Deutsches Institut für Bautechnik

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Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

European Technical Assessment

ETA-22/0035 of 1 December 2023

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	fischer Serrated Anchor Channel InnoLock FES-RS-S with fischer Serrated Channel Bolts FBC-S
Product family to which the construction product belongs	Anchor Channels
Manufacturer	fischerwerke GmbH & Co. KG Klaus-Fischer-Straße 1 72178 Waldachtal DEUTSCHLAND
Manufacturing plant	fischerwerke
This European Technical Assessment contains	27 pages including 3 annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	330008-04-0601, Edition 02/2023
This version replaces	ETA-22/0035 issued on 1 August 2022

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Specific Part

1 Technical description of the product

The fischer Serrated Anchor Channel InnoLock FES-RS-S with fischer Serrated Channel Bolts FBC-S 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 Serrated Channel Bolts.

The anchor channel is embedded surface-flush in the concrete. fischer Serrated 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 static and quasi-static tension 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	$N^0_{Rk,s,l}$; $s_{l,N}$ see Annex C1
- Resistance to steel failure of channel bolt	$N_{Rk,s}$ see Annex C6
- Resistance to steel failure by exceeding the bending strength of the channel	s_{max} see Annex A5 $M_{Rk,s,flex}$ see Annex C1
- 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 C2
- Resistance to concrete cone failure	h_{ef} see Annex B3 $k_{cr,N}$; $k_{ucr,N}$ see Annex C2
- Minimum edge distances, spacing and member thickness to avoid concrete splitting during installation	s_{min} see Annex A5 c_{min} ; h_{min} see Annex B3
- Characteristic edge distance and spacing to avoid splitting of concrete under load	$s_{cr,sp}$; $c_{cr,sp}$ see Annex C2
- Resistance to blowout failure - bearing area of anchor head	A_h see Annex A4

Essential characteristic	**Performance**
Characteristic resistance under static and quasi-static shear loading	
- Resistance to steel failure of channel bolt under shear loading without lever arm	$V_{Rk,s}$ see Annex C6
- Resistance to steel failure by bending of the channel bolt under shear load with lever arm	$M^0_{Rk,s}$ see Annex C7
- 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)	$V^0_{Rk,s,l,y}$; $s_{l,V}$; $V_{Rk,s,c,y}$; $V_{Rk,s,a,y}$ see Annex C4
- Resistance to steel failure of connection between channel lips and channel bolt (shear load in longitudinal channel axis)	$V_{Rk,s,l,x}$ see Annex C5
- Factor for sensitivity to installation (longitudinal shear)	γ_{inst} see Annex C5
- Resistance to steel failure of the anchor (longitudinal shear)	$V_{Rk,s,a,x}$ see Annex C4
- Resistance to steel failure of connection between anchor and channel (longitudinal shear)	$V_{Rk,s,c,x}$ see Annex C4
- Resistance to concrete pry-out failure	k_8 see Annex C5
- Resistance to concrete edge failure	$k_{cr,V}$; $k_{ucr,V}$ see Annex C5
Characteristic resistance under combined static and quasi-static tension and shear loading	
- Resistance to steel failure of the anchor channel	k_{13} ; k_{14} see Annex C6
Characteristic resistance under fatigue tension loading	
- Fatigue resistance to steel failure of the whole system (continuous or tri-linear function, test method A1, A2)	No Performance assessed
- Fatigue limit resistance to steel failure of the whole system (test method B)	No Performance assessed
- Fatigue resistance to steel failure of the whole system (linearized function, test method C)	No Performance assessed
- Fatigue resistance to concrete related failure (exponential function, test method A1, A2)	No Performance assessed
- Fatigue limit resistance to concrete related failure (test method B)	No Performance assessed
- Fatigue resistance to concrete related failure (linearized function, test method C)	No Performance assessed

Characteristic resistance under seismic loading (seismic performance category C1)	
- Resistance to steel failure under seismic tension loading (seismic performance category C1)	No Performance assessed
- Resistance to steel failure under seismic shear loading for shear load in transverse direction (seismic performance category C1)	No Performance assessed
- Resistance to steel failure under seismic shear loading for shear load in longitudinal channel axis (seismic performance category C1)	No Performance assessed
Characteristic resistance under static and quasi-static tension and/or shear loading	
- Displacements	δ_{N0} ; $\delta_{N\infty}$ see Annex C3 $\delta_{V,y,0}$; $\delta_{V,y,\infty}$; $\delta_{V,x,0}$; $\delta_{V,x,\infty}$ see Annex C6

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Characteristic resistance to fire	See Annex C8 and C9

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

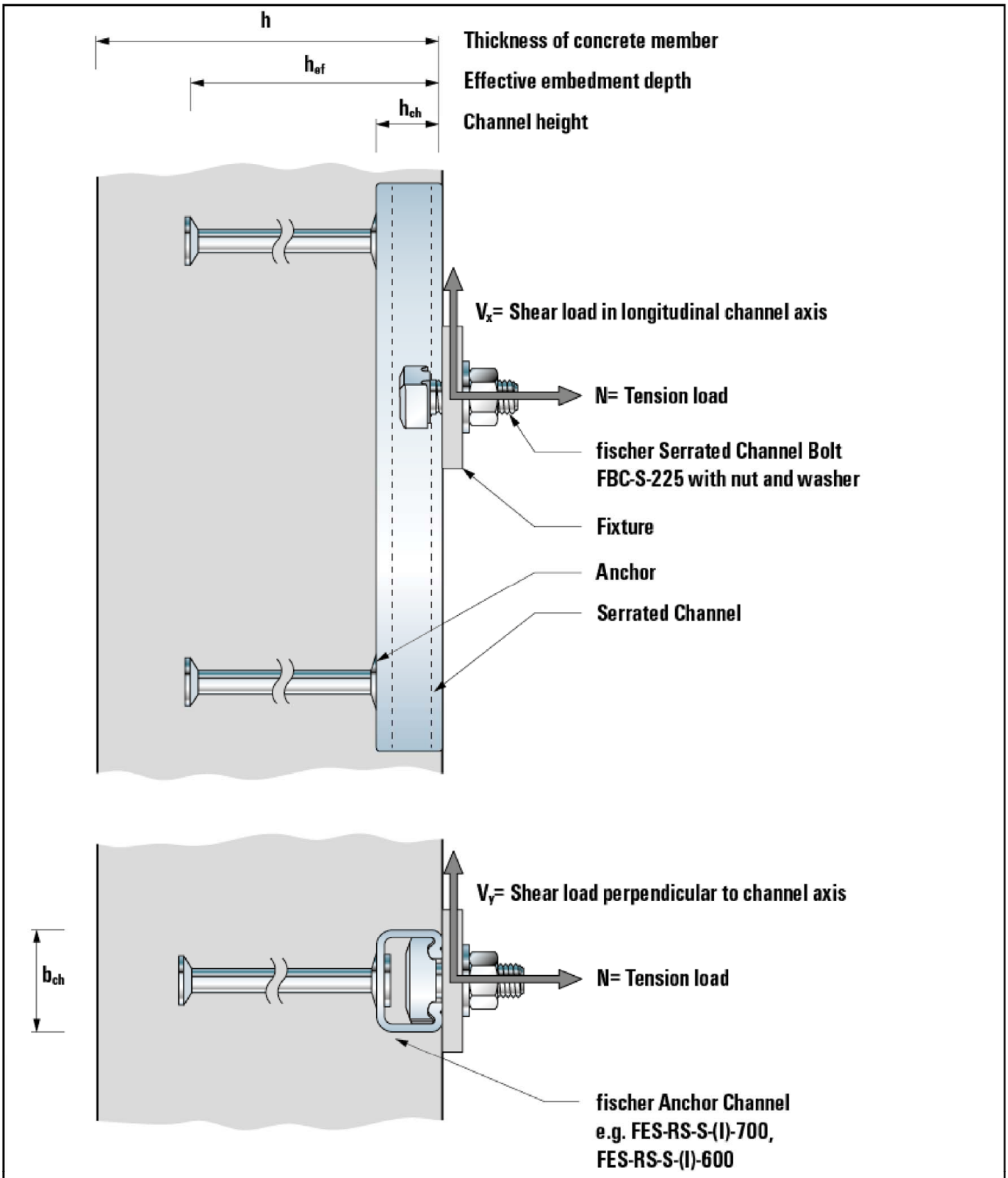
5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 1 December 2023 by Deutsches Institut für Bautechnik

