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-13/0224 of 3 March 2022

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	Modersohn Anchor Channel MBA
Product family to which the construction product belongs	Anchor channels
Manufacturer	Wilhelm Modersohn GmbH & Co. KG Industriestraße 23 32139 Spenge DEUTSCHLAND
Manufacturing plant	Werk Spenge Industriestraße 23 32139 Spenge
This European Technical Assessment contains	22 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	EAD 330008-03-0601, Edition 06/2021
This version replaces	ETA-13/0224 issued on 26 March 2019

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Specific Part

1 Technical description of the product

The Modersohn Anchor Channel MBA is system consisting of C-shaped channel profile of stainless steel and at least two metal anchors non-detachably fixed on the channel back and channel bolts.

The anchor channel is embedded surface-flush in the concrete. Modersohn channel bolts (hammerhead or hooked) with appropriate hexagon 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	$N^0_{Rk,s,l}$; $s_{l,N}$ see Annex C1
- Resistance to steel failure of channel bolt	$N_{Rk,s}$ see Annex C5
- Resistance to steel failure by exceeding the bending strength of the channel	s_{max} see Annex A4 $M_{Rk,s,flex}$ see Annex C1
- Maximum installation torque to avoid damage during installation	$T_{inst,g}$; $T_{inst,s}$ see Annex B3
- Resistance to pull-out failure of the anchor	$N_{Rk,p}$ see Annex C2
- Resistance to concrete cone failure	h_{ef} see Annex B2 $k_{cr,N}$; $k_{ucr,N}$ see Annex C2
- Minimum edge distances, spacing and member thickness to avoid concrete splitting during installation	s_{min} see Annex A4 c_{min} ; h_{min} see Annex B2
- 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 A3

Essential characteristic	**Performance**
Characteristic resistance under shear load (static and quasi-static loading)	
- Resistance to steel failure of channel bolt under shear loading without lever arm	$V_{Rk,s}$ see Annex C5
- Resistance to steel failure by bending of the channel bolt under shear load with lever arm	$M^0_{Rk,s}$ see Annex C5
- 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 C3
- Resistance to steel failure of connection between channel lips and channel bolt (shear load in longitudinal channel axis)	No Performance assessed
- Factor for sensitivity to installation (longitudinal shear)	No Performance assessed
- Resistance to steel failure of the anchor (longitudinal shear)	No Performance assessed
- Resistance to steel failure of connection between anchor and channel (longitudinal shear)	No Performance assessed
- Resistance to concrete pry-out failure	k_8 see Annex C3
- Resistance to concrete edge failure	$k_{cr,V}$; $k_{ucr,V}$ see Annex C3
Characteristic resistance under combined tension and shear load (static and quasi-static load)	
- Resistance to steel failure of the anchor channel	k_{13} ; k_{14} see Annex C4
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 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
Displacements (static and quasi-static load)	δ_{N0} ; $\delta_{N\infty}$ see Annex C2 $\delta_{V,y,0}$; $\delta_{V,y,\infty}$; $\delta_{V,x,0}$; $\delta_{V,x,\infty}$ see Annex C4

3.2 Safety in case of fire (BWR 2)

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

3.3 Aspects of durability

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. 330008-03-0601, the applicable European legal act is: [2000/273/EC].

