

DoP 0422

fischer iesmidzināšanas sistēmai FIS VB (saistītais stiprinājums lietošanai betonā)

LV

- | | |
|---|---|
| 1. Unikāls izstrādājuma tipa identifikācijas numurs: | DoP 0422 |
| 2. Paredzētais izmantojums: | Pēcuzstādīti stiprinājumi plaisātā vai neplaisātā betonā, Skatīt papildinājumu, īpaši pielikumus B1 - B11. |
| 3. Ražotājs: | fischerwerke GmbH & Co. KG, Otto-Hahn-Straße 15, 79211 Denzlingen, Vācija |
| 4. Pilnvarotais pārstāvis: | — |
| 5. Eksploatācijas īpašību noturības novērtējuma un pārbaudes (AVCP) sistēma(-as): | 1 |
| 6. Eiropas novērtējuma dokuments:
Eiropas tehniskais novērtējums:
Tehniskā novērtējuma iestāde:
Paziņotā(-ās) iestāde(-es): | EAD 330499-02-0601; 2022-09 (Decision (EU) 2024/1944)
ETA-24/0274; 2026-08-19
1020, TZUS - TECHNICKY A ZKUSEBNI USTAV STAVEBNI PRAHA s.p.
2873, Technische Universität Darmstadt, Institut für Stahlbau und Werkstoffmechanik |
| 7. Deklarētā(-ās) eksploatācijas īpašība(-as):
<u>Mehāniskā izturība un stabilitāte (BWR 1)</u>
Raksturīgā izturība pret stiepes slodzi (statiskā un kvazistatiskā slodze):
1) Izturība pret tērauda bojājumu: Skatīt papildinājumu, īpaši pielikumus C1, C2
2) Izturība pret izraušanu un betona bojājumu: Skatīt papildinājumu, īpaši pielikumu C4
3) Izturība pret betona konusa bojājumu Skatīt papildinājumu, īpaši pielikumu C3
4) Attālums līdz malai, lai novērstu plaisāšanu slodzes laikā Skatīt papildinājumu, īpaši pielikumu C3
5) Uzstādīšanas procesa robustums Skatīt papildinājumu, īpaši pielikumus C3, C4
6) Maksimālais uzstādīšanas griezes moments: Skatīt papildinājumu, īpaši pielikumus B3, B4
7) Minimālais attālums līdz malai, atstatums un elementa biezums: Skatīt papildinājumu, īpaši pielikumus B3 - B5

Raksturīgā izturība pret bīdes slodzi (statiskā un kvazistatiskā slodze)
8) Izturība pret tērauda bojājumu: Skatīt papildinājumu, īpaši pielikumus C1, C2
9) Izturība pret izraušanas bojājumu: Skatīt papildinājumu, īpaši pielikumu C3
10) Izturība pret betona malas bojājumu: Skatīt papildinājumu, īpaši pielikumu C3

Deformācijas koeficienti īstermiņa un ilgtermiņa slodzē:
11) Deformācijas koeficienti īstermiņa un ilgtermiņa slodzē: Skatīt papildinājumu, īpaši pielikumu C5
12) Izturība tērauda šķiedru armētā betonā: NPĐ

Raksturīgā izturība un pārvietojumi seismiskās veiktspējas kategorijās C1 un C2:
13) Izturība pret stiepes slodzi seismiskajā kategorijā C1 NPĐ
14) Izturība pret stiepes slodzi, kategorija C2 NPĐ
15) Izturība pret bīdes slodzi seismiskajā kategorijā C1 NPĐ
16) Izturība pret bīdes slodzi un pārvietojumiem seismiskajā kategorijā C2 NPĐ

<u>Drošība ugunsgrēka gadījumā (BWR 2)</u>
17) Reakcija uz uguni Klase (A1)
Izturība pret uguni:
18) Ugunsizturība pret tērauda plīsumu vilkmes slodzes gadījumā: NPĐ
19) Ugunsizturība pret saites bojājumu stiepes slodzē NPĐ
20) Ugunsizturība pret tērauda atteici (šķērsslodze): NPĐ

<u>Higiēna, veselība un vide (BWR 3)</u>
21) Bīstamo vielu saturs, emisija un izdalīšanās NPĐ | |
| 8. Atbilstīgā tehniskā dokumentācija un/vai īpaša tehniskā dokumentācija: | — |

Iepriekš norādītā izstrādājuma ekspluatācijas īpašības atbilst deklarēto ekspluatācijas īpašību kopumam. Šī ekspluatācijas īpašību deklarācija izdota saskaņā ar Regulu (ES) Nr. 305/2011, un par to ir atbildīgs vienīgi iepriekš norādītais ražotājs.

Parakstīts ražotāja vārdā:

i.v. 

Dr. Christian Weber, Attīstības vadītājs



Dieter Pfaff, Starptautiskās ražošanas federācijas un kvalitātes vadības vadītājs

Tumlingen, 2026-10-01

Šī deklarācija par tehniskajiem raksturojumiem ir sagatavota dažādās valodās. Gadījumos, ja rodas strīdi attiecībā uz skaidrojumu, prioritāte vienmēr ir angļu versijai. Pielikums satur brīvprātīgi sniegtu papildu informāciju angļu valodā, kas pārsniedz (norādīts neatkarīgi no valodas) likumā noteiktās prasības.

Translation guidance Essential Characteristics and Performance Parameters for Annexes

