

ΔΗΛΩΣΗ ΕΠΙΔΟΣΕΩΝ

DoP 0387

για το σύστημα έκχυσης fischer FIS RC II / FIS RC II Low Speed (χημικό αγκύριο για χρήση σε σκυρόδεμα)

EL

1. Μοναδικός κωδικός ταυτοποίησης του τύπου του προϊόντος: **DoP 0387**
2. Προβλεπόμενη(-ες) χρήση(-εις): **Μεταγενέστερη αγκύρωση σε ρηγματωμένο ή μη ρηγματωμένο σκυρόδεμα, δείτε το παράρτημα, ειδικά τα παραρτήματα B1 - B10.**
3. Κατασκευαστής: **fischerwerke GmbH & Co. KG, Klaus-Fischer-Str. 1, 72178 Waldachtal, Γερμανία**
4. Εξουσιοδοτημένος αντιπρόσωπος: **–**
5. Σύστημα/συστήματα AVCP (αξιολόγηση και επαλήθευση της σταθερότητας της επίδοσης): **1**
6. Ευρωπαϊκό έγγραφο αξιολόγησης: **EAD 330499-02-0601, Edition 12/2023**
Ευρωπαϊκή τεχνική αξιολόγηση: **ETA-22/0501; 2025-09-23**
Οργανισμός τεχνικής αξιολόγησης: **DIBt- Deutsches Institut für Bautechnik**
Κοινοποιημένος(-οι) οργανισμός(-οι): **2873 TU Darmstadt**
7. Δηλωθείσα(-ες) επίδοση(-εις):
Μηχανική αντίσταση και σταθερότητα (BWR1)
Χαρακτηριστική αντίσταση σε εφελκυστικό φορτίο (στατικό και σχεδόν στατικό):
 1) Αντίσταση σε αστοχία χάλυβα: Παράρτημα C1
 2) Αντίσταση για συνδυασμένη αστοχία από ολίσθηση και κώνο σκυροδέματος: Παραρτήματα C2 - C4
 3) Αντίσταση σε αστοχία από κώνο σκυροδέματος: Παραρτήματα C2
 4) Απόσταση από ακμή για αποφυγή θραύσης από φορτίο: Παραρτήματα C2
 5) Ανθεκτικότητα: Παραρτήματα C2 - C4
 6) Μέγιστη ροπή σύσφιξης: Παραρτήματα B4
 7) Ελάχιστη απόσταση από ακμή και μεταξύ αγκυρίων: Παραρτήματα B3 - B5
Χαρακτηριστική αντίσταση σε διατμητικό φορτίο (στατικό και σχεδόν στατικό):
 8) Αντίσταση σε αστοχία χάλυβα: Παράρτημα C1
 9) Αντίσταση σε ολίσθηση: Παραρτήματα C2
 10) Αντίσταση σε αστοχία ακμής σκυροδέματος: Παραρτήματα C2
Μετατόπιση σε βραχείας διάρκειας και μακράς διάρκειας φόρτιση:
 11) Μετατόπιση σε βραχείας διάρκειας και μακράς διάρκειας φόρτιση: Παράρτημα C5
 12) Αντοχή σε οπλισμένο με χαλύβδινες ίνες σκυρόδεμα: NPД
Χαρακτηριστική αντίσταση και μετακινήσεις για τις σεισμικές κατηγορίες C1 και C2 (προαιρετικά):
 13) Αντίσταση σε εφελκυσμό, μετατόπιση, κατηγορία C1: NPД
 14) Αντίσταση σε εφελκυσμό, μετατόπιση, κατηγορία C2: NPД
 15) Αντίσταση σε διάτμηση, μετατόπιση, κατηγορία C1: NPД
 16) Αντίσταση σε διάτμηση, μετατόπιση, κατηγορία C2: NPД
Ασφάλεια σε περίπτωση φωτιάς (BWR 2)
 17) Αντίδραση σε φωτιά: Κατηγορίας (A1)
Αντίσταση στη φωτιά:
 18) Αντίσταση σε φωτιά για αστοχία χάλυβα (εφελκυστικό φορτίο): NPД
 19) Αντοχή δεσμού σε συνθήκες πυρκαγιάς: NPД
 20) Αντίσταση σε φωτιά για αστοχία χάλυβα (διατμητικό φορτίο): NPД
Υγιεινή, υγεία και περιβάλλον (BWR 3)
 21) Περιεχόμενο, εκπομπή ή/και απελευθέρωση επικίνδυνων ουσιών: NPД
8. Κατάλληλη τεχνική τεκμηρίωση και/ή ειδική τεχνική τεκμηρίωση: **–**

Η επίδοση του προϊόντος που ταυτοποιείται ανωτέρω είναι σύμφωνη με τη (τις) δηλωθείσα(-ες) επίδοση(-εις). Αυτή η δήλωση επιδόσεων εκδίδεται σύμφωνα με τον Κανονισμό (ΕΕ) Αρ. 305/2011 με αποκλειστική ευθύνη του κατασκευαστή που προσδιορίζεται παραπάνω.

Υπογραφή για λογαριασμό και εξ ονόματος του κατασκευαστή από:



Dr. Ronald Mihal, Διευθύνων Σύμβουλος Έρευνας και Ανάπτυξης
Tumlingen, 2025-10-22



Dieter Pfaff, Επικεφαλής της Διεθνούς Ομοσπονδίας Παραγωγής και Διαχείρισης Ποιότητας

Αυτή η Δήλωση Επιδόσεων μεταφράστηκε σε διάφορες γλώσσες. Σε περίπτωση που υπάρχει αμφιβολία για τη μετάφραση, υπερισχύει πάντα η αγγλική έκδοση.

Το παράρτημα περιλαμβάνει προαιρετικές και συμπληρωματικές πληροφορίες στα αγγλικά, που ξεπερνούν τις (οριζόμενες σε άλλες γλώσσες) νόμιμες απαιτήσεις.

