

## PRESTATIEVERKLARING

### DoP 0376

voor fischer ankerkanaal FES met fischer kanaalbouten FBC (ankerkanalen voor gebruik in beton)

NL

1. Unieke identificatiecode van het producttype: **DoP 0376**
2. Beoogd(e) gebruik(en): **Ankerkanaal voor gebruik in gescheurd of ongescheurd beton, zie bijlage, met name de bijlagen B1- B8.**
3. Fabrikant: **fischerwerke GmbH & Co. KG, Klaus-Fischer-Str. 1, 72178 Waldachtal, Duitsland**
4. Gemachtigde: **–**
5. Het systeem of de systemen voor de beoordeling en verificatie van de prestatiebestendigheid: **1**
6. Europees beoordelingsdocument: **EAD 330008-04-0601, Edition 07/2024**  
Europese technische beoordeling: **ETA-18/0862; 2025-05-19**  
Technische beoordelingsinstantie: **DIBt- Deutsches Institut für Bautechnik**  
Aangemelde instantie(s): **2873 TU Darmstadt**

7. Aangegeven prestatie(s):

**Mechanische weerstand en stabiliteit (BWR 1)**

**Kenmerkende weerstand tegen spanningsbelasting (statische en quasi-statische belasting):**

- 1) Weerstand tegen staalbreuk van ankers: Bijlage C1
- 2) Weerstand tegen staalbreuk van de verbinding tussen ankers en goot: Bijlage C1
- 3) Weerstand tegen staalbreuk van de gootlippen en vervolgens uittrekken van de gootbout: Bijlage C1
- 4) Weerstand tegen staalbreuk van kanaalbout: Bijlage C10
- 5) Weerstand tegen staalbreuk door overschrijding van de buigsterkte van het kanaal: Bijlagen A5, C2
- 6) Maximaal installatiemoment om schade tijdens de installatie te voorkomen: Bijlage B4
- 7) Weerstand tegen uittrekken: Bijlagen C3,C4
- 8) Weerstand tegen betonnen kegelbreuk: Bijlagen B3, C3, C4
- 9) Minimale afstand tussen de randen, tussenruimte en dikte van de elementen om te voorkomen dat het beton splijt tijdens de installatie: Bijlagen A5, B3
- 10) Randafstand om spleetbreuk onder belasting te voorkomen: Bijlagen C3, C4
- 11) Weerstand tegen doorslaan - dragend gebied van de kop: Bijlage A4

**Kenmerkende weerstand tegen schuifbelasting (statische en quasi-statische belasting):**

- 12) Weerstand tegen staalbreuk van kanaalbout onder afschuifbelasting zonder hefboomarm: Bijlage C10
- 13) Weerstand tegen staalbreuk door buiging van de kanaalbout onder afschuifbelasting met hefboomarm: Bijlage C11
- 14) Weerstand tegen staalbreuk van de gootlippen, staalbreuk van de verbinding tussen het anker en de goot of staalbreuk van het anker (afschuifbelasting in dwarsrichting): Bijlagen C6, C7
- 15) Weerstand tegen staalbreuk van de verbinding tussen kanaallippen en kanaalbout (afschuifbelasting in de lengterichting van het kanaal): Bijlage C8
- 16) Factor voor installatiegevoeligheid (Longitudinale afschuiving): Bijlage C8
- 17) Weerstand tegen staalbreuk van het anker (Longitudinale afschuiving): Bijlagen C6, C7
- 18) Weerstand tegen staalbreuk van de verbinding tussen anker en kanaal (afschuifbelasting in de lengterichting van het kanaal): Bijlagen C6, C7
- 19) Weerstand tegen uitbreken (pryout): Bijlage C8
- 20) Weerstand tegen bezwijken van betonranden: Bijlage C8

**Karakteristieke weerstand onder gecombineerde statische en quasi-statische trek- en schuifbelasting**

- 21) Weerstand tegen staalbreuk van het ankerkanaal: Bijlage C9

**Karakteristieke weerstand onder vermoeiings trekbelasting:**

- 22) Vermoeiingsweerstand tegen staalbreuk van het hele systeem (continue of tri-lineaire functie, Beoordelingsmethode A1, A2): NPD
- 23) Vermoeiingsgrens weerstand tegen staalbreuk van het hele systeem (Beoordelingsmethode B): NPD
- 24) Vermoeiingsweerstand tegen staalbreuk van het hele systeem (Gelineariseerde functie, Beoordelingsmethode C): NPD
- 25) Weerstand tegen vermoeiing door betongerelateerd falen (exponentiële functie, Beoordelingsmethode A1, A2): NPD
- 26) Vermoeiingsgrens weerstand tegen betongerelateerd falen (Beoordelingsmethode B): NPD
- 27) Weerstand tegen vermoeiing door betongerelateerd falen (Gelineariseerde functie, Beoordelingsmethode C): NPD

**Karakteristieke weerstand onder seismische belasting (seismische prestatiecategorie C1)**

- 28) Weerstand tegen staalfalen onder seismische trekbelasting (seismische prestatiecategorie C1): Bijlagen C12, C14
- 29) Weerstand tegen staalfalen onder seismische afschuifbelasting voor afschuifkracht in dwarsrichting (seismische prestatiecategorie C1): Bijlagen C13, C14
- 30) Weerstand tegen staalfalen onder seismische afschuifbelasting voor afschuifkracht in de lengterichting van het kanaal (seismische prestatiecategorie C1): Bijlage C13

**Karakteristieke weerstand onder statische en quasi-statische trek- en/of afschuifbelasting**

31) Verplaatsingen: Bijlages C5, C9

**Veiligheid in geval van brand (BWR 2)**

32) Reactie op brand: Klasse (A1)

33) Weerstand tegen vuur: Bijlages C15, C16

**Duurzaamheid:**

34) Duurzaamheid: Bijlages A7, B1

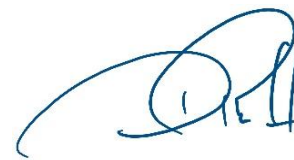
8. Geëigende technische documentatie en/of specifieke technische documentatie: --

De prestaties van het hierboven omschreven product zijn conform de aangegeven prestaties. Deze prestatieverklaring wordt in overeenstemming met Verordening (EU) nr. 305/2011 onder de exclusieve verantwoordelijkheid van de hierboven vermelde fabrikant verstrekt.

Ondertekend voor en namens de fabrikant door:



Dr. Ronald Mihala, Algemeen directeur Onderzoek en Ontwikkeling  
Tumlingen, 2025-06-02



Dieter Pfaff, Hoofd van de Internationale Productiefederatie en Kwaliteitsbeheer

Deze DoP is opgesteld in meerdere talen. In het geval van geschillen over de interpretatie zal de Engelse tekst altijd prevaleren.

Het aanhangsel bevat vrijwillige en aanvullende informatie in het Engels die de (taal-neutraal gespecificeerde) wettelijke vereisten overschrijdt.

Vertaal assistent van de essentiële kenmerken en eigenschappen voor bijlagen

|                                                                                                     |                                                                                                                                                                                                                                                                                                                                                  |                                                                    |
|-----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| Mechanical resistance and stability (BWR 1)                                                         |                                                                                                                                                                                                                                                                                                                                                  |                                                                    |
| Mechanische weerstand en stabiliteit (BWR 1)                                                        |                                                                                                                                                                                                                                                                                                                                                  |                                                                    |
| Characteristic resistance to tension load (static and quasi-static loading):                        |                                                                                                                                                                                                                                                                                                                                                  |                                                                    |
| Kenmerkende weerstand tegen spanningsbelasting (statische en quasi-statische belasting):            |                                                                                                                                                                                                                                                                                                                                                  |                                                                    |
| 1                                                                                                   | Resistance to steel failure of anchors:<br>Weerstand tegen staalbreuk van ankers:                                                                                                                                                                                                                                                                | $N_{Rk,s,a}$                                                       |
| 2                                                                                                   | Resistance to steel failure of the connection between anchors and channel:<br>Weerstand tegen staalbreuk van de verbinding tussen ankers en goot:                                                                                                                                                                                                | $N_{Rk,s,c}$                                                       |
| 3                                                                                                   | Resistance to steel failure of channel lips and sunsequently pullout of channel bolt:<br>Weerstand tegen staalbreuk van de gootlippen en vervolgens uittrekken van de gootbout:                                                                                                                                                                  | $N_{Rk,s,l}^0 ; S_{l,N}$                                           |
| 4                                                                                                   | Resistance to steel failure of channel bolt:<br>Weerstand tegen staalbreuk van kanaalbout:                                                                                                                                                                                                                                                       | $N_{Rk,s}$                                                         |
| 5                                                                                                   | Resistance to steel failure by exceeding the bending strength of the channel:<br>Weerstand tegen staalbreuk door overschrijding van de buigsterkte van het kanaal:                                                                                                                                                                               | $M_{Rk,s,flex} ; S_{max}$                                          |
| 6                                                                                                   | Maximum installation torque moment to avoid damage during installation:<br>Maximaal installatiemoment om schade tijdens de installatie te voorkomen:                                                                                                                                                                                             | $T_{inst,g} ; (T_{inst,s})$                                        |
| 7                                                                                                   | Resistance to pull-out failure of the anchor:<br>Weerstand tegen uittrekken:                                                                                                                                                                                                                                                                     | $N_{Rk,p}$                                                         |
| 8                                                                                                   | Resistance to concrete cone failure:<br>Weerstand tegen betonnen kegelbreuk:                                                                                                                                                                                                                                                                     | $k_{cr,N} ; k_{ucr,N} ; h_{ef}$                                    |
| 9                                                                                                   | Minimum edge distance, spacing, member thickness to prevent concrete splitting during installation:<br>Minimale afstand tussen de randen, tussenruimte en dikte van de elementen om te voorkomen dat het beton splijt tijdens de installatie:                                                                                                    | $S_{min} ; c_{min} ; h_{min}$                                      |
| 10                                                                                                  | Characteristic edge distance and spacing to avoid splitting of concrete under load:<br>Randafstand om spleetbreuk onder belasting te voorkomen:                                                                                                                                                                                                  | $S_{cr,sp} ; c_{cr,sp}$                                            |
| 11                                                                                                  | Resistance to blowout failure- bearing area of head:<br>Weerstand tegen doorslaan - dragend gebied van de kop:                                                                                                                                                                                                                                   | $A_h$                                                              |
| Characteristic resistance to shear load (static and quasi-static loading):                          |                                                                                                                                                                                                                                                                                                                                                  |                                                                    |
| Kenmerkende weerstand tegen schuifbelasting (statische en quasi-statische belasting):               |                                                                                                                                                                                                                                                                                                                                                  |                                                                    |
| 12                                                                                                  | Resistance to steel failure of channel bolt under shear loading without lever arm:<br>Weerstand tegen staalbreuk van kanaalbout onder afschuifbelasting zonder hefboomarm:                                                                                                                                                                       | $V_{Rk,s}$                                                         |
| 13                                                                                                  | Resistance to steel failure by bending of the channel bolt under shear load with lever arm:<br>Weerstand tegen staalbreuk door buiging van de kanaalbout onder afschuifbelasting met hefboomarm:                                                                                                                                                 | $M_{Rk,s}^0$                                                       |
| 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):<br>Weerstand tegen staalbreuk van de gootlippen, staalbreuk van de verbinding tussen het anker en de goot of staalbreuk van het anker (afschuifbelasting in dwarsrichting): | $V_{Rk,s,l,y}^0 ; S_{l,v} ; V_{Rk,s,c,y} ; V_{Rk,s,a,y}$           |
| 15                                                                                                  | Resistance to steel failure of connection between channel lips and channel bolt (shear load in longitudinal channel axis):<br>Weerstand tegen staalbreuk van de verbinding tussen kanaallippen en kanaalbout (afschuifbelasting in de lengterichting van het kanaal):                                                                            | $V_{Rk,s,l,x}$                                                     |
| 16                                                                                                  | Factor for sensistivity to installation:<br>Factor voor installatiegevoeligheid (Longitudinale afschuiving):                                                                                                                                                                                                                                     | $\gamma_{inst}$                                                    |
| 17                                                                                                  | Resistance to steel failure of the anchor:<br>Weerstand tegen staalbreuk van het anker (Longitudinale afschuiving):                                                                                                                                                                                                                              | $V_{Rk,s,a,x}$                                                     |
| 18                                                                                                  | Resistance to steel failure of connection between anchor and channel (shear load in longitudinal channel axis):<br>Weerstand tegen staalbreuk van de verbinding tussen anker en kanaal (afschuifbelasting in de lengterichting van het kanaal):                                                                                                  | $V_{Rk,s,c,x}$                                                     |
| 19                                                                                                  | Resistance to concrete pry-out failure:<br>Weerstand tegen uitbreken (pryout):                                                                                                                                                                                                                                                                   | $k_g$                                                              |
| 20                                                                                                  | Resistance to concrete edge failure:<br>Weerstand tegen bezwijken van betonranden:                                                                                                                                                                                                                                                               | $k_{cr,v} ; k_{ucr,v}$                                             |
| Characteristic resistance under combined static and quasi-static tension and shear loading          |                                                                                                                                                                                                                                                                                                                                                  |                                                                    |
| Karakteristieke weerstand onder gecombineerde statische en quasi-statische trek- en schuifbelasting |                                                                                                                                                                                                                                                                                                                                                  |                                                                    |
| 21                                                                                                  | Resistance to steel failure of the anchor channel:<br>Weerstand tegen staalbreuk van het ankerkanaal:                                                                                                                                                                                                                                            | $k_{13}, k_{14}$                                                   |
| Characteristic resistance under fatigue tension loading:                                            |                                                                                                                                                                                                                                                                                                                                                  |                                                                    |
| Karakteristieke weerstand onder vermoeiings trekbelasting:                                          |                                                                                                                                                                                                                                                                                                                                                  |                                                                    |
| 22                                                                                                  | Fatigue resistance to steel failure of the whole system (continuous or tri-linear function):<br>Vermoeiingsweerstand tegen staalbreuk van het hele systeem (continue of tri-lineaire functie,Beoordelingsmethode A1, A2):                                                                                                                        | $\Delta N_{Rk,s,0,n}$<br>(n=1 to n=∞)                              |
| 23                                                                                                  | Fatigue limit resistance to steel failure of the whole system:<br>Vermoeiingsgrens weerstand tegen staalbreuk van het hele systeem (Beoordelingsmethode B):                                                                                                                                                                                      | $\Delta N_{Rk,s,0,\infty}$                                         |
| 24                                                                                                  | Fatigue resistance to steel failure of the whole system (linearized function,assessment method C):<br>Vermoeiingsweerstand tegen staalbreuk van het hele systeem (Gelineariseerde functie,Beoordelingsmethode C):                                                                                                                                | $\Delta N_{Rk,s,l0,n} ; N_{lok,s,n}$<br>(n=10 <sup>4</sup> to n=∞) |
| 25                                                                                                  | Fatigue resistance to concrete related failure (exponential function):<br>Weerstand tegen vermoeiing door betongerelateerd falen (exponentiële functie, Beoordelingsmethode A1, A2):                                                                                                                                                             | $\Delta N_{Rk,c,0,n} ; \Delta N_{Rk,p,0,n}$<br>(n=1 to n=∞)        |
| 26                                                                                                  | Fatigue limit resistance to concrete related failure:<br>Vermoeiingsgrens weerstand tegen betongerelateerd falen (Beoordelingsmethode B):                                                                                                                                                                                                        | $\Delta N_{Rk,c,0,\infty} ; \Delta N_{Rk,p,0,\infty}$              |
| 27                                                                                                  | Fatigue resistance to concrete related failure (linearized function, assessment method C):<br>Weerstand tegen vermoeiing door betongerelateerd falen (Gelineariseerde functie, Beoordelingsmethode C):                                                                                                                                           | $\Delta N_{Rk,c,E,n} ; N_{Rk,p,E,n}$<br>(n=10 <sup>4</sup> to n=∞) |

