

DECLARAȚIA DE PERFORMANȚĂ

DoP 0376

pentru profil de ancorare fischer FES cu șuruburi de profil fischer FBC (profil de ancorare pentru utilizare în beton)

RO

- | | |
|--|---|
| 1. <u>Cod unic de identificare al produsului-tip:</u> | DoP 0376 |
| 2. <u>Utilizare (utilizări) preconizată (preconizate):</u> | Profil de ancorare pentru utilizare în beton fisurat sau nefisurat, consultați suplimentul, în special anexele B1- B8. |
| 3. <u>Fabricant:</u> | fischerwerke GmbH & Co. KG, Klaus-Fischer-Str. 1, 72178 Waldachtal, Germany |
| 4. <u>Reprezentant autorizat:</u> | — |
| 5. <u>Sistemul (sistemele) de evaluare și de verificare a constanței performanței:</u> | 1 |
| 6. <u>Documentul de evaluare european:</u> | EAD 330008-04-0601, Edition 07/2024 |
| Evaluarea tehnică europeană: | ETA-18/0862; 2025-05-19 |
| Organismul de evaluare tehnică: | DIBt- Deutsches Institut für Bautechnik |
| Organism (organisme) notificat(e): | 2873 TU Darmstadt |

7. Performanța (performante) declarată (declarate):

Rezistență mecanică și stabilitate (BWR 1)

Rezistența caracteristică la întindere (pentru încărcări statice și cvasistatice):

- 1) Rezistența ancorelor la cedarea oțelului: Anexele C1
- 2) Rezistența conexiunii dintre profil și ancore la cedarea oțelului: Anexele C1
- 3) Rezistența marginilor profilului la cedarea oțelului și, prin urmare, smulgerea șuruburilor de profil: Anexele C1
- 4) Rezistența șuruburilor de profil la cedarea oțelului: Anexele C10
- 5) Rezistența la cedarea oțelului prin depășirea rezistenței la încovoiere a profilului: Anexele A5, C2
- 6) Momentul maxim de strângere pentru evitarea deteriorărilor din timpul instalării: Anexele B4
- 7) Rezistența la smulgere: Anexele C3,C4
- 8) Rezistența la cedarea conului de beton: Anexele B3, C3, C4
- 9) Distanța minimă față de margine și între ancore, grosime element pentru prevenirea fisurării betonului în timpul instalării: Anexele A5, B3
- 10) Distanța față de margine pentru a preveni fisurarea betonului sub încărcare: Anexele C3, C4
- 11) Rezistență cedare rupere beton - arie influență cap ancoră: Anexele A4

Rezistența caracteristică la forfecare (pentru încărcări statice și cvasistatice):

- 12) Rezistența ancorelor la cedarea oțelului sub acțiunea forței tăietoare fără braț pârghie: Anexele C10
- 13) Rezistența la cedarea oțelului prin încovoierea profilului sub acțiunea forței tăietoare cu braț pârghie: Anexele C11
- 14) Rezistența la cedarea oțelului marginilor canalului, cedarea oțelului la conexiunea dintre ancoră și profil sau cedarea oțelului profilului (forță tăietoare în direcție transversală): Anexele C6, C7
- 15) Rezistența la cedarea oțelului a conexiunii dintre marginile profilului și șuruburile de profil (forță tăietoare pe direcția longitudinală a profilului): Anexa C8
- 16) Factor pentru sensibilitatea instalării (Forfecare longitudinală): Anexa C8
- 17) Rezistența ancorelor la cedarea oțelului (Forfecare longitudinală): Anexele C6, C7
- 18) Rezistența conexiunii dintre profil și ancore la cedarea oțelului (forță tăietoare pe direcția longitudinală a profilului): Anexele C6, C7
- 19) Rezistența la cedarea cu braț de levier: Anexa C8
- 20) Rezistența la cedarea muchiei betonului: Anexele C8

Rezistența caracteristică sub sarcină combinată de smulgere și forfecare (acțiuni statice și cvasi-statice)

- 21) Rezistența ancorelor de profil la cedarea oțelului: Anexele C9

Rezistența caracteristică la întindere din oboseală:

- 22) Rezistența la oboseală la ruperea oțelului a întregului sistem (funcție continuă sau tri-liniară, Metoda de evaluare A1, A2): NPD
- 23) Rezistența limită la oboseală la ruperea oțelului a întregului sistem (Metoda de evaluare B): NPD
- 24) Rezistența la oboseală la ruperea oțelului a întregului sistem (Funcție linearizată, Metoda de evaluare C): NPD
- 25) Rezistența la oboseală la cedarea betonului (funcție exponențială, Metoda de evaluare A1, A2): NPD
- 26) Weerstand tegen vermoeiing door betongerelateerd falen (Gelineariseerde functie, Beoordelingsmethode C): NPD
- 27) Rezistența la oboseală la cedarea betonului (Funcție linearizată, Metoda de evaluare C): NPD

Rezistență caracteristică sub încărcare seismică (categoria de performanță seismică C1)

- 28) Rezistență la cedarea oțelului sub încărcare seismică de tracțiune (categoria de performanță seismică C1): Anexele C12, C14
- 29) Rezistență la cedarea oțelului sub încărcare seismică de forfecare pentru sarcină de forfecare în direcție transversală (categoria de performanță seismică C1): Anexele C13, C14
- 30) Rezistență la cedarea oțelului sub încărcare seismică de forfecare pentru sarcină de forfecare pe axa longitudinală a canalului (categoria de performanță seismică C1): Anexa C13

Rezistență caracteristică sub încărcare statică și cvasi-statică de tracțiune și/sau forfecare

31) Deplasări: Anexele C5, C9

Siguranța în caz de incendiu (BWR 2)

32) Reacție la foc: Clasa (A1)

33) Rezistența la incendiu: Anexele C15, C16

Durabilitate:

34) Durabilitate: Anexele A7, B1

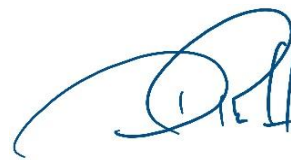
8. Documentație tehnică adecvată și/sau documentație tehnică specifică: --

Performanța produsului identificat mai sus este în conformitate cu setul de performanțe declarate. Această declarație de performanță este eliberată în conformitate cu Regulamentul (UE) nr. 305/2011, pe răspunderea exclusivă a fabricantului identificat mai sus.

Semnată pentru și în numele fabricantului de către:



Dr. Ronald Mihala, Director general Cercetare și Dezvoltare
Tumlingen, 2025-06-02



Dieter Pfaff, Șeful Federației Internaționale de Producție și Managementul Calității

Această declarație de performanță a fost întocmită în mai multe limbi. În cazul unei divergențe de interpretare, versiunea în limba engleză prevalează întotdeauna.

Suplimentul include informații voluntare și complementare în limba engleză, în afara cerințelor legale (specificate neutru din punct de vedere al limbii).

Translation guidance Essential Characteristics and Performance Parameters for Annexes

Ghid de traducere a caracteristicilor esențiale și a parametrilor de performanță pentru anexe

Mechanical resistance and stability (BWR 1)		
Rezistență mecanică și stabilitate (BWR 1)		
Characteristic resistance to tension load (static and quasi-static loading):		
Rezistența caracteristică la întindere (pentru încărcări statice și cvasistatice):		
1	Resistance to steel failure of anchors: Rezistența ancorelor la cedarea oțelului:	$N_{Rk,s,a}$
2	Resistance to steel failure of the connection between anchors and channel: Rezistența conexiunii dintre profil și ancore la cedarea oțelului:	$N_{Rk,s,c}$
3	Resistance to steel failure of channel lips and sunsequently pullout of channel bolt: Rezistența marginilor profilului la cedarea oțelului și, prin urmare, smulgerea șuruburilor de profil:	$N_{Rk,s,l}^0 ; S_{l,N}$
4	Resistance to steel failure of channel bolt: Rezistența șuruburilor de profil la cedarea oțelului:	$N_{Rk,s}$
5	Resistance to steel failure by exceeding the bending strength of the channel: Rezistența la cedarea oțelului prin depășirea rezistenței la încovoiere a profilului:	$M_{Rk,s,flex} ; S_{max}$
6	Maximum installation torque moment to avoid damage during installation: Momentul maxim de strângere pentru evitarea deteriorărilor din timpul instalării:	$T_{inst,g} ; (T_{inst,s})$
7	Resistance to pull-out failure of the anchor: Rezistența la smulgere:	$N_{Rk,p}$
8	Resistance to concrete cone failure: Rezistența la cedarea conului de beton:	$k_{cr,N} ; k_{ucr,N} ; h_{ef}$
9	Minimum edge distance, spacing, member thickness to prevent concrete splitting during installation: Distanța minimă față de margine și între ancore, grosime element pentru prevenirea fisurării betonului în timpul instalării:	$S_{min} ; c_{min} ; h_{min}$
10	Characteristic edge distance and spacing to avoid splitting of concrete under load: Distanța față de margine pentru a preveni fisurarea betonului sub încărcare:	$S_{cr,sp} ; c_{cr,sp}$
11	Resistance to blowout failure- bearing area of head: Rezistență cedare rupere beton - arie influență cap ancoră:	A_h
Characteristic resistance to shear load (static and quasi-static loading):		
Rezistența caracteristică la forfecare (pentru încărcări statice și cvasistatice):		
12	Resistance to steel failure of channel bolt under shear loading without lever arm: Rezistența ancorelor la cedarea oțelului sub acțiunea forței tăietoare fără braț pârghie:	$V_{Rk,s}$
13	Resistance to steel failure by bending of the channel bolt under shear load with lever arm: Rezistența la cedarea oțelului prin încovoierea profilului sub acțiunea forței tăietoare cu braț pârghie:	$M_{Rk,s}^0$
14	Resistance to steel failure of channel lips, steel failure of connection between anchor and channel or steel failure of anchor (shear load in transverse direction): Rezistența la cedarea oțelului marginilor canalului, cedarea oțelului la conexiunea dintre ancoră și profil sau cedarea oțelului profilului (forță tăietoare în direcție transversală):	$V_{Rk,s,l,y}^0 ; S_{l,V} ; V_{Rk,s,c,y} ; V_{Rk,s,a,y}$
15	Resistance to steel failure of connection between channel lips and channel bolt (shear load in longitudinal channel axis): Rezistența la cedarea oțelului a conexiunii dintre marginile profilului și șuruburile de profil (forță tăietoare pe direcția longitudinală a profilului):	$V_{Rk,s,l,x}$
16	Factor for sensistivity to installation: Factor pentru sensibilitatea instalării (Forfecare longitudinală):	γ_{inst}
17	Resistance to steel failure of the anchor: Rezistența ancorelor la cedarea oțelului (Forfecare longitudinală):	$V_{Rk,s,a,x}$
18	Resistance to steel failure of connection between anchor and channel (shear load in longitudinal channel axis): Rezistența conexiunii dintre profil și ancore la cedarea oțelului (forță tăietoare pe direcția longitudinală a profilului):	$V_{Rk,s,c,x}$
19	Resistance to concrete pry-out failure: Rezistența la cedarea cu braț de levier:	k_g
20	Resistance to concrete edge failure: Rezistența la cedarea muchiei betonului:	$k_{cr,V} ; k_{ucr,V}$
Characteristic resistance under combined static and quasi-static tension and shear loading		
Rezistența caracteristică sub sarcină combinată de smulgere și forfecare (acțiuni statice și cvasi-statice)		
21	Resistance to steel failure of the anchor channel: Rezistența ancorelor de profil la cedarea oțelului:	k_{13}, k_{14}
Characteristic resistance under fatigue tension loading:		
Rezistența caracteristică la întindere din oboseală:		
22	Fatigue resistance to steel failure of the whole system (continuous or tri-linear function): Rezistența la oboseală la ruperea oțelului a întregului sistem (funcție continuă sau tri-liniară, Metoda de evaluare A1, A2):	$\Delta N_{Rk,s,0,n}$ (n=1 to n=∞)
23	Fatigue limit resistance to steel failure of the whole system: Rezistența limită la oboseală la ruperea oțelului a întregului sistem (Metoda de evaluare B):	$\Delta N_{Rk,s,0,\infty}$
24	Fatigue resistance to steel failure of the whole system (linearized function, assessment method C): Rezistența la oboseală la ruperea oțelului a întregului sistem (Funcție linearizată, Metoda de evaluare C):	$\Delta N_{Rk,s,l0,n} ; N_{lok,s,n}$ (n=10 ⁴ to n=∞)
25	Fatigue resistance to concrete related failure (exponential function): Rezistența la oboseală la cedarea betonului (funcție exponențială, Metoda de evaluare A1, A2):	$\Delta N_{Rk,c,0,n} ; \Delta N_{Rk,p,0,n}$ (n=1 to n=∞)
26	Fatigue limit resistance to concrete related failure: Weerstand tegen vermoeiing door betonggerelateerd falen (Gelineariseerde functie, Beoordelingsmethode C):	$\Delta N_{Rk,c,0,\infty} ; \Delta N_{Rk,p,0,\infty}$
27	Fatigue resistance to concrete related failure (linearized function, assessment method C): Rezistența la oboseală la cedarea betonului (Funcție linearizată, Metoda de evaluare C):	$\Delta N_{Rk,c,E,n} ; N_{Rk,p,E,n}$ (n=10 ⁴ to n=∞)

Characteristic resistance under seismic loading (seismic performance category C1)		
Rezistență caracteristică sub încărcare seismică (categoria de performanță seismică C1)		
28	Resistance to steel failure under seismic tension loading (seismic performance category C1): Rezistență la cedarea oțelului sub încărcare seismică de tracțiune (categoria de performanță seismică C1):	$N_{Rk,s,a,eq}$; $N_{Rk,s,c,eq}$; $N^0_{Rk,s,l,eq}$; $N_{Rk,s,eq}$; $M_{Rk,s,flex,eq}$
29	Resistance to steel failure under seismic shear loading for shear load in transverse direction (seismic performance category C1): Rezistență la cedarea oțelului sub încărcare seismică de forfecare pentru sarcină de forfecare în direcție transversală (categoria de performanță seismică C1):	$V_{Rk,s,eq}$; $V^0_{Rk,s,l,y,eq}$; $V_{Rk,s,c,y,eq}$; $V_{Rk,s,a,y,eq}$
30	Resistance to steel failure under seismic shear loading for shear load in longitudinal channel axis (seismic performance category C1): Rezistență la cedarea oțelului sub încărcare seismică de forfecare pentru sarcină de forfecare pe axa longitudinală a canalului (categoria de performanță seismică C1):	$V_{Rk,s,l,x,eq}$; $V_{Rk,s,a,x,eq}$; $V_{Rk,s,c,x,eq}$
Characteristic resistance under static and quasi-static tension and / or shear loading:		
Rezistență caracteristică sub încărcare statică și cvasi-statică de tracțiune și/sau forfecare		
31	Displacements: Deplasări:	δ_{N0} ; $\delta_{N\infty}$; $\delta_{V,y,0}$; $\delta_{V,y,\infty}$; $\delta_{V,x,0}$; $\delta_{V,x,\infty}$
Safety in case of fire (BWR 2)		
Siguranța în caz de incendiu (BWR 2)		
32	Reaction to fire: Reacție la foc:	Class
33	Resistance to fire: Rezistența la incendiu:	$N_{Rk,s,fi}$; $V_{Rk,y,s,fi}$; $C_{min,fi}$; $S_{min,fi}$
Durability:		
Durabilitate:		
34	Durability: Durabilitate:	Description

Specific Part

1 Technical description of the product

The fischer Anchor Channel FES with fischer Channel Bolts FBC is a system consisting of a C-shaped channel profile of steel and at least two metal anchors non-detachably fixed on the channel back and fischer Channel Bolts.