Tulkošanas norādījumi Pielikumu būtiskie raksturlielumi un darbības parametri

Mechanical resistance and stability (BWR 1)		
Mehāniskā izturība un stabilitāte (BWR 1)		
Characteristic resistance to tension load (static and quasi-static loading):		
Raksturīgā izturība pret stiepes slodzi (statiskā un kvazistatiskā slodze):		
1	Resistance to steel failure: Izturība pret tērauda bojājumu:	$N_{Rk,s}$ [kN]
2	Resistance to combined pull- out and concrete cone failure: Izturība pret izraušanu un betona bojājumu:	τ_{Rk} and/or $\tau_{Rk,100}$ [N/mm ²], $\psi_c, \psi_{sus}^0, \psi_{sus,100}$ [-] (BF)
	Resistance to pull-out failure: Izturība pret izraušanu:	$N_{Rk,p}$ and/or $N_{Rk,p,100}$ [kN], ψ_c [-] (BEF)
3	Resistance to concrete cone failure: Izturība pret betona konusa bojājumu	$c_{cr,N}$ [mm], $k_{cr,N}$, $k_{ucr,N}$ [-]
4	Edge distance to prevent splitting under load: Attālums līdz malai, lai novērstu plaisāšanu slodzes laikā	$c_{cr,sp}$ [mm]
5	Robustness: Uzstādīšanas procesa robustums	γ_{inst} [-]
6	Maximum installation torque: Maksimālais uzstādīšanas griezes moments:	$\max T_{inst}$ [Nm] (BF)
	Installation torque: Uzstādīšanas griezes moments:	T_{inst} [Nm] (BEF)
7	Minimum edge distance,spacing and member thickness: Minimālais attālums līdz malai, atstatums un elementa biezums:	$c_{min}, s_{min}, h_{min}$ [mm]
Characteristic resistance to shear load (static and quasi-static loading):		
Raksturīgā izturība pret bīdes slodzi (statiskā un kvazistatiskā slodze)		
8	Resistance to steel failure: Izturība pret tērauda bojājumu:	$V_{Rk,s}^0$ [kN], $M_{Rk,s}^0$ [Nm], k_7 [-]
9	Resistance to pry-out failure: Izturība pret izraušanas bojājumu:	k_8 [-]
10	Resistance to concrete edge failure: Izturība pret betona malas bojājumu:	d_{nom}, l_f [mm]
Displacements under short-term and long-term loading:		
Deformācijas koeficienti īstermiņa un ilgtermiņa slodzē:		
11	Displacements factors under short-term and long-term loading: Deformācijas koeficienti īstermiņa un ilgtermiņa slodzē:	δ_0, δ_∞ [mm/(N/mm ²)] or [mm/kN]
12	Resistance in steel fibre reinforced concrete: Izturība tērauda šķiedru armētā betonā:	Description
Characteristic resistance and displacements for seismic performance categories C1 and C2:		
Raksturīgā izturība un pārvietojumi seismiskās veiktspējas kategorijās C1 un C2:		
13	Resistance to tension for seismic performance category C1 Izturība pret stiepes slodzi seismiskajā kategorijā 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 Izturība pret stiepes slodzi, kategorija 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 Izturība pret bīdes slodzi seismiskajā kategorijā C1	$V_{Rk,s,C1}$ [kN] (all)
16	Resistance to shear load and displacements for seismic performance category C2 Izturība pret bīdes slodzi un pārvietojumiem seismiskajā kategorijā C2	$V_{Rk,s,C2}$ [kN] (all) $\delta_{V,C2(50\%)}, \delta_{V,C2(100\%)}$ [mm] (all)
Safety in case of fire (BWR 2)		
Drošība ugunsgrēka gadījumā (BWR 2)		
17	Reaction to fire Reakcija uz uguni	Class Klase (A1)
Resistance to fire		
Izturība pret uguni:		
18	Fire resistance to steel failure (tension load): Ugunsizturība pret tērauda plīsumu viļkmes slodzes gadījumā:	$N_{Rk,s,fi}$ [kN]
19	Bond resistance under fire conditions: Ugunsizturība pret saites bojājumu stiepes slodzē	$k_{fi,p}(\theta)$ [-], $\tau_{Rk,fi}(\theta)$ [N/mm ²] (BF)
20	Fire resistance to steel failure under shear loading: Ugunsizturība pret tērauda atteici (šķērsslodze):	$V_{Rk,s,fi}$ [kN], $M_{Rk,s,fi}^0$ [Nm]
Hygiene, health and the environment (BWR 3)		
Higiēna, veselība un vide (BWR 3)		
21	Content, emission and/or release of dangerous substances: Bīstamo vielu saturs, emisija un izdalīšanās	Description/Level

Specific parts

1. Technical description of the product

The fischer injection system FIS VB for uncracked concrete is a bonded anchor consisting of a cartridge with injection mortar and a steel element. The steel element is galvanized or stainless steel threaded rod.

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 illustration and the description of the product are given in Annex A.

2. Specification of the intended use in accordance with the applicable European Assessment Document (hereinafter EAD)

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 provisions made in this European Technical Assessment are based on an assumed 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 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)	Annex C1 to C4
Characteristic resistance to shear load (static and quasi-static loading)	Annex C1 to C3
Displacements under short term and long term loading	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	Satisfy the requirements for performance class A1
Resistance to fire	No performance assessed

3.3 Hygiene, health and environment (BWR 3)

No performance assessed.

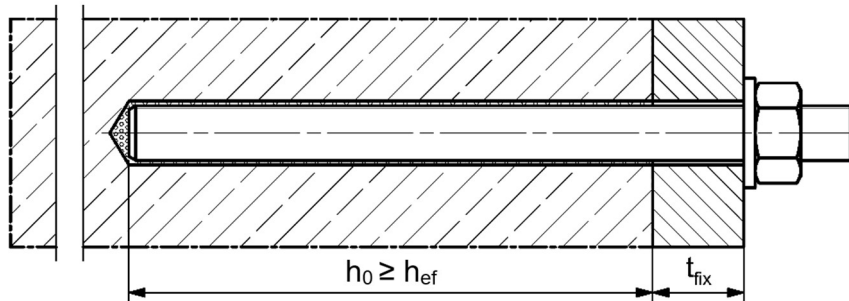
4. Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base

According to the Decision 96/582/EC of the European Commission the system of assessment verification of constancy of performance (see Annex IX to Regulation (EU) 2024/3110) is system 1.

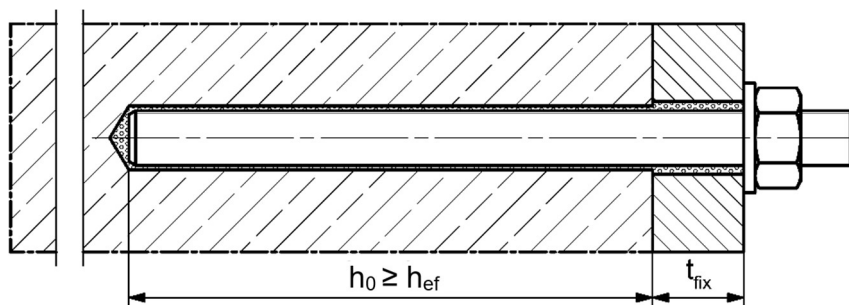
Installation conditions part 1

fischer Anchor rod FIS A / RG (Anchor rod) and
commercial standard Threaded rod (Threaded rod)