|                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                         |                                                                                                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| Characteristic resistance under seismic loading (seismic performance category C1)<br>Karakteristieke weerstand onder seismische belasting (seismische prestatiecategorie C1)          |                                                                                                                                                                                                                                                                                                         |                                                                                                               |
| 28                                                                                                                                                                                    | Resistance to steel failure under seismic tension loading (seismic performance category C1):<br><br>Weerstand tegen staalfalen onder seismische trekbelasting (seismische prestatiecategorie C1):                                                                                                       | $N_{Rk,s,a,eq}; N_{Rk,s,c,eq};$<br>$N^0_{Rk,s,l,eq}; N_{Rk,s,eq};$<br>$M_{Rk,s,flex,eq}$                      |
| 29                                                                                                                                                                                    | Resistance to steel failure under seismic shear loading for shear load in transverse direction (seismic performance category C1):<br><br>Weerstand tegen staalfalen onder seismische afschuifbelasting voor afschuifkracht in dwarsrichting (seismische prestatiecategorie C1):                         | $V_{Rk,s,eq}; V^0_{Rk,s,l,y,eq};$<br>$V_{Rk,s,c,y,eq}; V_{Rk,s,a,y,eq}$                                       |
| 30                                                                                                                                                                                    | Resistance to steel failure under seismic shear loading for shear load in longitudinal channel axis (seismic performance category C1):<br><br>Weerstand tegen staalfalen onder seismische afschuifbelasting voor afschuifkracht in de lengterichting van het kanaal (seismische prestatiecategorie C1): | $V_{Rk,s,l,x,eq}; V_{Rk,s,a,x,eq};$<br>$V_{Rk,s,c,x,eq}$                                                      |
| Characteristic resistance under static and quasi-static tension and / or shear loading:<br>Karakteristieke weerstand onder statische en quasi-statische trek- en/of afschuifbelasting |                                                                                                                                                                                                                                                                                                         |                                                                                                               |
| 31                                                                                                                                                                                    | Displacements:<br>Verplaatsingen:                                                                                                                                                                                                                                                                       | $\delta_{N0}; \delta_{N\infty}; \delta_{V,y,0}; \delta_{V,y,\infty}$<br>$\delta_{V,x,0}; \delta_{V,x,\infty}$ |
| Safety in case of fire (BWR 2)<br>Veiligheid in geval van brand (BWR 2)                                                                                                               |                                                                                                                                                                                                                                                                                                         |                                                                                                               |
| 32                                                                                                                                                                                    | Reaction to fire:<br>Reactie op brand:                                                                                                                                                                                                                                                                  | Class                                                                                                         |
| 33                                                                                                                                                                                    | Resistance to fire:<br>Weerstand tegen vuur:                                                                                                                                                                                                                                                            | $N_{Rk,s,fi}; V_{Rk,y,s,fi}; c_{min,fi};$<br>$s_{min,fi}$                                                     |
| Durability:<br>Duurzaamheid:                                                                                                                                                          |                                                                                                                                                                                                                                                                                                         |                                                                                                               |
| 34                                                                                                                                                                                    | Durability:<br>Duurzaamheid:                                                                                                                                                                                                                                                                            | 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<br>$M_{Rk,s,flex}$ 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<br>$k_{cr,N}$ ; $k_{ucr,N}$ see Annex C3 and C4 |
| - Minimum edge distances, spacing and member thickness to avoid concrete splitting during installation | $s_{min}$ see Annex A5<br>$c_{min}$ ; $h_{min}$ 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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Characteristic resistance under shear load (static and quasi-static loading)</p> <ul style="list-style-type: none"> <li>- Resistance to steel failure of channel bolt under shear loading without lever arm</li> <li>- Resistance to steel failure by bending of the channel bolt under shear load with lever arm</li> <li>- 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)</li> <li>- Resistance to steel failure of connection between channel lips and channel bolt (longitudinal shear)</li> <li>- Factor for sensitivity to installation (longitudinal shear)</li> <li>- Resistance to steel failure of the anchor (longitudinal shear)</li> <li>- Resistance to steel failure of connection between anchor and channel (longitudinal shear)</li> <li>- Resistance to concrete pry-out failure</li> <li>- Resistance to concrete edge failure</li> </ul> | <p><math>V_{Rk,s}</math> see Annex C10</p> <p><math>M_{Rk,s}^0</math> see Annex C11</p> <p><math>V_{Rk,s,l,y}^0</math> ; <math>S_{l,V}</math> ; <math>V_{Rk,s,c,y}</math> ; <math>V_{Rk,s,a,y}</math> see Annex C6 and C7</p> <p><math>V_{Rk,s,l,x}</math> see Annex C8</p> <p><math>\gamma_{inst}</math> see Annex C8</p> <p><math>V_{Rk,s,a,x}</math> see Annex C6 and C7</p> <p><math>V_{Rk,s,c,x}</math> see Annex C6 and C7</p> <p><math>k_8</math> see Annex C8</p> <p><math>k_{cr,V}</math> ; <math>k_{ucr,V}</math> see Annex C8</p> |
| <p>Characteristic resistance under combined tension and shear load (static and quasi-static load)</p> <ul style="list-style-type: none"> <li>- Resistance to steel failure of the anchor channel</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <p><math>k_{13}</math> ; <math>k_{14}</math> see Annex C9</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <p>Characteristic resistance under fatigue tension loading</p> <ul style="list-style-type: none"> <li>- Fatigue resistance to steel failure of the whole system (continuous or tri-linear function, assessment method A1, A2)</li> <li>- Fatigue limit resistance to steel failure of the whole system (assessment method B)</li> <li>- Fatigue resistance to steel failure of the whole system (linearized function, assessment method C)</li> <li>- Fatigue resistance to concrete related failure (exponential function, assessment method A1, A2)</li> <li>- Fatigue limit resistance to concrete related failure (assessment method B)</li> <li>- Fatigue resistance to concrete related failure (linearized function, assessment method C)</li> </ul>                                                                                                                                                                                                                            | <p>No Performance assessed</p> <p>No Performance assessed</p> <p>No performance assessed</p> <p>No Performance assessed</p> <p>No Performance assessed</p> <p>No performance assessed</p>                                                                                                                                                                                                                                                                                                                                                    |