Dipl.-Ing. Beatrix Wittstock
Head of Section

beglaubigt:
Müller



fischer Serrated Anchor Channel InnoLock FES-RS-S with fischer Serrated Channel Bolts FBC-S	**Annex A 1**
Product description Installed conditions	

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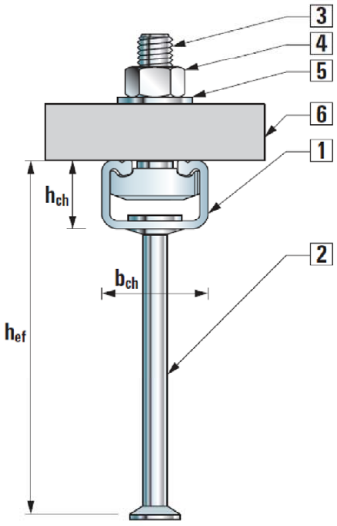
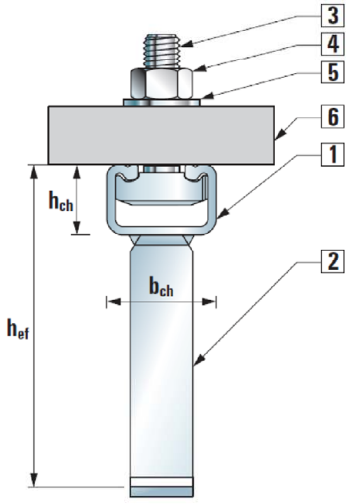


Round anchor



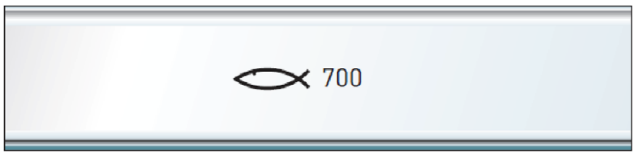
I-anchor

fischer Anchor Channel
FES-RS-S
1 Serrated channel profile
2 Anchor
3 Serrated channel bolt
4 Hexagonal nut
5 Washer
6 Fixture

Marking of the fischer anchor channel FES-RS-S:

e. g.: 700

	= Identifying mark of the manufacturer
I	= Additional marking for I-anchors No marking for round anchors
700	= Size of the anchor channel (700, 600)

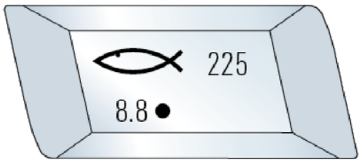


Stamped into back of channel
Optional: printed on channel web or channel lips
RS = Roll-shaped, S = Serrated
No marking for material acc. Table A7.1 (Channel profile)

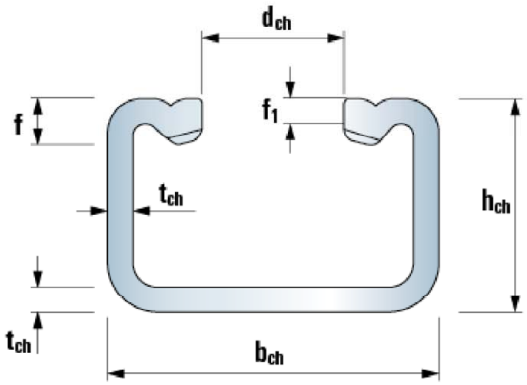
Marking of the fischer channel bolt FBC-S:

e. g.: 8.8 225

	= Identifying mark of the manufacturer
8.8	= Strength grade
225	= Width of anchor channel opening d_{ch}
●	= Coating electro-plated No marking for hot dip galvanized



fischer Serrated Anchor Channel InnoLock FES-RS-S with fischer Serrated Channel Bolts FBC-S	**Annex A 2**
Product description Product and marking	



Serrated anchor channel FES-RS-S-(I)-

Table A3.1: Dimensions of channel profile

Anchor channel FES-RS-S-(I)-	b_{ch} [mm]	h_{ch} [mm]	t_{ch} [mm]	d_{ch} [mm]	f [mm]	f_1 [mm]	Iy [mm^4]
600	50,5	29,0	3,0	22,5	6,0	3,0	41.862
700	52,5	34,0	4,0	22,5	7,0	4,0	79.168

fischer Serrated Anchor Channel InnoLock FES-RS-S with fischer Serrated Channel Bolts FBC-S