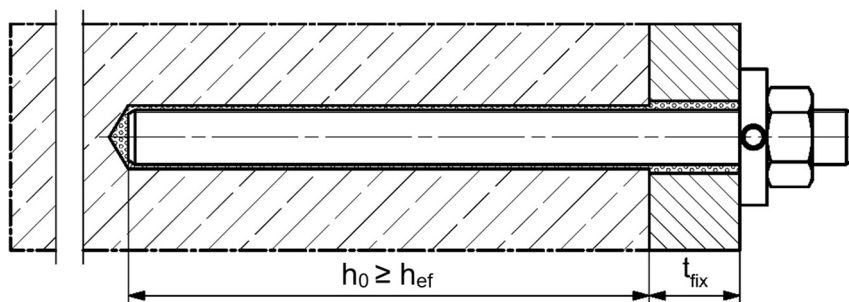
Pre-positioned installation



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

h_0 = drill hole depth

h_{ef} = effective embedment depth

t_{fix} = thickness of fixture

fischer injection system FIS VB

Product description

Installation conditions part 1

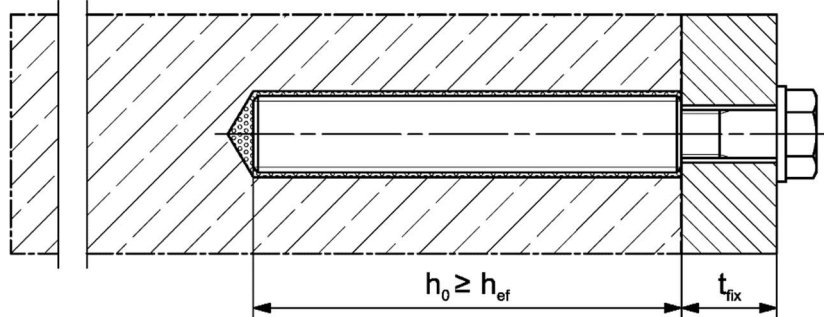
Annex A1

Appendix 2 / 22

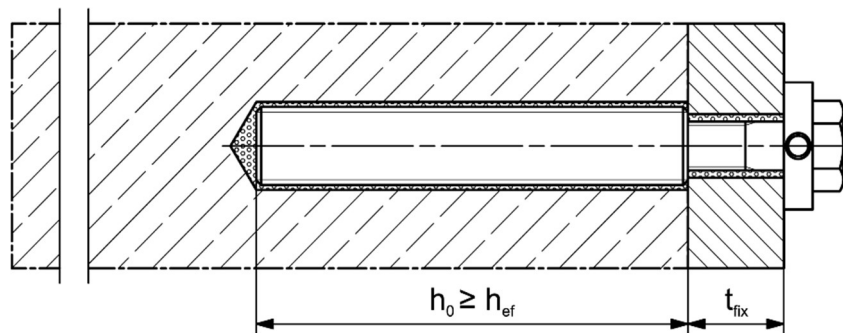
Installation conditions part 2

fischer internal threaded anchor FIS IG (fischer FIS IG)

Pre-positioned installation



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



Figures not to scale

h_0 = drill hole depth

h_{ef} = effective embedment depth

t_{fix} = thickness of fixture

fischer injection system FIS VB

Product description

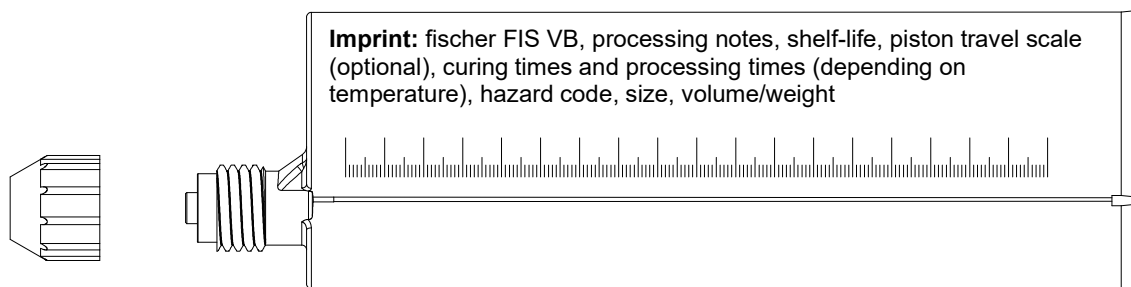
Installation conditions part 2

Annex A2

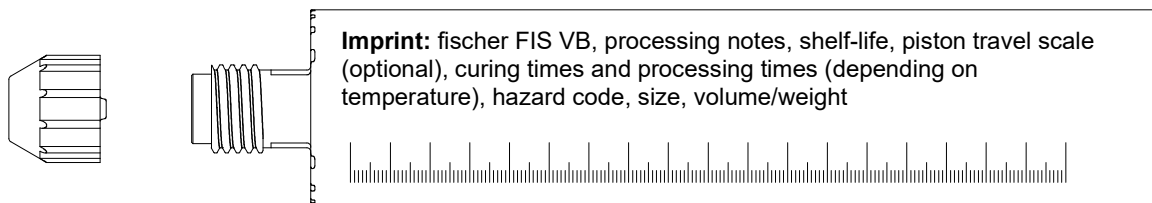
Appendix 3 / 22

Overview system components part 1

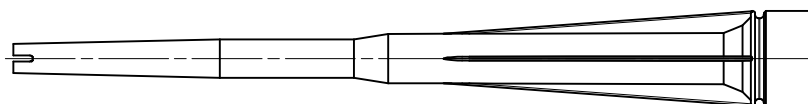
Injection cartridge (shuttle cartridge) with sealing cap; Sizes: 360 ml, 825 ml



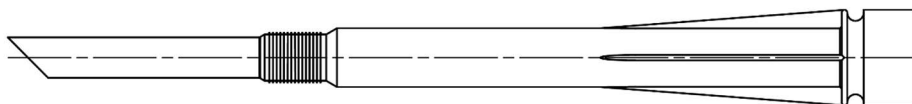
Injection cartridge (coaxial cartridge) with sealing cap; Sizes: 100 ml, 150 ml, 300 ml, 380 ml, 410 ml Injection cartridge (foilbag cartridge) with sealing cap; Sizes: 100 ml, 150 ml, 300 ml



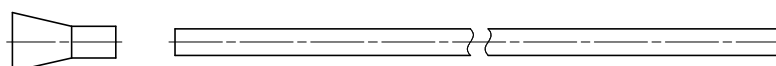
Static mixer FIS MR Plus for injection cartridges up to 825 ml



Static mixer FIS JMR for injection cartridges of 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



Cleaning brush BS



Blow-out pump AB G



Compressed-air cleaning tool ABP



Figures not to scale

fischer injection system FIS VB

Product description

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

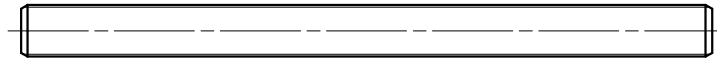
Annex A3

Appendix 4 / 22

Overview system components part 2

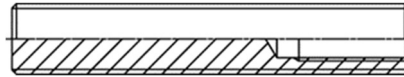
Anchor rod / Threaded rod

Size: M8, M10, M12, M16, M20

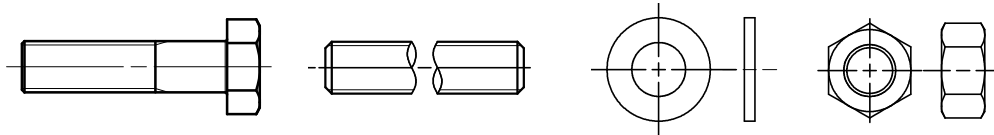


fischer FIS IG

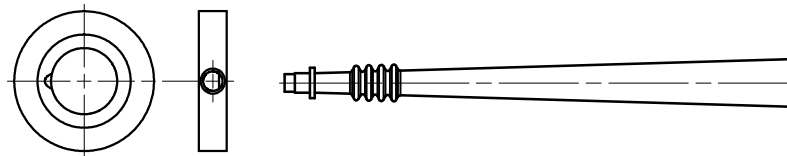
Size: M5, M6, M8, M10, M12



Screw / Anchor rod / Threaded rod / washer / hexagon nut



fischer filling disc with injection adapter



fischer centering clip DD-S / DD-E



Figures not to scale

fischer injection system FIS VB

Product description

Overview system components part 2; metal parts, fischer centering clip, injection adapter