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

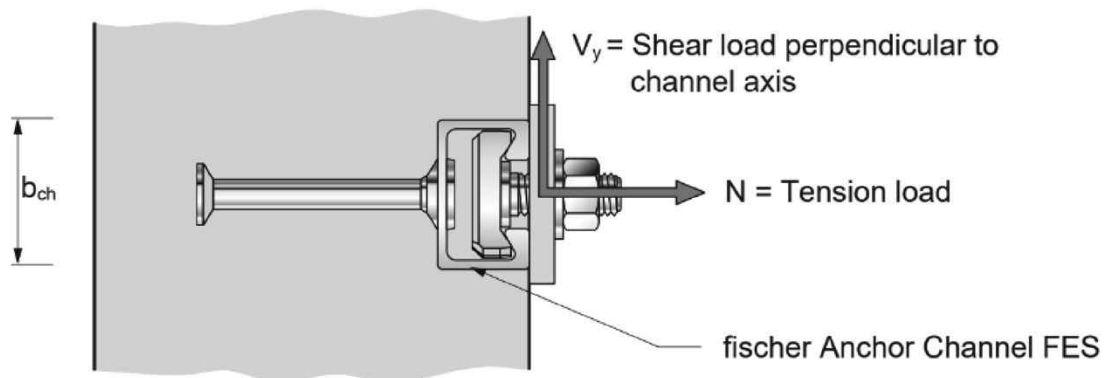
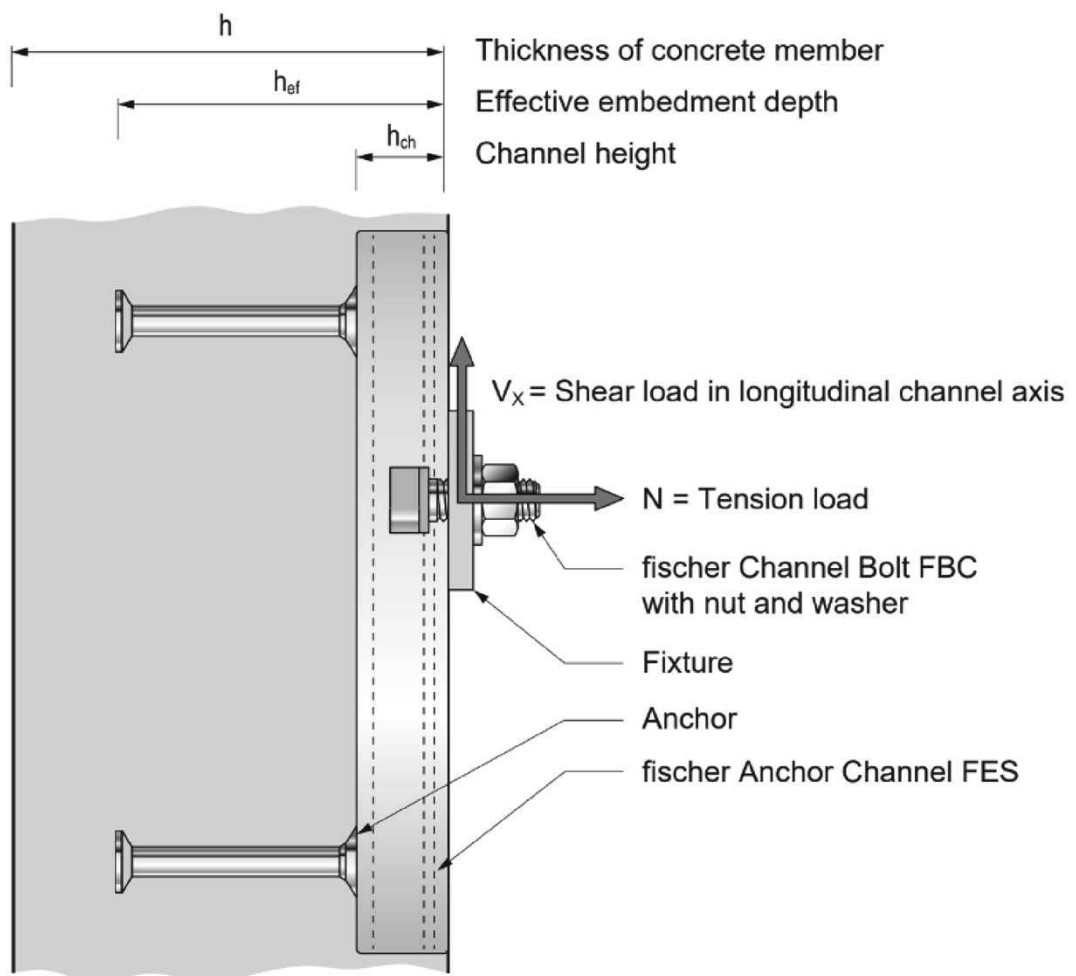
| Essential characteristic | Performance  |
|--------------------------|--------------|
| Durability               | See Annex B1 |

## 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





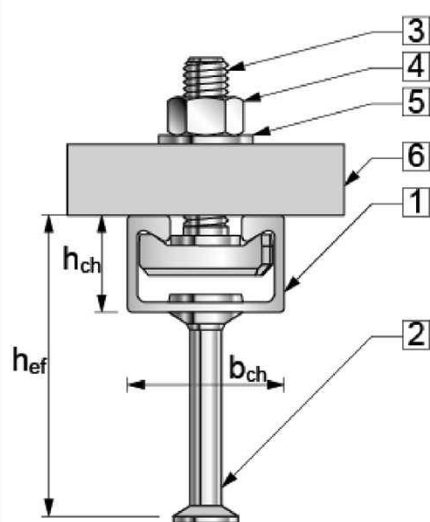
# fischer Anchor Channel FES with fischer Channel Bolts FBC

**Product Description**  
 Installed condition

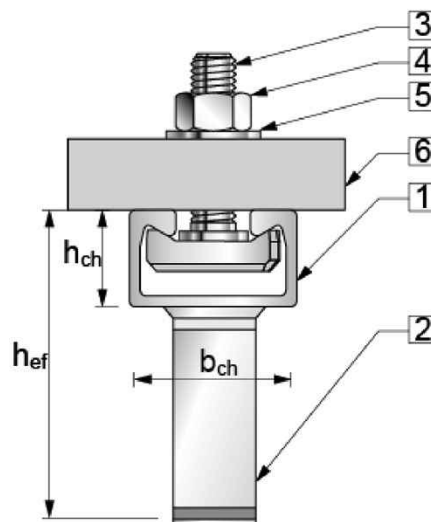
Annex A1

Appendix 4 / 34





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

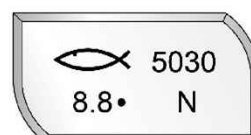
8.8 = Steel grade

A4-70 = Stainless steel

N = Notching channel bolt (if applicable)

• = Electroplated

No marking for hot-dip galvanised



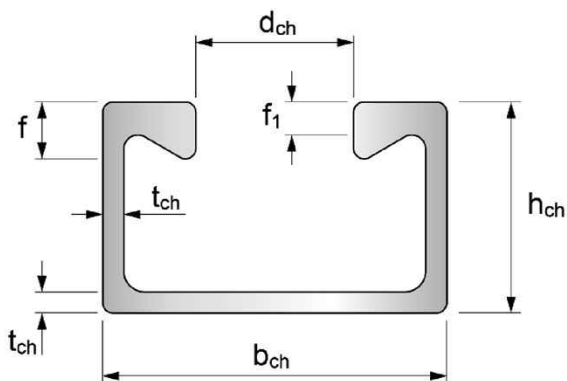
Additional marking of channel bolt (smooth, serrated,  
notching channel bolt head) according to Annex A6 at  
the top of thread.

## fischer Anchor Channel FES with fischer Channel Bolts FBC

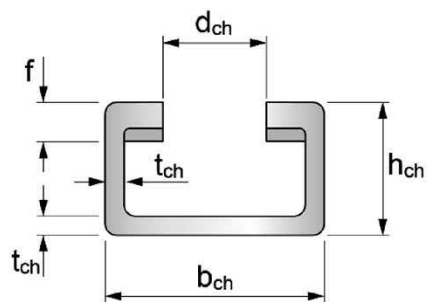
**Product Description**  
Marking and materials

Annex A2

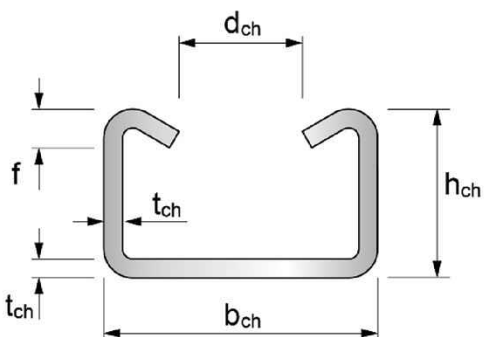
Appendix 5 / 34



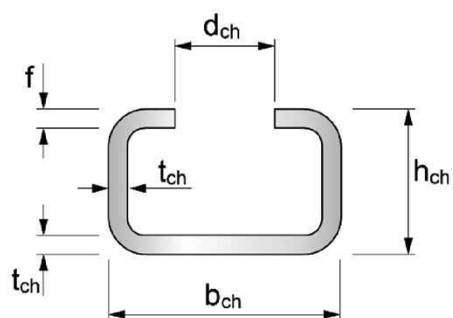
FES-H(I)-40/22(-P), -50/30(-P), -52/34



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)**

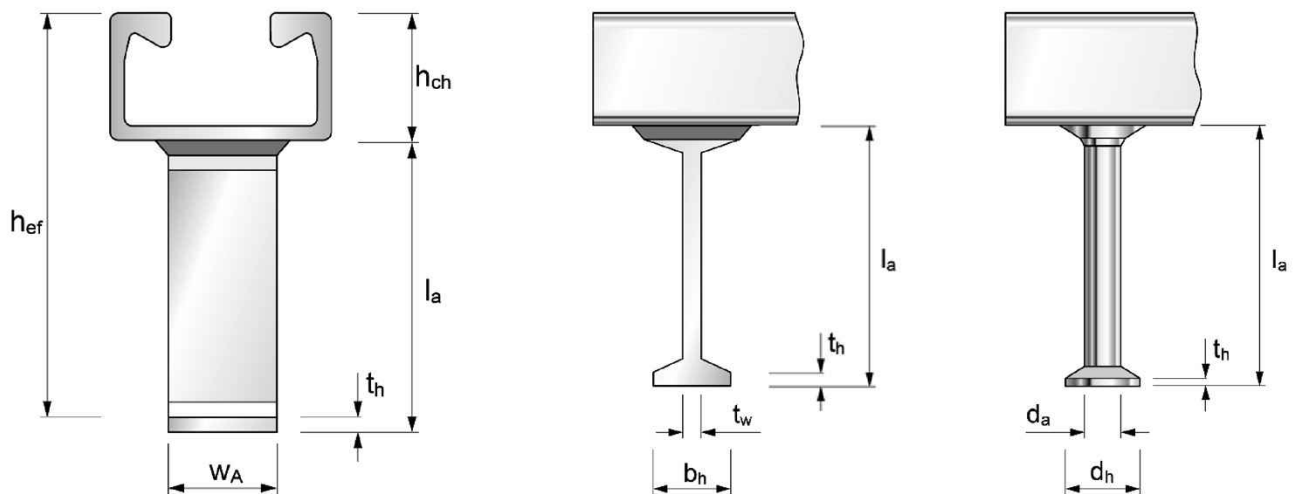
| Anchor<br>Channel FES- | Material                  | b <sub>ch</sub><br>[mm] | h <sub>ch</sub><br>[mm] | t <sub>ch</sub><br>[mm] | d <sub>ch</sub><br>[mm] | f<br>[mm] | f <sub>1</sub><br>[mm] | I <sub>y</sub><br>[mm <sup>4</sup> ] |
|------------------------|---------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-----------|------------------------|--------------------------------------|
| C-28/15                | Steel                     | 28,0                    | 15,5                    | 2,3                     | 12,0                    | 2,3       | - <sup>1)</sup>        | 4.280                                |
| C-38/17                | Steel                     | 38,0                    | 17,3                    | 3,0                     | 18,0                    | 3,0       | - <sup>1)</sup>        | 8.240                                |
| C-40/25                | Steel                     | 40,0                    | 25,0                    | 2,8                     | 18,0                    | 6,0       | - <sup>1)</sup>        | 20.340                               |
| C-49/30                | Steel                     | 50,0                    | 30,0                    | 3,3                     | 22,0                    | 7,0       | - <sup>1)</sup>        | 43.080                               |
| C-54/33                | Steel                     | 54,0                    | 33,0                    | 5,0                     | 22,0                    | 8,5       | - <sup>1)</sup>        | 74.090                               |
| H-S-29/20              | Steel                     | 30,0                    | 20,0                    | 3,0                     | 14,0                    | 5,2       | - <sup>1)</sup>        | 11.150                               |
| H-S-38/23              | Steel/<br>Stainless steel | 38,0                    | 23,0                    | 3,3                     | 18,0                    | 6,0       | - <sup>1)</sup>        | 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                               |

<sup>1)</sup> This dimension is not available for this product.