Product description
Dimensions of channels

Annex A 3

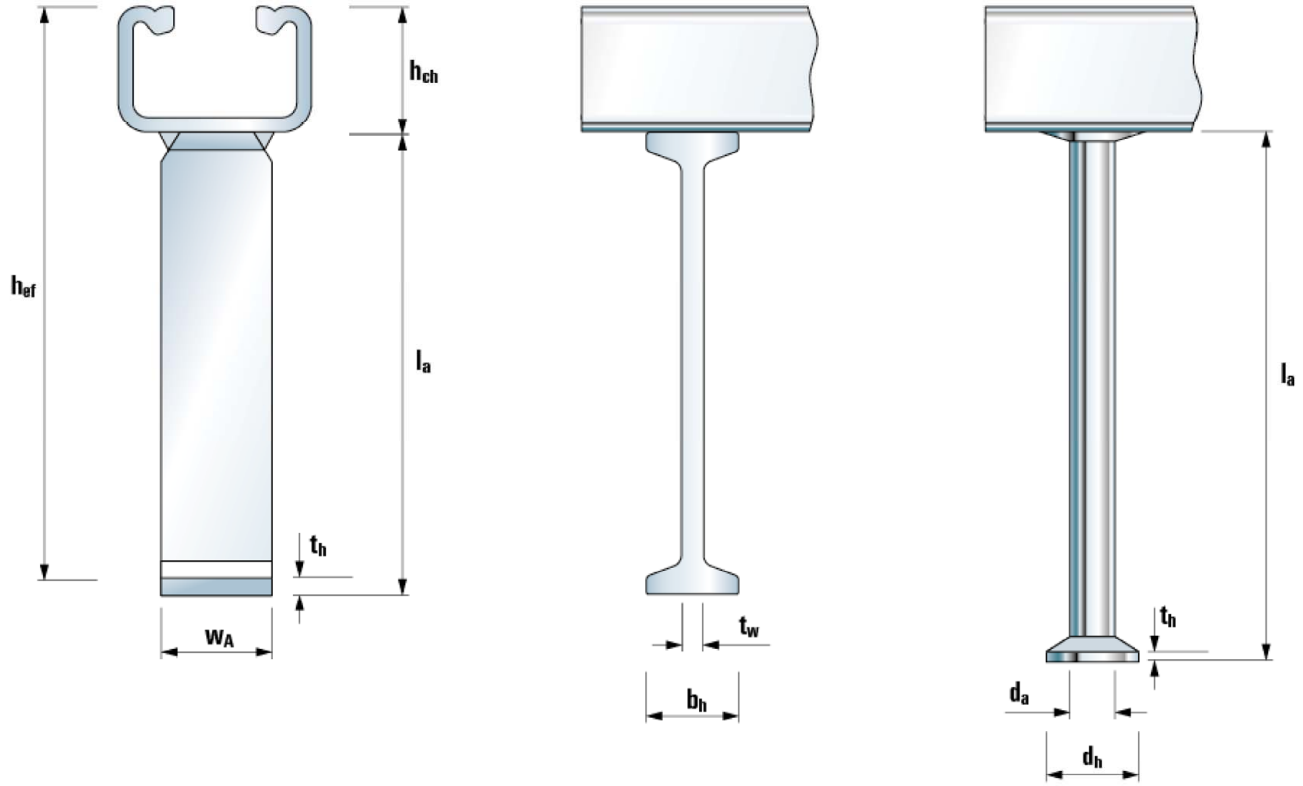


Table A4.1: Dimensions of anchor (welded I-anchor or forged round anchor)

Anchor channel FES-RS-S-(I)-	I-anchor						Round anchor				
	$l_{a,min}$ [mm]	$t_{w,min}$ [mm]	$b_{h,min}$ [mm]	t_h [mm]	$w_{A,min}$ [mm]	$A_{h,min}$ [mm²]	$l_{a,min}$ [mm]	d_a [mm]	d_h [mm]	t_h [mm]	A_h [mm²]
600	125	6	25	5	30	570	123,5	11,0	24,3	2,5	368
700	125	6	25	5	30	570	144,0	12,8	26,0	3,0	402

fischer Serrated Anchor Channel InnoLock FES-RS-S with fischer Serrated Channel Bolts FBC-S

Product description
Dimensions of anchors

Annex A 4

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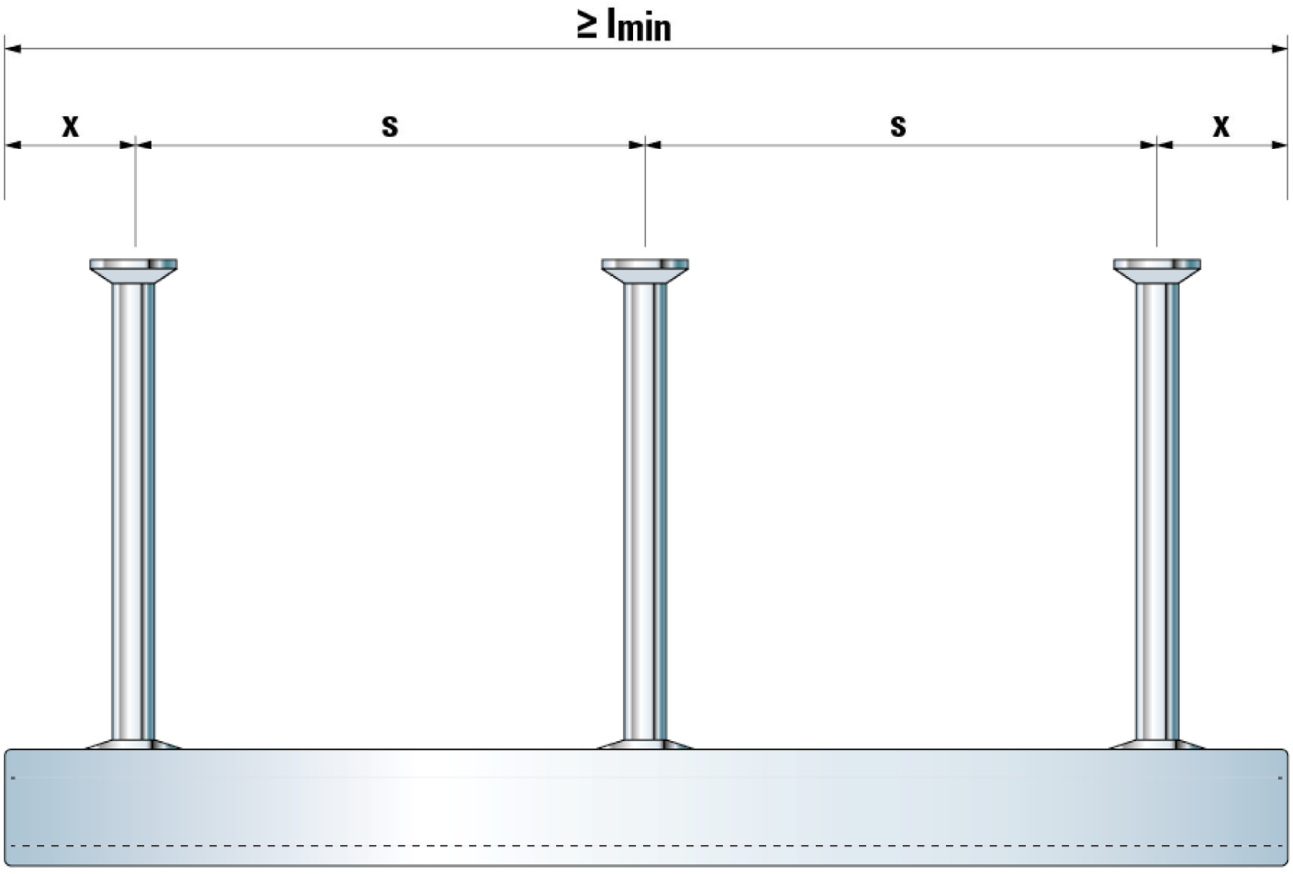
Table A5.1: Anchor position

Anchor channel FES-RS-S-(l)-	Anchor type	s_{min} [mm]	s_{max} [mm]	x_{min} [mm]	x_{max} [mm]	l_{min} [mm]	l_{max} [mm]
600 700	Round or I	80	250	30	35	140	6.070



fischer Serrated Anchor Channel InnoLock FES-RS-S with fischer Serrated Channel Bolts FBC-S