The anchor channel is embedded surface-flush in the concrete. fischer Channel Bolts with appropriate hexagonal nuts and washers are fixed to the channel.

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 channel 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 channel 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 under tension load (static and quasi-static loading)	
- Resistance to steel failure of anchors	$N_{Rk,s,a}$ see Annex C1
- Resistance to steel failure of the connection between anchors and channel	$N_{Rk,s,c}$ see Annex C1
- Resistance to steel failure of channel lips and subsequently pull-out of channel bolt	$N_{Rk,s,l}^0$; $s_{l,N}$ see Annex C1
- Resistance to steel failure of channel bolt	$N_{Rk,s}$ see Annex C10
- Resistance to steel failure by exceeding the bending strength of the channel	s_{max} see Annex A5 $M_{Rk,s,flex}$ see Annex C2
- Maximum installation torque to avoid damage during installation	$T_{inst,g}$; $T_{inst,s}$ see Annex B4
- Resistance to pull-out failure of the anchor	$N_{Rk,p}$ see Annex C3 and C4
- Resistance to concrete cone failure	h_{ef} see Annex B3 $k_{cr,N}$; $k_{ucr,N}$ see Annex C3 and C4
- Minimum edge distances, spacing and member thickness to avoid concrete splitting during installation	s_{min} see Annex A5 c_{min} ; h_{min} see Annex B3
- Characteristic edge distance and spacing to avoid splitting of concrete under load	$s_{cr,sp}$; $c_{cr,sp}$ see Annex C3 and C4
- Resistance to blowout failure - bearing area of anchor head	A_h see Annex A4

Essential characteristic	Performance
Characteristic resistance under shear load (static and quasi-static loading) - Resistance to steel failure of channel bolt under shear loading without lever arm - Resistance to steel failure by bending of the channel bolt under shear load with lever arm - Resistance to steel failure of channel lips, steel failure of connection between anchor and channel and steel failure of anchor (shear load in transverse direction) - Resistance to steel failure of connection between channel lips and channel bolt (longitudinal shear) - Factor for sensitivity to installation (longitudinal shear) - Resistance to steel failure of the anchor (longitudinal shear) - Resistance to steel failure of connection between anchor and channel (longitudinal shear) - Resistance to concrete pry-out failure - Resistance to concrete edge failure	$V_{Rk,s}$ see Annex C10 $M_{Rk,s}^0$ see Annex C11 $V_{Rk,s,l,y}^0$; $S_{l,V}$; $V_{Rk,s,c,y}$; $V_{Rk,s,a,y}$ see Annex C6 and C7 $V_{Rk,s,l,x}$ see Annex C8 γ_{inst} see Annex C8 $V_{Rk,s,a,x}$ see Annex C6 and C7 $V_{Rk,s,c,x}$ see Annex C6 and C7 k_8 see Annex C8 $k_{cr,V}$; $k_{ucr,V}$ see Annex C8
Characteristic resistance under combined tension and shear load (static and quasi-static load) - Resistance to steel failure of the anchor channel	k_{13} ; k_{14} see Annex C9
Characteristic resistance under fatigue tension loading - Fatigue resistance to steel failure of the whole system (continuous or tri-linear function, assessment method A1, A2) - Fatigue limit resistance to steel failure of the whole system (assessment method B) - Fatigue resistance to steel failure of the whole system (linearized function, assessment method C) - Fatigue resistance to concrete related failure (exponential function, assessment method A1, A2) - Fatigue limit resistance to concrete related failure (assessment method B) - Fatigue resistance to concrete related failure (linearized function, assessment method C)	No Performance assessed No Performance assessed No performance assessed No Performance assessed No Performance assessed No performance assessed

Essential characteristic	Performance
Characteristic resistance under seismic loading (seismic performance category C1)	
Resistance to steel failure under seismic tension loading (seismic performance category C1)	$N_{Rk,s,a.eq}$; $N_{Rk,s,c.eq}$; $N^0_{Rk,s,l.eq}$; $M_{Rk,s,flex.eq}$ see Annex C12 $N_{Rk,s.eq}$ see Annex C14
Resistance to steel failure under seismic shear loading for shear load in transverse direction (seismic performance category C1)	$V_{Rk,s.eq}$ see Annex C14 $V^0_{Rk,s,l,y.eq}$; $V_{Rk,s,c,y.eq}$; $V_{Rk,s,a,y.eq}$ see Annex C13
Resistance to steel failure under seismic shear loading for shear load in longitudinal channel axis (seismic performance category C1)	$V_{Rk,s,l,x.eq}$; $V_{Rk,s,a,x.eq}$; $V_{Rk,s,c,x.eq}$ see Annex C13
Characteristic resistance under static and quasi-static tension and/or shear loading	
Displacements	δ_{N0} ; $\delta_{N\infty}$ see Annex C5 $\delta_{V,y,0}$; $\delta_{V,y,\infty}$; $\delta_{V,x,0}$; $\delta_{V,x,\infty}$ see Annex C9

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Characteristic resistance to fire	$N_{Rk,s,fi}$; $V_{Rk,s,y,fi}$ see Annex C15

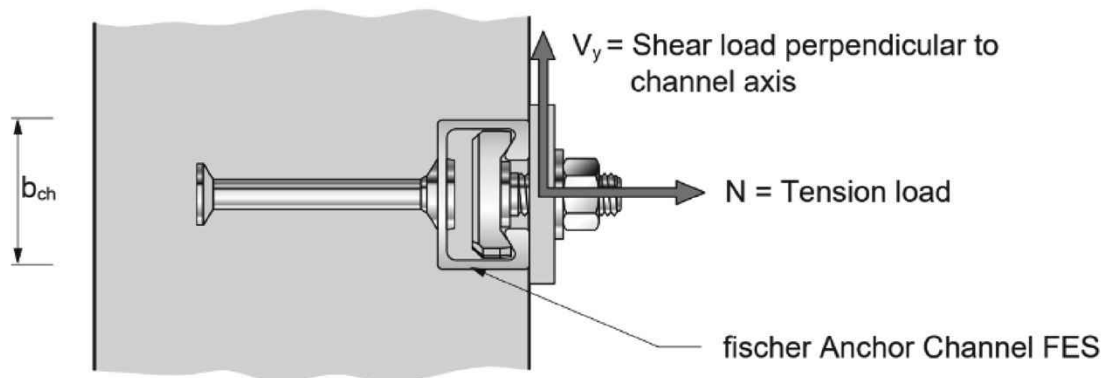
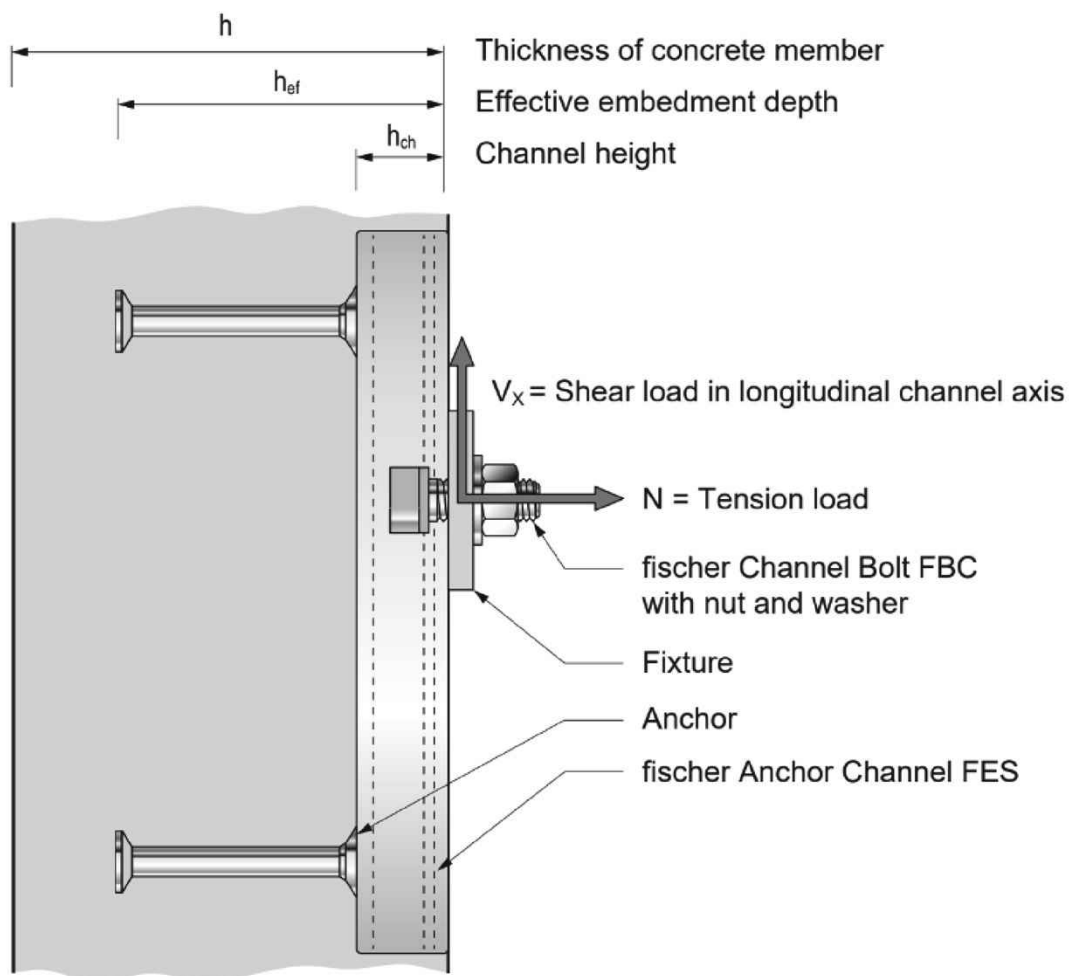
3.3 Aspects of durability linked with the Basic Works Requirements

Essential characteristic	Performance
Durability	See Annex B1

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

In accordance with EAD No. 330008-04-0601, the applicable European legal act is: [2000/273/EC].