**fischer Anchor Channel FES with fischer Channel Bolts FBC**

**Product Description**  
Dimensions of channels

Annex A3  
Appendix 6 / 34



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

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

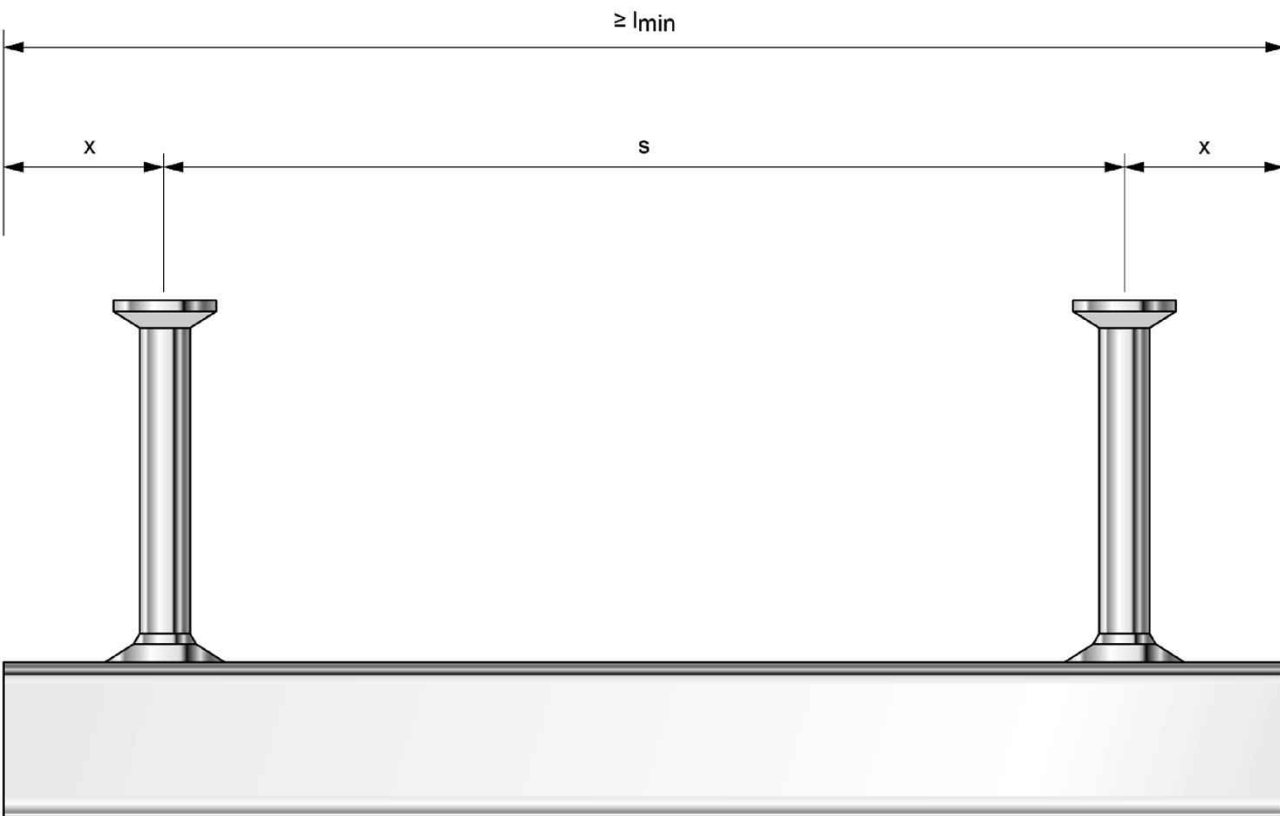
<sup>1)</sup> Alternative round anchor:  $d_a = 10$  mm,  $d_h = 20$  mm,  $t_h = 2,5$  mm,  $A_h = 236$  mm<sup>2</sup>,  $l_{a,min} = 59,5$  mm.

<sup>2)</sup> Product not available.

<sup>3)</sup> 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<br>[mm] | Smax<br>[mm] | Xmin<br>[mm] | Xmax<br>[mm] | lmin<br>[mm] | lmax<br>[mm] |     |
|----------------------|-------------|--------------|--------------|--------------|--------------|--------------|--------------|-----|
| C-28/15              | round       | 50           | 200          | 25           | 35           | 100          | 6.070        |     |
| C-38/17              |             |              | 250          |              |              | 150          |              |     |
| C-40/25              |             | 100          |              |              |              |              |              | 200 |
| 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<br>H-52/34 | round       |              |              |              |              |              |              |     |



**fischer Anchor Channel FES with fischer Channel Bolts FBC**

**Product Description**  
Anchor position and channel length

Annex A5  
Appendix 8 / 34

**Table A6.1: Steel grade and coating**

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

<sup>1)</sup> Material properties according to Annex A7.

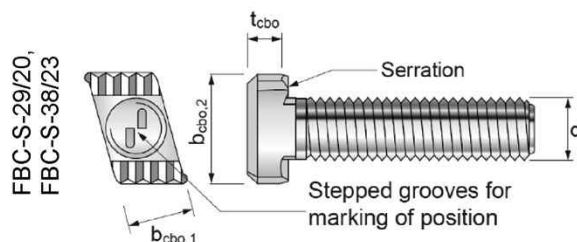
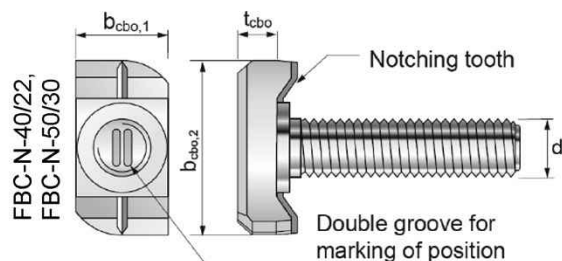
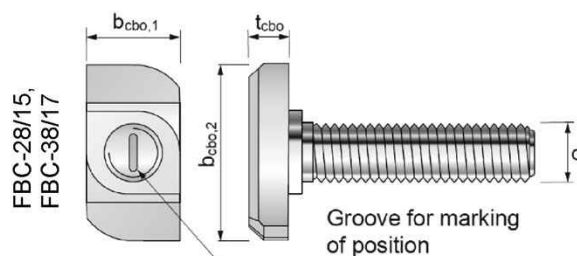
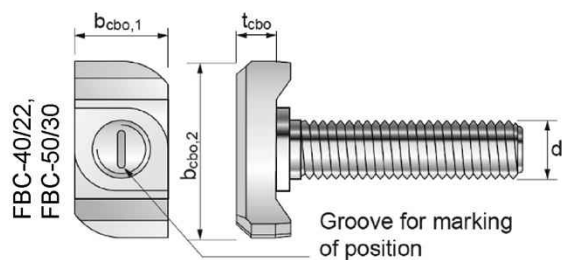
<sup>2)</sup> Material properties according to EN ISO 898-1:2013+AC:2013.

<sup>3)</sup> Electroplated.

<sup>4)</sup> Hot-dip galvanised.

**Table A6.2: Dimensions of fischer Channel Bolts FBC**

| Anchor<br>Channel FES-                           | Channel<br>Bolt FBC- | Steel grade | Dimensions |                         |                         |                       |
|--------------------------------------------------|----------------------|-------------|------------|-------------------------|-------------------------|-----------------------|
|                                                  |                      |             | d [mm]     | b <sub>cbo,1</sub> [mm] | b <sub>cbo,2</sub> [mm] | t <sub>cbo</sub> [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)<br>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<br>H(-I)-50/30<br>C-54/33<br>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)<br>H(-I)-52/34                   |                      |             | 20         | 21,0                    |                         | 12,0                  |



### fischer Anchor Channel FES with fischer Channel Bolts FBC

**Product Description**  
Channel bolts

Annex A6

Appendix 9 / 34

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

<sup>1)</sup> Not in the scope of delivery.