Product description
Anchor position and channel length

Annex A 5

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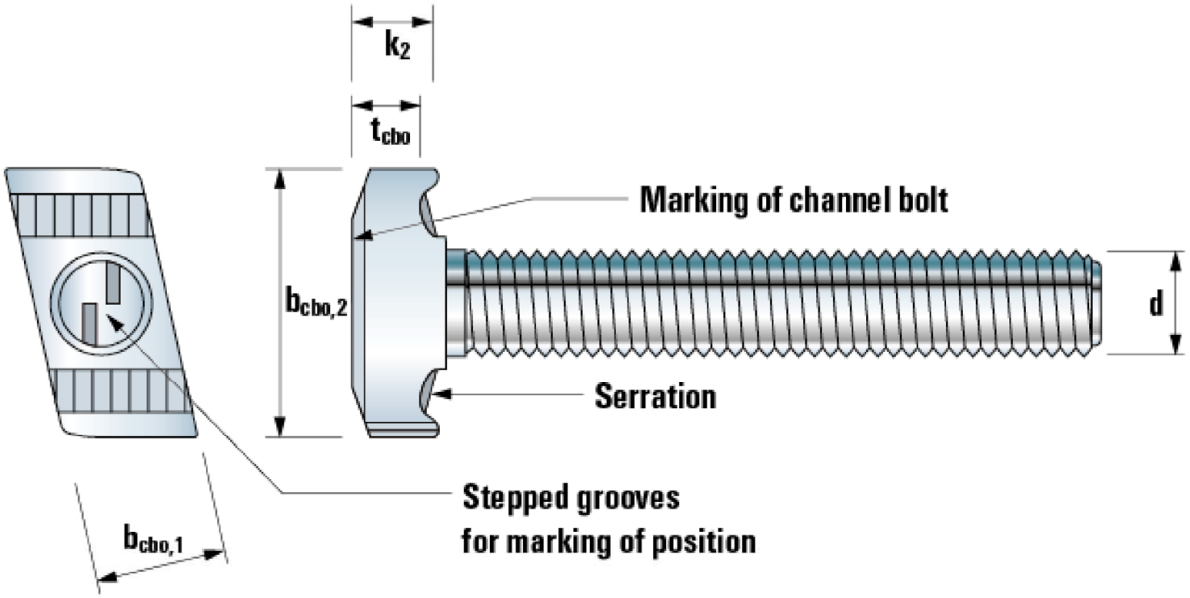
Table A6.1: Strength grade and corrosion class

Channel bolt	Carbon steel [1]
Strength grade	8.8
f_{uk} [N/mm²]	800 / 830
f_{yk} [N/mm²]	640 / 660 [2]
Corrosion protection	F[3] or Electroplated

[1] Material properties according to Annex A7.
[2] Material properties according to EN ISO 898-1:2013.
[3] Hot-dip galvanized.



Serrated channel bolt FBC-S-225

Table A6.2: Dimensions of fischer channel bolt FBC and matching fischer anchor channels FES

Anchor channel FES-RS-S-(I)-	Channel bolt FBC-S	d [mm]	$b_{cbo,1}$ [mm]	$b_{cbo,2}$ [mm]	t_{cbo} [mm]	k_2 [mm]
600	225	12 16 20	21,0	43,0	10,7	15,0
700						

fischer Serrated Anchor Channel InnoLock FES-RS-S with fischer Serrated Channel Bolts FBC-S

Product description
Serrated channel bolts

Annex A 6

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Table A7.1: Materials and properties

Component	Carbon steel		
	Mechanical properties	**Coating**	**Coating**
1	**2**	**2a**	**2b**
Channel profile	1.0976 acc. to EN 10149:2013	Hot dip galvanized ≥ 55 µm acc. to EN ISO 1461:2022	Hot dip galvanized ≥ 55 µm acc. to EN ISO 1461:2022
Round anchor	1.5525 acc. to EN 10263:2017	Hot dip galvanized ≥ 55 µm acc. to EN ISO 1461:2022	Hot dip galvanized ≥ 55 µm acc. to EN ISO 1461:2022
I-anchor	1.0045, 1.0976 acc. to EN 10149:2013	Hot dip galvanized ≥ 55 µm acc. to EN ISO 1461:2022	Hot dip galvanized ≥ 55 µm acc. to EN ISO 1461:2022
Serrated channel bolt	Strength grade 8.8 acc. to EN ISO 898-1:2013	Electroplated acc. to EN ISO 4042:2022	Hot dip galvanized ≥ 50 µm acc. to EN ISO 10684:2004 + AC:2009
Plain washer [1] acc. to EN ISO 7089:2000 and EN ISO 7093-1:2000	Hardness class A ≥ 200 HV	Electroplated acc. to EN ISO 4042:2022	Hot dip galvanized ≥ 50 µm acc. to EN ISO 10684:2004 + AC:2009
Hexagonal nut acc. to EN ISO 4032:2012	Property class 8 acc. to EN ISO 898-2:2022	Electroplated acc. to EN ISO 4042:2022	Hot dip galvanized ≥ 50 µm acc. to EN ISO 10684:2004 + AC:2009

[1] Not in the scope of delivery.

fischer Serrated Anchor Channel InnoLock FES-RS-S with fischer Serrated Channel Bolts FBC-S

Product description
Materials

Annex A 7

Specifications of intended use

Anchor channels and serrated channel bolts subject to:

- Static and quasi-static tension, shear perpendicular to the longitudinal axis of the channel and shear in the direction of the longitudinal axis of the channel.
- Fire exposure: Only for concrete class C20/25 to C50/60.

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).
- 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).

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 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 Serrated Anchor Channel InnoLock FES-RS-S with fischer Serrated Channel Bolts FBC-S	**Annex B 1**
Intended Use Specifications	

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 5, Table A5.1 are generated including end spacing x and minimum channel length l_{min} and only to be used in dry internal conditions.
- Installation in accordance with the installation instruction given in Annexes B5 and B6.
- 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.
- Washer may be chosen according to Annex A7 and provided separately by the user.
- Orientating the serrated channel bolt (groove according to Annex B6) rectangular to the channel axis.
- The required installation torque given in Annex B4 must be applied and must not be exceeded.

fischer Serrated Anchor Channel InnoLock FES-RS-S with fischer Serrated Channel Bolts FBC-S	**Annex B 2**
Intended Use Specifications	

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Installation parameters

Table B3.1: Installation parameters

Anchor channel FES-RS-S-			**600**	**I-600**	**700**	**I-700**
Minimum effective embedment depth	$h_{ef,min}$	[mm]	150	154	175	154
Minimum edge distance	c_{min}		75	75	75	75
Minimum thickness of concrete member	h_{min}		153	159	178	178