Translation guidance Essential Characteristics and Performance Parameters for Annexes

Οδηγίες Μετάφρασης των βασικών χαρακτηριστικών και απόδοσης για τα παραρτήματα

Mechanical resistance and stability (BWR 1)

Μηχανική αντίσταση και σταθερότητα (BWR1)

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

Χαρακτηριστική αντίσταση σε εφελκυστικό φορτίο (στατικό και σχεδόν στατικό):

1	Resistance to steel failure: Αντίσταση σε αστοχία χάλυβα:	$N_{Rk,s}$ [kN]
2	Resistance to combined pull-out and concrete cone failure: Αντίσταση για συνδυασμένη αστοχία από ολίσθηση και κώνο σκυροδέματος:	τ_{Rk} and/or $\tau_{Rk,100}$ [N/mm ²], ψ_c , ψ_{sus}^0 , $\psi_{sus,100}$ [-] (BF)
	Resistance to pull-out failure:	$N_{Rk,p}$ and/or $N_{Rk,p,100}$ [kN], ψ_c [-] (BEF)
3	Resistance to concrete cone failure: Αντίσταση σε αστοχία από κώνο σκυροδέματος:	$c_{cr,N}$ [mm], $k_{cr,N}$, $k_{ucr,N}$ [-]
4	Edge distance to prevent splitting under load: Απόσταση από ακμή για αποφυγή θραύσης από φορτίο:	$c_{cr,sp}$ [mm]
5	Robustness: Ανθεκτικότητα:	γ_{inst} [-]
6	Maximum installation torque: Μέγιστη ροπή σύσφιξης:	$\max T_{inst}$ [Nm] (BF)
	Installation torque:	T_{inst} [Nm] (BEF)
7	Minimum edge distance, spacing and member thickness: Ελάχιστη απόσταση από ακμή και μεταξύ αγκυρίων:	c_{min} , s_{min} , h_{min} [mm]

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

Χαρακτηριστική αντίσταση σε διατμητικό φορτίο (στατικό και σχεδόν στατικό):

8	Resistance to steel failure: Αντίσταση σε αστοχία χάλυβα:	$V_{Rk,s}^0$ [kN], $M_{Rk,s}^0$ [Nm], k_7 [-]
9	Resistance to pry-out failure: Αντίσταση σε ολίσθηση:	k_8 [-]
10	Resistance to concrete edge failure: Αντίσταση σε αστοχία ακμής σκυροδέματος:	d_{nom} , l_f [mm]

Displacements under short-term and long-term loading:

Μετατόπιση σε βραχείας διάρκειας και μακράς διάρκειας φόρτιση:

11	Displacements factors under short-term and long-term loading: Μετατόπιση σε βραχείας διάρκειας και μακράς διάρκειας φόρτιση:	δ_0 , δ_∞ [mm/(N/mm ²)] or [mm/kN]
12	Resistance in steel fibre reinforced concrete: Αντοχή σε οπλισμένο με χαλύβδινες ίνες σκυρόδεμα:	Description

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

Χαρακτηριστική αντίσταση και μετακινήσεις για τις σεισμικές κατηγορίες C1 και C2 (προαιρετικά):

13	Resistance to tension for seismic performance category C1 Αντίσταση σε εφελκυσμό, μετατόπιση, κατηγορία C1:	$N_{Rk,s,C1}$ [kN] (all) $\tau_{Rk,C1}$ [N/mm ²] (BF) $N_{Rk,p,C1}$ [kN] (BEF)
14	Resistance to tension and displacements for seismic performance category C2 Αντίσταση σε εφελκυσμό, μετατόπιση, κατηγορία C2:	$N_{Rk,s,C2}$ [kN] (all) $\tau_{Rk,C2}$ [N/mm ²] (BF) $N_{Rk,p,C2}$ [kN] (BEF) $\delta_{N,C2(50\%)}$, $\delta_{N,C2(100\%)}$ [mm] (all)
15	Resistance to shear for seismic performance category C1 Αντίσταση σε διάτμηση, μετατόπιση, κατηγορία C1:	$V_{Rk,s,C1}$ [kN] (all)
16	Resistance to shear load and displacements for seismic performance category C2 Αντίσταση σε διάτμηση, μετατόπιση, κατηγορία C2:	$V_{Rk,s,C2}$ [kN] (all) $\delta_{V,C2(50\%)}$, $\delta_{V,C2(100\%)}$ [mm] (all)

Safety in case of fire (BWR 2)

Ασφάλεια σε περίπτωση φωτιάς (BWR 2)

17	Reaction to fire Αντίδραση σε φωτιά:	Class Κατηγορίας (A1)
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Resistance to fire

Αντίσταση στη φωτιά:

18	Fire resistance to steel failure (tension load): Αντίσταση σε φωτιά για αστοχία χάλυβα (εφελκυστικό φορτίο):	$N_{Rk,s,fi}$ [kN]
19	Bond resistance under fire conditions: Αντοχή δεσμού σε συνθήκες πυρκαγιάς:	$k_{fi,p}$ (θ) [-], $\tau_{Rk,fi}$ (θ) [N/mm ²] (BF)
20	Fire resistance to steel failure under shear loading: Αντίσταση σε φωτιά για αστοχία χάλυβα (διατμητικό φορτίο):	$V_{Rk,s,fi}$ [kN], $M_{Rk,s,fi}^0$ [Nm]

Hygiene, health and the environment (BWR 3)

Υγιεινή, υγεία και περιβάλλον (BWR 3)

21	Content, emission and/or release of dangerous substances: Περιεχόμενο, εκπομπή ή/και απελευθέρωση επικίνδυνων ουσιών:	Description/Level
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Specific Part

1 Technical description of the product

The "fischer injection system FIS RC II and FIS RC II Low Speed" is a bonded fastener consisting of a cartridge with injection mortar fischer FIS RC II, fischer FIS RC II Low Speed, and a steel element according to Annex A3.

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

The product description is given in Annex A.

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

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

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the fastener of at least 50 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 B3 to B6, C1 to C4
Characteristic resistance to shear load (static and quasi-static loading)	See Annex C1 and C2
Displacements under short-term and long-term loading	See Annex C5
Characteristic resistance and displacements for seismic performance categories C1 and C2	No performance assessed

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	No performance assessed

3.3 Hygiene, health and the environment (BWR 3)

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

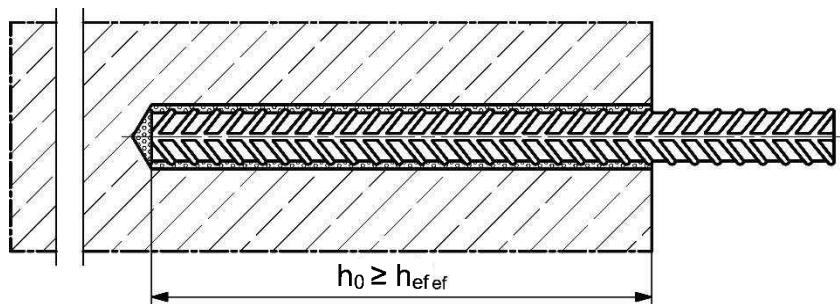
4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

In accordance with the European Assessment Document EAD 330499-02-0601 the applicable European legal act is: [96/582/EC].