**fischer Anchor Channel FES with fischer Channel Bolts FBC**

**Product Description**  
Materials

Annex A7  
Appendix 10 / 34

## 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  
Appendix 11 / 34

**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

Appendix 12 / 34



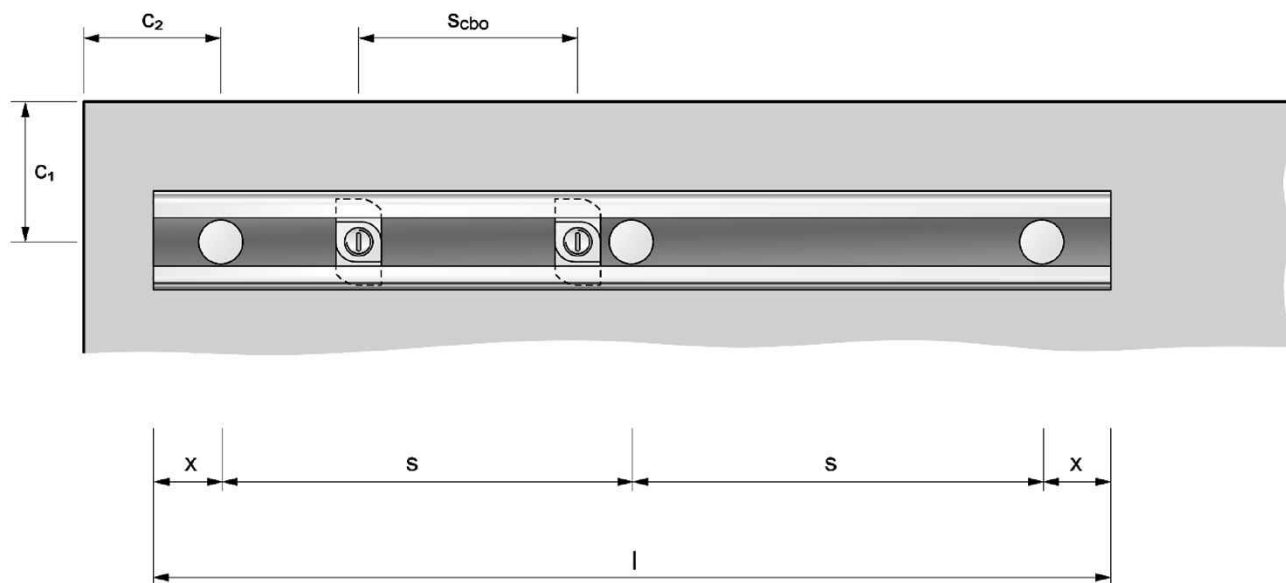
**Table B3.1: Installation parameters**

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

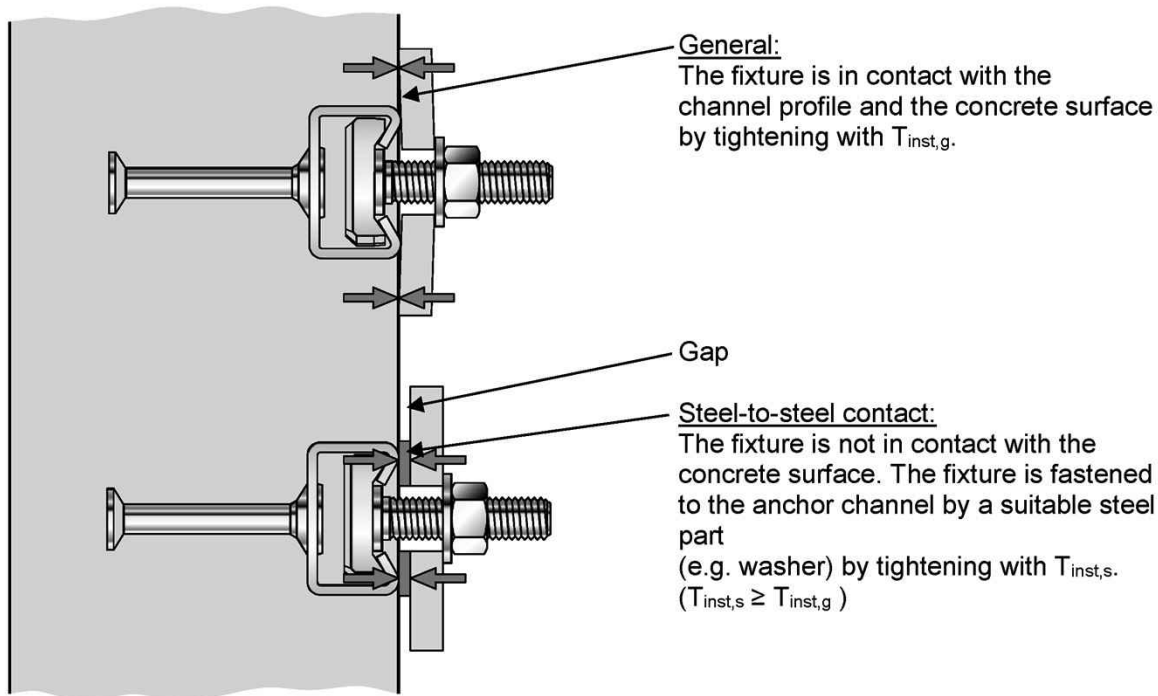
Appendix 13 / 34

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

| fischer<br>Anchor channel<br>FES- | fischer<br>Channel Bolt<br>FBC | Thread<br>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)<br>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),<br>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**

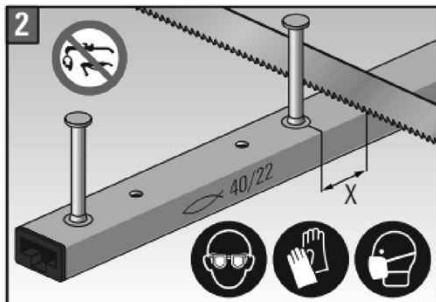
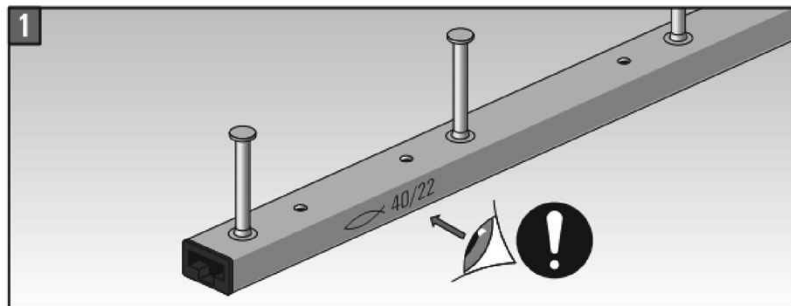
**Intended Use**

Installation parameters for fischer Channel Bolts FBC

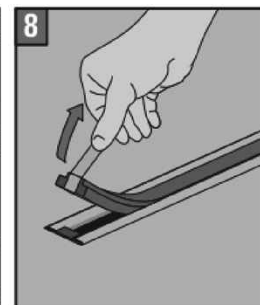
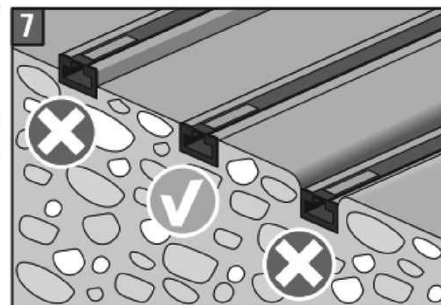
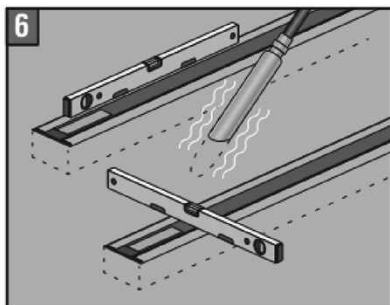
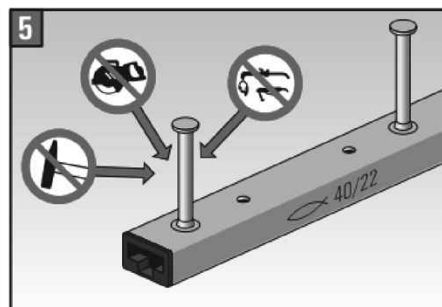
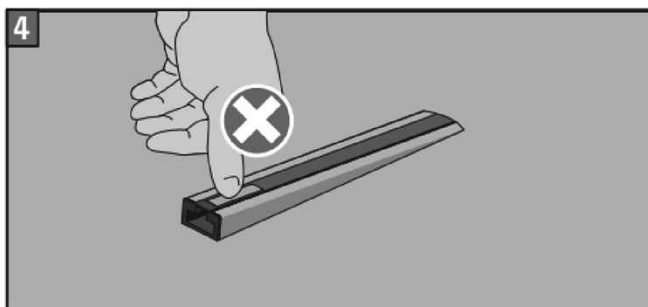
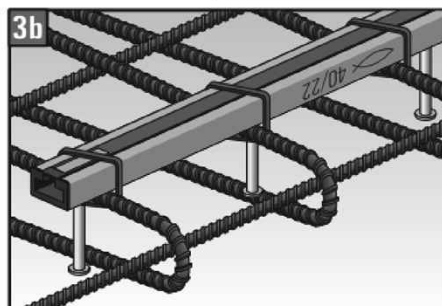
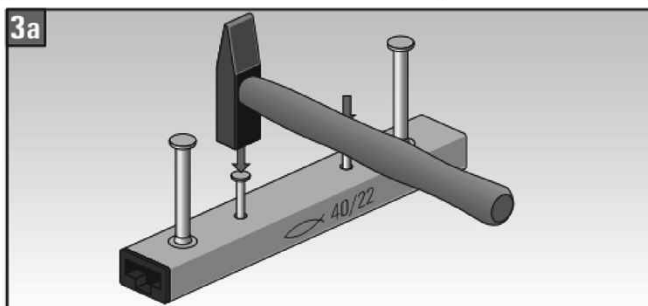
Annex B4

Appendix 14 / 34

# 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         |        |

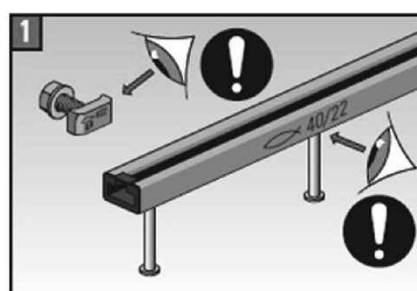


fischer Anchor Channel FES with fischer Channel Bolts FBC

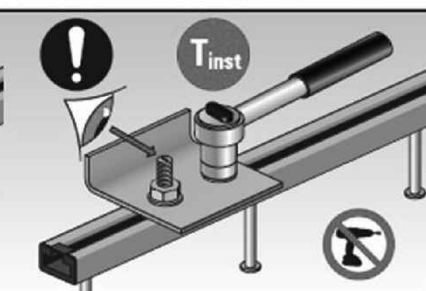
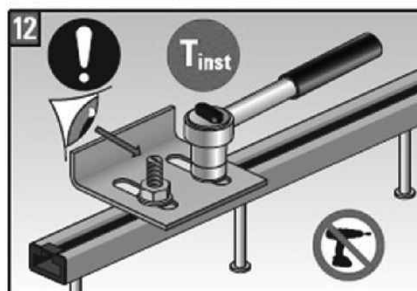
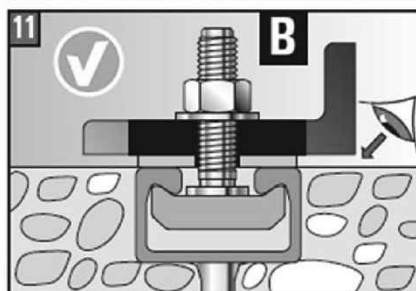
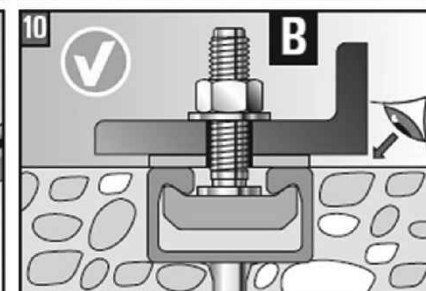
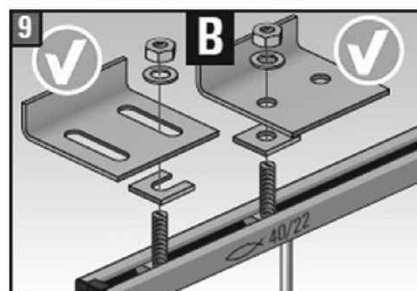
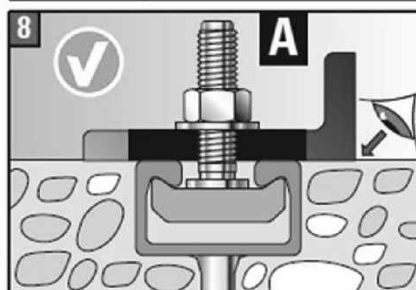
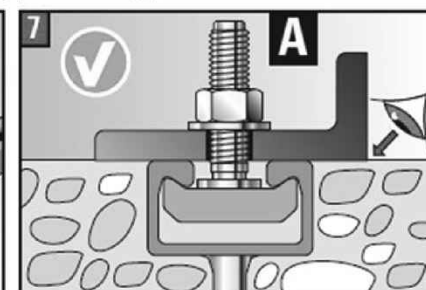
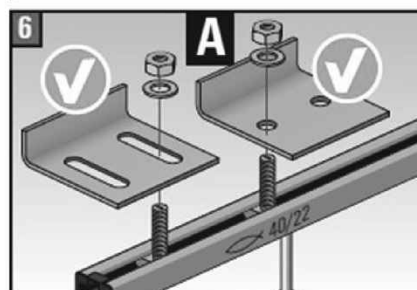
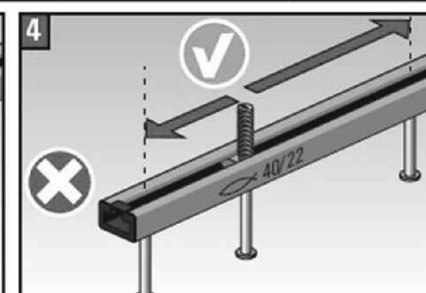
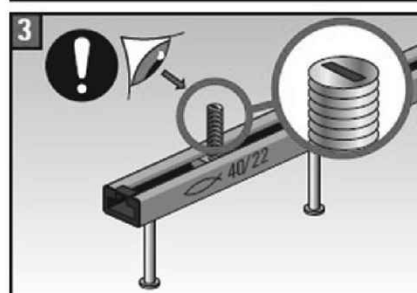
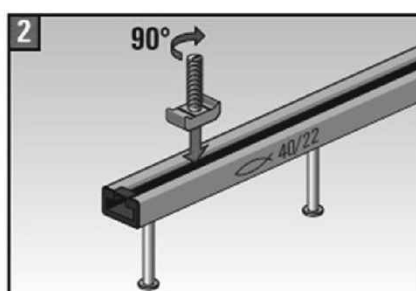
**Intended Use**  
Installation instruction for fischer Anchor Channels FES

Annex B5  
Appendix 15 / 34

# 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 <sub>inst</sub> [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 <sup>1)</sup> | A                      | -  | 15  | 24  | 32  | -   |
|                    | B                      | -  | 30  | 45  | 100 | -   |
| 5030 <sup>2)</sup> | A                      | -  | 15  | 25  | 60  | 75  |
|                    | B                      | -  | 30  | 45  | 100 | 230 |

<sup>1)</sup>T<sub>inst</sub> must not be exceeded.