The system to be applied is: 1

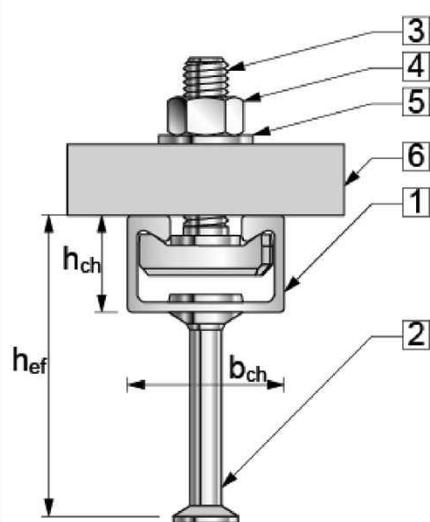


fischer Anchor Channel FES with fischer Channel Bolts FBC

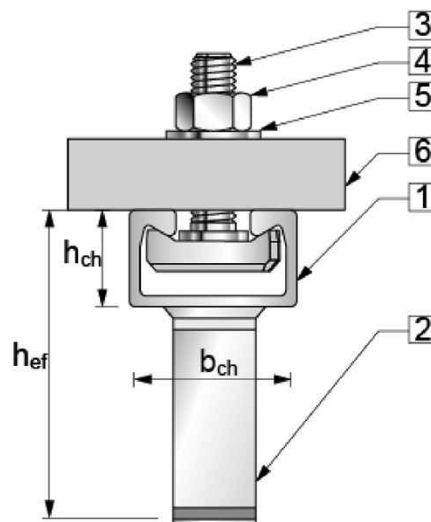
Product Description
 Installed condition

Annex A1

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Round Anchor



I-Anchor

- Fischer Anchor channel FES
with fischer Channel Bolt FBC:
- 1 Channel profile
 - 2 Anchor
 - 3 Channel bolt
 - 4 Hexagonal nut
 - 5 Washer
 - 6 Fixture

Marking of the fischer anchor channel FES:

e.g.:  I-50/30

 = Identifying mark of the manufacturer

I = Additional marking for I-anchors
No marking for round anchors

50/30(-P) = Anchor channel size
(29/20; 38/23; 40/22; 50/30; 52/34;
28/15; 38/17; 40/25; 49/30; 54/33)

P = Additional marking for P-version



Stamped into back of channel

Optional: printed on channel web or channel lips

H = Hot rolled channel, C = Cold formed channel

No marking for material acc. Annex A7 Table A7.1
(Channel profile)

Marking of the fischer channel bolt FBC:

e.g.:  5030 8.8 N

 = Identifying mark of the manufacturer

5030 = Size of channel bolt

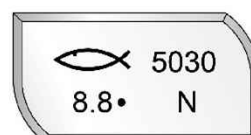
8.8 = Steel grade

A4-70 = Stainless steel

N = Notching channel bolt (if applicable)

• = Electroplated

No marking for hot-dip galvanised



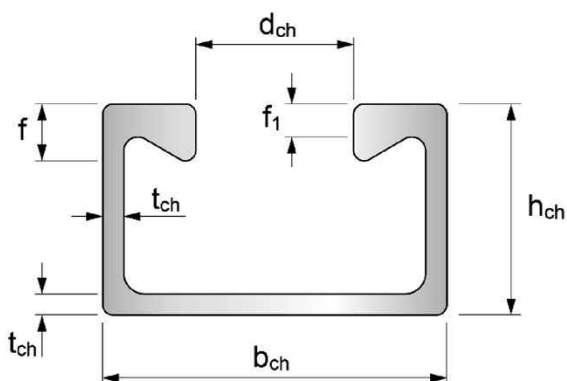
Additional marking of channel bolt (smooth, serrated,
notching channel bolt head) according to Annex A6 at
the top of thread.

fischer Anchor Channel FES with fischer Channel Bolts FBC

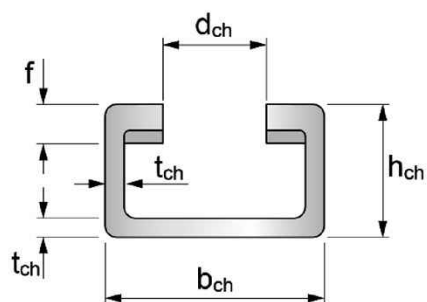
Product Description
Marking and materials

Annex A2

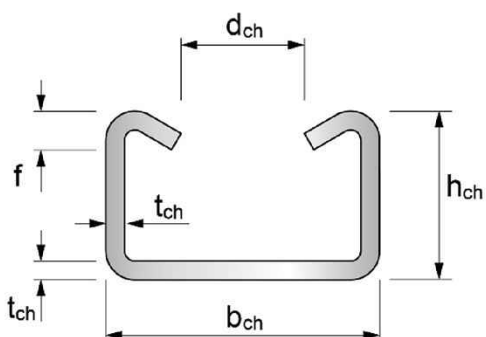
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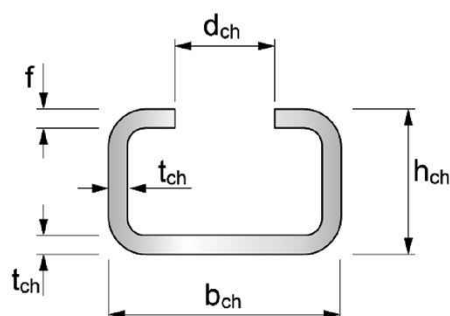
FES-H(I)-40/22(-P), -50/30(-P), -52/34



FES-H-S-29/20, -38/23 (serrated)



FES-C-40/25, -49/30, -54/33



FES-C-28/15, -38/17

Table A3.1: Dimensions of hot-rolled and cold-formed channel profile (steel and stainless steel)

Anchor Channel FES-	Material	b _{ch} [mm]	h _{ch} [mm]	t _{ch} [mm]	d _{ch} [mm]	f [mm]	f ₁ [mm]	I _y [mm ⁴]
C-28/15	Steel	28,0	15,5	2,3	12,0	2,3	- ¹⁾	4.280
C-38/17	Steel	38,0	17,3	3,0	18,0	3,0	- ¹⁾	8.240
C-40/25	Steel	40,0	25,0	2,8	18,0	6,0	- ¹⁾	20.340
C-49/30	Steel	50,0	30,0	3,3	22,0	7,0	- ¹⁾	43.080
C-54/33	Steel	54,0	33,0	5,0	22,0	8,5	- ¹⁾	74.090
H-S-29/20	Steel	30,0	20,0	3,0	14,0	5,2	- ¹⁾	11.150
H-S-38/23	Steel/ Stainless steel	38,0	23,0	3,3	18,0	6,0	- ¹⁾	21.070
H-(I)-40/22(-P)	Steel	40,0	23,5	2,6	18,0	6,2	3,6	21.660
H-(I)-50/30(-P)	Steel	50,0	30,0	3,0	22,5	8,1	5,5	54.960
H-(I)-52/34	Steel	52,5	34,0	4,0	22,5	11,5	8,3	96.330

¹⁾ This dimension is not available for this product.

fischer Anchor Channel FES with fischer Channel Bolts FBC

Product Description
Dimensions of channels

Annex A3
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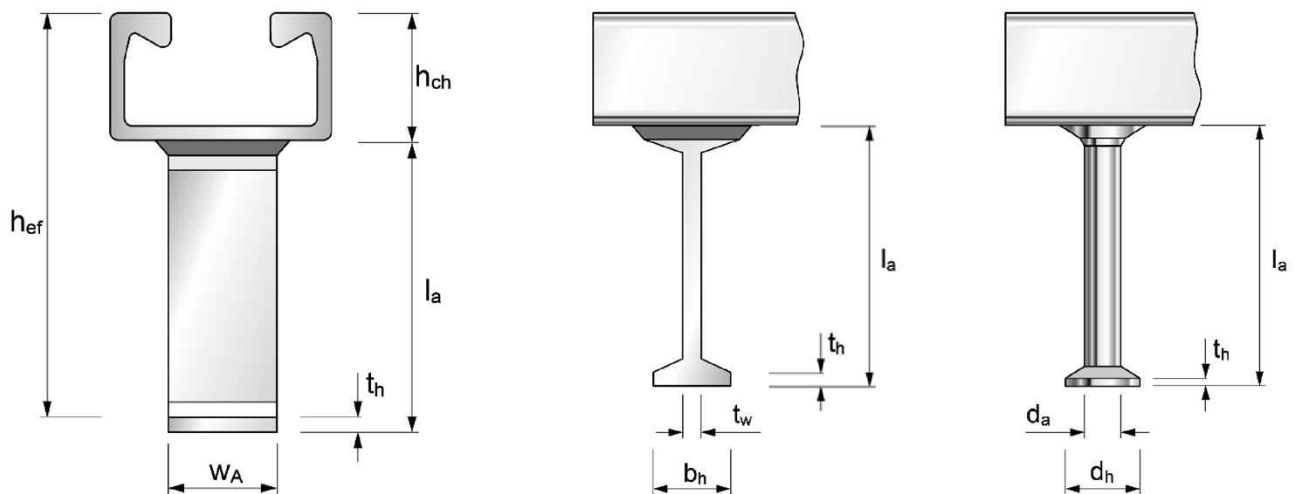


Table A.4.1: Dimensions of anchor (welded I-anchor or forged round anchor)

Anchor Channel FES -	I-anchor						Round anchor				
	$l_{a,min}$ [mm]	$t_{w,min}$ [mm]	$b_{h,min}$ [mm]	t_h [mm]	w_A [mm]	$A_{h,min}$ [mm ²]	$l_{a,min}$ [mm]	d_a [mm]	d_h [mm]	t_h [mm]	A_h [mm ²]
C-28/15	- ²⁾						31,0	6	12,0	1,3	85
C-38/17	- ²⁾						60,8	8	16,0	2,0	151
C-40/25	- ²⁾						56,0	8	16,0	2,0	151
C-49/30	- ²⁾						66,0	10	20,0	2,2	236
C-54/33	- ²⁾						124,5	11	24,3	2,5	369
H-S-29/20 ¹⁾	- ²⁾						59,5	8	18,0	2,0	204
H-S-38/23	- ²⁾						76,2	10	20,0	2,2	236
H-(I)-40/22	62	5	20	5	20	300	68,5	8	16,0	2,0	151
H-40/22-P	- ²⁾						69,7	10	20,0	2,2	236
H-(I)-50/30	69	5	20	5	25	375	66,2	10	20,0	2,2	236
H-50/30-P	- ²⁾						78,5	11	24,3	2,5	369
H-(I)-52/34 ³⁾	126	5	20	5	40	600	123,5	11	24,3	2,5	369

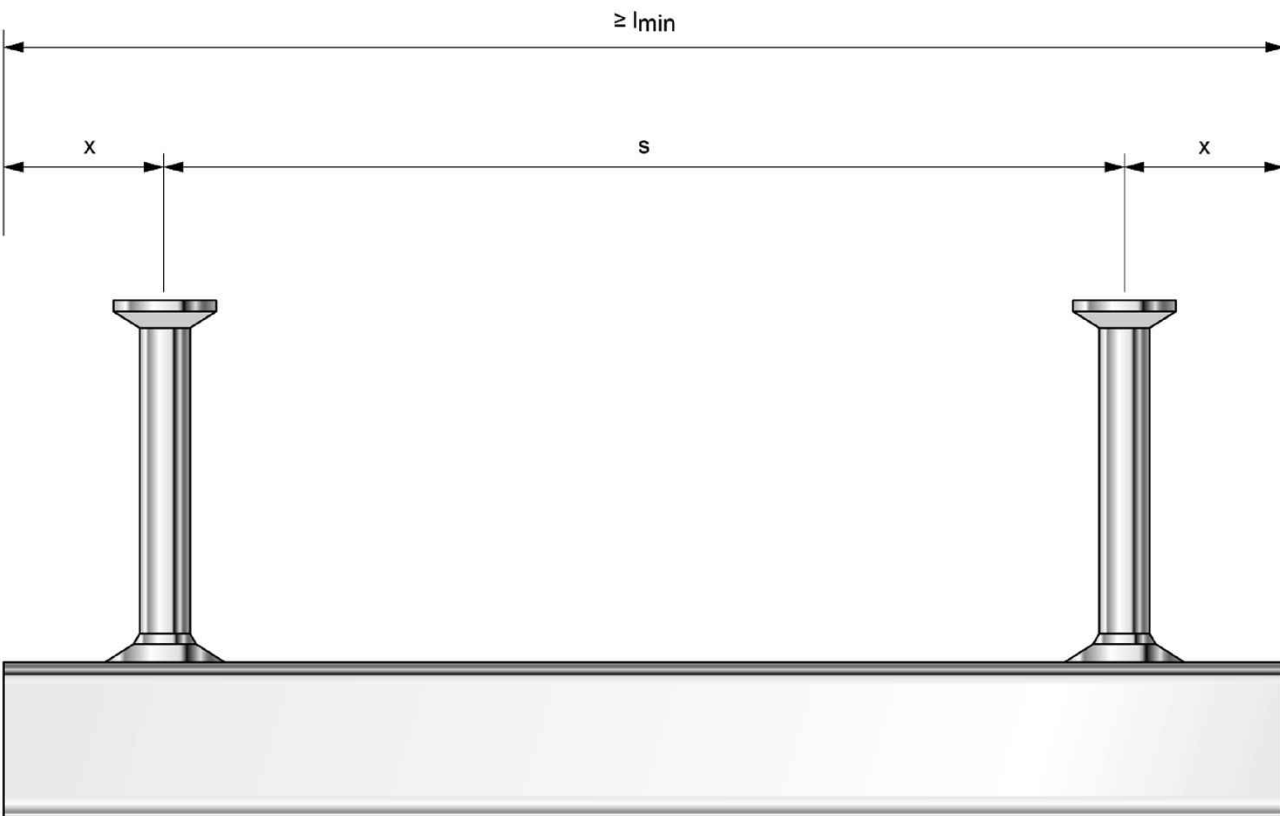
¹⁾ Alternative round anchor: $d_a = 10$ mm, $d_h = 20$ mm, $t_h = 2,5$ mm, $A_h = 236$ mm², $l_{a,min} = 59,5$ mm.

²⁾ Product not available.

³⁾ Alternative I-anchor: $t_w = 6$ mm, $b_h = 25$ mm, $t_h = 5$ mm, $w_A = 40$ mm, $l_{a,min} = 126$ mm.

Table A5.1: Dimensions of Anchor Channels FES

Anchor channel FES-	Anchor type	Smin [mm]	Smax [mm]	Xmin [mm]	Xmax [mm]	lmin [mm]	lmax [mm]	
C-28/15	round	50	200	25	35	100	6.070	
C-38/17			250			150		
C-40/25		200						100
C-49/30			100			250		35
C-54/33								
H-S-29/20								
H-S-38/23								
H-(I-)40/22(-P)	round or I	100	250	35	170			
H-(I-)50/30	round or I							
H-I-52/34	I							
H-50/30-P H-52/34	round							



fischer Anchor Channel FES with fischer Channel Bolts FBC

Product Description
Anchor position and channel length

Annex A5
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Table A6.1: Steel grade and coating

Channel Bolt	Carbon steel ¹⁾	Stainless steel ¹⁾
Steel grade	8.8	A4-70
f_{uk} [N/mm ²]	800 / 830	700
f_{yk} [N/mm ²]	640 / 660 ²⁾	450
Coating	G ³⁾ F ⁴⁾	-

¹⁾ Material properties according to Annex A7.