The system to be applied is: 1

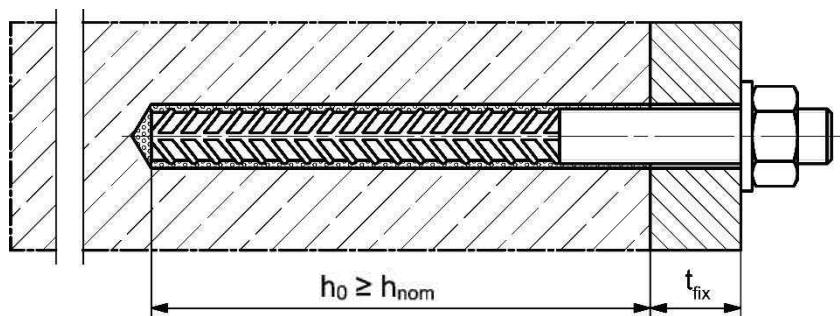
Installation conditions part 1

Reinforcing bar

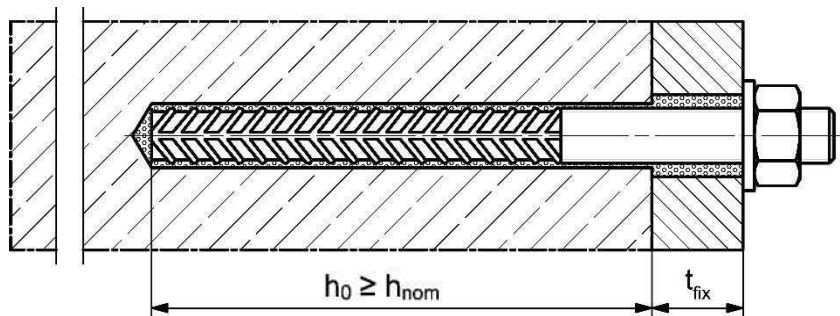


fischer rebar anchor FRA

Pre-positioned installation



Push through installation (annular gap filled with mortar)



Figures not to scale

h_0 = drill hole depth

h_{ef} = effective embedment depth

t_{fix} = thickness of fixture

h_{nom} = overall fastener embedment depth in the concrete

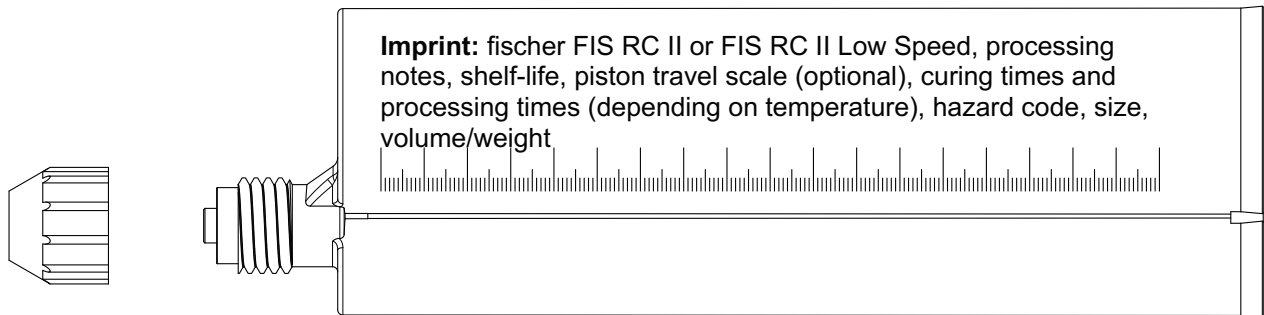
fischer injection system FIS RC II and FIS RC II Low Speed

Product description
Installation conditions part 1

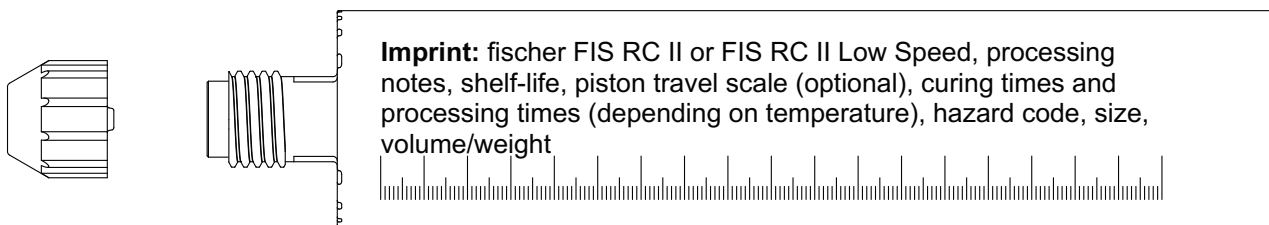
Annex A1

Overview system components part 1

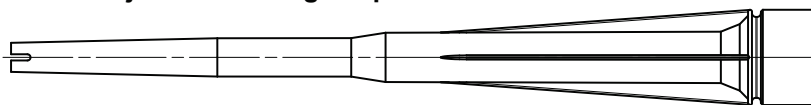
Injection cartridge (shuttle cartridge) with sealing cap; Sizes: 360 ml, 825 ml



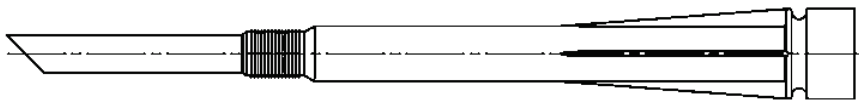
Injection cartridge (coaxial cartridge) with sealing cap; Sizes: 300 ml, 380 ml, 400 ml, 410 ml



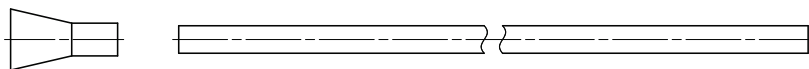
Static mixer FIS MR Plus for injection cartridges up to 410 ml



Static mixer FIS JMR for injection cartridges with 825 ml



Injection adapter and extension tube Ø 9 for static mixer FIS MR Plus;
Injection adapter and extension tube Ø 9 or Ø 15 for static mixer FIS JMR



fischer cleaning brush BS



Blow-out pump AB G



or

Compressed-air cleaning tool ABP:



Figures not to scale

fischer injection system FIS RC II and FIS RC II Low Speed

Product description

Overview system components part 1; cartridges / static mixer / accessories

Annex A2

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Overview system components part 2

Reinforcing bar

Nominal diameter: $\phi 8$, $\phi 10$, $\phi 12$, $\phi 14$, $\phi 16$, $\phi 20$, $\phi 25$, $\phi 28$

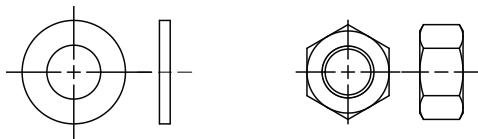


fischer rebar anchor FRA (fischer FRA)