Annex A4

Appendix 5 / 22

Table A5.1: Materials

Part	Designation	Material		
1	Injection cartridge	Mortar, hardener, filler		
	Steel grade	Steel	Stainless steel R	High corrosion resistant steel HCR
		zinc plated (zp, hdg)	EN 10088-1 Corrosion resistance class CRC III EN 1993-1-4	EN 10088-1 Corrosion resistance class CRC V EN 1993-1-4
2	Anchor rod / Threaded rod	Property class 5.8 or 8.8; EN ISO 898-1 zp ≥ 5 µm, EN ISO 4042 or hot dip galvanised ≥ 40 µm EN ISO 10684 f _{uk} ≤ 1000 N/mm ² A ₅ > 8 % fracture elongation	Property class 50, 70 or 80; EN ISO 3506-1 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; 1.4062; 1.4662; 1.4462; EN 10088-1 f _{uk} ≤ 1000 N/mm ² A ₅ > 8 % fracture elongation	Property class 50, 70 or 80; EN ISO 3506-1 or property class HCR 70 with f _{yk} ≥ 560 N/mm ² ; 1.4565; 1.4529; EN 10088-1 f _{uk} ≤ 1000 N/mm ² A ₅ > 8 % fracture elongation
3	Washer ISO 7089	zinc plated ≥ 5 µm, EN ISO 4042 or hot dip galvanised ≥ 40 µm EN ISO 10684	1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1	1.4565; 1.4529; EN 10088-1
4	Hexagon nut	Property class 5 or 8 EN ISO 898-2 zinc plated ≥ 5 µm, EN ISO 4042 or hot dip galvanised ≥ 40 µm EN ISO 10684	Property class 50, 70 or 80 EN ISO 3506-2 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1	Property class 50, 70 or 80 EN ISO 3506-2 1.4565; 1.4529; EN 10088-1
5	fischer FIS IG	Property class 5.8 EN ISO 898-1 zinc plated ≥ 5 µm, EN ISO 4042	Property class 70 EN ISO 3506-1; 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1	Property class 70 EN ISO 3506-1 1.4565; 1.4529; EN 10088-1
6	Commercial standard screw or Anchor rod / Threaded rod for fischer FIS IG	Property class 5.8 or 8.8; EN ISO 898-1 zinc plated ≥ 5 µm, EN ISO 4042 A ₅ > 8 % fracture elongation	Property class 70 EN ISO 3506-1 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1 A ₅ > 8 % fracture elongation	Property class 70 EN ISO 3506-1 1.4565; 1.4529; EN 10088-1 A ₅ > 8 % fracture elongation
7	fischer filling disc similar to DIN 6319-G	zinc plated ≥ 5 µm, EN ISO 4042 or hot dip galvanised ≥ 40 µm EN ISO 10684	1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362; EN 10088-1	1.4565; 1.4529; EN 10088-1

Specifications of intended use part 1

Table B1.1: Overview use and performance categories

		FIS VB with ...			
		Anchor rod Threaded rod 		fischer FIS IG 	
Hammer drilling with standard drill bit 		all sizes			
Static and quasi static load, in uncracked concrete		all sizes	Tables: C1.1 C3.1 C4.1 C5.1	all sizes	Tables: C2.1 C3.1 C4.1 C5.1
Use category	I1 dry or wet concrete	all sizes			
Installation direction		D3 (downward and horizontal and upwards (e.g. overhead) installation)			
Installation temperature		T _{i,min} = 0 °C to T _{i,max} = +40 °C			
In-service temperature	Temperature range I	-40 °C to +40 °C	(max. short term temperature +40 °C ; max. long term temperature +24 °C)		
	Temperature range II	-40 °C to +80 °C	(max. short term temperature +80 °C ; max. long term temperature +50 °C)		
fischer injection system FIS VB					Annex B1 Appendix 7 / 22
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.

Use conditions (Environmental conditions):

- Fastener intended for use in structures subject to dry, internal conditions (all materials).
- For all other conditions according to EN 1993-1-4 corresponding to corrosion resistance classes to **Annex A5 Table A5.1**.

Design:

- Fastenings are designed in accordance with EN 1992-4.
- 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.
- Overhead installation is allowed (necessary equipment see installation instruction).

fischer injection system FIS VB

Intended use
Specifications part 2

Annex B2

Appendix 8 / 22

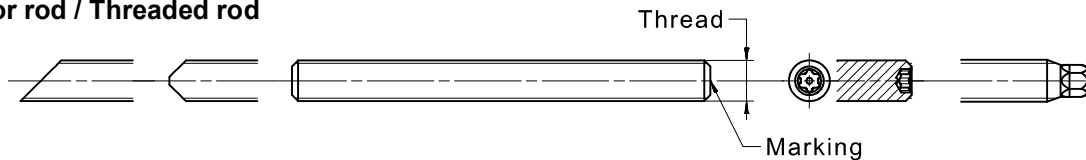
Table B3.1: Installation parameters for Anchor rods / Threaded rods

Anchor rods / Threaded rods		Thread	M8	M10	M12	M16	M20
Nominal drill hole diameter	d_0	[mm]	10	12	14	18	24
Drill hole depth	$h_0^{2)}$		$h_0 \geq h_{ef}$				
Effective embedment depth	$h_{ef, min}$		60	60	70	80	90
	$h_{ef, max}$		160	200	240	320	400
Simplified spacing and edge distance ¹⁾	$s = c$		40	45	55	65	85
Maximum diameter of the clearance hole of the fixture	pre-positioned installation d_f		9	12	14	18	22
	push-through installation d_f		12	14	16	20	26
Minimum thickness of concrete member	h_{min}		$h_{ef} + 30 (\geq 100)$			$h_{ef} + 2d_0$	
Maximum installation torque	$\max T_{inst}$	[Nm]	10	20	40	60	120

¹⁾ Detailed calculation according to **Annex B5 and B6**.

²⁾ When using centering clips DD-S / DD-E, observe the deviating specifications as specified in **Table B8.1**.

Anchor rod / Threaded rod



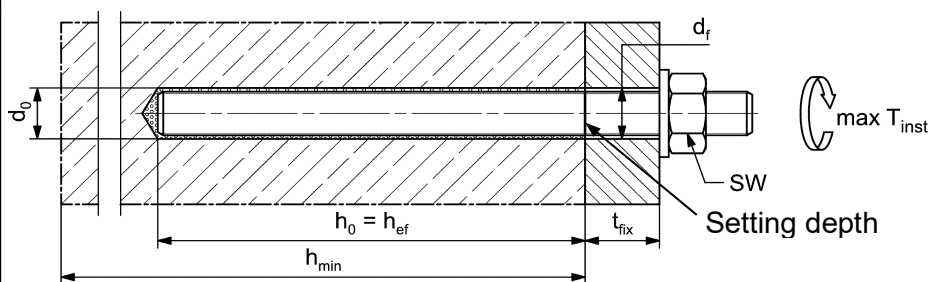
Marking (on random place) fischer Anchor rod:

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

Alternatively: Colour coding according to DIN 976-1

¹⁾ PC = property class

Installation conditions:



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

- Materials, dimensions and mechanical properties according to **Annex A5, Table A5.1**.
 - Inspection certificate 3.1 according to EN 10204:2004, the documents have to be stored.
 - Setting depth is marked.
 - Hot-dip galvanized steel
- Steel load-bearing capacities for hot-dip galvanised parts are only valid if the threaded rod and nut are correctly paired. The strength class of the nut must be one strength class higher than that of the threaded rod ($\geq M12$ in combination with tolerance class 6AX in accordance with EN ISO 10684 two strength classes higher). The pairing of undersized threaded rods (additional designation U according to EN ISO 10684) with oversized nuts (additional designation Z or X according to EN ISO 10684) is not permitted under any circumstances.