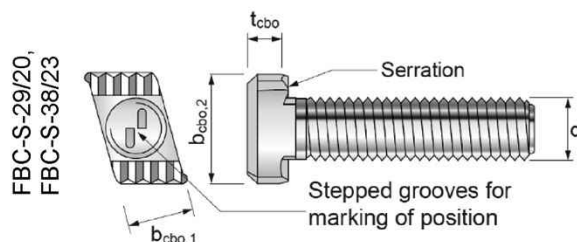
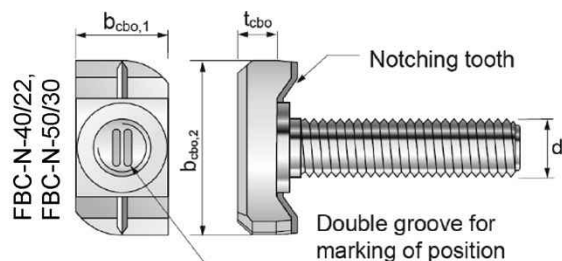
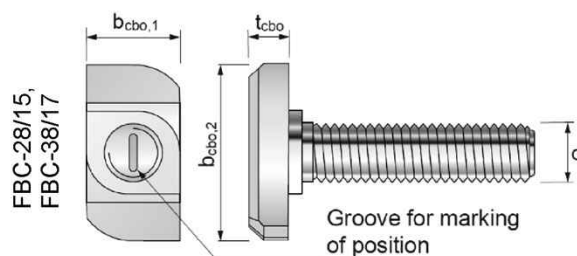
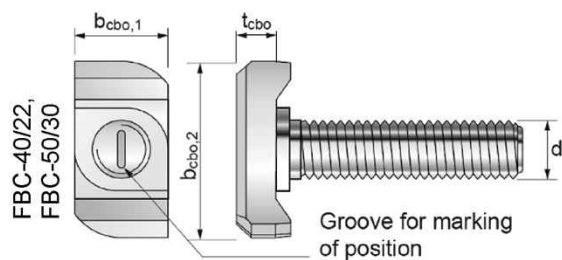
²⁾ Material properties according to EN ISO 898-1:2013+AC:2013.

³⁾ Electroplated.

⁴⁾ Hot-dip galvanised.

Table A6.2: Dimensions of fischer Channel Bolts FBC

Anchor Channel FES-	Channel Bolt FBC-	Steel grade	Dimensions			
			d [mm]	b _{cbo,1} [mm]	b _{cbo,2} [mm]	t _{cbo} [mm]
C-28/15	28/15	8.8	8	11,0	22,2	5,0
			10			5,0
			12			7,0
C-38/17	38/17	8.8	10	16,0	30,0	6,0
			12			7,0
			16			8,0
H-S-29/20	S-29/20	8.8	12	13,0	22,0	6,5
H-S-38/23	S-38/23	8.8	12	16,7	29,1	5,8
C-38/17		A4-70	16			
H(-I)-40/22(-P) C-40/25	40/22	8.8	10	14,0	32,5	8,0
		8.8	12	14,0		
		A4-70	16	17,0		
H(-I)-40/22(-P)	N-40/22	8.8	16	17,0	33,0	7,8
C-49/30 H(-I)-50/30 C-54/33 H(-I)-52/34	50/30	8.8	10	17,1	40,5	9,0
		8.8	12	17,1		10,0
		A4-70	16	17,1		11,0
	N-50/30	8.8	20	20,5	42,2	12,0
			16	17,5		12,0
H(-I)-50/30(-P) H(-I)-52/34			20	21,0		12,0



fischer Anchor Channel FES with fischer Channel Bolts FBC

Product Description
Channel bolts

Annex A6

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Table A7.1: Materials and properties

Component	Carbon steel			Stainless steel
	Mechanical properties	Coating	Coating	Mechanical properties
1	2	2a	2b	3
Channel profile	1.0038, 1.0044 acc. to EN 10025:2004 1.0976, 1.0979 acc. to EN 10149:2013	Hot-dip galvanised ≥ 50 µm acc. to EN ISO 1461:2022		1.4401, 1.4404, 1.4571, 1.4578 according to EN 10088: 2023
Anchor	1.0038, 1.0213, 1.0214 acc. to EN 10025:2004 1.5525, 1.5535 acc. to EN 10263:2017 1.5523 acc. to EN 10269:2014-02	Hot-dip galvanised ≥ 50 µm acc. to EN ISO 1461:2022		1.4401, 1.4404, 1.4571, 1.4578 according to EN 10088: 2023
Channel bolt	Steel grade 8.8 acc. to EN ISO 898-1:2013 +AC:2013	Electroplated acc. to EN ISO 4042:2022	Hot-dip galvanised ≥ 50 µm acc. to EN ISO 10684:2004 + AC:2009	Steel grade 70 according to EN ISO 3506-1: 2020
Plain washer ¹⁾ acc. to EN ISO 7089:2000 and EN ISO 7093-1:2000	Hardness class A ≥ 200 HV	Electroplated acc. to EN ISO 4042:2022	Hot-dip galvanised ≥ 50 µm acc. to EN ISO 10684:2004 + AC:2009	1.4401, 1.4404, 1.4571; 1.4578 according to EN 10088: 2023
Hexagonal nut acc. to EN ISO 4032:2023	Property class 5 or 8 acc. to EN ISO 898-2:2022	Electroplated acc. to EN ISO 4042:2022	Hot-dip galvanised ≥ 50 µm acc. to EN ISO 10684:2004 + AC:2009	Property class 70 or 80 according to EN ISO 3506-2: 2020

¹⁾ Not in the scope of delivery.

fischer Anchor Channel FES with fischer Channel Bolts FBC

Product Description
Materials

Annex A7
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Specification of intended use

Anchor channels and channel bolts subject to:

- Static and quasi-static tension, shear perpendicular to the longitudinal axis of the channel
- Static and quasi-static shear in the direction of the longitudinal axis of the channel.
(anchor channels FES-H(-I)-40/22(-P) with notching channel bolts FBC-N-40/22, anchor channels FES-H(-I)-50/30(-P) or FES-H(-I)-52/34 with notching channel bolts FBC-N-50/30 and serrated anchor channels FES-H-S in combination with serrated channel bolts FBC-S).
- Seismic tension, seismic shear perpendicular to the longitudinal axis of the channel and seismic shear in the direction of the longitudinal axis of the channel (seismic performance category C1)
(anchor channels and channel bolts according to Annex C12).
- Fire exposure for concrete strength class C20/25 to C50/60 for tension and shear perpendicular to the longitudinal axis of the channel
(anchor channels and channel bolts according to Annex C15).

Base materials:

- Reinforced or unreinforced compacted normal weight concrete without fibres according to EN 206:2013+A2:2021.
- Strength classes C12/15 to C90/105 according to EN 206:2013+A2:2021.
- Cracked or uncracked concrete.

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions
(anchor channels and channel bolts according to Annex A7, Table A7.1, column 2a and 2b, 3).
- Structures subject to internal conditions with usual humidity (e.g. kitchens, bathrooms and laundries in residential buildings, exceptional permanent damp conditions and application under water)
(anchor channels and channel bolts according to Annex A7, Table A7.1, column 2b, 3).
- According to EN 1993-1-4:2006 +A1:2015+A2:2020 relating to corrosion resistance class CRC III
(anchor channels, channel bolts, washers and nuts made of stainless steel according to Annex A7, Table A7.1, column 3).

Design:

- Anchor channels are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the anchor channel and channel bolts are indicated on the design drawings (e.g. position of the anchor channel relative to the reinforcement or to supports).
- For static and quasi-static loading as well as seismic loading (performance category C1) and fire exposure the anchor channels are designed in accordance with EN 1992-4:2018 and EOTA TR 047 "Design of Anchor Channels", May 2021.
- The characteristic resistances are calculated with the minimum effective embedment depth.

fischer Anchor Channel FES with fischer Channel Bolts FBC

Intended Use
Specifications

Annex B1
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Installation:

- The installation of anchor channels is carried out by appropriately qualified personnel under the supervision of the person responsible for the technical matters on site.
- Use of the anchor channels only as supplied by the manufacturer - without any manipulations, repositioning or exchanging of channel components.
- Cutting of anchor channels is allowed only if pieces according to Annex A5, Table A5.1 are generated including end spacing x and minimum channel length l_{min} and only to be used in dry internal conditions. For anchor channels made of stainless steel there are no restrictions regarding corrosion resistance when using channel pieces, if cutting is done professionally and contamination of cutting edges with corroding material is avoided.
- Installation in accordance with the installation instruction given in Annexes B5, B6, B7 or B8.
- The anchor channels are fixed on the formwork, reinforcement or auxiliary construction such that no movement of the channels will occur during the time of laying the reinforcement and of placing and compacting the concrete.
- The concrete around the head of the anchors is properly compacted. The channels are protected from penetration of concrete into the internal space of the channels.
- Washers may be chosen according to Annex A7 and provided separately by the user.
- Orientating the channel bolt (groove according to Annex B6, B7 and B8) rectangular to the channel axis.
- The required installation torque given in Annex B4 must be applied and must not be exceeded.
- Notching channel bolts FBC-N may be used only once after applying the installation torque $T_{inst,s}$.

fischer Anchor Channel FES with fischer Channel Bolts FBC

Intended Use
Specifications

Annex B2

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Table B3.1: Installation parameters

Anchor Channel FES-			C-28/15	C-38/17	H-S-29/20	H-S-38/23	C-40/25 H-40/22 H-40/22-P H-I-40/22	C-49/30 H-50/30 H-50/30-P H-I-50/30	C-54/33 H-52/34 H-I-52/34
Minimum effective embedment depth	$h_{ef,min}$	[mm]	45	76	77	97	79 90 91 79	94 94 106 94	155 155 155
Minimum edge distance	c_{min}		40	50	50	75	50 50 50 50	75 75 75 75	100 100 100
Minimum thickness of concrete member	$h_{min}^{1)}$		55	87 ²⁾	120 ³⁾	100	90 100 100 100	100 100 109 100	160 160 170

1) For corrosion protection: $h_{min} = h_{ef} + t_h + C_{nom}$; C_{nom} acc. to EN 1992-1-1:2004 + AC:2010.

2) $h_{min} = 100$ mm for FES-C-38/17 in combination with FBC-S-38/23.

3) $h_{min} = 100$ mm if $c_{min} = 100$ mm and $s_{min} = 100$ mm.

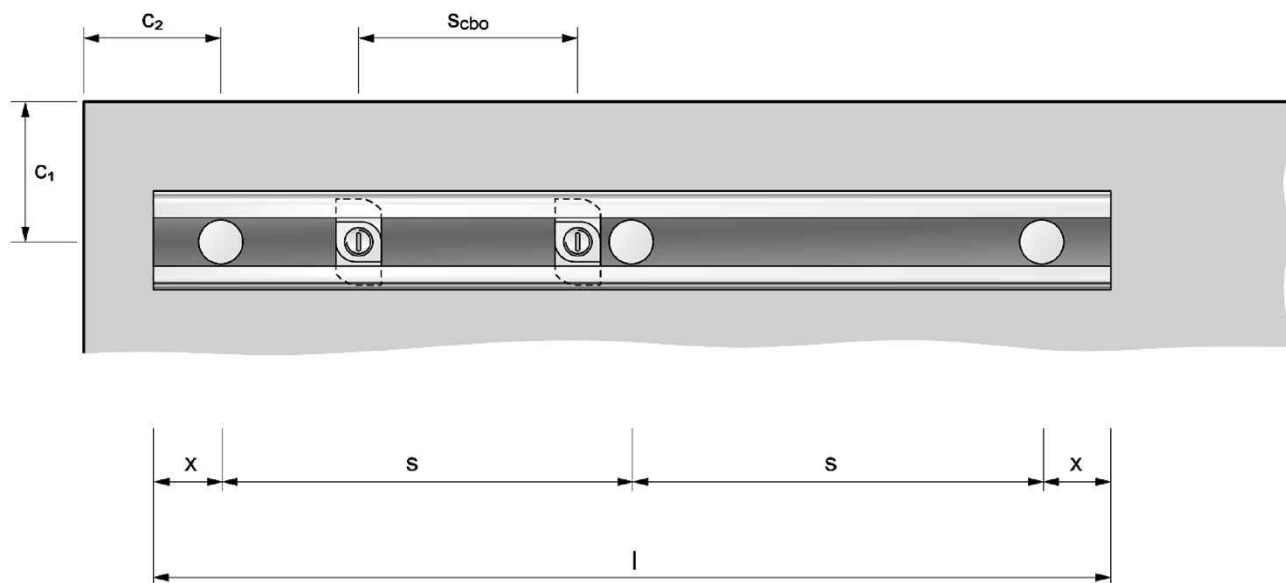


Table B3.2: Minimum spacing for channel bolts

Channel bolt			M8	M10	M12	M16	M20
Minimum spacing between channel bolts	$s_{cbo,min}$	[mm]	40	50	60	80	100