Size: M12, M16, M20, M24



washer / hexagon nut



Figures not to scale

fischer injection system FIS RC II and FIS RC II Low Speed

Product description

Overview system components part 2; steel components

Annex A3

Table A4.1: Materials

Part	Designation	Material	
1	Injection cartridge	Mortar, hardener, filler	
	Steel grade	Stainless steel R	High corrosion resistant steel HCR
		acc. to EN 10088-1:2023 Corrosion resistance class CRC III acc. to EN 1993-1-4: 2006+A1:2015	acc. to EN 10088-1:2023 Corrosion resistance class CRC V acc. to EN 1993-1-4: 2006+A1:2015
2	Washer ISO 7089:2000 for fischer rebar anchor FRA	1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1:2023	1.4565; 1.4529; EN 10088-1:2023
3	Hexagon nut for fischer FRA	Property class 80 acc. to fischer specification for fischer FRA or EN ISO 3506-2:2020 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1:2023	Property class 80 acc. to fischer specification for fischer FRA or EN ISO 3506-2:2020 1.4565; 1.4529 EN 10088-1:2023
4	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 NCI according to EN 1992-1-1/NA; $f_{uk} = f_{tk} = k \cdot f_{yk}$ ($A_5 > 8 \%$)	
5	fischer rebar anchor FRA	Rebar part: Bars and de-coiled rods class B or C with f_{yk} and k according to NDP or NCI of EN 1992-1-1:2004+AC:2010 $f_{uk} = f_{tk} = k \cdot f_{yk}$ ($A_5 > 8 \%$) Threaded part: Property class 80 EN ISO 3506-1:2020	1.4401, 1.4404, 1.4571, 1.4578, 1.4439, 1.4362, 1.4062 acc. to EN 10088-1:2023 Corrosion resistance class CRC III acc. to EN 1993-1-4:2006+A1:2015 1.4565; 1.4529 acc. to EN 10088-1:2023 Corrosion resistance class CRC V acc. to EN 1993-1-4:2006+A1:2015 $f_{uk} \leq 1000 \text{ N/mm}^2$; fracture elongation $A_5 > 8 \%$

fischer injection system FIS RC II and FIS RC II Low Speed**Product description**
Materials**Annex A4**

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Specifications of intended use part 1

Table B1.1: Overview use and performance categories

Anchorages subject to		FIS RC II with ...			
		Reinforcing bar 		fischer 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			
Static and quasi static loading, in	uncracked concrete	all sizes	Tables: C1.1 C2.1 C3.1 C5.1	all sizes	Tables: C1.2 C2.1 C4.1 C5.2
	cracked concrete				
Use category	I1 dry or wet concrete	all sizes			
	I2 water filled hole	- ¹⁾		- ¹⁾	
Seismic performance category	C1 ¹⁾	- ¹⁾		- ¹⁾	
	C2 ¹⁾				
Installation direction		D3 (downward and horizontal and upwards installation)			
Installation temperature		T _{i,min} = -5 °C to T _{i,max} = +40 °C For the standard variation of temperature after installation			
In-service temperature	Temperature range I	-40 °C to +80 °C	(max. short term temperature +80 °C ; max. long term temperature +50 °C)		
	Temperature range II	-40 °C to +120°C	(max. short term temperature +120 °C ; max. long term temperature +72 °C)		
1) No performance assessed					
fischer injection system FIS RC II and FIS RC II Low Speed					Annex B1 Appendix 7 / 21
Intended use Specifications part 1					

Specifications of intended use part 2

Base materials:

- Compacted reinforced or unreinforced normal weight concrete without fibres of strength classes C20/25 to C50/60 according to EN 206:2013+A2:2021.

Use conditions (Environmental conditions):

- Fastener intended for use in structures subject to dry, internal conditions (all materials).
- For all other conditions according to EN1993-1-4:2015 corresponding to corrosion resistance classes to Annex A4 Table A4.1.

Design:

- Fastenings are designed in accordance with EN 1992-4:2018.
- The structural design is conducted under responsibility of a designer experienced in the field of anchorages and concrete works.
- Verifiable calculation notes and drawings are to be prepared taking account of the loads to be anchored. The position of the fastener is indicated on the design drawings (e. g. position of the fastener relative to reinforcement or to supports, etc.).

Installation:

- Fastener installation is to be carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Fastening depth should be marked and adhered to installation.

fischer injection system FIS RC II and FIS RC II Low Speed

Intended use
Specifications part 2

Annex B2

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Table B3.1: Installation parameters for reinforcing bars

Nominal diameter of the bar		ϕ	8 ¹⁾		10 ¹⁾		12 ¹⁾		14	16	20	25	28
Nominal drill hole diameter	d_0	[mm]	10	12	12	14	14	16	18	20	25	30	35
Drill hole depth	h_0		$h_0 = h_{ef}$										
Effective embedment depth	$h_{ef,min}$		60		60		70		75	80	90	100	112
	$h_{ef,max}$		160		200		240		280	320	400	500	560
Simplified spacing and edge distance ²⁾	$s = c$		40		45		55		60	65	85	110	130
Minimum thickness of concrete member	h_{min}	$h_{ef} + 30$ (≥ 100)					$h_{ef} + 2d_0$						

¹⁾ Both drill hole diameters can be used

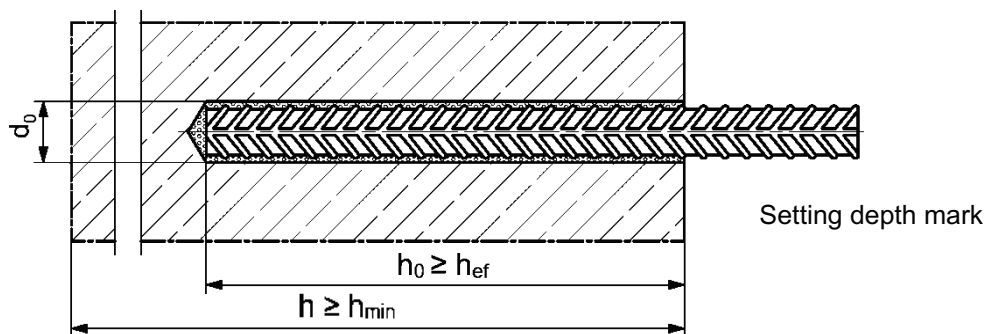
²⁾ Detailed calculation according to **Annex B5** and **B6**

Reinforcing bar



- The minimum value of related rib area $f_{R,min}$ must fulfil the requirements of EN 1992-1-1:2011
- The rib height must be within the range: $0,05 \cdot \phi \leq h_{rib} \leq 0,07 \cdot \phi$
(ϕ = Nominal diameter of the bar, h_{rib} = rib height)

Installation conditions:



Figures not to scale

fischer injection system FIS RC II and FIS RC II Low Speed

Intended use
Installation parameters reinforcing bars

Annex B3

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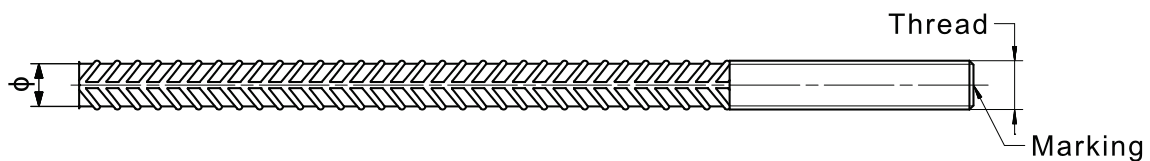
Table B4.1: Installation parameters for **fischer rebar anchor FRA**