<sup>2)</sup>applies to all materials (8.8 and A4-70).

## fischer Ankerschiene FES mit fischer Spezialschrauben FBC

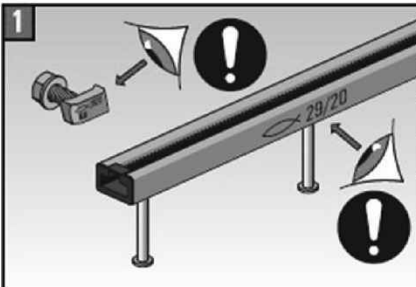
### Verwendungszweck

Montageanleitung für fischer Zahnschrauben FBC-S

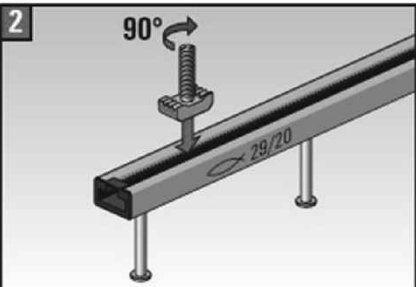
Anhang B7

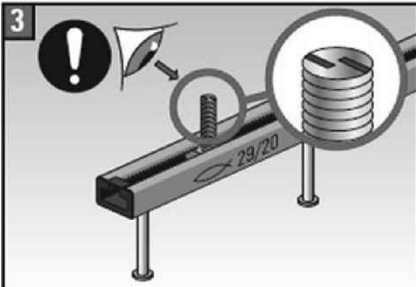
Appendix 16 / 34

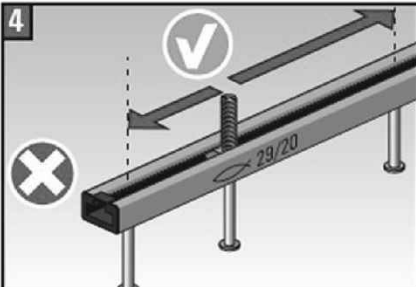
# Serrated channel bolt FBC-S



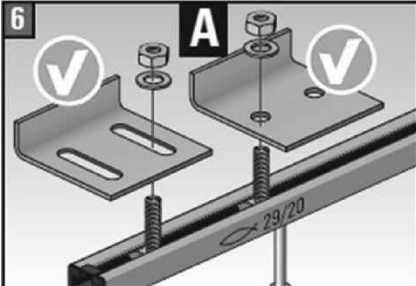
|      | FBC-S | FES-H-S | FES-C |
|------|-------|---------|-------|
| 2920 | 29/20 | 29/20   | -     |
| 3823 | 38/23 | 38/23   | 38/17 |

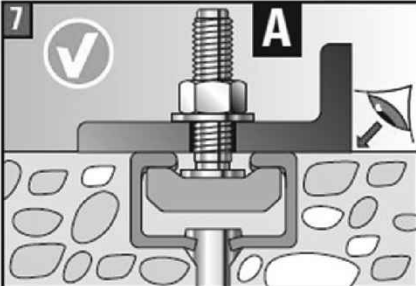


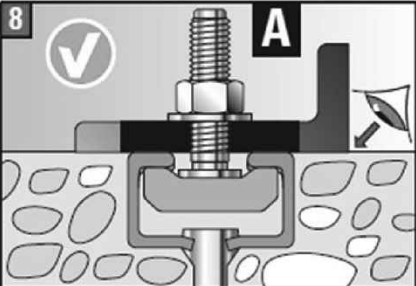


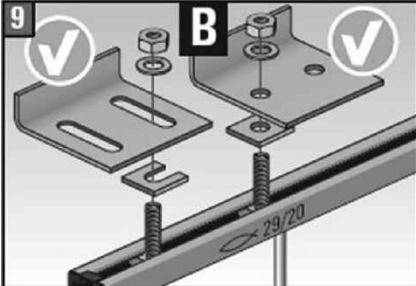


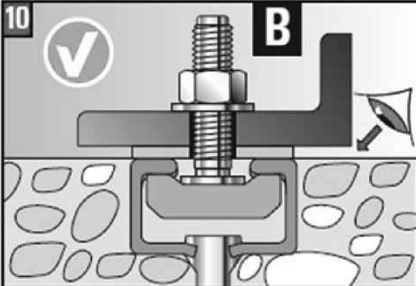


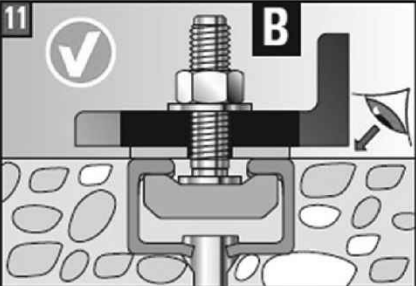


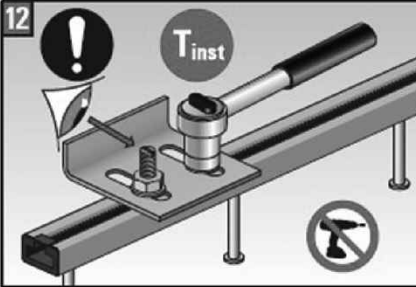


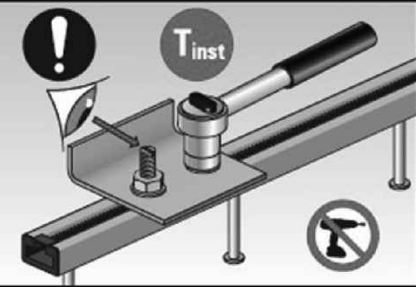












| FBC-S              | FES      | T <sub>inst</sub> <sup>1)</sup> [Nm] | M12 | M16 |
|--------------------|----------|--------------------------------------|-----|-----|
| 2920               | HS-29/20 | A                                    | 80  | -   |
|                    |          | B                                    | 80  | -   |
| 3823 <sup>2)</sup> | HS-38/23 | A                                    | 80  | 100 |
|                    |          | B                                    | 80  | 100 |
|                    | C-38/17  | A                                    | 40  | 50  |
|                    |          | B                                    | 80  | 100 |

<sup>1)</sup>T<sub>inst</sub> must not be exceeded.

<sup>2)</sup> 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

Appendix 17 / 34

# Notching channel bolt FBC-N

**1**

|            |                |
|------------|----------------|
|            |                |
| FBC-N-4022 | 40/22          |
| FBC-N-5030 | 50/30<br>52/34 |

**2**

**3**

**4**

**5**

**6**

**7**

**8**

**12**

**12**

| FBC-N- | FES-           | T <sub>inst</sub> <sup>1</sup> [Nm] |     |     |
|--------|----------------|-------------------------------------|-----|-----|
|        |                | M12                                 | M16 | M20 |
| 4022   | H-(I)-4022-(P) | -                                   | 200 | -   |
| 5030   | H-(I)-5030-(P) | -                                   | 200 | 400 |
|        | H-(I)-52/34    | -                                   | 200 | 400 |

<sup>1)</sup>T<sub>inst</sub> 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

Appendix 18 / 34

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

<sup>1)</sup> 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 <sub>Rk,s,a</sub>              | [kN] | 9,0   | 20,0  | 20,0  | 31,0  | 55,0  |
| Partial factor                                                  | γ <sub>Ms</sub> <sup>1)</sup>    | [-]  | 1,8   |       |       |       |       |
| Steel failure: Connection between anchor and channel            |                                  |      |       |       |       |       |       |
| Characteristic resistance                                       | N <sub>Rk,s,c</sub>              | [kN] | 9,0   | 18,0  | 20,0  | 31,0  | 55,0  |
| Partial factor                                                  | γ <sub>Ms</sub> <sup>1)</sup>    | [-]  | 1,8   |       |       |       |       |
| Steel failure: Local flexure of channel lips                    |                                  |      |       |       |       |       |       |
| Characteristic spacing of channel bolts for N <sub>Rk,s,l</sub> | s <sub>l,N</sub>                 | [mm] | 56    | 76    | 80    | 100   | 108   |
| Characteristic resistance                                       | N <sup>0</sup> <sub>Rk,s,l</sub> | [kN] | 9,0   | 18,0  | 20,0  | 31,0  | 55,0  |
| Partial factor                                                  | γ <sub>Ms</sub> <sup>1)</sup>    | [-]  | 1,8   |       |       |       |       |

<sup>1)</sup> 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

Appendix 19 / 34

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

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

<sup>1)</sup> 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 |
|-----------------------------------------------|-------------------------|------|-------|-------|-------|-------|-------|
| <b>Steel failure: Flexure of channel</b>      |                         |      |       |       |       |       |       |
| 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  |       |       |       |       |

<sup>1)</sup> 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

Appendix 20 / 34



**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<br>40/22-P<br>I-40/22 | 50/30<br>50/30-P<br>I-50/30 | 52/34<br>I-52/34 |
|------------------------------------------------------------------------------------|-------------------------------------------------|--------------------|---------|---------|-----------------------------|-----------------------------|------------------|
| Concrete failure: Pull-out failure                                                 |                                                 |                    |         |         |                             |                             |                  |
| Characteristic resistance in cracked concrete C12/15                               | N <sub>Rk,p</sub>                               | [kN]               | 18,4    | 21,2    | 13,6<br>21,2<br>27,0        | 21,2<br>33,2<br>33,8        | 33,2<br>54,0     |
| Characteristic resistance in uncracked concrete C12/15                             |                                                 |                    | 25,7    | 29,7    | 19,0<br>29,7<br>37,8        | 29,7<br>46,5<br>47,3        | 46,5<br>75,6     |
| Increasing factor of N <sub>Rk,p</sub> = N <sub>Rk,p</sub> (C12/15)*ψ <sub>c</sub> | C16/20                                          | ψ <sub>c</sub> [-] | 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 <sub>Mp</sub> =γ <sub>Mc</sub> <sup>1)</sup>  | [-]                | 1,5     |         |                             |                             |                  |
| Concrete failure: Concrete cone failure                                            |                                                 |                    |         |         |                             |                             |                  |
| Product factor k <sub>1</sub>                                                      | k <sub>cr,N</sub>                               | [-]                | 7,8     | 8,1     | 8,0<br>8,0<br>7,9           | 8,1<br>8,2<br>8,1           | 8,7<br>8,7       |
|                                                                                    | k <sub>ucr,N</sub>                              | [-]                | 11,2    | 11,6    | 11,4<br>11,5<br>11,2        | 11,5<br>11,7<br>11,5        | 12,4<br>12,4     |
| Partial factor                                                                     | γ <sub>Mc</sub> <sup>1)</sup>                   | [-]                | 1,5     |         |                             |                             |                  |
| Concrete failure: Splitting                                                        |                                                 |                    |         |         |                             |                             |                  |
| Characteristic edge distance                                                       | C <sub>cr,sp</sub>                              | [mm]               | 231     | 291     | 270<br>273<br>237           | 282<br>318<br>282           | 465<br>465       |
| Characteristic spacing                                                             | S <sub>cr,sp</sub>                              | [mm]               | 462     | 582     | 540<br>546<br>474           | 564<br>636<br>564           | 930<br>930       |
| Partial factor                                                                     | γ <sub>Msp</sub> =γ <sub>Mc</sub> <sup>1)</sup> | [-]                | 1,5     |         |                             |                             |                  |