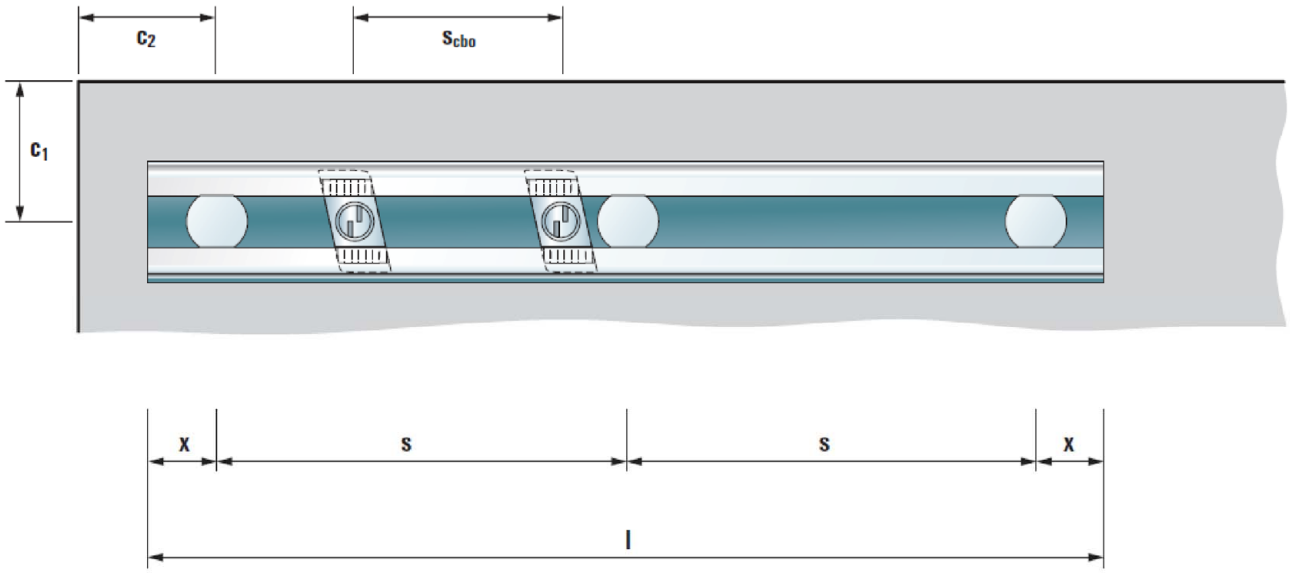

Table B3.2: Minimum spacing for serrated channel bolts

Serrated channel bolt			M12	M16	M20
Minimum spacing between channel bolts	$s_{cbo,min}$	[mm]	60	80	100

fischer Serrated Anchor Channel InnoLock FES-RS-S with fischer Serrated Channel Bolts FBC-S	**Annex B 3**
Intended Use Installation parameters for fischer anchor channels FES-RS-S	

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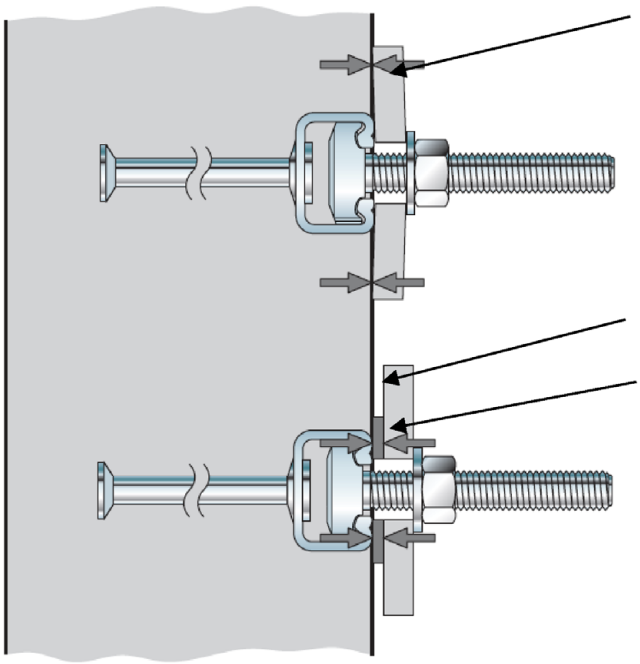
Table B4.1: Installation torque T_{inst}

fischer anchor channel FES-RS-S-(I)-	fischer serrated channel bolt FBC-S	Thread diameter	T_{inst} [1] [Nm]	
			General $T_{inst,g}$	Steel – steel contact $T_{inst,s}$
			8.8	8.8
600	225	M12	80	100
700		M16	100	200
		M20	120	360

[1] T_{inst} must not be exceeded.



General:
The fixture is in contact with the channel profile and the concrete surface by tightening with $T_{inst,g}$.

Gap

Steel-to-steel contact:
The fixture is not in contact with the concrete surface. The fixture is fastened to the anchor channel by a suitable steel part (e.g. washer) by tightening with $T_{inst,s}$. ($T_{inst,s} \geq T_{inst,g}$)

fischer Serrated Anchor Channel InnoLock FES-RS-S with fischer Serrated Channel Bolts FBC-S

Intended Use
Installation parameters for fischer serrated channel bolts FBC-S

Annex B 4

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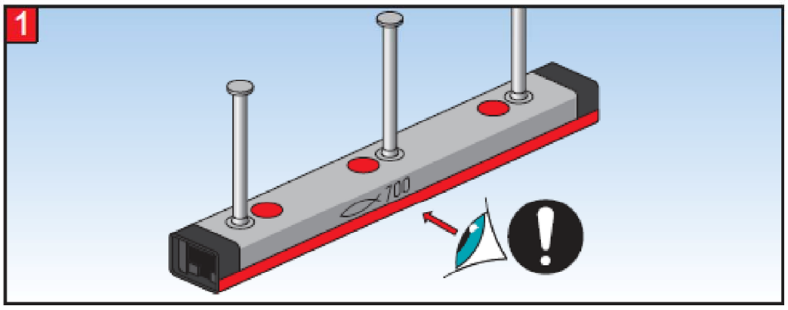
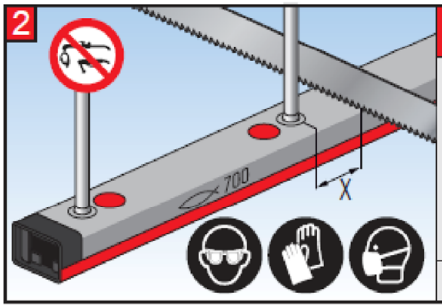
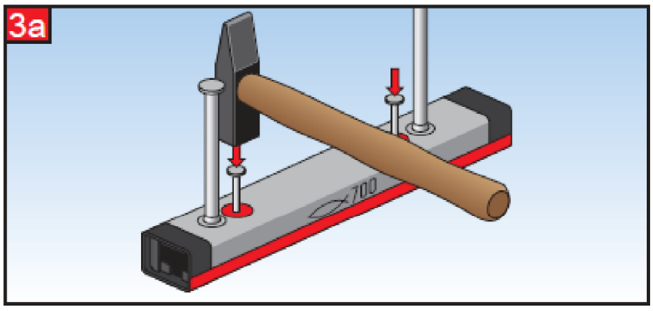
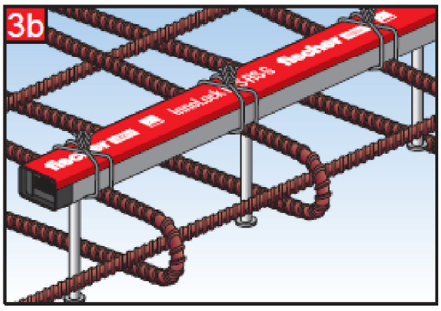
Anchor channel FES-RS-S