Rebar anchor FRA		Thread	M12 ¹⁾	M16	M20	M24
Nominal diameter of the bar	ϕ	[mm]	12	16	20	25
Nominal drill hole diameter	d_0		14 16	20	25	30
Drill hole depth	h_0		$h_{ef} + l_e$			
Effective embedment depth	$h_{ef,min}$		70	80	90	96
	$h_{ef,max}$		140	220	300	380
Distance concrete surface to welded joint	l_e		100			
Simplified spacing and edge distance ²⁾	$s = c$		55	65	85	105
Maximum Diameter of pre-positioned anchorage clearance hole in the fixture	d_f		14	18	22	26
	push through anchorage d_f		18	22	26	32
Minimum thickness of concrete member	h_{min}		$h_0 + 30$	$h_0 + 2d_0$		
Maximum torque moment for attachment of the fixture	$\max T_{inst}$	[Nm]	40	60	120	150

1) Both drill hole diameters can be used

2) Detailed calculation according to **Annex B5** and **B6**

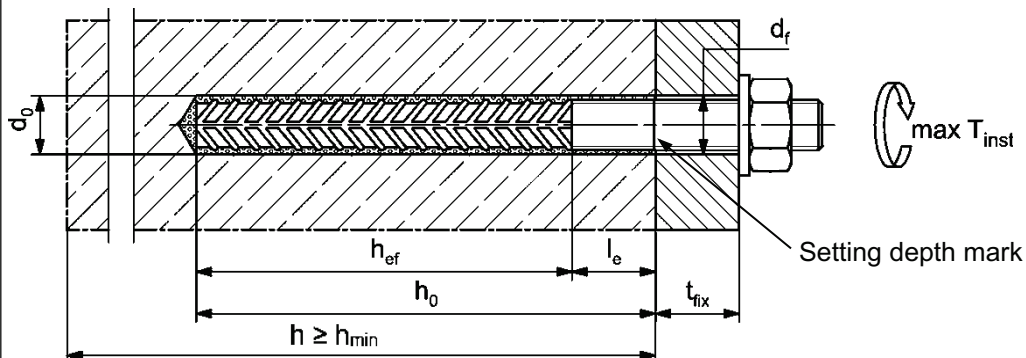
fischer rebar anchor FRA



Marking frontal e.g.:

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

Installation conditions:



Figures not to scale

fischer injection system FIS RC II and FIS RC II Low Speed

Intended use

Installation parameters rebar anchor FRA

Annex B4

Table B5.1: Minimum spacing and minimum edge distance for **reinforcing bars** and **fischer rebar anchor FRA**

Reinforcing bars / FRA (Nominal diameter)		ϕ	8	10	12	14	16	20	25	28
Minimum edge distance										
Uncracked / cracked concrete	c_{min}	[mm]	40	45	45	45	50	55	75	80
Minimum spacing	s		according to Annex B6							
Minimum spacing										
Uncracked / cracked concrete	s_{min}	[mm]	40	45	55	60	65	85	120	140
Minimum edge distance	c		according to Annex B6							
Required projecting area										
Uncracked concrete	$A_{sp,req}$	[1000 mm ²]	8,0	13,0	22,0	23,0	24,0	38,5	47,5	64,0
Cracked concrete			6,5	10,0	16,5	17,5	18,5	29,5	36,5	49,0

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:

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

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

$A_{sp,t}$ = effective projecting area (according to **Annex B6**)

fischer injection system FIS RC II and FIS RC II Low Speed

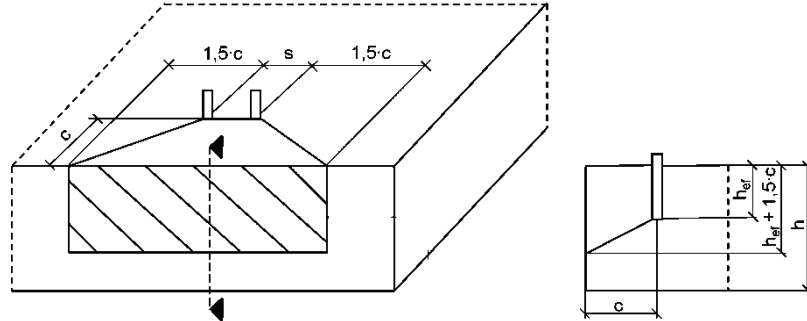
Intended use

Minimum spacing and edge distance for reinforcing bars and fischer rebar anchor FRA

Annex B5

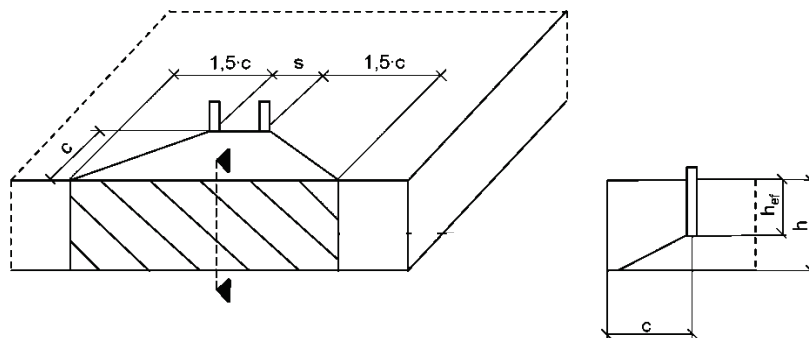
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Table B6.1: Projecting area $A_{sp,t}$ with concrete member thickness
 $h > h_{ef} + 1,5 \cdot c$ and $h \geq h_{min}$



Single anchor		$A_{sp,t} = (3 \cdot c) \cdot (h_{ef} + 1,5 \cdot c)$	[mm ²]	with $c \geq c_{min}$
Group of anchors with	$s > 3 \cdot c$	$A_{sp,t} = (6 \cdot c) \cdot (h_{ef} + 1,5 \cdot c)$	[mm ²]	
Group of anchors with	$s \leq 3 \cdot c$	$A_{sp,t} = (3 \cdot c + s) \cdot (h_{ef} + 1,5 \cdot c)$	[mm ²]	

Table B6.2: Projecting area $A_{sp,t}$ with concrete member thickness
 $h \leq h_{ef} + 1,5 \cdot c$ and $h \geq h_{min}$