<sup>1)</sup> 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

Appendix 21 / 34

**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 <sub>Rk,p</sub>                               | [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 <sub>Rk,p</sub> = N <sub>Rk,p</sub> (C12/15)*ψ <sub>c</sub> | C16/20                                          | ψ <sub>c</sub> [-] | 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 <sub>Mp</sub> =γ <sub>Mc</sub> <sup>1)</sup>  | [-]                | 1,5   |       |       |       |       |
| Concrete failure: Concrete cone failure                                            |                                                 |                    |       |       |       |       |       |
| Product factor k <sub>1</sub>                                                      | k <sub>Cr,N</sub>                               | [-]                | 7,2   | 7,8   | 7,9   | 8,1   | 8,7   |
|                                                                                    | k <sub>ucr,N</sub>                              | [-]                | 10,3  | 11,2  | 11,2  | 11,5  | 12,4  |
| Partial factor                                                                     | γ <sub>Mc</sub> <sup>1)</sup>                   | [-]                | 1,5   |       |       |       |       |
| Concrete failure: Splitting failure                                                |                                                 |                    |       |       |       |       |       |
| Characteristic edge distance                                                       | C <sub>cr,sp</sub>                              | [mm]               | 135   | 228   | 237   | 282   | 465   |
| Characteristic spacing                                                             | S <sub>cr,sp</sub>                              | [mm]               | 270   | 456   | 474   | 564   | 930   |
| Partial factor                                                                     | γ <sub>Msp</sub> =γ <sub>Mc</sub> <sup>1)</sup> | [-]                | 1,5   |       |       |       |       |

<sup>1)</sup> 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

Appendix 22 / 34

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

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

<sup>1)</sup> 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 <sup>1)</sup> | $\delta_{N0}$      | [mm] | 0,7   | 1,3   | 1,5   | 1,4   | 1,2   |
| Long-term displacement <sup>1)</sup>  | $\delta_{N\infty}$ | [mm] | 1,4   | 2,6   | 3,0   | 2,8   | 2,4   |

<sup>1)</sup> 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

Appendix 23 / 34

**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<br>S-38/23-A4 | 40/22<br>40/22-P<br>I-40/22 | 50/30<br>50/30-P<br>I-50/30 | 52/34<br>I-52/34 |
|----------------------------------------------------------|--------------------|------|---------|-----------------------|-----------------------------|-----------------------------|------------------|
| Steel failure: Anchor                                    |                    |      |         |                       |                             |                             |                  |
| Characteristic resistance                                | $V_{Rk,s,a,y}$     | [kN] | 25,0    | 30,3<br>40,0          | 40,0<br>50,8<br>40,0        | 60,0<br>87,9<br>60,0        | 100<br>100       |
|                                                          | $V_{Rk,s,a,x}$     | [kN] | 15,1    | 18,8<br>24,0          | 12,0<br>25,4<br>22,8        | 18,6<br>26,8<br>24,0        | 33,0<br>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<br>40,0          | 40,0<br>50,8<br>40,0        | 60,0<br>87,9<br>60,0        | 100<br>100       |
|                                                          | $V_{Rk,s,c,x}$     | [kN] | 15,0    | 18,2<br>24,0          | 12,0<br>25,2<br>22,8        | 18,6<br>26,4<br>24,0        | 33,0<br>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<br>80<br>80              | 100<br>100<br>100           | 108<br>108       |
| Characteristic resistance                                | $V^0_{Rk,s,l,y}$   | [kN] | 25,0    | 30,3<br>40,0          | 40,0<br>50,8<br>40,0        | 60,0<br>87,9<br>60,0        | 100<br>100       |
| Partial factor                                           | $\gamma_{Ms}^{1)}$ | [-]  | 1,8     |                       |                             |                             |                  |

<sup>1)</sup> 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

Appendix 24 / 34

**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                                           | $\gamma_{Ms}$ 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                                           | $\gamma_{Ms}$ 1) | [-]  | 1,8   |       |       |       |       |
| Steel failure: Local flexure of channel lips             |                  |      |       |       |       |       |       |
| Characteristic spacing of channel bolts for $V_{Rk,s,l}$ | $s_{l,V}$        | [mm] | 56    | 76    | 80    | 100   | 108   |
| Characteristic resistance                                | $V^0_{Rk,s,l,y}$ | [kN] | 9     | 18    | 20    | 31    | 55    |
| Partial factor                                           | $\gamma_{Ms}$ 1) | [-]  | 1,8   |       |       |       |       |

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

<sup>2)</sup> 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

Appendix 25 / 34

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

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

<sup>2)</sup> 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<br>40/22-P<br>I-40/22 | 50/30<br>50/30-P<br>I-50/30 | 52/34<br>I-52/34 |
|-----------------------------------------|-------------------------------|-----|---------|---------|-----------------------------|-----------------------------|------------------|
| Concrete failure: Pry-out failure       |                               |     |         |         |                             |                             |                  |
| Product factor                          | k <sub>8</sub>                | [-] | 2,0     | 2,0     | 2,0                         | 2,0                         | 2,0              |
| Partial factor                          | γ <sub>Mc</sub> <sup>1)</sup> | [-] | 1,5     |         |                             |                             |                  |
| Concrete failure: Concrete edge failure |                               |     |         |         |                             |                             |                  |
| Product factor k <sub>12</sub>          | k <sub>cr,V</sub>             | [-] | 7,5     | 7,5     | 7,5                         | 7,5                         | 7,5              |
|                                         | k <sub>ucr,V</sub>            | [-] | 10,5    | 10,5    | 10,5                        | 10,5                        | 10,5             |
| Partial factor                          | γ <sub>Mc</sub> <sup>1)</sup> | [-] | 1,5     |         |                             |                             |                  |

<sup>1)</sup> 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 <sub>8</sub>                | [-] | 1     | 2     | 2     | 2     | 2     |
| Partial factor                          | γ <sub>Mc</sub> <sup>1)</sup> | [-] | 1,5   |       |       |       |       |
| Concrete failure: Concrete edge failure |                               |     |       |       |       |       |       |
| Product factor k <sub>12</sub>          | k <sub>Cr,V</sub>             | [-] | 5,8   | 7,5   | 7,5   | 7,5   | 7,5   |
|                                         | k <sub>uCr,V</sub>            | [-] | 8,1   | 10,5  | 10,5  | 10,5  | 10,5  |
| Partial factor                          | γ <sub>Mc</sub> <sup>1)</sup> | [-] | 1,5   |       |       |       |       |

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

**fischer Anchor Channel FES with fischer Channel Bolts FBC**

**Performance**  
Characteristic resistance under shear load

Annex C8  
Appendix 26 / 34

**Table C9.1: Displacements under shear load**

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

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

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

<sup>3)</sup> No performance assessed.

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

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

<sup>6)</sup> 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<br>H-40/22<br>H-40/22-P<br>H-I-40/22 | C-49/30<br>H-50/30<br>H-50/30-P<br>H-I-50/30 | C-54/33<br>H-52/34<br>H-I-52/34 |
|---------------------------------------------------------------------|-----------------|-----|--------------------------------------|---------|-----------|-----------|----------------------------------------------|----------------------------------------------|---------------------------------|
| Steel failure: Local flexure of channel lips and flexure of channel |                 |     |                                      |         |           |           |                                              |                                              |                                 |
| Product factor                                                      | k <sub>13</sub> | [-] | according to EN 1992-4:2018, 7.4.3.1 |         |           |           |                                              |                                              |                                 |
| Steel failure: Anchor and connection between anchor and channel     |                 |     |                                      |         |           |           |                                              |                                              |                                 |
| Product factor                                                      | k <sub>14</sub> | [-] | 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

Appendix 27 / 34

**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 <sub>Rk,s</sub>             | [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 <sub>Ms</sub> <sup>1)</sup> | [-]                           | 1,5               |      |      |       |       |      |       |
| Steel failure: Special screw A4-70    |             |                               |                               |                   |      |      |       |       |      |       |
| Characteristic tensile resistance     | FBC-S-38/23 | N <sub>Rk,s</sub>             | [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 <sub>Ms</sub> <sup>1)</sup> | [-]                           | 1,87              |      |      |       |       |      |       |
| Characteristic shear resistance 8.8   |             |                               |                               | V <sub>Rk,s</sub> | [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 <sub>Ms</sub> <sup>1)</sup> | [-]               | 1,25 |      |       |       |      |       |
| Partial factor (shear loads A4-70)    |             |                               | γ <sub>Ms</sub> <sup>1)</sup> | [-]               | 1,56 |      |       |       |      |       |

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

<sup>2)</sup> 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

Appendix 28 / 34



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

| Channel bolt <sup>2)</sup> thread diameter |                                |      |               |              | M8              | M10             | M12             | M16             | M20             |
|--------------------------------------------|--------------------------------|------|---------------|--------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Steel failure                              |                                |      |               |              |                 |                 |                 |                 |                 |
| Characteristic flexural resistance         | M <sup>0</sup> <sub>Rk,s</sub> | [Nm] | FBC-(S-) (N-) | 8.8          | 30,0            | 59,8            | 104,8           | 266,4           | 519,3           |
|                                            |                                |      |               | A4-70        | - <sup>3)</sup> | - <sup>3)</sup> | 91,7            | 233,1           | 454,4           |
| Partial factor                             | γ <sub>Ms</sub> <sup>1)</sup>  | [-]  | 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            | - <sup>3)</sup> | - <sup>3)</sup> |
|                                            |                                |      | FBC-38/17     | 8.8          | - <sup>3)</sup> | 22,7            | 24,0            | 26,0            | - <sup>3)</sup> |
|                                            |                                |      | FBC-S-29/20   | 8.8          | - <sup>3)</sup> | - <sup>3)</sup> | 20,0            | - <sup>3)</sup> | - <sup>3)</sup> |
|                                            |                                |      | FBC-S-38/23   | 8.8<br>A4-70 | - <sup>3)</sup> | - <sup>3)</sup> | 22,4            | 25,7            | - <sup>3)</sup> |
|                                            |                                |      | FBC-40/22     | 8.8          | - <sup>3)</sup> | 23,5            | 24,8            | 26,8            | - <sup>3)</sup> |
|                                            |                                |      | FBC-N-40/22   | 8.8          | - <sup>3)</sup> | - <sup>3)</sup> | - <sup>3)</sup> | 26,9            | - <sup>3)</sup> |
|                                            |                                |      | FBC-50/30     | 8.8          | - <sup>3)</sup> | 27,7            | 29,0            | 31,0            | 33,3            |
|                                            |                                |      | FBC-N-50/30   | 8.8          | - <sup>3)</sup> | - <sup>3)</sup> | - <sup>3)</sup> | 31,5            | 33,9            |
|                                            |                                |      | FBC-40/22     | A4-70        | - <sup>3)</sup> | - <sup>3)</sup> | 24,7            | 26,7            | - <sup>3)</sup> |
|                                            |                                |      | FBC-50/30     | A4-70        | - <sup>3)</sup> | - <sup>3)</sup> | 28,8            | 30,9            | 33,1            |

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

<sup>2)</sup> Materials according to Annex A7, Table A7.1.