fischer Anchor Channel FES with fischer Channel Bolts FBC

Intended Use

Installation parameters for fischer Anchor Channels FES

Annex B3

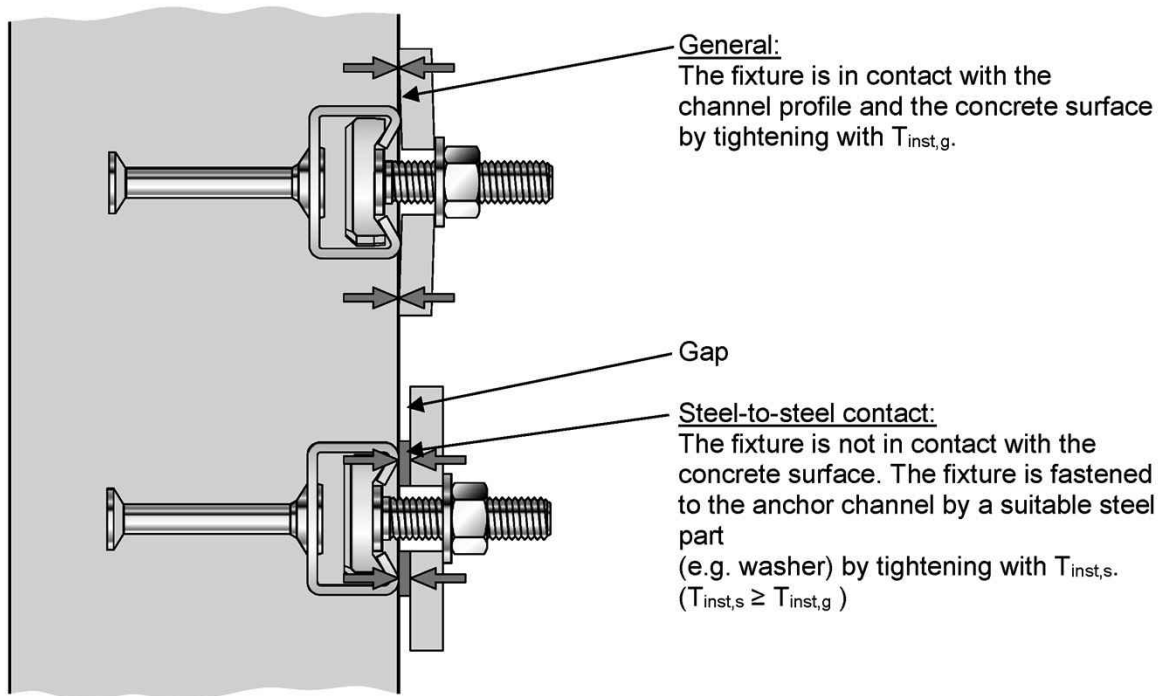
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Table B4.1: Required installation torque T_{inst}

fischer Anchor channel FES-	fischer Channel Bolt FBC	Thread diameter	$T_{inst}^{1)}$ [Nm]			
			General		Steel - steel contact	
			$T_{inst,g}$		$T_{inst,s}$	
			8.8	A4-70	8.8	A4-70
C-28/15	28/15	M8	7	-2)	15	-2)
		M10	10	-2)	30	-2)
		M12	13	-2)	45	-2)
C-38/17	38/17	M10	15	-2)	30	-2)
		M12	20	-2)	45	-2)
		M16	30	-2)	100	-2)
H-S-29/20	S-29/20	M12	80	-2)	80	-2)
H-S-38/23	S-38/23	M12	80	80	80	80
		M16	100	100	100	100
C-38/17		M12	40	-2)	80	-2)
		M16	50	-2)	100	-2)
H(-I)-40/22(-P) C-40/25	40/22	M10	15	-2)	30	-2)
		M12	24	24	45	45
		M16	32	32	100	100
	N-40/22	M16	-2)	-2)	200	-2)
C-49/30	50/30	M10	15	-2)	30	-2)
H(-I)-50/30(-P)		M12	25	25	45	45
C-54/33		M16	60	60	100	100
H(-I)-52/34		M20	75	75	230	230
H(-I)-50/30(-P), H(-I)-52/34	N-50/30	M16	-2)	-2)	200	-2)
		M20	-2)	-2)	400	-2)

1) T_{inst} must not be exceeded.

2) No performance assessed.



fischer Anchor Channel FES with fischer Channel Bolts FBC

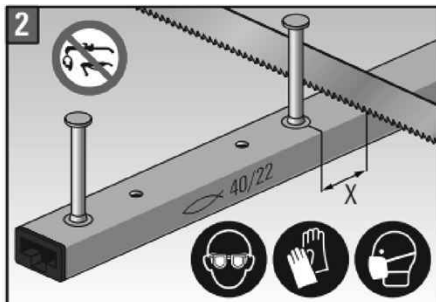
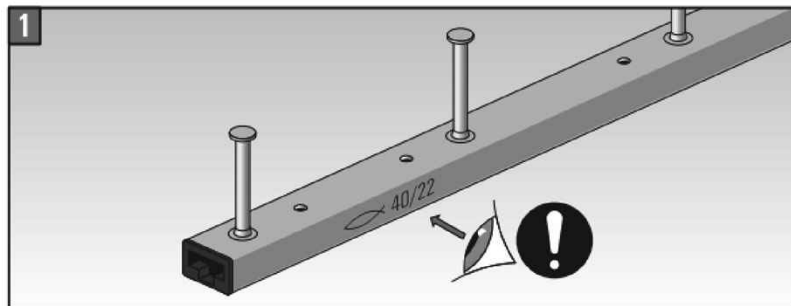
Intended Use

Installation parameters for fischer Channel Bolts FBC

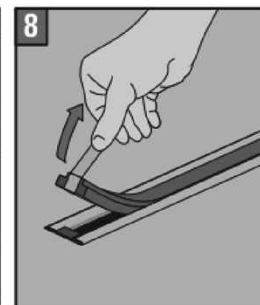
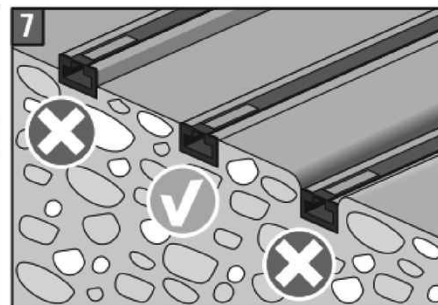
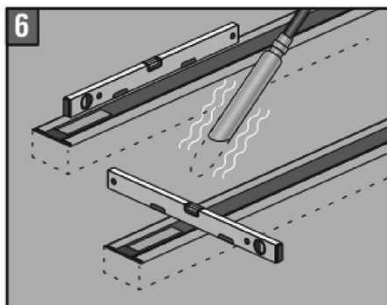
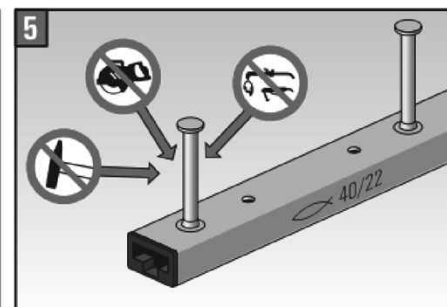
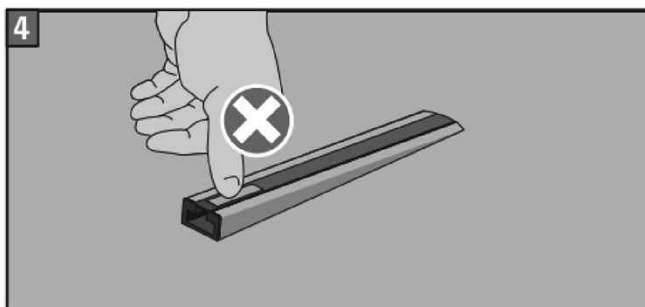
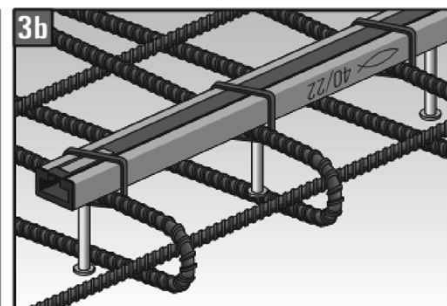
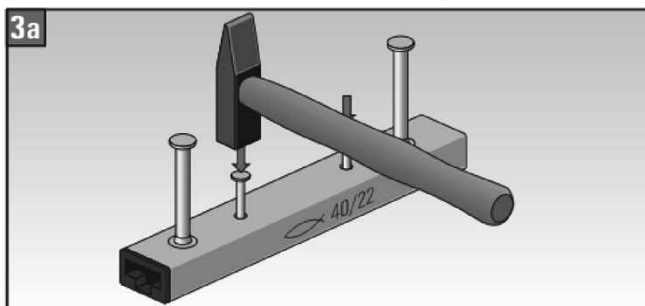
Annex B4

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Anchor channel FES



X		
25 - 35 mm	FES-H-	FES-C-
	S - 29/20	28/15
	S - 38/23	38/17
	(I-)40/22(-P)	40/25
	(I-)50/30	49/30
35 mm	I-52/34	54/33
	50/30-P	
	52/34	

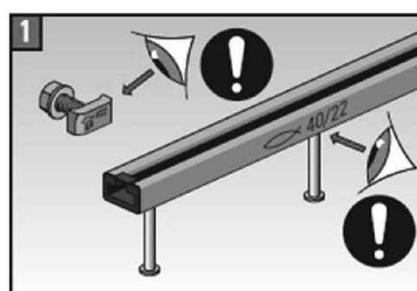


fischer Anchor Channel FES with fischer Channel Bolts FBC

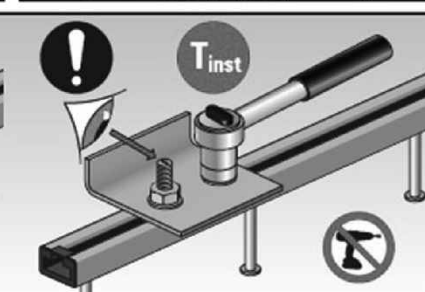
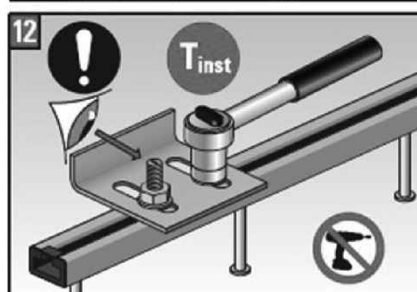
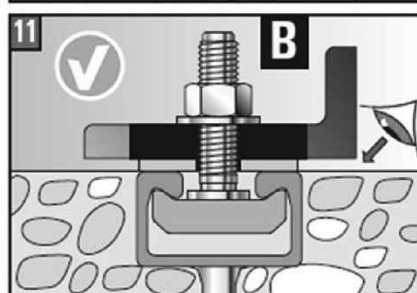
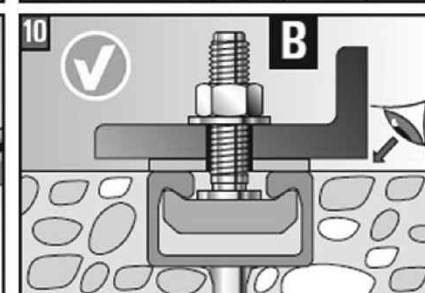
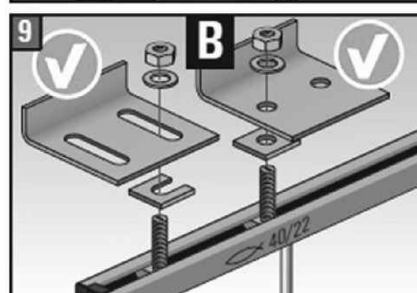
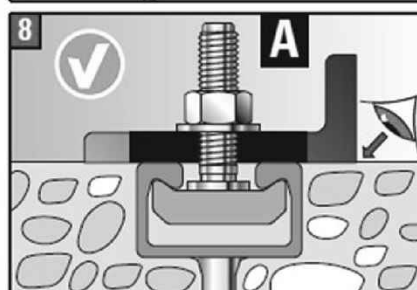
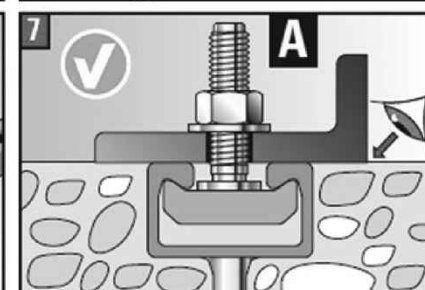
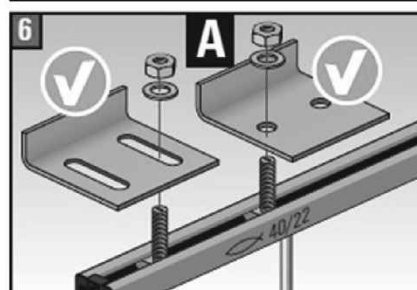
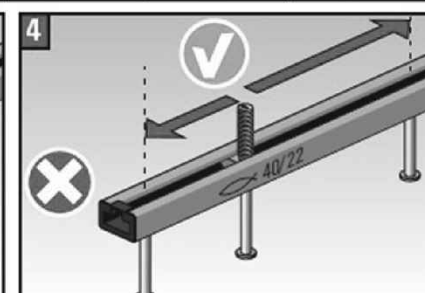
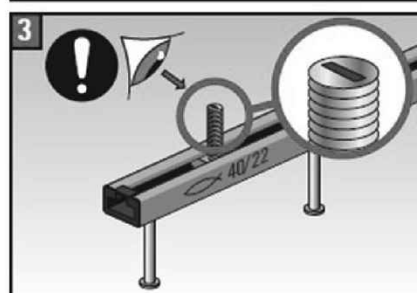
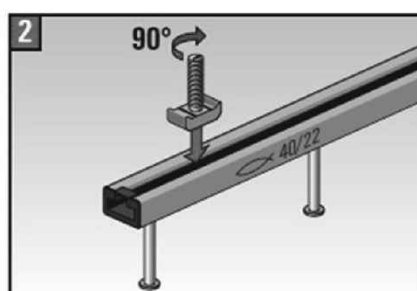
Intended Use
Installation instruction for fischer Anchor Channels FES

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Channel bolt FBC



	FBC	FES-H(I)	FES-C
2815	-	-	28/15
3817	-	-	38/17
4022	40/22	40/22	40/25
5030	50/30	52/34	49/30
			54/33



FBC	T _{inst} [Nm]	M8	M10	M12	M16	M20
2815	A	7	10	13	-	-
	B	15	30	45	-	-
3817	A	-	15	20	30	-
	B	-	30	45	100	-
4022 ¹⁾	A	-	15	24	32	-
	B	-	30	45	100	-
5030 ²⁾	A	-	15	25	60	75
	B	-	30	45	100	230

¹⁾T_{inst} must not be exceeded.