Single anchor		$A_{sp,t} = 3 \cdot c \cdot \text{existing } h$	[mm ²]	with $c \geq c_{min}$
Group of anchors with	$s > 3 \cdot c$	$A_{sp,t} = 6 \cdot c \cdot \text{existing } h$	[mm ²]	
Group of anchors with	$s \leq 3 \cdot c$	$A_{sp,t} = (3 \cdot c + s) \cdot \text{existing } h$	[mm ²]	

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

Figures not to scale

fischer injection system FIS RC II and FIS RC II Low Speed

Intended use

Minimum thickness of concrete member for anchor rods,
minimum spacing and edge distance

Annex B6

Appendix 12 / 21

Table B7.1: Parameters of the **cleaning brush BS** (steel brush with steel bristles)
The size of the cleaning brush refers to the drill hole diameter

Nominal drill hole diameter	d_0		10	12	14	16	18	20	25	35
Steel brush diameter BS	d_b	[mm]	11	14	16	20		25	27	40

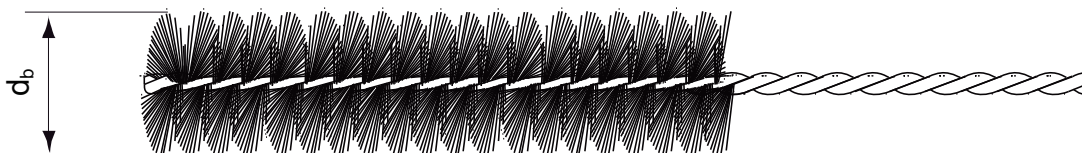


Table B7.2: Conditions for use **static mixer** without an **extension tube**

Nominal drill hole diameter	d_0		10	12	14	16	18	20	25	30	35
Drill hole depth h_0 by using	FIS MR Plus	[mm]	≤ 90		≤ 120	≤ 140	≤ 150	≤ 160	≤ 210		
	FIS JMR		-	-	≤ 90	≤ 160	≤ 180	≤ 190	≤ 220	≤ 250	

Table B7.3 **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 ¹⁾ t_{cure}	
	FIS RC II	FIS RC II Low Speed	FIS RC II	FIS RC II Low Speed
> -5 to 0 ²⁾	20 min	40 min	24 h	5 d
> 0 to 5 ²⁾	13 min	30 min	3 h	48 h
> 5 to 10	9 min	20 min	90 min	24 h
> 10 to 20	5 min	13 min	60 min	120 min
> 20 to 30	4 min	9 min	45 min	60 min
> 30 to 40	2 min	7 min	35 min	45 min

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

²⁾ Minimal cartridge temperature +5°C

fischer injection system FIS RC II and FIS RC II Low Speed

Intended use

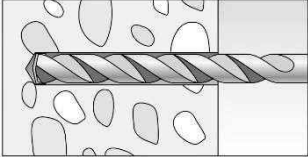
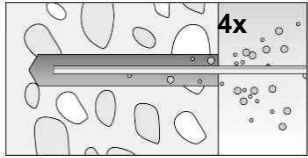
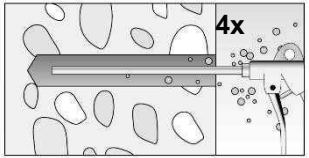
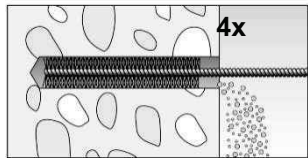
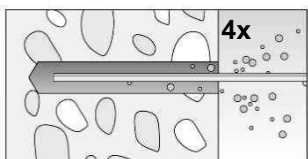
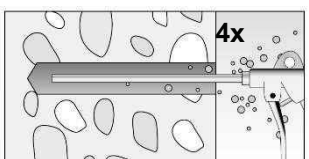
Cleaning brush (steel brush)
Processing time and curing time

Annex B7

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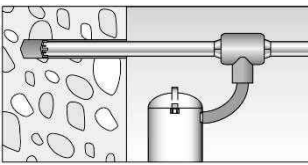
Installation instructions part 1

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

1		Drill the hole. Nominal drill hole diameter d_0 and drill hole depth h_0 see Tables B3.1, B4.1.	
2		Clean the drill hole: For $h_{ef} \leq 12d$ and $d_0 < 18$ mm blow out the hole four times by hand.	 For $h_{ef} > 12d$ and / or $d_0 \geq 18$ mm blow out the hole four times with oil-free compressed air ($p \geq 6$ bar). Use suitable compressed-air nozzle.
3		Brush the drill hole four times. For drill hole diameter ≥ 30 mm use a power drill. For deep holes use an extension. Use suitable brushes (see Table B7.1)	
4		Clean the drill hole: For $h_{ef} \leq 12d$ and $d_0 < 18$ mm blow out the hole four times by hand.	 For $h_{ef} > 12d$ and / or $d_0 \geq 18$ mm blow out the hole four times with oil-free compressed air ($p \geq 6$ bar). Use suitable compressed-air nozzle.

Go to step 5

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

1		Check a suitable hollow drill (see Table B1.1) for correct operation of the dust extraction.	
2		Use a suitable dust extraction system, e.g. fischer FVC 35 M or a comparable dust extraction system with equivalent performance data. Drill the hole with hollow drill bit. The dust extraction system has to extract the drill dust nonstop during the drilling process and must be adjusted to maximum power. Nominal drill hole diameter d_0 and drill hole depth h_0 see Tables B3.1, B4.1.	

Go to step 5

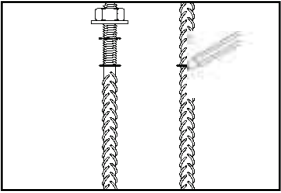
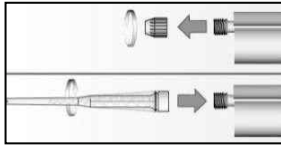
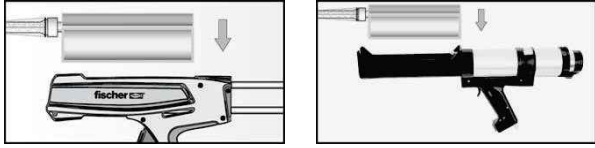
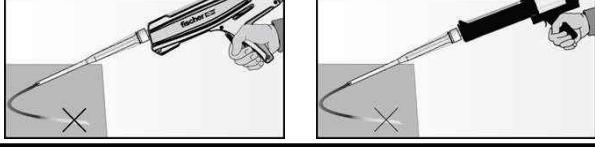
fischer injection system FIS RC II and FIS RC II Low Speed

Intended use
Installation instructions part 1

Annex B8

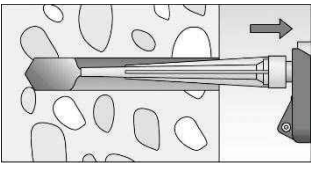
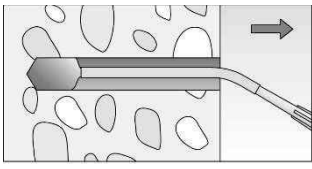
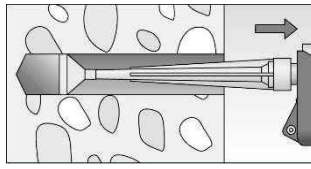
Installation instructions part 2

Preparing the cartridge

5		Mark the setting depth of the steel element.
6		Remove the sealing cap. Screw on the static mixer (the spiral in the static mixer must be clearly visible).
7		Place the cartridge into the dispenser.
8		Extrude approximately 10 cm of material out until the resin is evenly grey in colour. Do not use mortar that is not uniformly grey.