<sup>3)</sup> No performance assessed.

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

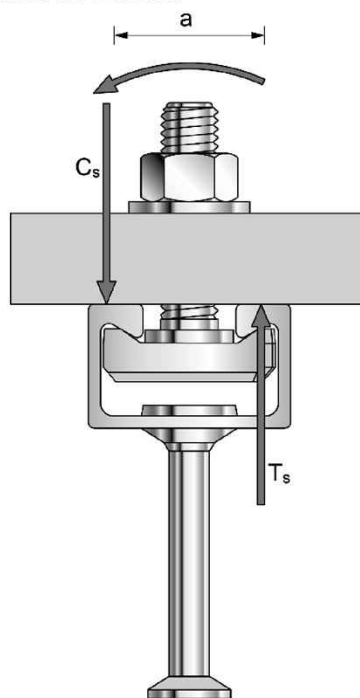
$$M^0_{RK,s} \leq 0,5 \cdot N^0_{RK,s,l} \cdot a \quad (N^0_{RK,s,l} \text{ according to Annex C1, Table C1.1 and Table C1.2})$$

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

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

Appendix 29 / 34

**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<br>M16      | 8.8         | G <sup>1)</sup><br>F <sup>2)</sup> |
| H-50/30<br>H-52/34  | N-50/30           | M20             |             |                                    |

<sup>1)</sup> Electroplated.

<sup>2)</sup> 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 <sub>Rk,s,a,eq</sub>              | [kN] | 31,0    | 31,0   | 31,0   |
| Partial factor                                       | γ <sub>Ms,eq</sub> <sup>1)</sup>    | [-]  | 1,8     |        |        |
| Steel failure: Connection between anchor and channel |                                     |      |         |        |        |
| Characteristic resistance                            | N <sub>Rk,s,c,eq</sub>              | [kN] | 30,3    | 31,0   | 31,0   |
| Partial factor                                       | γ <sub>Ms,eq</sub> <sup>1)</sup>    | [-]  | 1,8     |        |        |
| Steel failure: Local flexure of channel lips         |                                     |      |         |        |        |
| Characteristic resistance                            | N <sup>0</sup> <sub>Rk,s,l,eq</sub> | [kN] | 30,3    | 43,0   | 43,0   |
| Partial factor                                       | γ <sub>Ms,eq</sub> <sup>1)</sup>    | [-]  | 1,8     |        |        |

<sup>1)</sup> 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 |
|-----------------------------------------------|-------------------------------------|------|-----------|---------|---------|
| <b>Steel failure: Flexure of channel</b>      |                                     |      |           |         |         |
| Characteristic flexural resistance of channel | $M_{Rk,s,flex,eq}$                  | [Nm] | 1.240     | 2.185   | 2.185   |
| Partial factor                                | $\gamma_{Ms,flex,eq}$ <sup>1)</sup> | [-]  | 1,15      |         |         |

<sup>1)</sup> 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)

Annex C12

Appendix 30 / 34

**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       |         |         |

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

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

<sup>2)</sup> 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

Appendix 31 / 34

**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             |
|--------------------------------------------|-------------|-----------------------------|------|-----------------|-----------------|-----------------|
| <b>Steel failure: Special screw</b>        |             |                             |      |                 |                 |                 |
| Characteristic tensile resistance          | FBC-S-38/23 | $N_{Rk,s,eq}$               | [kN] | 67,4            | 67,4            | – <sup>2)</sup> |
|                                            | FBC-N-50/30 |                             |      | – <sup>2)</sup> | – <sup>2)</sup> | 134,0           |
| Partial factor                             |             | $\gamma_{Ms}$ <sup>1)</sup> | [-]  | 1,5             |                 |                 |
| <b>Characteristic shear resistance 8.8</b> |             | $V_{Rk,s,eq}$               | [kN] | 33,7            | 33,7            | 98,0            |
| Partial factor (shear loads 8.8)           |             | $\gamma_{Ms}$ <sup>1)</sup> | [-]  | 1,25            |                 |                 |

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

<sup>2)</sup> 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

Appendix 32 / 34

**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 <sup>3)</sup> | FES-H-S-29/2        | FBC-S-29/20                  | R30<br>R60<br>R90<br>R120 | $N_{Rk,s,fi}$<br>=<br>$V_{Rk,s,y,fi}$ | [kN]                                                                                        | - 2)                     | - 2)                     | 2,5<br>2,4<br>1,7<br>1,4 | - 2)                     | - 2)                     |
|                                                             | FES-H-S-38/23       | FBC-S-38/23                  | R30<br>R60<br>R90<br>R120 |                                       |                                                                                             | - 2)                     | - 2)                     | 4,6<br>4,1<br>2,8<br>2,1 | 4,6<br>4,1<br>2,8<br>2,1 | - 2)                     |
|                                                             | FES-H(-I)-40/22(-P) | FBC-40/22                    | R30<br>R60<br>R90<br>R120 |                                       |                                                                                             | - 2)                     | 1,3<br>1,0<br>0,7<br>0,6 | 2,0<br>1,7<br>1,4<br>1,3 | 4,5<br>3,4<br>2,3<br>1,7 | - 2)                     |
|                                                             | FES-H(-I)-50/30(-P) | FBC(-N)-50/30                | R30<br>R60<br>R90<br>R120 |                                       |                                                                                             | - 2)                     | 1,3<br>1,0<br>0,7<br>0,6 | 2,0<br>1,7<br>1,4<br>1,3 | 5,2<br>4,2<br>3,2<br>2,7 | 5,2<br>4,2<br>3,2<br>2,7 |
|                                                             | FES-H(-I)-52/34     | FBC(-N)-50/30                | R30<br>R60<br>R90<br>R120 |                                       |                                                                                             | - 2)                     | 1,3<br>1,0<br>0,7<br>0,6 | 4,6<br>4,1<br>2,8<br>2,1 | 5,2<br>4,2<br>3,2<br>2,7 | 8,0<br>6,5<br>5,0<br>4,2 |
|                                                             | FES-C-28/15         | FBC-28/15                    | R30<br>R60<br>R90<br>R120 |                                       |                                                                                             | 0,6<br>0,6<br>0,5<br>0,4 | 1,3<br>1,0<br>0,7<br>0,6 | 1,3<br>1,0<br>0,7<br>0,6 | - 2)                     | - 2)                     |
|                                                             | FES-C-38/17         | FBC-38/17<br>FBC-S-38/23-M16 | R30<br>R60<br>R90<br>R120 |                                       |                                                                                             | - 2)                     | 1,3<br>1,0<br>0,7<br>0,6 | 1,3<br>1,0<br>0,7<br>0,6 | 3,5<br>2,8<br>1,8<br>1,3 | - 2)                     |
|                                                             | FES-C-40/25         | FBC-40/22                    | R30<br>R60<br>R90<br>R120 |                                       |                                                                                             | - 2)                     | 1,8<br>1,5<br>1,1<br>0,8 | 3,0<br>2,4<br>1,7<br>1,4 | 3,5<br>2,8<br>1,8<br>1,3 | - 2)                     |
|                                                             | FES-C-49/30         | FBC-50/30                    | R30<br>R60<br>R90<br>R120 |                                       |                                                                                             | - 2)                     | 1,3<br>1,0<br>0,7<br>0,6 | 2,9<br>2,4<br>1,8<br>1,6 | 3,1<br>2,5<br>1,9<br>1,6 | 3,1<br>2,5<br>1,9<br>1,6 |
|                                                             | FES-C-54/33         | FBC-50/30                    | R30<br>R60<br>R90<br>R120 |                                       |                                                                                             | - 2)                     | 1,3<br>1,0<br>0,7<br>0,6 | 2,9<br>2,4<br>1,8<br>1,6 | 3,1<br>2,5<br>1,9<br>1,6 | 3,1<br>2,5<br>1,9<br>1,6 |
| Partial factor                                              |                     |                              |                           | $\gamma_{Ms,fi}$ <sup>1)</sup>        | [-]                                                                                         | 1,0                      |                          |                          |                          |                          |

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

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

<sup>3)</sup> Values also valid for stainless steel A4-70.

**fischer Anchor Channel FES with fischer Channel Bolts FBC**

**Performance**

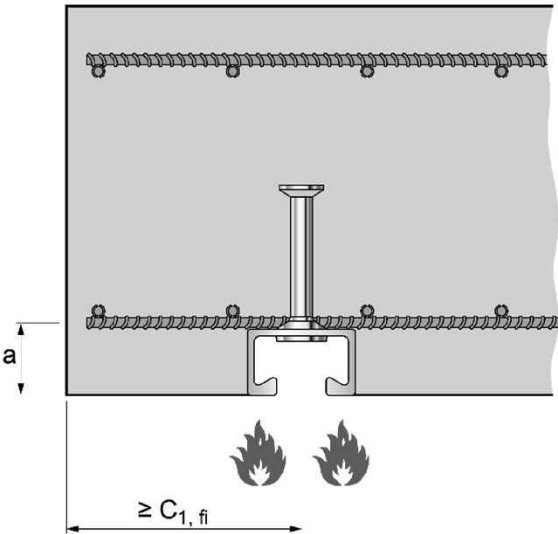
Characteristic resistance under fire exposure

Annex C15

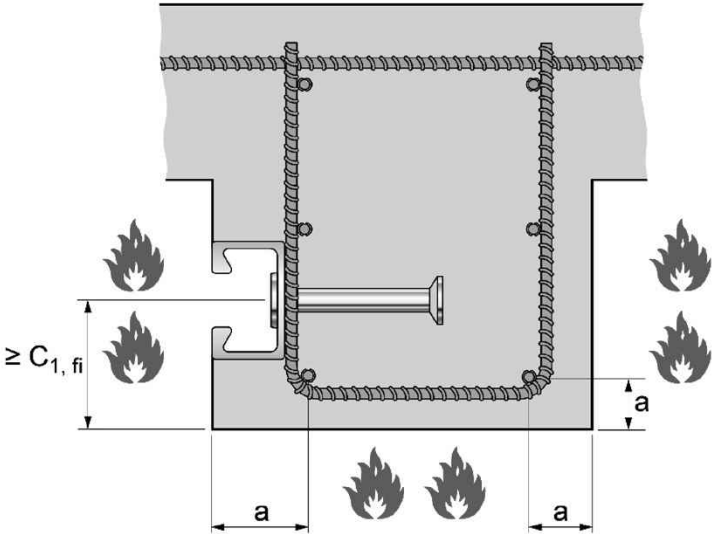
Appendix 33 / 34

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<br>H-40/22<br>H-40/22-P<br>H-I-40/22 | C-49/30<br>H50/30<br>H-50/30-P<br>H-I-50/30 | C-54/33<br>H-52/34<br>H-I-52/34 |
|--------------------------|------|-----------|---------|---------|-----------|-----------|----------------------------------------------|---------------------------------------------|---------------------------------|
| Minimum axis<br>distance | R30  | a<br>[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.

fischer Anchor Channel FES with fischer Channel Bolts FBC

**Performance**  
Characteristic resistance under fire exposure

Annex C16  
Appendix 34 / 34