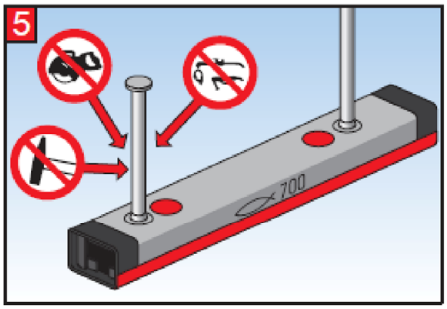


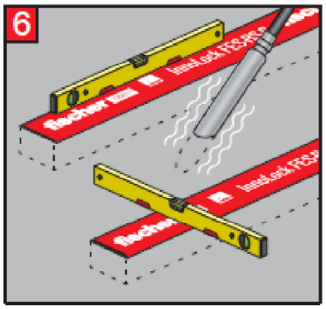


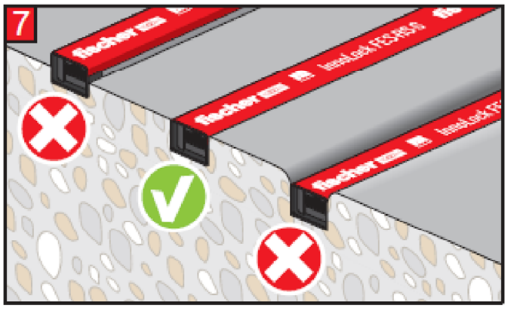
X	FES-RS-S-
30 - 35 mm	600
	700

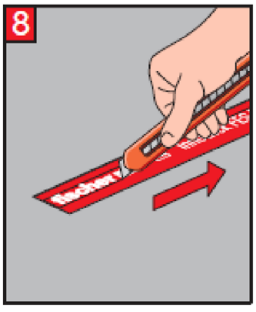


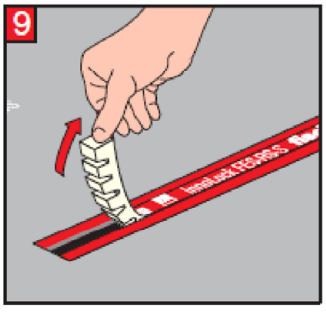












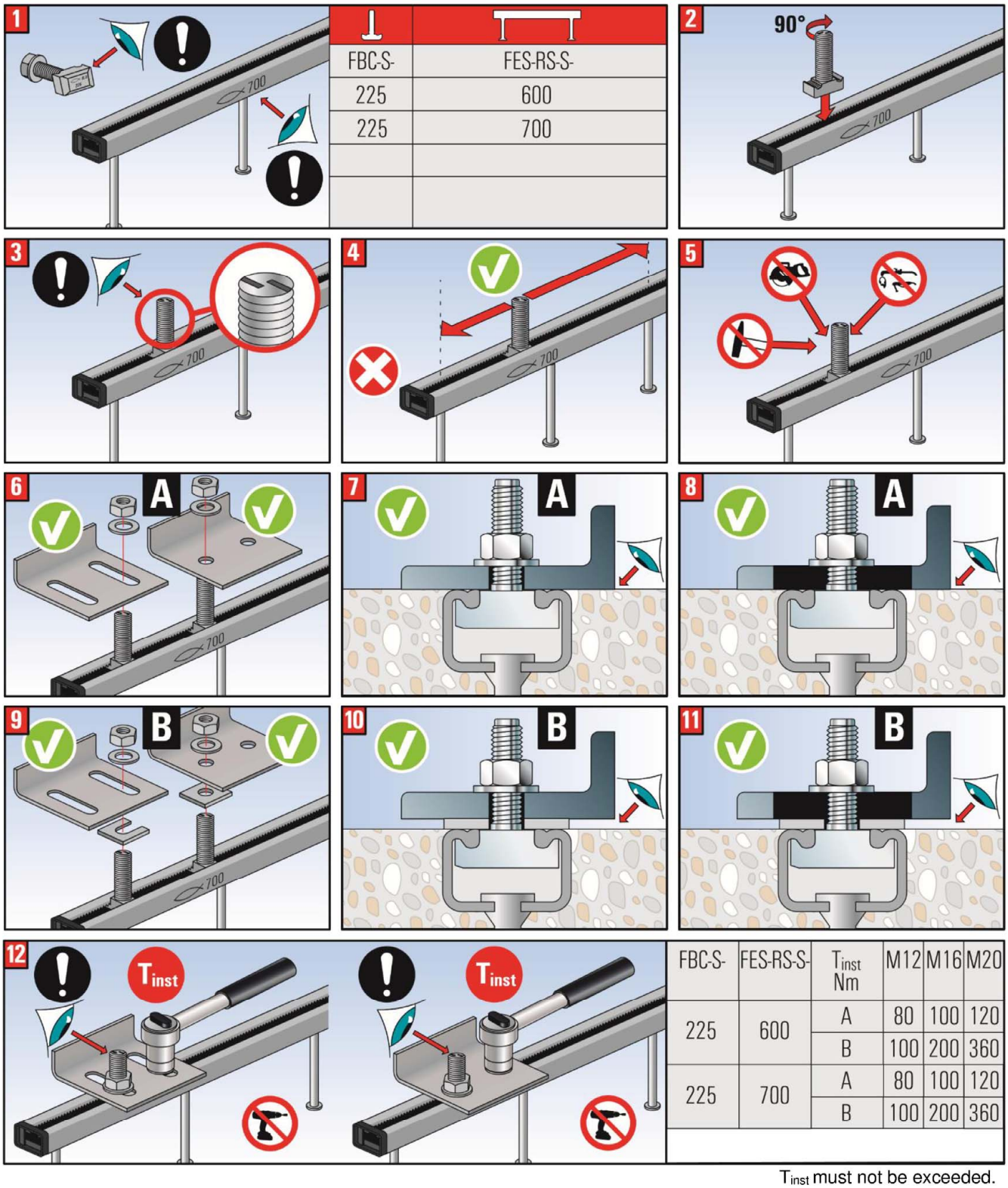
fischer Serrated Anchor Channel InnoLock FES-RS-S with fischer Serrated Channel Bolts FBC-S

Intended Use
Installation instruction for fischer anchor channel FES-RS-S

Annex B 5

Deutsches Institut für Bautechnik DIBt

Serrated Channel bolt FBC-S



FBC-S-	FES-RS-S-
225	600
225	700

FBC-S-	FES-RS-S-	T_{inst} Nm	M12	M16	M20
225	600	A	80	100	120
		B	100	200	360
225	700	A	80	100	120
		B	100	200	360

T_{inst} must not be exceeded.

fischer Serrated Anchor Channel InnoLock FES-RS-S with fischer Serrated Channel Bolts FBC-S

Intended Use
Installation instruction for fischer serrated channel bolt FBC-S

Annex B 6

Deutsches Institut für Bautechnik DIBt

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

Anchor channel FES-RS-S-			**600**	**I-600**	**700**	**I-700**
Steel failure: Anchor						
Characteristic resistance	$N_{Rk,s,a}$	[kN]	55,2	57,0	73,3	81,0
Partial factor	γ_{Ms} [1)]	[-]	1,8			
Steel failure: Connection between anchor and channel						
Characteristic resistance	$N_{Rk,s,c}$	[kN]	55,2	57,0	73,0	80,0
Partial factor	γ_{Ms} [1)]	[-]	1,8			
Steel failure: Local flexure of the channel lips						
Characteristic spacing of channel bolts for $N_{Rk,s,l}$	$s_{l,N}$	[mm]	101		105	
Characteristic resistance	$N^0_{Rk,s,l}$	[kN]	64,0		80,0	
Partial factor	γ_{Ms} [1)]	[-]	1,8			

[1)] In absence of other national regulations.

