
<b>Installation factors</b>										
Dry or wet concrete	$\gamma_{inst}$	[ <sup>-</sup> ]	1,0							

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#### **Performances**

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**

**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 rod / standard threaded rod		M12	M16	M20	M24				
<b>Characteristic bond resistance, combined pullout and concrete cone failure</b>									
<b>Hammer-drilling with standard drill bit or hollow drill bit (dry or wet concrete)</b>									
Tem- perature range	I: 24 °C / 40 °C	$\tau_{Rk,C2}$ [N/mm <sup>2</sup> ]	4,5	3,2	2,6				
	II: 50 °C / 80 °C		4,5	3,2	3,0				
	III: 72 °C / 120 °C		3,9	2,7	2,3				
	IV: 90 °C / 150 °C		3,6	2,5	2,1				
<b>Installation factors</b>									
Dry or wet concrete	$\gamma_{inst}$	[ - ]		1,0					
<b>Displacement-Factors for tension load<sup>1)</sup></b>									
$\delta_{N,C2}$ (DLS)-Factor	[mm/(N/mm <sup>2</sup> )]	0,09	0,10	0,11	0,12				
$\delta_{N,C2}$ (ULS)-Factor		0,15	0,17	0,17	0,18				
<b>Displacement-Factors for shear load<sup>2)</sup></b>									
$\delta_{V,C2}$ (DLS)-Factor	[mm/kN]	0,18	0,10	0,07	0,06				
$\delta_{V,C2}$ (ULS)-Factor		0,25	0,14	0,11	0,09				
1) Calculation of effective displacement:			2) Calculation of effective displacement:						
$\delta_{N,C2}$ (DLS) = $\delta_{N,C2}$ (DLS)-Factor · $\tau_{Ed}$			$\delta_{V,C2}$ (DLS) = $\delta_{V,C2}$ (DLS)-Factor · $V_{Ed}$						
$\delta_{N,C2}$ (ULS) = $\delta_{N,C2}$ (ULS)-Factor · $\tau_{Ed}$			$\delta_{V,C2}$ (ULS) = $\delta_{V,C2}$ (ULS)-Factor · $V_{Ed}$						
( $\tau_{Ed}$ : Design value of the applied tensile stress )			( $V_{Ed}$ : Design value of the applied shear force )						
fischer Superbond									
<b>Performances</b> Characteristic values for combined pull-out and concrete failure under seismic action (performance category C2) for fischer anchor rods and standard threaded rods									
				<b>Annex C 16</b>					
				Appendix 40/ 40					