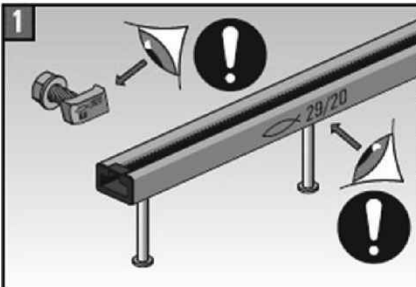
²⁾applies to all materials (8.8 and A4-70).

fischer Ankerschiene FES mit fischer Spezialschrauben FBC

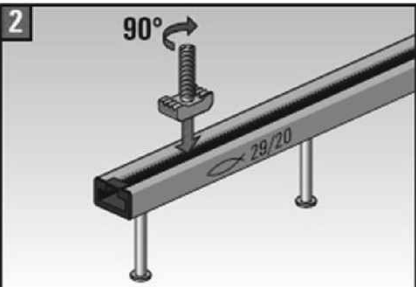
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Montageanleitung für fischer Zahnschrauben FBC-S

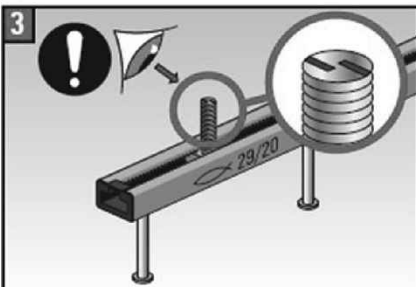
Anhang B7
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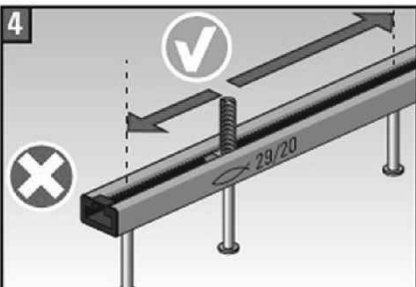
Serrated channel bolt FBC-S



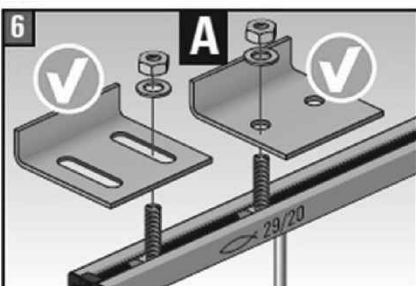
	FBC-S	FES-H-S	FES-C
2920	29/20	29/20	-
3823	38/23	38/23	38/17

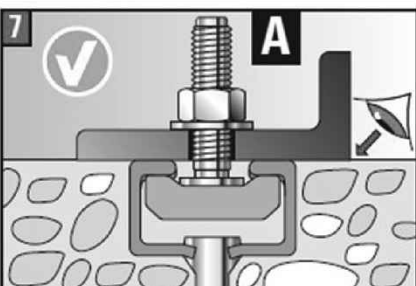


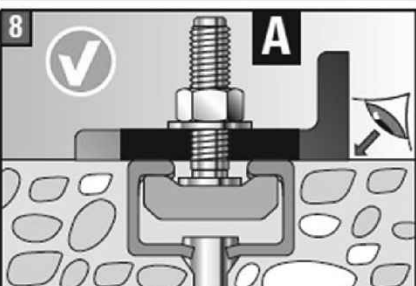


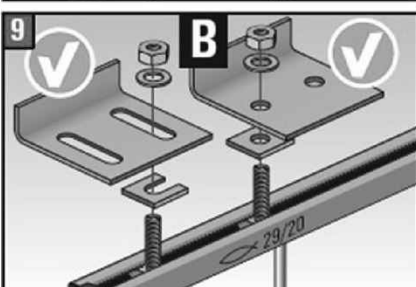


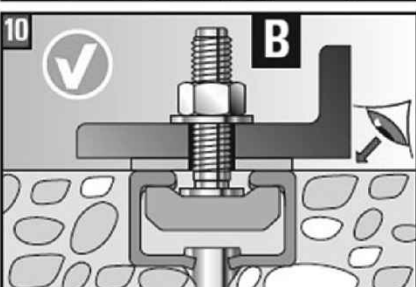


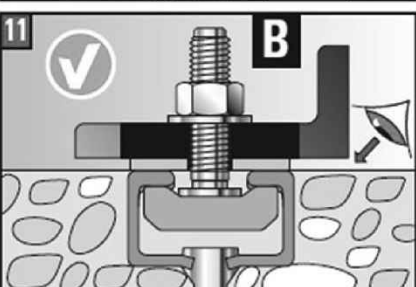


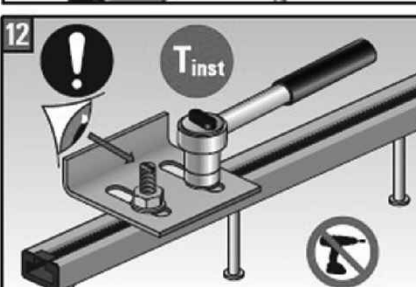


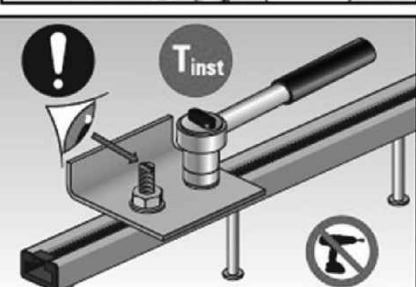












FBC-S	FES	T _{inst} ¹⁾ [Nm]	M12	M16
2920	HS-29/20	A	80	-
		B	80	-
3823 ²⁾	HS-38/23	A	80	100
		B	80	100
	C-38/17	A	40	50
		B	80	100

¹⁾T_{inst} must not be exceeded.

²⁾ Applies to all materials (8.8 and A4-70).

fischer Anchor Channel FES with fischer Channel Bolts FBC

Intended Use

Installation instruction for Serrated fischer Channel Bolts FBC-S

Annex B7

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Notching channel bolt FBC-N

FBC-N-4022	40/22	
FBC-N-5030		50/30 52/34

FBC-N-	FES-	T _{inst} ¹ [Nm]		
		M12	M16	M20
4022	H-(I)-4022-(P)	-	200	-
5030	H-(I)-5030-(P)	-	200	400
	H-(I)-52/34	-	200	400

¹⁾T_{inst} must not be exceeded.

fischer Anchor Channel FES with fischer Channel Bolts FBC

Intended Use

Installation instruction for Notching fischer Channel Bolts FBC-N

Annex B8

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Table C1.1: Characteristic resistances under tension load – steel failure of hot-rolled anchor channels

Anchor Channel FES-H-			S-29/20	S-38/23 S-38/23-A4	40/22 40/22-P I-40/22	50/30 50/30-P I-50/30	52/34 I-52/34
Steel failure: Anchor							
Characteristic resistance	N _{Rk,s,a}	[kN]	25,0	31,0 40,0	20,0 42,0 35,0	31,0 44,0 44,0	55,0 70,4
Partial factor	γ _{Ms} ¹⁾	[-]	1,8				
Steel failure: Connection between anchor and channel							
Characteristic resistance	N _{Rk,s,c}	[kN]	25,0	30,3 40,0	20,0 40,1 38,0	31,0 44,0 40,0	55,0 70,4
Partial factor	γ _{Ms} ¹⁾	[-]	1,8				
Steel failure: Local flexure of channel lips							
Characteristic spacing of channel bolts for N _{Rk,s,l}	s _{l,N}	[mm]	60	76	80 80 80	100 100 100	105 105
Characteristic resistance	N ⁰ _{Rk,s,l}	[kN]	25,0	30,3 45,0	38,0 42,0 38,0	43,0 52,0 43,0	72,0 72,0
Partial factor	γ _{Ms} ¹⁾	[-]	1,8				

¹⁾ In absence of other national regulations.

Table C1.2: Characteristic resistances under tension load – steel failure of cold-formed anchor channels

Anchor Channel FES-C-			28/15	38/17	40/25	49/30	54/33
Steel failure: Anchor							
Characteristic resistance	N _{Rk,s,a}	[kN]	9,0	20,0	20,0	31,0	55,0
Partial factor	γ _{Ms} ¹⁾	[-]	1,8				
Steel failure: Connection between anchor and channel							
Characteristic resistance	N _{Rk,s,c}	[kN]	9,0	18,0	20,0	31,0	55,0
Partial factor	γ _{Ms} ¹⁾	[-]	1,8				
Steel failure: Local flexure of channel lips							
Characteristic spacing of channel bolts for N _{Rk,s,l}	s _{l,N}	[mm]	56	76	80	100	108
Characteristic resistance	N ⁰ _{Rk,s,l}	[kN]	9,0	18,0	20,0	31,0	55,0
Partial factor	γ _{Ms} ¹⁾	[-]	1,8				

¹⁾ In absence of other national regulations.

fischer Anchor Channel FES with fischer Channel Bolts FBC

Performance

Characteristic resistances under tension load – Steel failure of anchor channel

Annex C1

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Table C2.1: Characteristic flexural resistance of hot rolled channels under tension load

Anchor Channel FES-H-			S-29/20	S-38/23 S-38/23-A4	40/22 40/22-P I-40/22	50/30 50/30-P I-50/30	52/34 I-52/34
Steel failure: Flexure of channel							
Characteristic flexural resistance of channel	$M_{Rk,s,flex}$	[Nm]	704	1.240 1.305	1.118 1.118 1.118	2.185 2.185 2.185	3.163 3.670
Partial factor	$\gamma_{Ms,flex}^{1)}$	[-]	1,15				

¹⁾ In absence of other national regulations.

Table C2.2: Characteristic flexural resistance of cold-formed channels under tension load

Anchor Channel FES-C-			28/15	38/17	40/25	49/30	54/33
Steel failure: Flexure of channel							
Characteristic flexural resistance of channel	$M_{Rk,s,flex}$	[Nm]	310	567	915	1.554	2.350
Partial factor	$\gamma_{Ms,flex}^{1)}$	[-]	1,15				

¹⁾ In absence of other national regulations.

fischer Anchor Channel FES with fischer Channel Bolts FBC

Performance

Characteristic resistances under tension load – Steel failure of anchor channel

Annex C2

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Table C3.1: Characteristic resistances under tension load – concrete failure of hot rolled anchor channels

Anchor Channel FES-H-			S-29/20	S-38/23	40/22 40/22-P I-40/22	50/30 50/30-P I-50/30	52/34 I-52/34
Concrete failure: Pull-out failure							
Characteristic resistance in cracked concrete C12/15	N _{Rk,p}	[kN]	18,4	21,2	13,6 21,2 27,0	21,2 33,2 33,8	33,2 54,0
Characteristic resistance in uncracked concrete C12/15			25,7	29,7	19,0 29,7 37,8	29,7 46,5 47,3	46,5 75,6
Increasing factor of N _{Rk,p} = N _{Rk,p} (C12/15)*ψ _c	C16/20	ψ _c [-]	1,33				
	C20/25		1,67				
	C25/30		2,08				
	C30/37		2,50				
	C35/45		2,92				
	C40/50		3,33				
	C45/55		3,75				
	C50/60		4,17				
	C55/67		4,58				
	≥C60/75		5,00				
Partial factor	γ _{Mp} =γ _{Mc} ¹⁾	[-]	1,5				
Concrete failure: Concrete cone failure							
Product factor k ₁	k _{cr,N}	[-]	7,8	8,1	8,0 8,0 7,9	8,1 8,2 8,1	8,7 8,7
	k _{ucr,N}	[-]	11,2	11,6	11,4 11,5 11,2	11,5 11,7 11,5	12,4 12,4
Partial factor	γ _{Mc} ¹⁾	[-]	1,5				
Concrete failure: Splitting							
Characteristic edge distance	C _{cr,sp}	[mm]	231	291	270 273 237	282 318 282	465 465
Characteristic spacing	S _{cr,sp}	[mm]	462	582	540 546 474	564 636 564	930 930
Partial factor	γ _{Msp} =γ _{Mc} ¹⁾	[-]	1,5				

¹⁾ In absence of other national regulations.

fischer Anchor Channel FES with fischer Channel Bolts FBC

Performance

Characteristic resistances under tension load – concrete failure of hot rolled anchor channels

Annex C3

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Table C4.1: Characteristic resistances under tension load – concrete failure of cold-formed anchor channels

Anchor Channel FES-C-			28/15	38/17	40/25	49/30	54/33
Concrete failure: Pull-out failure							
Characteristic resistance in cracked concrete C12/15	N _{Rk,p}	[kN]	7,6	13,6	13,6	21,2	33,2
Characteristic resistance in uncracked concrete C12/15			10,7	19,0	19,0	29,7	46,5
Increasing factor of N _{Rk,p} = N _{Rk,p} (C12/15)*ψ _c	C16/20	ψ _c [-]	1,33				
	C20/25		1,67				
	C25/30		2,08				
	C30/37		2,50				
	C35/45		2,92				
	C40/50		3,33				
	C45/55		3,75				
	C50/60		4,17				
	C55/67		4,58				
	≥C60/75		5,00				
Partial factor	γ _{Mp} =γ _{Mc} ¹⁾	[-]	1,5				
Concrete failure: Concrete cone failure							
Product factor k ₁	k _{Cr,N}	[-]	7,2	7,8	7,9	8,1	8,7
	k _{ucr,N}	[-]	10,3	11,2	11,2	11,5	12,4
Partial factor	γ _{Mc} ¹⁾	[-]	1,5				
Concrete failure: Splitting failure							
Characteristic edge distance	C _{cr,sp}	[mm]	135	228	237	282	465
Characteristic spacing	S _{cr,sp}	[mm]	270	456	474	564	930
Partial factor	γ _{Msp} =γ _{Mc} ¹⁾	[-]	1,5				

¹⁾ In absence of other national regulations.

fischer Anchor Channel FES with fischer Channel Bolts FBC

Performance

Characteristic resistances under tension load – concrete failure of cold formed anchor channels

Annex C4

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Table C5.1: Displacements of hot-rolled anchor channels under tension load

Anchor Channel FES-H-			S-29/20	S-38/23 S-38/23-A4	40/22 40/22-P I-40/22	50/30 50/30-P I-50/30	52/34 I-52/34
Tension load	N	[kN]	14,6	19,4 19,2	15,1 16,7 15,1	17,1 20,6 17,1	28,6 28,6
Short-term displacement ¹⁾	δ_{N0}	[mm]	2,3	1,4 1,3	2,2 2,5 2,2	1,5 1,8 1,5	1,9 1,9
Long-term displacement ¹⁾	$\delta_{N\infty}$	[mm]	4,6	2,8 2,6	4,4 5,0 4,4	3,0 3,6 3,0	3,8 3,8

¹⁾ Displacements in midspan of the anchor channel, including slip of channel bolt, deformation of channel lips, bending of the channel and slip of the anchor channel in concrete.