Go to step 9

Injection of the mortar

9			
	For $h_0 = h_{ef}$ fill approximately 2/3 of the drill hole with mortar. For $h_0 > h_{ef}$ more mortar is needed. Always begin from the bottom of the hole and avoid bubbles.	The conditions for mortar injection without extension tube can be found in Table B7.2 . For deeper drill holes, than those mentioned in Table B7.2 , use a suitable extension tube.	For deep holes ($h_0 > 250$ mm) use an injection adapter.

Go to step 10

fischer injection system FIS RC II and FIS RC II Low Speed

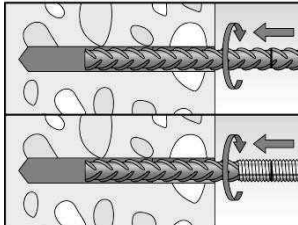
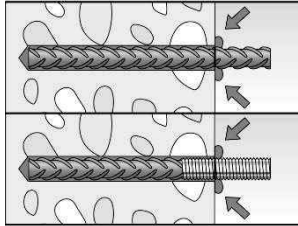
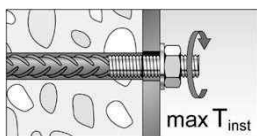
Intended use
Installation instructions part 2

Annex B9

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Installation instructions part 3

Installation reinforcing bars and fischer rebar anchor FRA

10		Only use clean and oil-free reinforcing bars or fischer FRA. Insert the rebar / fischer FRA slowly twisted into the borehole until the embedment mark is reached. Recommendation: Rotation back and forth of the reinforcement bar or the fischer FRA makes pushing easy.				
		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 B7.3		12		Mounting the fixture $\max T_{inst}$ for fischer FRA see Table B4.1

fischer injection system FIS RC II and FIS RC II Low Speed

Intended use
Installation instructions part 3

Annex B10

Appendix 16 / 21

Table C1.1: Characteristic resistance to **steel failure** under **tension / shear loading** of **reinforcing bars**

Nominal diameter of the bar	ϕ	8	10	12	14	16	20	25	28
Characteristic resistance to steel failure under tension loading									
Characteristic resistance	$N_{Rk,s}$	[kN]	$A_s \cdot f_{uk}^{1)}$						
Characteristic resistance to steel failure under shear loading									
Without lever arm									
Characteristic resistance	$V_{Rk,s}^0$	[kN]	$k_6^{2)}) \cdot A_s \cdot f_{uk}^{1)}$						
Ductility factor	k_7	[-]	1,0						
With lever arm									
Characteristic resistance	$M_{Rk,s}^0$	[Nm]	$1,2 \cdot W_{el} \cdot f_{uk}^{1)}$						

1) f_{uk} respectively shall be taken from the specifications of the reinforcing bar.

2) In accordance with EN 1992-4:2018 section 7.2.2.3.1:

- $k_6 = 0,6$ for fasteners made of carbon steel with $f_{uk} \leq 500 \text{ N/mm}^2$,
 $= 0,5$ for fasteners made of carbon steel with $500 \text{ N/mm}^2 < f_{uk} \leq 1000 \text{ N/mm}^2$,
 $= 0,5$ for fasteners made of stainless steel.

Table C1.2: Characteristic resistance to **steel failure** under **tension / shear loading** of **fischer rebar anchors FRA**

fischer rebar anchor FRA			M12	M16	M20	M24
Characteristic resistance to steel failure under tension loading						
Characteristic resistance	N _{Rk,s}	[kN]	62,0	111,0	173,0	236,5
Partial factor ¹⁾						
Partial factor	γ _{Ms,N}	[-]	1,4			
Characteristic resistance to steel failure under shear loading						
Without lever arm						
Characteristic resistance	V ⁰ _{Rk,s}	[kN]	34,5	64,3	100,4	144,7
Ductility factor	k ₇	[-]	1,0			
With lever arm						
Characteristic resistance	M ⁰ _{Rk,s}	[Nm]	107,4	273,0	532,2	920,4
Partial factor ¹⁾						
Partial factor	γ _{Ms,V}	[-]	1,5			

1) In absence of other national regulations

fischer injection system FIS RC II and FIS RC II Low Speed

Performance

Characteristic resistance to steel failure under tension / shear loading of reinforcing bars and fischer rebar anchors FRA

Annex C1

Table C2.1: Characteristic resistance to **concrete failure** under **tension / shear loading**

Size			All sizes								
Characteristic resistance to concrete failure under tension loading											
Installation factor		γ_{inst}	[-]	See annex C3 to C4							
Factors for the compressive strength of concrete > C20/25											
Increasing factor ψ_c for cracked or uncracked concrete $\tau_{Rk}(X,Y) = \psi_c \cdot \tau_{Rk}(C20/25)$	C25/30	[-]	[mm]	1,05							
	C30/37			1,10							
	C35/45			1,15							
	C40/50			1,19							
	C45/55			1,22							
	C50/60			1,26							
Splitting failure											
Edge distance	$h / h_{ef} \geq 2,0$	$c_{cr,sp}$	[mm]	1,0 h_{ef}							
	$2,0 > h / h_{ef} > 1,3$			4,6 h_{ef} - 1,8 h							
$h / h_{ef} \leq 1,3$	2,26 h_{ef}										
Spacing		$s_{cr,sp}$		2 $c_{cr,sp}$							
Concrete cone failure											
Uncracked concrete	$k_{ucr,N}$	[-]	[mm]	11,0							
Cracked concrete	$k_{cr,N}$			7,7							
Edge distance	$c_{cr,N}$	[mm]	[mm]	1,5 h_{ef}							
Spacing	$s_{cr,N}$			2 $c_{cr,N}$							
Factors for sustained tension loading											
Temperature range		[°C]		50 / 80				72 / 120			
Factor		Ψ_{sus}^0	[-]	0,74				0,87			
Characteristic resistance to concrete failure under shear loading											
Installation factor		γ_{inst}	[-]	1,0							
Concrete pry-out failure											
Factor for pry-out failure		k_8	[-]	2,0							
Concrete edge failure											
Effective length of fastener in shear loading		l_f	[mm]	for $d_{nom} \leq 24$ mm: min (h_{ef} ; 12 d_{nom}) for $d_{nom} > 24$ mm: min (h_{ef} ; max (8 d_{nom} ; 300 mm))							
Calculation diameters											
Size				M12		M16		M20		M24	
fisher rebar anchor FRA		d_{nom}	[mm]	12		16		20		25	
Size (nominal diameter of the bar)		ϕ	[mm]	8	10	12	14	16	20	25	28
Reinforcing bar		d_{nom}		8	10	12	14	16	20	25	28