Figures not to scale

fischer injection system FIS VB

Intended use

Installation parameters Anchor rods / Threaded rods

Annex B3

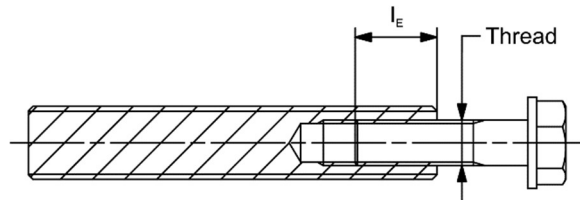
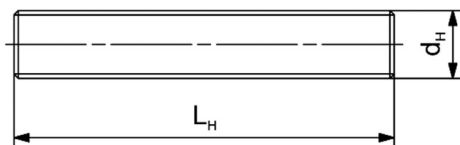
Appendix 9 / 22

Table B4.1: Installation parameters for fischer FIS IG

fischer FIS IG		Thread	M5	M6	M8	M10	M12
Diameter of anchor	$d_{nom} = d_H$	[mm]	8	10	12	16	20
Nominal drill hole diameter	d_0		10	12	14	18	24
Drill hole depth	$h_0^{2)}$		$h_0 \geq h_{ef} = L_H$				
Effective embedment depth ($h_{ef} = L_H$)	$h_{ef, min}$		60	60	70	80	90
	$h_{ef, max}$		160	200	240	320	400
Simplified spacing and edge distance ¹⁾	$s = c$		40	45	55	65	85
Diameter of the clearance hole in the fixture	d_f		6	7	9	12	14
Minimum thickness of concrete member	$h_{min}^{1)}$		$h_{ef} + 30 (\geq 100)$			$h_{ef} + 2d_0$	
Maximum screw-in depth	$l_{E, max}$		18	18	20	25	30
Minimum screw-in depth	$l_{E, min}$		8	8	10	12	14
Maximum installation torque	$\max T_{inst}$	[Nm]	5	5	10	20	40

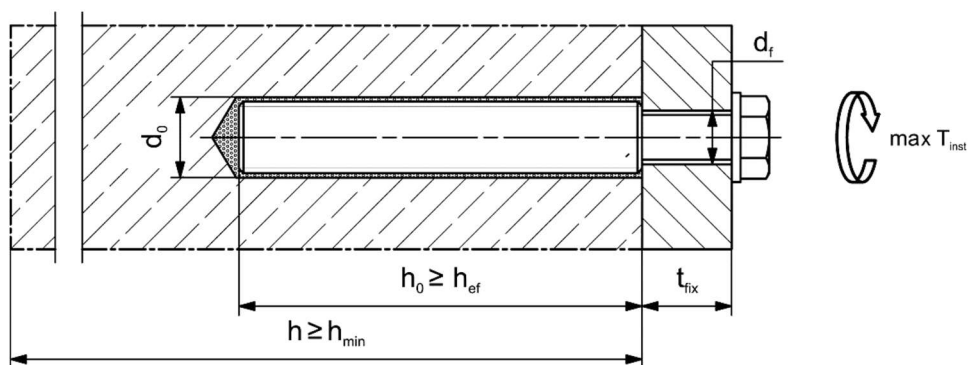
¹⁾ Detailed calculation according to **Annex B5 and B6**.

²⁾ When using centering clips DD-S / DD-E, observe the deviating specifications as specified in **Table B8.1**.

fischer FIS IG**Marking (at any location):**

High corrosion resistant steel HCR property class 70 -

Bolts or threaded rods (including nut and washer) must comply with the relevant material and strength class as specified in **Annex A5, Table A5.1**.

Installation conditions:

Figures not to scale

fischer injection system FIS VB

Intended use
Installation parameters fischer FIS IG

Annex B4

Appendix 10 / 22

Table B5.1: Minimum spacing and minimum edge distance for **Anchor rods / Threaded rods** and **fischer FIS IG**

Anchor rods / Threaded rods			M8		M10	-	M12	-	M16	-	M20	-
fischer FIS IG			-	M5	-	M6	-	M8	-	M10	-	M12
Minimum edge distance												
Uncracked concrete	c _{min}	[mm]	40	40	45	45	45	45	50	50	55	55
Minimum spacing	s		according to Annex B6									
Minimum spacing												
Uncracked concrete	s _{min}	[mm]	40	40	45	45	55	55	65	65	85	85
Minimum edge distance	c		according to Annex B6									
Required projecting area												
Uncracked concrete≥C20/25	A _{sp,req}	[1000 mm²]	8,0	3,5	13,0	3,5	22,0	5,5	24,0	8,0	38,5	13,0

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

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

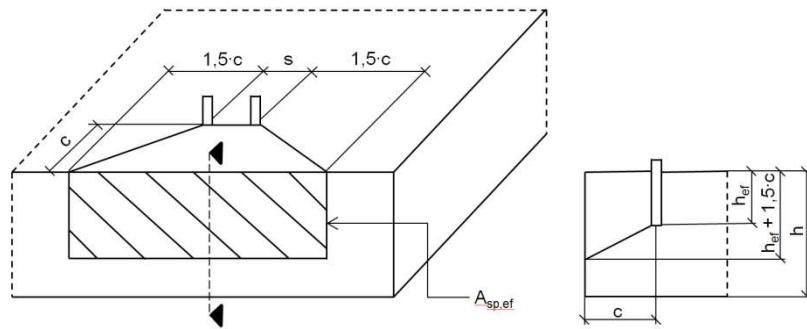
fischer injection system FIS VB

Intended use
Minimum spacing and edge distance for Anchor rods / Threaded rods and fischer FIS IG

Annex B5

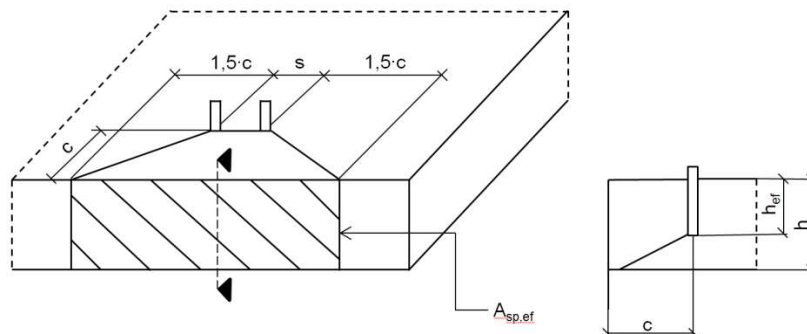
Appendix 11 / 22

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

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



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

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

Figures not to scale

fischer injection system FIS VB

Intended use

Minimum thickness of concrete member for Anchor rods / Threaded rods and fischer FIS IG, minimum spacing and edge distance