Table C1.2: Characteristic flexural resistance of the channel

Anchor channel FES-RS-S-			**600**	**700**
Steel failure: Flexure of channel				
Characteristic flexural resistance of channel	$M_{Rk,s,flex}$	[Nm]	2581	3749
Partial factor	$\gamma_{Ms,flex}$ [1)]	[-]	1,15	

[1)] In absence of other national regulations.

fischer Serrated Anchor Channel InnoLock FES-RS-S with fischer Serrated Channel Bolts FBC-S

Performances
Characteristic resistances of anchor channels under tension load – steel failure of anchor channel

Annex C 1

Deutsches Institut für Bautechnik DIBt

Table C2.1: Characteristic resistances under tension load – concrete failure

Anchor channel FES-RS-S-			**600**	**I-600**	**700**	**I-700**
Concrete failure: Pull-out failure						
Characteristic resistance in cracked concrete C12/15	$N_{Rk,p}$	[kN]	33,1	51,3	36,2	51,3
Characteristic resistance in uncracked concrete C12/15	$N_{Rk,p}$	[kN]	46,4	71,8	50,7	71,8
Increasing factor of $N_{Rk,p} = N_{Rk,p}(C12/15)*\psi_c$	C16/20 C20/25 C25/30 C30/37 C35/45 C40/50 C45/55 C50/60 C55/67 ≥C60/75	ψ_c[-]	1,33 1,67 2,08 2,50 2,92 3,33 3,75 4,17 4,58 5,00			
Partial factor	$\gamma_{Mp} = \gamma_{Mc}$ [1)]	[-]	1,5			
Concrete failure: Concrete cone failure						
Product factor k_1	$k_{cr,N}$	[-]	8,6	8,6	8,9	8,7
	$k_{ucr,N}$	[-]	12,3	12,4	12,6	12,5
Partial factor	γ_{Mc} [1)]	[-]	1,5			
Concrete failure: Concrete splitting failure						
Characteristic edge distance	$c_{cr,sp}$	[mm]	450	462	525	462
Characteristic spacing	$s_{cr,sp}$	[mm]	900	942	1050	942
Partial factor	$\gamma_{MSp} = \gamma_{Mc}$ [1)]	[-]	1,5			

[1)] In absence of other national regulations.

fischer Serrated Anchor Channel InnoLock FES-RS-S with fischer Serrated Channel Bolts FBC-S

Performances
Characteristic resistances under tension load – concrete failure

Annex C 2

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Table C3.1: Displacements under tension load

Anchor channel FES-RS-S-(I)-			**600**	**700**
Tension load	N	[kN]	21,4	31,4
Short-term displacement [1)]	δ_{N0}	[mm]	2,1	2,1
Long-term displacement [1)]	$\delta_{N\infty}$	[mm]	4,2	4,2

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

fischer Serrated Anchor Channel InnoLock FES-RS-S with fischer Serrated Channel Bolts FBC-S

Performances
Displacement under tension load

Annex C 3

Deutsches Institut für Bautechnik DIBt

Table C4.1: Characteristic resistances under shear load – steel failure of anchor channels

Anchor channel FES-RS-S-			**600**	**I-600**	**700**	**I-700**
Steel failure: Anchor						
Characteristic resistance	$V_{Rk,s,a,y}$	[kN]	98,5	98,5	120,0	120,0
	$V_{Rk,s,a,x}$		34,2	50,7	44,0	48,6
Partial factor	γ_{Ms} [1)]	[-]	1,8			
Steel failure: Connection between anchor and channel						
Characteristic resistance	$V_{Rk,s,c,y}$	[kN]	98,5	98,5	120,0	120,0
	$V_{Rk,s,c,x}$		33,1	34,9	43,8	48,0
Partial factor	γ_{Ms} [1)]	[-]	1,8			
Steel failure: Local flexure of the channel lips						
Characteristic spacing of channel bolts for $V_{Rk,s,l}$	$s_{l,V}$	[mm]	101		105	
Characteristic resistance	$V^0_{Rk,s,l,y}$	[kN]	77,7		92,0	
Partial factor	γ_{Ms} [1)]	[-]	1,8			

[1)] In absence of other national regulations.

fischer Serrated Anchor Channel InnoLock FES-RS-S with fischer Serrated Channel Bolts FBC-S

Performances
Characteristic resistance of anchor channel under shear load – steel failure of anchor channel

Annex C 4

Deutsches Institut für Bautechnik DIBt

Table C5.1: Characteristic resistance for shear load in direction of the longitudinal axis of the channel – steel failure

Anchor channel FES-RS-S-(I)-				**600**	**700**
Steel failure: Connection between channel lips and serrated channel bolt					
Characteristic resistance	$V_{Rk,s,l,x}$	[kN]	FBC-S-225-M12-8.8	17,6	-[2)]
			FBC-S-225-M16-8.8	17,6	22,5
			FBC-S-225-M20-8.8	17,6	22,5
Installation factor	γ_{Inst}[1)]	[-]		M12: 1,4 M16, M20: 1,0	1,2

[1)] In absence of other national regulations.

[2)] No performance assessed.

Table C5.2: Characteristic resistance of the anchor channel under shear load – concrete failure

Anchor channel FES-RS-S-(I)-				**600**	**700**
Concrete failure: Pry-out failure					
Product factor		k_8	[-]	2,0	2,0
Partial factor		γ_{Mc}[1)]	[-]	1,5	
Concrete failure: Concrete edge failure					
Product factor k_{12}	Cracked concrete	$k_{cr,V}$	[-]	7,5	7,5
	Uncracked concrete	$k_{ucr,V}$	[-]	10,5	10,5
Partial factor		γ_{Mc}[1)]	[-]	1,5	

[1)] In absence of other national regulations.