Table C5.2: Displacements of cold-formed anchor channels under tension load

Anchor Channel FES-C-			28/15	38/17	40/25	49/30	54/33
Tension load	N	[kN]	3,6	7,1	7,9	12,3	21,8
Short-term displacement ¹⁾	δ_{N0}	[mm]	0,7	1,3	1,5	1,4	1,2
Long-term displacement ¹⁾	$\delta_{N\infty}$	[mm]	1,4	2,6	3,0	2,8	2,4

¹⁾ Displacements in midspan of the anchor channel, including slip of channel bolt, deformation of channel lips, bending of the channel and slip of the anchor channel in concrete.

fischer Anchor Channel FES with fischer Channel Bolts FBC

Performance

Characteristic resistance under tension load - displacements

Annex C5

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Table C6.1: Characteristic resistances under shear load – steel failure of hot-rolled anchor channels

Anchor Channel FES-H-			S-29/20	S-38/23 S-38/23-A4	40/22 40/22-P I-40/22	50/30 50/30-P I-50/30	52/34 I-52/34
Steel failure: Anchor							
Characteristic resistance	$V_{Rk,s,a,y}$	[kN]	25,0	30,3 40,0	40,0 50,8 40,0	60,0 87,9 60,0	100 100
	$V_{Rk,s,a,x}$	[kN]	15,1	18,8 24,0	12,0 25,4 22,8	18,6 26,8 24,0	33,0 42,2
Partial factor	$\gamma_{Ms}^{1)}$	[-]	1,8				
Steel failure: Connection between anchor and channel							
Characteristic resistance	$V_{Rk,s,c,y}$	[kN]	25,0	30,3 40,0	40,0 50,8 40,0	60,0 87,9 60,0	100 100
	$V_{Rk,s,c,x}$	[kN]	15,0	18,2 24,0	12,0 25,2 22,8	18,6 26,4 24,0	33,0 42,2
Partial factor	$\gamma_{Ms}^{1)}$	[-]	1,8				
Steel failure: Local flexure of channel lips							
Characteristic spacing of channel bolts for $V_{Rk,s,l}$	$s_{l,v}$	[mm]	60	76	80 80 80	100 100 100	108 108
Characteristic resistance	$V^0_{Rk,s,l,y}$	[kN]	25,0	30,3 40,0	40,0 50,8 40,0	60,0 87,9 60,0	100 100
Partial factor	$\gamma_{Ms}^{1)}$	[-]	1,8				

¹⁾ In absence of other national regulations.

fischer Anchor Channel FES with fischer Channel Bolts FBC

Performance

Characteristic resistance under shear load - Steel failure of hot-rolled anchor channels

Annex C6

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Table C7.1: Characteristic resistances under shear load – steel failure of cold-formed anchor channels

Anchor Channel FES-C-			28/15	38/17	40/25	49/30	54/33
Steel failure: Anchor							
Characteristic resistance	$V_{Rk,s,a,y}$	[kN]	9	18	20	31	55
	$V_{Rk,s,a,x}$	[kN]	–2)	–2)	–2)	–2)	–2)
Partial factor	γ_{Ms} 1)	[-]	1,8				
Steel failure: Connection between anchor and channel							
Characteristic resistance	$V_{Rk,s,c,y}$	[kN]	9	18	20	31	55
	$V_{Rk,s,c,x}$	[kN]	–2)	–2)	–2)	–2)	–2)
Partial factor	γ_{Ms} 1)	[-]	1,8				
Steel failure: Local flexure of channel lips							
Characteristic spacing of channel bolts for $V_{Rk,s,l}$	$s_{l,V}$	[mm]	56	76	80	100	108
Characteristic resistance	$V^0_{Rk,s,l,y}$	[kN]	9	18	20	31	55
Partial factor	γ_{Ms} 1)	[-]	1,8				

¹⁾ In absence of other national regulations.

²⁾ No performance assessed.

fischer Anchor Channel FES with fischer Channel Bolts FBC

Performance

Characteristic resistance under shear load - Steel failure of cold-formed anchor channels

Annex C7

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Table C8.1: Characteristic resistance for shear load in direction of the longitudinal axis of the channel – steel failure

Anchor Channel FES-H-			S-29/20	S-38/23	40/22 40/22-P I-40/22	50/30 50/30-P I-50/30	52/34 I-52/34
Steel failure: Connection between channel lips and channel bolt							
Characteristic resistance	$V_{Rk,s,l,x}$	[kN]	FBC-S-29/20-M12-8.8	22,5	– ²⁾	– ²⁾	– ²⁾
			FBC-S-38/23-M12-8.8	– ²⁾	23,2	– ²⁾	– ²⁾
			FBC-S-38/23-M12-A4-70	– ²⁾	29,0	– ²⁾	– ²⁾
			FBC-S-38/23-M16-8.8	– ²⁾	30,3	– ²⁾	– ²⁾
			FBC-S-38/23-M16-A4-70	– ²⁾	29,0	– ²⁾	– ²⁾
			FBC-N-40/22-M16-8.8	– ²⁾	– ²⁾	14,0	– ²⁾
			FBC-N-50/30-M16-8.8	– ²⁾	– ²⁾	10,7	10,7
			FBC-N-50/30-M20-8.8	– ²⁾	– ²⁾	21,0	21,0
Installation factor	$\gamma_{inst}^{1)}$	[-]		1,2	8.8: 1,0 A4-70: 1,2	1,2	M16: 1,2 M20: 1,4

¹⁾ In absence of other national regulations.

²⁾ No performance assessed.

Table C8.2: Characteristic resistances of the hot-rolled anchor channel under shear load – concrete failure

Anchor Channel FES-H-			S-29/20	S-38/23	40/22 40/22-P I-40/22	50/30 50/30-P I-50/30	52/34 I-52/34
Concrete failure: Pry-out failure							
Product factor	k ₈	[-]	2,0	2,0	2,0	2,0	2,0
Partial factor	γ _{Mc} ¹⁾	[-]	1,5				
Concrete failure: Concrete edge failure							
Product factor k ₁₂	k _{cr,V}	[-]	7,5	7,5	7,5	7,5	7,5
	k _{ucr,V}	[-]	10,5	10,5	10,5	10,5	10,5
Partial factor	γ _{Mc} ¹⁾	[-]	1,5				

¹⁾ In absence of other national regulations.

Table C8.3: Characteristic resistances of the cold-formed anchor channel under shear load – concrete failure

Anchor Channel FES-C			28/15	38/17	40/25	49/30	54/33
Concrete failure: Pry-out failure							
Product factor	k ₈	[-]	1	2	2	2	2
Partial factor	γ _{Mc} ¹⁾	[-]	1,5				
Concrete failure: Concrete edge failure							
Product factor k ₁₂	k _{Cr,V}	[-]	5,8	7,5	7,5	7,5	7,5
	k _{uCr,V}	[-]	8,1	10,5	10,5	10,5	10,5
Partial factor	γ _{Mc} ¹⁾	[-]	1,5				

¹⁾ In absence of other national regulations.

fischer Anchor Channel FES with fischer Channel Bolts FBC

Performance
Characteristic resistance under shear load

Annex C8

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Table C9.1: Displacements under shear load

Anchor Channel FES-			C-28/15	C-38/17	H-S-29/20	H-S-38/23 H-S-38/23-A4	C-40/25 H-40/22 H-40/22-P H-I-40/22	C-49/30 H-50/30 H-50/30-P H-I-50/30	C-54/33 H-52/34 H-I-52/34
Shear load perpendicular to the longitudinal axis of the channel	V_y	[kN]	3,6	7,1	14,6	23,0 23,0	7,9 15,9 20,2 15,9	12,3 23,8 34,9 23,8	21,8 39,7 39,7
Short-term displacement ¹⁾	$\delta_{V,y,0}$	[mm]	0,7	1,3	2,3	3,8 2,8	1,5 2,1 2,2 2,1	1,4 3,7 2,1 3,7	1,2 4,0 4,0
Long-term displacement ¹⁾	$\delta_{V,y,\infty}$	[mm]	1,1	2,0	3,5	5,7 4,2	2,3 3,2 3,3 3,2	2,1 5,5 3,2 5,5	1,8 5,9 5,9
Shear load in direction of the longitudinal axis of the channel	V_x	[kN]	- ³⁾	- ³⁾	16,6	15,4 21,2	- ³⁾ 4,6 4,6 4,6	- ³⁾ 4) 4) 4)	- ³⁾ 4) 4)
Short-term displacement ²⁾	$\delta_{V,x,0}$	[mm]	- ³⁾	- ³⁾	1,9	0,8 2,0	- ³⁾ 0,9 0,9 0,9	- ³⁾ 5) 5) 5)	- ³⁾ 5) 5)
Long-term displacement ²⁾	$\delta_{V,x,\infty}$	[mm]	- ³⁾	- ³⁾	2,9	1,2 3,0	- ³⁾ 1,4 1,4 1,4	- ³⁾ 6) 6) 6)	- ³⁾ 6) 6)

¹⁾ Displacements in midspan of the anchor channel, including slip of channel bolt, deformation of channel lips and slip of the anchor channel in concrete.

²⁾ Displacements of the anchor channel, including slip of channel bolt, deformation of channel lips and slip of the anchor channel in concrete.

³⁾ No performance assessed.

⁴⁾ For FBC-N-5030-M16 $V_x = 3,5$ kN, for FBC-N-5030-M20 $V_x = 6,7$ kN.

⁵⁾ For FBC-N-5030-M16 $\delta_{V,x,0} = 0,4$ mm, for FBC-N-5030-M20 $\delta_{V,x,0} = 0,1$ mm.

⁶⁾ For FBC-N-5030-M16 $\delta_{V,x,\infty} = 0,6$ mm, for FBC-N-5030-M20 $\delta_{V,x,\infty} = 0,2$ mm.

Table C9.2: Characteristic resistances under combined tension and shear load

Anchor Channel FES-			C-28/15	C-38/17	H-S-29/20	H-S-38/23	C-40/25 H-40/22 H-40/22-P H-I-40/22	C-49/30 H-50/30 H-50/30-P H-I-50/30	C-54/33 H-52/34 H-I-52/34
Steel failure: Local flexure of channel lips and flexure of channel									
Product factor	k ₁₃	[-]	according to EN 1992-4:2018, 7.4.3.1						
Steel failure: Anchor and connection between anchor and channel									
Product factor	k ₁₄	[-]	according to EN 1992-4:2018, 7.4.3.1						

fischer Anchor Channel FES with fischer Channel Bolts FBC
Performance

Displacement under shear load, characteristic resistance under combined tension and shear load

Annex C9

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Table C10.1: Characteristic resistances under tension and shear load – steel failure of channel bolts

Channel bolt thread diameter				M8	M10	M12	M16	M20		
Steel failure: Special screw 8.8										
Characteristic tensile resistance	FBC-28/15	N _{Rk,s}	[kN]	29,2	33,0	45,1	-2)	-2)		
	FBC-38/17			-2)	46,4	67,4	89,9	-2)		
	FBC-S-29/20			-2)	-2)	48,5	-2)	-2)		
	FBC-S-38/23			-2)	-2)	67,4	71,5	-2)		
	FBC-40/22			-2)	46,4	55,1	82,2	-2)		
	FBC-N-40/22			-2)	-2)	-2)	100,9	-2)		
	FBC-50/30			-2)	46,4	67,4	96,5	127,2		
	FBC-N-50/30			-2)	-2)	-2)	113,5	134,0		
Partial factor		γ _{Ms} ¹⁾	[-]	1,5						
Steel failure: Special screw A4-70										
Characteristic tensile resistance	FBC-S-38/23	N _{Rk,s}	[kN]	-2)	-2)	59,0	71,5	-2)		
	FBC-40/22			-2)	-2)	54,9	102,8	-2)		
	FBC-50/30			-2)	-2)	59,0	82,8	163,1		
Partial factor		γ _{Ms} ¹⁾	[-]	1,87						
Characteristic shear resistance 8.8				V _{Rk,s}	[kN]	14,6	23,2	33,7	62,8	98,0
Characteristic shear resistance A4-70						-2)	-2)	35,4	65,9	102,9
Partial factor (shear loads 8.8)			γ _{Ms} ¹⁾	[-]	1,25					
Partial factor (shear loads A4-70)			γ _{Ms} ¹⁾	[-]	1,56					

¹⁾ In absence of other national regulations.