Annex B6

Appendix 12 / 22

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	[mm]	10	12	14	18	24
Steel brush diameter BS	d_b		11	14	16	20	26

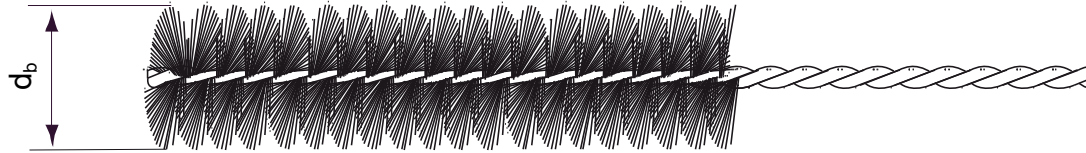


Table B7.2: Maximum processing time of the mortar and minimum curing time
(During the curing time of the mortar the concrete temperature may not fall below the listed minimum temperature)

Temperature at anchoring base [°C]	Maximum processing time t_{work}	Minimum curing time ¹⁾ t_{cure}
> 0 to 5 ²⁾	13 min	3 h
> 5 to 10	9 min	90 min
> 10 to 20	5 min	60 min
> 20 to 30	3 min	45 min
> 30 to 40	2 min	35 min

¹⁾ In wet concrete the curing times must be doubled.

²⁾ Minimum cartridge temperature +5°C

Table B7.3: Conditions for use of static mixer without an extension tube

Nominal drill hole diameter	d_0	[mm]	10	12	14	18	24
Drill hole depth h_0 by using	FIS MR Plus		≤ 90		≤ 120	≤ 150	≤ 190
	FIS JMR		-	-	≤ 90	≤ 180	≤ 220

Figures not to scale

fischer injection system FIS VB

Intended use
Cleaning brush (steel brush)
Processing time and curing time

Annex B7

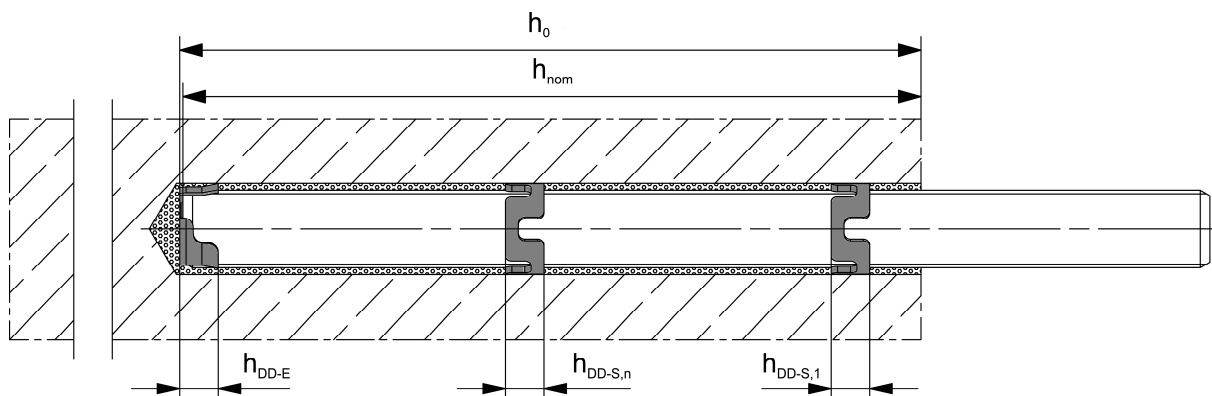
Appendix 13 / 22

Table B8.1: Parameters of the fischer centering clip DD-S / DD-E

Anchor rods / Threaded rods			M12	M16	M20
fischer FIS IG			M8	M10	M12
fischer centering clip DD-S / DD-E			M12	M16	M20
fischer centering clip DD-S	h_{DD-S}	[mm]	6,5	8,0	9,0
fischer centering clip DD-E	h_{DD-E}	[mm]	12,0	13,5	18,0
Drill hole depth	h_0	[mm]	$h_0 \geq h_{nom} + 3 \text{ mm}$		
Overall fastener embedment depth	h_{nom}	[mm]	$h_{nom} \leq h_{ef,max}$		
Minimum thickness of concrete member	h_{min}	[mm]	$h_{nom} + 30 (\geq 100)$		$h_{nom} + 2d_0$

The uppermost DD-S clip should be positioned approx. 5 - 10 mm below the concrete surface.
The effective embedment depth h_{ef} is calculated as follows when using the DD-S / DD-E clips.

$$h_{ef} = h_{nom} - h_{DD-E} - n \cdot h_{DD-S} \quad n = \text{number of DD-S clips used}$$



Figures not to scale

fischer injection system FIS VB

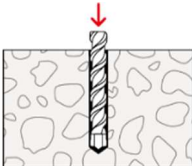
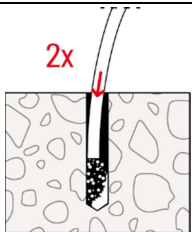
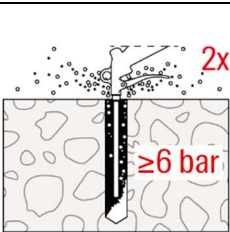
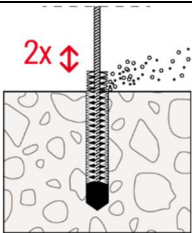
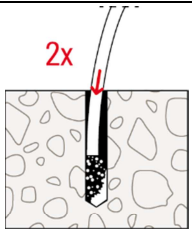
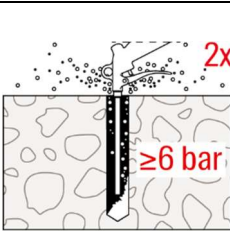
Intended use
fischer centering clip DD-S / DD-E

Annex B8

Appendix 14 / 22

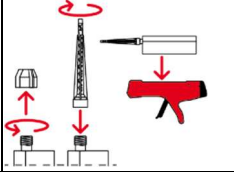
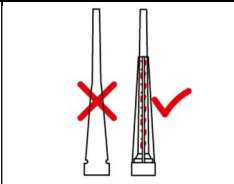
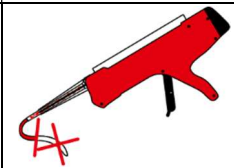
Installation instructions part 1