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Table C6.1: Displacements under shear load

Anchor channel FES-RS-S-(l)-			**600**	**700**
Shear load perpenticular to the longitudinal axis of the channel	V_y	[kN]	30,5	36,5
Short-term displacement [1]	$\delta_{V,y,0}$	[mm]	2,5	2,9
Long-term displacement [1]	$\delta_{V,y,\infty}$	[mm]	3,7	4,4
Shear load in direction of the longitudinal axis of the channel	V_x	[kN]	7,0	6,6
Short-term displacement [2]	$\delta_{V,x,0}$	[mm]	0,9	1,2
Long-term displacement [2]	$\delta_{V,x,\infty}$	[mm]	1,3	1,8

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

Table C6.2: Characteristic resistances under tension and shear load – steel failure of serrated channel bolts

Serrated channel bolt FBC-S-225			**M12**	**M16**	**M20**
Steel failure:				Steel grade 8.8	
Characteristic resistance	$N_{Rk,s}$	[kN]	67,4	125,6	170,0
Partial factor	γ_{Ms} [1]	[-]		1,5	
Characteristic resistance	$V_{Rk,s}$	[kN]	33,7	62,8	98,0
Partial factor	γ_{Ms} [1]	[-]		1,25	

[1] In absence of other national regulations.

Table C6.3: Characteristic resistances under combined tension and shear load

Anchor channel FES-RS-S-(l)-			**600**	**700**
Steel failure: Local flexure of channel lips and flexure of channel				
Product factor	k_{13}	[-]	according to EN 1992-4:2018, 7.4.3.1	
Steel failure: Anchor and connection between anchor and channel				
Product factor	k_{14}	[-]	according to EN 1992-4:2018, 7.4.3.1	

fischer Serrated Anchor Channel InnoLock FES-RS-S with fischer Serrated Channel Bolts FBC-S	**Annex C 6**
Performances Characteristic resistance of channel bolts under tension and shear load, displacements under shear load, combined tension and shear load	

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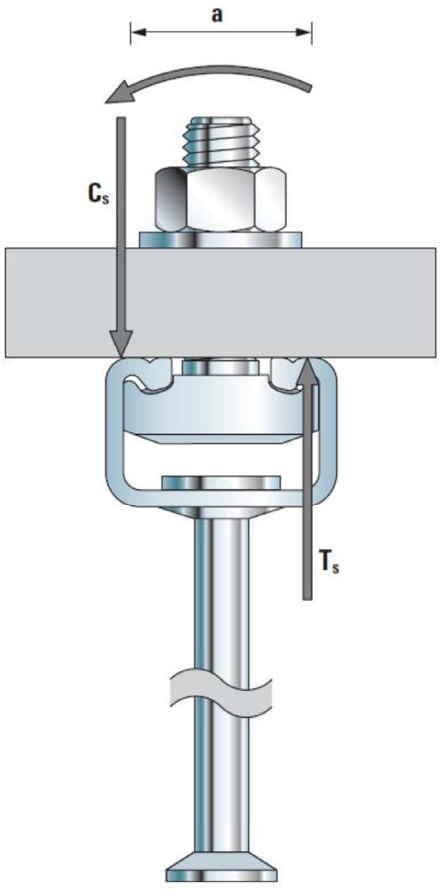
Table C7.1: Characteristic resistances under shear load with lever arm – steel failure of serrated channel bolts

Thread diameter of serrated channel bolt [2]				M12	M16	M20
Steel failure:						
Characteristic flexural resistance	$M^0_{Rk,s}$	[Nm]	FBC-S-225	104,8	266,4	519,3
Partial factor	γ_{Ms} [1]	[-]	FBC-S-225	1,25		
Interna lever arm	a	[kN]	FBC-S-225	29,8	31,8	34,2

[1] In absence of other national regulations.

[2] Materials according to Annex A7, Table A7.1.

The characteristic flexure resistance according to Table C7.1 is limited as follows:



$M^0_{Rk,s} \leq 0{,}5 \cdot N^0_{Rk,s,l} \cdot a$ ($N^0_{Rk,s,l}$ according to Table C1.1)

$M^0_{Rk,s} \leq 0{,}5 \cdot N_{Rk,s} \cdot a$ ($N_{Rk,s}$ according to Table C6.2)

a = Internal lever arm according to Table C7.1

T_s = Tension force acting on the channel lips

C_s = Compression force acting on the channel lips

fischer Serrated Anchor Channel InnoLock FES-RS-S with fischer Serrated Channel Bolts FBC-S

Performances
Characteristic flexural resistances under shear load of serrated channel bolts

Annex C 7

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Table C8.1: Characteristic resistances under fire exposure – steel failure

Channel bolt					**M12**	**M16**	**M20**
Steel failure: Anchor, connection between anchor and channel, local bending of channel lip							
Characteristic resistance	$N_{Rk,s,fi}$ $=V_{Rk,s,y,fi}$	[kN]	FES-RS-S-(I)-600	R30	2,5	4,8	12,0
				R60	2,0	4,2	8,7
				R90	1,4	3,5	5,2
				R120	1,2	3,1	3,4
			FES-RS-S-(I)-700	R30	2,5	4,8	12,0
				R60	2,0	4,2	8,7
				R90	1,4	3,5	5,2
				R120	1,2	3,1	3,4
Partial factor	$\gamma_{Ms,fi}$ [1)]	[-]				1,0	

[1)] In absence of other national regulations.

fischer Serrated Anchor Channel InnoLock FES-RS-S with fischer Serrated Channel Bolts FBC-S

Performances
Characteristic resistance under fire exposure

Annex C 8

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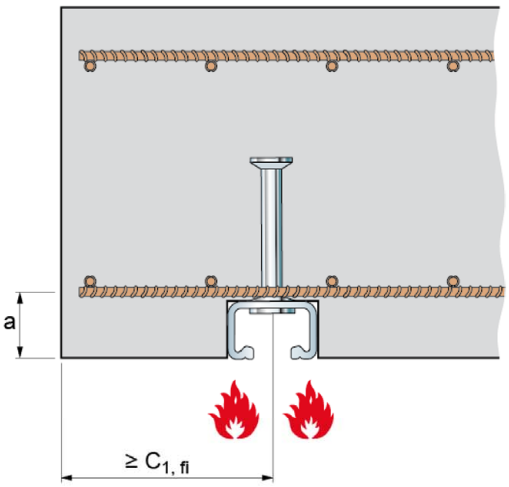
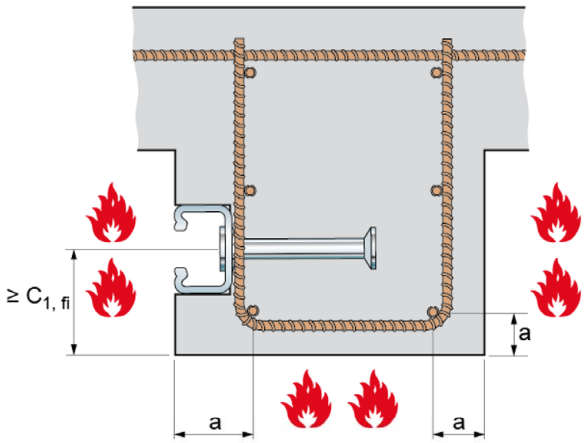
Table C9.1: Minimum axis distance of reinforcement

Anchor channel FES-RS-S-(I)-			**600**	**700**
Min. axis distance	R30	a [mm]	35	50
	R60		35	50
	R90		45	50
	R120		60	65

Fire exposure from one side only



Fire exposure from more than one side



fischer Serrated Anchor Channel InnoLock FES-RS-S with fischer Serrated Channel Bolts FBC-S

Performances
Characteristic resistance under fire exposure

Annex C 9