²⁾ No performance assessed.

fischer Anchor Channel FES with fischer Channel Bolts FBC

Performance

Characteristic resistances under tension and shear load of channel bolts

Annex C10

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Table C11.1: Characteristic resistances under shear load with lever arm – steel failure of channel bolts

Channel bolt ²⁾ thread diameter					M8	M10	M12	M16	M20
Steel failure									
Characteristic flexural resistance	M ⁰ _{Rk,s}	[Nm]	FBC-(S-) (N-)	8.8	30,0	59,8	104,8	266,4	519,3
				A4-70	₋³)	₋³)	91,7	233,1	454,4
Partial factor	γ _{Ms} ¹⁾	[-]	FBC-(S-) (N-)	8.8	1,25				
				A4-70	1,56				
Internal lever arm	a	[mm]	FBC-28/15	8.8	16,7	18,1	19,4	₋³)	₋³)
			FBC-38/17	8.8	₋³)	22,7	24,0	26,0	₋³)
			FBC-S-29/20	8.8	₋³)	₋³)	20,0	₋³)	₋³)
			FBC-S-38/23	8.8 A4-70	₋³)	₋³)	22,4	25,7	₋³)
			FBC-40/22	8.8	₋³)	23,5	24,8	26,8	₋³)
			FBC-N-40/22	8.8	₋³)	₋³)	₋³)	26,9	₋³)
			FBC-50/30	8.8	₋³)	27,7	29,0	31,0	33,3
			FBC-N-50/30	8.8	₋³)	₋³)	₋³)	31,5	33,9
			FBC-40/22	A4-70	₋³)	₋³)	24,7	26,7	₋³)
			FBC-50/30	A4-70	₋³)	₋³)	28,8	30,9	33,1

¹⁾ In absence of other national regulations.

²⁾ Materials according to Annex A7, Table A7.1.

³⁾ No performance assessed.

The characteristic flexure resistance according to Table C11.1 is limited as follows:

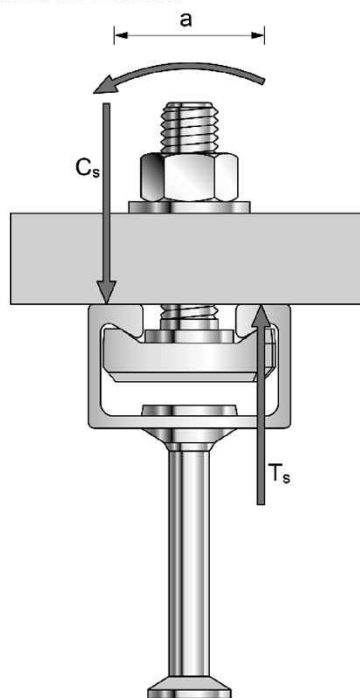
$$M^0_{RK,s} \leq 0,5 \cdot N^0_{RK,s,l} \cdot a \quad (N^0_{RK,s,l} \text{ according to Annex C1, Table C1.1 and Table C1.2})$$

$$M^0_{RK,s} \leq 0,5 \cdot N_{RK,s} \cdot a \quad (N_{RK,s} \text{ according to Annex C10, Table 10.1})$$

a = Internal lever arm according to Table C11.1

T_s = Tension force acting on the channel lips

C_s = Compression force acting on the channel lips



fischer Anchor Channel FES with fischer Channel Bolts FBC

Performance

Characteristic resistances under shear load of channel bolts

Annex C11

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**Table 12.1: Combination of anchor channels and channel bolts under seismic load
(performance category C1)**

Anchor channel FES-	Channel Bolt FBC-	Thread diameter	Steel grade	Corrosion protection
H-S-38/23	S-38/23	M12 M16	8.8	G ¹⁾ F ²⁾
H-50/30 H-52/34	N-50/30	M20		

¹⁾ Electroplated.

²⁾ Hot-dip galvanised.

**Table C12.2: Characteristic resistance under seismic tension load- steel failure of anchor channels
(performance category C1)**

Anchor Channel FES-H-			S-38/23	H50/30	H52/34
Steel failure: Anchor					
Characteristic resistance	N _{Rk,s,a,eq}	[kN]	31,0	31,0	31,0
Partial factor	γ _{Ms,eq} ¹⁾	[-]	1,8		
Steel failure: Connection between anchor and channel					
Characteristic resistance	N _{Rk,s,c,eq}	[kN]	30,3	31,0	31,0
Partial factor	γ _{Ms,eq} ¹⁾	[-]	1,8		
Steel failure: Local flexure of channel lips					
Characteristic resistance	N ⁰ _{Rk,s,l,eq}	[kN]	30,3	43,0	43,0
Partial factor	γ _{Ms,eq} ¹⁾	[-]	1,8		

¹⁾ In absence of other national regulations.

**Table 12.3: Characteristic flexural resistance of the channel under seismic tension load
(performance category C1)**

Anchor Channel FES-			H-S-38/23	H-50/30	H-52/43
Steel failure: Flexure of channel					
Characteristic flexural resistance of channel	$M_{Rk,s,flex,eq}$	[Nm]	1.240	2.185	2.185
Partial factor	$\gamma_{Ms,flex,eq}$ ¹⁾	[-]	1,15		

¹⁾ In absence of other national regulations.

fischer Anchor Channel FES with fischer Channel Bolts FBC

Performance

Characteristic resistance under seismic tension load (performance category C1)

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**Table C13.1: Characteristic resistance under seismic shear load- steel failure of anchor channels
(performance category C1)**

Anchor Channel FES-			H-S-38/23	H-50/30	H-52/34
Steel failure: Anchor					
Characteristic resistance	$V_{Rk,s,a,y,eq}$	[kN]	30,3	60,0	60,0
	$V_{Rk,s,a,x,eq}$	[kN]	18,8	18,6	18,6
Partial factor	$\gamma_{Ms,eq}^{1)}$	[-]	1,8		
Steel failure: Connection between anchor and channel					
Characteristic resistance	$V_{Rk,s,c,y,eq}$	[kN]	30,3	60,0	60,0
	$V_{Rk,s,c,x,eq}$	[kN]	18,2	18,6	18,6
Partial factor	$\gamma_{Ms,eq}^{1)}$	[-]	1,8		
Steel failure: Local flexure of channel lips					
Characteristic resistance	$V_{Rk,s,l,y,eq}^0$	[kN]	30,3	60,0	60,0
Partial factor	$\gamma_{Ms,eq}^{1)}$	[-]	1,8		

¹⁾ In absence of other national regulations.

Table C13.2: Characteristic resistance for seismic shear load in direction of the longitudinal axis of the channel - steel failure (performance category C1)

Anchor Channel FES-				H-S-38/23	H-50/30	H-52/34
Steel failure: Connection between channel lips and channel bolt						
Characteristic resistance	$V_{Rk,s,l,x,eq}$	[kN]	FBC-S-38/23-M12-8.8	23,2	- ²⁾	- ²⁾
			FBC-S-38/23-M16-8.8	23,2	- ²⁾	- ²⁾
			FBC-N-50/30-M20-8.8	- ²⁾	21,0	21,0
Installation factor	$\gamma_{inst}^{1)}$	[-]		1,0	1,4	1,4

¹⁾ In absence of other national regulations.

²⁾ No performance assessed.

fischer Anchor Channel FES with fischer Channel Bolts FBC

Performance

Characteristic resistance under seismic shear load perpendicular to the channel and in direction of the longitudinal axis of the channel (performance category C1)

Annex C13

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**Table C14.1: Characteristic resistance under seismic tension and seismic shear load
– steel failure of channel bolt (performance category C1)**

Channel bolt thread diameter				M12	M16	M20
Steel failure: Special screw						
Characteristic tensile resistance	FBC-S-38/23	$N_{Rk,s,eq}$	[kN]	67,4	67,4	– ²⁾
	FBC-N-50/30			– ²⁾	– ²⁾	134,0
Partial factor		γ_{Ms} ¹⁾	[-]	1,5		
Characteristic shear resistance 8.8		$V_{Rk,s,eq}$	[kN]	33,7	33,7	98,0
Partial factor (shear loads 8.8)		γ_{Ms} ¹⁾	[-]	1,25		

¹⁾ In absence of other national regulations.

²⁾ No performance assessed.

fischer Anchor Channel FES with fischer Channel Bolts FBC

Performance

Characteristic resistance of the channel bolt under seismic tension and seismic shear load (performance category C1)

Annex C14

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Table C15.1: Characteristic resistance under fire exposure – steel failure

Channel bolt thread diameter					M8	M10	M12	M16	M20	
Steel failure:					Anchor, connection between anchor and channel, local flexure of channel lips, channel bolts					
Characteristic resistance under fire exposure ³⁾	FES-H-S-29/2	FBC-S-29/20	R30 R60 R90 R120	$N_{Rk,s,fi}$ = $V_{Rk,s,y,fi}$	[kN]	- 2)	- 2)	2,5 2,4 1,7 1,4	- 2)	- 2)
	FES-H-S-38/23	FBC-S-38/23	R30 R60 R90 R120			- 2)	- 2)	4,6 4,1 2,8 2,1	4,6 4,1 2,8 2,1	- 2)
	FES-H(-I)-40/22(-P)	FBC-40/22	R30 R60 R90 R120			- 2)	1,3 1,0 0,7 0,6	2,0 1,7 1,4 1,3	4,5 3,4 2,3 1,7	- 2)
	FES-H(-I)-50/30(-P)	FBC(-N)-50/30	R30 R60 R90 R120			- 2)	1,3 1,0 0,7 0,6	2,0 1,7 1,4 1,3	5,2 4,2 3,2 2,7	5,2 4,2 3,2 2,7
	FES-H(-I)-52/34	FBC(-N)-50/30	R30 R60 R90 R120			- 2)	1,3 1,0 0,7 0,6	4,6 4,1 2,8 2,1	5,2 4,2 3,2 2,7	8,0 6,5 5,0 4,2
	FES-C-28/15	FBC-28/15	R30 R60 R90 R120			0,6 0,6 0,5 0,4	1,3 1,0 0,7 0,6	1,3 1,0 0,7 0,6	- 2)	- 2)
	FES-C-38/17	FBC-38/17 FBC-S-38/23-M16	R30 R60 R90 R120			- 2)	1,3 1,0 0,7 0,6	1,3 1,0 0,7 0,6	3,5 2,8 1,8 1,3	- 2)
	FES-C-40/25	FBC-40/22	R30 R60 R90 R120			- 2)	1,8 1,5 1,1 0,8	3,0 2,4 1,7 1,4	3,5 2,8 1,8 1,3	- 2)
	FES-C-49/30	FBC-50/30	R30 R60 R90 R120			- 2)	1,3 1,0 0,7 0,6	2,9 2,4 1,8 1,6	3,1 2,5 1,9 1,6	3,1 2,5 1,9 1,6
	FES-C-54/33	FBC-50/30	R30 R60 R90 R120			- 2)	1,3 1,0 0,7 0,6	2,9 2,4 1,8 1,6	3,1 2,5 1,9 1,6	3,1 2,5 1,9 1,6
Partial factor				$\gamma_{Ms,fi}$ ¹⁾	[-]	1,0				

¹⁾ In absence of other national regulations.

²⁾ No performance assessed.

³⁾ Values also valid for stainless steel A4-70.

fischer Anchor Channel FES with fischer Channel Bolts FBC

Performance

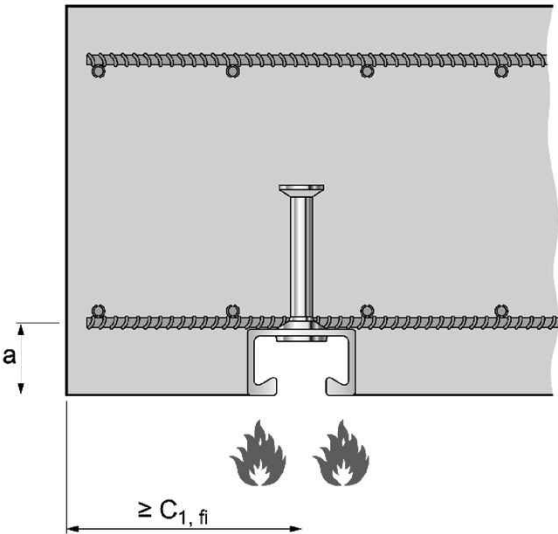
Characteristic resistance under fire exposure

Annex C15

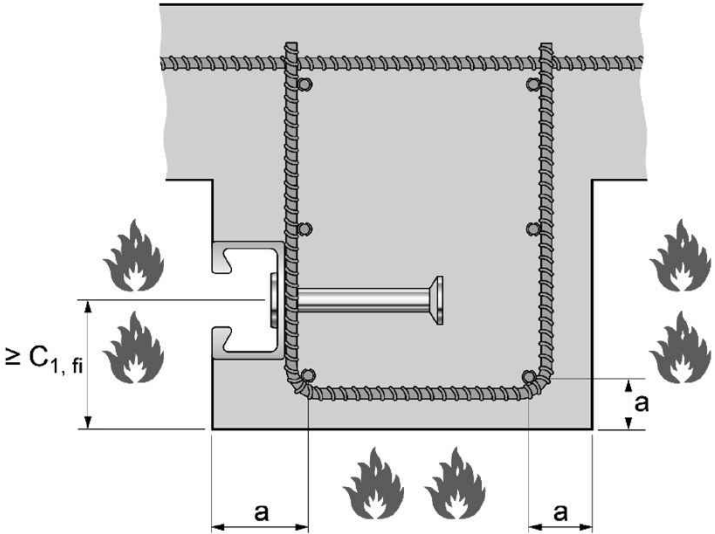
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Table C16.1: Minimum axis distance of the reinforcement under fire exposure

Anchor Channel FES-			C-28/15	C-38/17	H-S-29/20	H-S-38/23	C-40/25 H-40/22 H-40/22-P H-I-40/22	C-49/30 H50/30 H-50/30-P H-I-50/30	C-54/33 H-52/34 H-I-52/34
Minimum axis distance	R30	a [mm]	35	35	35	35	35	35	50
	R60		35	35	35	35	35	35	50
	R90		45	45	45	45	45	45	50
	R120		60	60	60	60	60	60	65



Fire exposure from one side only.



Fire exposure from more than one side.