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 or B4.1 .
2		Clean the drill hole: For $h_{ef} \leq 12d_{nom}$ and $d_0 < 18$ mm blow out the hole twice by hand.  For $h_{ef} > 12d_{nom}$ and / or $d_0 \geq 18$ mm blow out the hole twice with oil-free compressed air ($p \geq 6$ bar). Use suitable compressed-air nozzle
3		Brush the drill hole twice. For deep holes use an extension. Use suitable brushes (see Table B7.1).
4		Clean the drill hole: For $h_{ef} \leq 12d_{nom}$ and $d_0 < 18$ mm blow out the hole twice by hand.  For $h_{ef} > 12d_{nom}$ and / or $d_0 \geq 18$ mm blow out the hole twice with oil-free compressed air ($p \geq 6$ bar). Use suitable compressed-air nozzle.
Go to step 5		
fischer injection system FIS VB		Annex B9 Appendix 15 / 22
Intended use Installation instructions part 1		

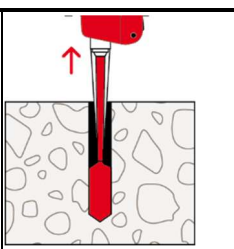
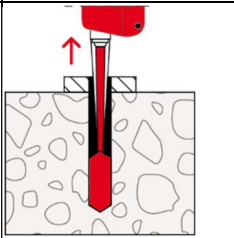
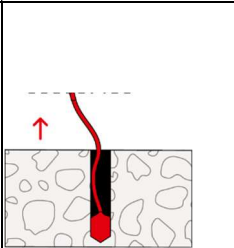
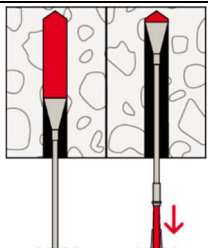
Installation instructions part 2

Preparing the cartridge

5		Remove the sealing cap Screw on the static mixer Place the cartridge into the dispenser
6		Ensuring that the spiral inside the mixer is clearly visible.
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.

Go to step 8

Injection of the mortar

8		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.
9		Push-through installation: the drill hole in the fixture must be also filled with mortar.
10		The conditions for mortar injection without extension tube can be found in Table B7.3.  For overhead installation, deep holes ($h_0 > 250$ mm) use an injection-adaptor.

Go to step 11

fischer injection system FIS VB

Intended use
Installation instructions part 2

Annex B10

Appendix 16 / 22

Installation instructions part 3

Installation of Anchor rods / Threaded rods and fischer FIS IG

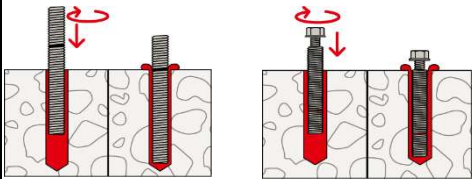
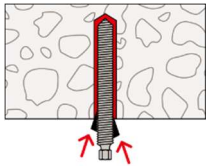
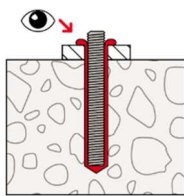
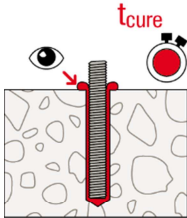
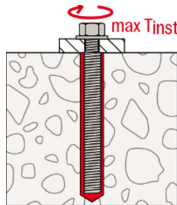
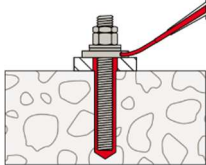
11		Only use clean and oil-free metal parts. Push the Anchor rod / Threaded rods with the setting depth mark or fischer FIS IG down to the bottom of the hole, turning it slightly while doing so. No turning movement is permitted when using the DD-S / DD-E centering clips. After inserting the metal parts, excess mortar must be emerged around the anchor element.
12	 For overhead installations support the metal part with wedges (e.g. fischer centering wedges or fischer overhead clips).	 For push-through installation fill the annular gap with mortar.
13	 Wait for the specified curing time t_{cure} see Table B7.2. The application with the anchor rod is shown as an example.	 14 Mounting the fixture max T_{inst} see Tables B3.1 and B4.1.
Option	 After the minimum curing time is reached, the gap between metal part and fixture (annular clearance) may be filled with mortar via the fischer filling disc. Compressive strength $\geq 50 \text{ N/mm}^2$ (e.g. fischer injection mortars FIS VB, FIS HB, FIS SB, FIS V Plus, FIS EM Plus). ATTENTION: Using fischer filling disc reduces t_{fix} (usable length of the Anchor).	
fischer injection system FIS VB		
Intended use Installation instructions part 3		Annex B11 Appendix 17 / 22

Table C1.1: Characteristic resistance to **steel failure** under **tension / shear loading** of **Anchor rods** and **Threaded rods**

Anchor rod / Threaded rod				M8	M10	M12	M16	M20	
Characteristic resistance to steel failure under tension loading ¹⁾									
Characteristic resistance $N_{Rk,s}$	Steel zinc plated	Property class	5.8	[kN]	18,3(16,6)	29,0(26,8)	42,1	78,5	122,5
			8.8		29,2(26,5)	46,4(42,8)	67,4	125,6	196,0
	Stainless steel R and high corrosion resistant steel HCR		50		18,3	29,0	42,1	78,5	122,5
			70		25,6	40,6	59,0	109,9	171,5
			80		29,2	46,4	67,4	125,6	196,0
Partial factors ²⁾									
Partial factor $\gamma_{Ms,N}$	Steel zinc plated	Property class	5.8	[-]	1,50				
			8.8		1,50				
	Stainless steel R and high corrosion resistant steel HCR		50		2,86				
			70		1,87 / fischer HCR: 1,50 ³⁾				
			80		1,60				
Characteristic resistance to steel failure under shear loading ¹⁾									
without lever arm									
Characteristic resistance $V_{Rk,s}^0$	Steel zinc plated	Property class	5.8	[kN]	10,9(9,9)	17,4(16,0)	25,2	47,1	73,5
			8.8		14,6(13,2)	23,2(21,4)	33,7	62,8	98,0
	Stainless steel R and high corrosion resistant steel HCR		50		9,1	14,5	21,0	39,2	61,2
			70		12,8	20,3	29,5	54,9	85,7
			80		14,6	23,2	33,7	62,8	98,0
Ductility factor			k ₇	[-]	1,0				
with lever arm									
Characteristic resistance $M_{Rk,s}^0$	Steel zinc plated	Property class	5.8	[Nm]	18,7(16,1)	37,3(33,2)	65,4	166,2	324,6
			8.8		29,9(25,9)	59,8(53,1)	104,6	265,9	519,3
	Stainless steel R and high corrosion resistant steel HCR		50		18,7	37,3	65,4	166,2	324,6
			70		26,2	52,3	91,5	232,6	454,4
			80		29,9	59,8	104,6	265,9	519,3
Partial factors ²⁾									
Partial factor $\gamma_{Ms,V}$	Steel zinc plated	Property class	5.8	[-]	1,25				
			8.8		1,25				
	Stainless steel R and high corrosion resistant steel HCR		50		2,38				
			70		1,56 / fischer HCR: 1,25 ³⁾				
			80		1,33				
¹⁾ Values in brackets are valid for undersized threaded rods with smaller stress area A _s for hot dip galvanised threaded rods according to EN ISO 10684. ²⁾ In absence of other national regulations. ³⁾ Only admissible for high corrosion resistant steel HCR, acc. to Table A5.1 .									
fischer injection system FIS VB								Annex C1 Appendix 18 / 22	
Performances Characteristic resistance to steel failure under tension / shear loading of Anchor rods and Threaded rods									