Table C3.1: Characteristic resistance to **combined pull-out and concrete failure** for **reinforcing bars** in hammer drilled holes; **uncracked or cracked concrete**

Nominal diameter of the bar		ϕ	8	10	12	14	16	20	25	28	
Combined pull-out and concrete cone failure											
Calculation diameter		d	[mm]	8	10	12	14	16	20	25	28
Uncracked concrete											
Characteristic bond resistance in uncracked concrete C20/25											
Hammer-drilling with standard drill bit or hollow drill bit (dry or wet concrete)											
Temperature range	I: 50 °C / 80 °C	$\tau_{Rk,ucr}$	[N/mm ²]	11,0	11,0	11,0	10,0	10,0	9,5	9,0	8,5
	II: 72 °C / 120 °C			9,5	9,5	9,0	8,5	8,5	8,0	7,5	7,0
Installation factor											
Dry or wet concrete		γ_{inst}	[-]	1,0							
Cracked concrete											
Characteristic bond resistance in cracked concrete C20/25											
Hammer-drilling with standard drill bit or hollow drill bit (dry or wet concrete)											
Temperature range	I: 50 °C / 80 °C	$\tau_{Rk,cr}$	[N/mm ²]	- ¹⁾	3,0	5,0	5,0	5,0	4,5	4,0	4,0
	II: 72 °C / 120 °C			- ¹⁾	3,0	4,5	4,5	4,5	4,0	3,5	3,5
Installation factor											
Dry or wet concrete		γ_{inst}	[-]	1,0							

¹⁾ No performance assessed

fischer injection system FIS RC II and FIS RC II Low Speed

Performance

Characteristic resistance to combined pull-out and concrete failure for reinforcing bars

Annex C3

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Table C4.1: Characteristic resistance to combined pull-out and concrete failure for fischer rebar anchors FRA in hammer drilled holes; uncracked or cracked concrete

fischer rebar anchor FRA			M12	M16	M20	M24	
Combined pull-out and concrete cone failure							
Calculation diameter		d	[mm]	12	16	20	25
Uncracked concrete							
Characteristic bond resistance in uncracked concrete C20/25							
Hammer-drilling with standard drill bit or hollow drill bit (dry or wet concrete)							
Temperature range	I: 50 °C / 80 °C		$\tau_{Rk,ucr}$ [N/mm ²]	11,0	10,0	9,5	9,5
	II: 72 °C / 120 °C			9,0	8,5	8,0	7,5
Installation factors							
Dry or wet concrete		γ_{inst}	[-]	1,0			
Cracked concrete							
Characteristic bond resistance in cracked concrete C20/25							
Hammer-drilling with standard drill bit or hollow drill bit (dry or wet concrete)							
Temperature range	I: 50 °C / 80 °C		$\tau_{Rk,cr}$ [N/mm ²]	5,0	5,0	4,5	4,0
	II: 72 °C / 120 °C			4,5	4,5	4,0	3,5
Installation factors							
Dry or wet concrete		γ_{inst}	[-]	1,0			

fischer injection system FIS RC II and FIS RC II Low Speed

Performance

Characteristic resistance to combined pull-out and concrete failure for fischer rebar anchor FRA

Annex C4

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Table C5.1: Displacements for reinforcing bars									
Nominal diameter of the bar ϕ		8	10	12	14	16	20	25	28
Displacement-Factors for tension loading ¹⁾									
Uncracked concrete; Temperature range I, II									
δ_{N0} -Factor	[mm/(N/mm ²)]	0,09	0,09	0,10	0,10	0,10	0,10	0,10	0,11
$\delta_{N\infty}$ -Factor		0,10	0,10	0,12	0,12	0,12	0,12	0,12	0,13
Cracked concrete; Temperature range I, II									
δ_{N0} -Factor	[mm/(N/mm ²)]	– ³⁾	0,12	0,13	0,13	0,13	0,13	0,13	0,14
$\delta_{N\infty}$ -Factor		– ³⁾	0,27	0,30	0,30	0,30	0,30	0,30	0,35
Displacement-Factors for shear loading ²⁾									
Uncracked or cracked concrete; Temperature range I, II									
δ_{V0} -Factor	[mm/kN]	0,11	0,11	0,10	0,10	0,10	0,09	0,09	0,08
$\delta_{V\infty}$ -Factor		0,12	0,12	0,11	0,11	0,11	0,10	0,10	0,09
1) Calculation of effective displacement: $\delta_{N0} = \delta_{N0\text{-Factor}} \cdot \tau$ $\delta_{N\infty} = \delta_{N\infty\text{-Factor}} \cdot \tau$ τ : acting bond strength under tension loading					2) Calculation of effective displacement: $\delta_{V0} = \delta_{V0\text{-Factor}} \cdot V$ $\delta_{V\infty} = \delta_{V\infty\text{-Factor}} \cdot V$ V : acting shear loading				
3) No performance assessed									

Table C5.2: Displacements for fischer rebar anchors FRA				
fischer rebar anchor FRA	M12	M16	M20	M24
Displacement-Factors for tension loading ¹⁾				
Uncracked concrete; Temperature range I, II				
δ_{N0} -Factor	[mm/(N/mm ²)]	0,10	0,10	0,10
$\delta_{N\infty}$ -Factor		0,12	0,12	0,13
Cracked concrete; Temperature range I, II				
δ_{N0} -Factor	[mm/(N/mm ²)]	0,12	0,13	0,13
$\delta_{N\infty}$ -Factor		0,30	0,30	0,35
Displacement-Factors for shear loading ²⁾				
Uncracked or cracked concrete; Temperature range I, II				
δ_{V0} -Factor	[mm/kN]	0,10	0,10	0,09
$\delta_{V\infty}$ -Factor		0,11	0,11	0,10
1) Calculation of effective displacement: $\delta_{N0} = \delta_{N0\text{-Factor}} \cdot \tau$ $\delta_{N\infty} = \delta_{N\infty\text{-Factor}} \cdot \tau$ τ : acting bond strength under tension loading			2) Calculation of effective displacement: $\delta_{V0} = \delta_{V0\text{-Factor}} \cdot V$ $\delta_{V\infty} = \delta_{V\infty\text{-Factor}} \cdot V$ V : acting shear loading	

fischer injection system FIS RC II and FIS RC II Low Speed	Annex C5 Appendix 21 / 21
Performance Displacements for reinforcing bars and fischer rebar anchors FRA	