Table C2.1: Characteristic resistance to **steel failure** under **tension / shear loading** of **fischer FIS IG**

fischer FIS IG				M5	M6	M8	M10	M12	
Characteristic resistance to steel failure under tension loading									
Characteristic resistance with Screw or Threaded / Anchor rod $N_{Rk,s}$	Steel zinc plated	Property class of Screw or Threaded / Anchor rod	5.8	[kN]	7,1	10,1	18,3	29,0	42,1
			8.8		11,4	16,1	23,0	46,4	67,4
	Stainless steel R and high corrosion resistant steel HCR		70		9,9	14,1	25,6	40,6	59,0

Partial factors ¹⁾

Partial factor $\gamma_{Ms,N}$	Steel zinc plated	Property class of Screw or Threaded / Anchor rod	5.8	[-]	1,50
			8.8		1,50
	Stainless steel R and high corrosion resistant steel HCR		70		1,87 / fischer HCR: 1,50 ²⁾

Characteristic resistance to steel failure under shear loading

Without lever arm
$R_1 = R_2 = \frac{P}{2}$

Characteristic resistance with Screw or Threaded / Anchor rod $V_{Rk,s}^0$	Steel zinc plated	Property class of Screw or Threaded / Anchor rod	5.8	[kN]	4,3	6,0	10,9	17,4	25,2
			8.8		5,7	8,0	14,6	23,2	33,7
	Stainless steel R and high corrosion resistant steel HCR		70		5,0	7,0	12,8	20,3	29,5

Ductility factor	k ₇	[-]	1,0
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With lever arm

Characteristic resistance with Screw or Threaded / Anchor rod $M^0_{Rk,s}$	Steel zinc plated	5.8	[Nm]	4,5	7,6	18,7	37,3	65,4
		8.8		7,2	12,2	29,9	59,8	104,6
	Stainless steel R and high corrosion resistant steel HCR	70		6,3	10,7	26,2	52,3	91,5

Partial factors ¹⁾

Partial factor $\gamma_{Ms,V}$	Steel zinc plated	Property class of Screw or Threaded / Anchor rod	5.8	[-]	1,25
			8.8		1,25
	Stainless steel R and high corrosion resistant steel HCR		70		1,56 / fischer HCR: 1,25 ²⁾

¹⁾ In absence of other national regulations.

²⁾ Only admissible for high corrosion resistant steel HCR, acc. to **Table A5.1**.

fischer injection system FIS VB	Annex C2 Appendix 19 / 22
Performances Characteristic resistance to steel failure under shear loading of fischer FIS IG	

Table C3.1: Characteristic resistance to concrete failure under tension / shear loading

Anchor rod / Threaded rod			M8	M10	M12	M16	M20		
fischer FIS IG			M5	M6	M8	M10	M12		
Combined pullout and concrete cone failure									
Calculation diameter	d	[mm]	8	10	12	16	20		
Characteristic resistance to concrete failure under tension loading									
Installation factor	γ_{inst}	[-]	See annex C4						
Factors for the compressive strength of concrete > C20/25									
Increasing factor ψ_c for uncracked concrete $\tau_{Rk}(X,Y) = \psi_c \cdot \tau_{Rk}(C20/25)$	C25/30	[-]	1,03						
	C30/37		1,06						
	C35/45		1,09						
	C40/50		1,11						
	C45/55		1,13						
	C50/60		1,15						
Splitting failure									
$h / h_{ef} \geq 2,0$	$C_{cr,sp}$	[mm]	1,0 h_{ef}						
Edge distance $\frac{2,0 > h}{h_{ef}} > 1,3$			4,6 h_{ef} - 1,8 h						
$h / h_{ef} \leq 1,3$			2,1 h_{ef}						
Spacing			2 $C_{cr,sp}$						
Concrete failure									
Uncracked concrete	$k_{ucr,N}$	[-]	11,0						
Edge distance	$C_{cr,N}$	[mm]	1,5 h_{ef}						
Spacing	$S_{cr,N}$		2 $C_{cr,N}$						
Factors for sustained tension loading									
Factor $\Psi_{0,sus}$ for temperature range	24 °C / 40 °C	[-]	0,55						
	50 °C / 80 °C		0,55						
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})						
Calculation diameters									
Size			M5	M6	M8	M10	M12	M16	M20
Anchor rods and Threaded rods	d_{nom}	[mm]	- ¹⁾	- ¹⁾	8	10	12	16	20
fischer FIS IG	d_{nom}		8	10	12	16	20	- ¹⁾	- ¹⁾
¹⁾ Size of Anchor type not part of the assessment									
fischer injection system FIS VB								Annex C3 Appendix 20 / 22	
Performances Characteristic resistance to concrete failure under tension / shear loading									

Table C4.1: Characteristic resistance to combined pull-out and concrete failure for Anchor rods and Threaded rods and fischer FIS IG in hammer drilled holes; uncracked concrete C20/25

Anchor rod / Threaded rod			M8	M10	M12	M16	M20
fischer FIS IG			M5	M6	M8	M10	M12
Combined pullout and concrete cone failure							
Calculation diameter	d	[mm]	8	10	12	16	20
Uncracked concrete							
Characteristic bond resistance in uncracked concrete C20/25							
Hammer-drilling with standard drill bit (dry or wet concrete)							
Temperature range	I: 24 °C / 40 °C	$\tau_{Rk,ucr}$ [N/mm²]	9,9	9,9	9,9	9,9	10,8
	II: 50 °C / 80 °C		8,6	8,6	8,6	8,6	9,2
Installation factors							
Dry or wet concrete	γ_{inst}	[-]	1,2				1,4

fischer injection system FIS VB

Performances

Characteristic resistance to combined pull-out and concrete failure for Anchor rod, Threaded rods and fischer FIS IG; concrete C20/25

Annex C4

Appendix 21 / 22

Table C5.1: Displacement for Anchor rods / Threaded rods or fischer FIS IG					
Anchor rod / Threaded rod	M8	M10	M12	M16	M20
fischer FIS IG	M5	M6	M8	M10	M12
Displacement-Factors for tension loading ¹⁾					
Uncracked concrete; Temperature range I, II					
δ_{N0} -Factor	0,043	0,024	0,027	0,028	0,037
$\delta_{N\infty}$ -Factor	0,023	0,023	0,023	0,023	0,023
[mm/(N/mm ²)]					
Displacement-Factors for shear loading ²⁾					
Uncracked concrete; Temperature range I, II					
δ_{V0} -Factor	0,15	0,13	0,11	0,08	0,06
$\delta_{V\infty}$ -Factor	0,23	0,19	0,16	0,12	0,09
[mm/kN]					
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 VB					Annex C5 Appendix 22 / 22
Performances Displacements for Anchor rods / Threaded rods and fischer FIS IG					