The system to be applied is: 1

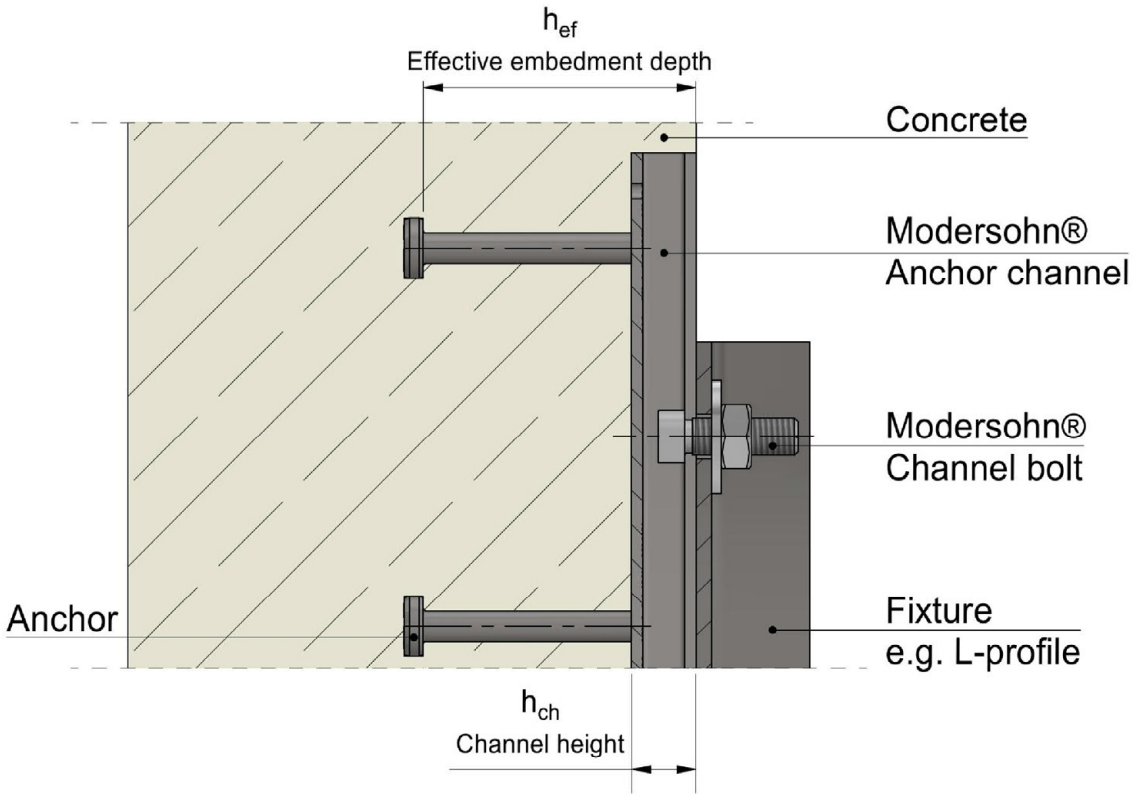
5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

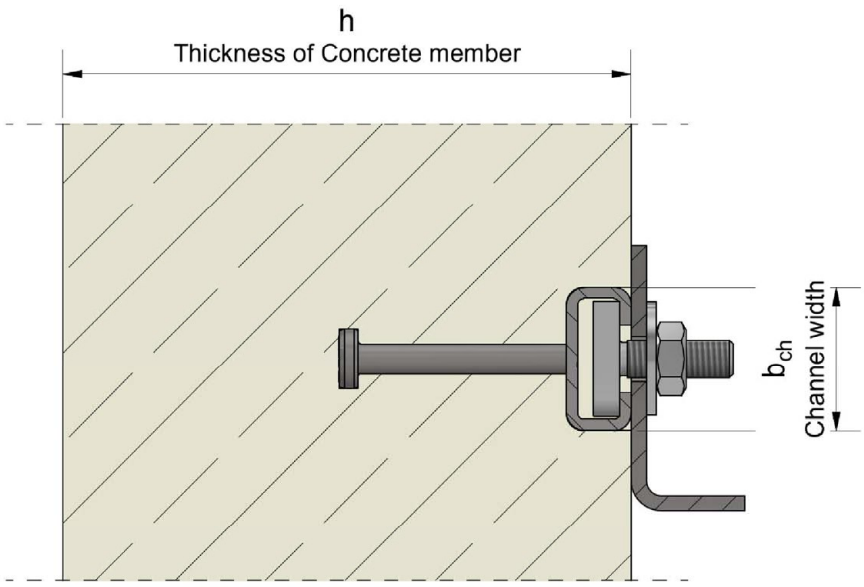
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 3 March 2022 by Deutsches Institut für Bautechnik

Dipl.-Ing Beatrix Wittstock
Head of Section

beglaubigt:
Müller





Modersohn® Anchor Channel MBA	
Product description **Installed condition**	**Annex A1**

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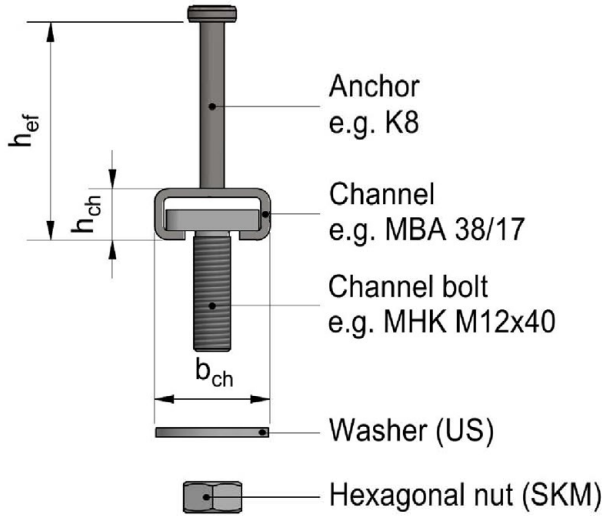
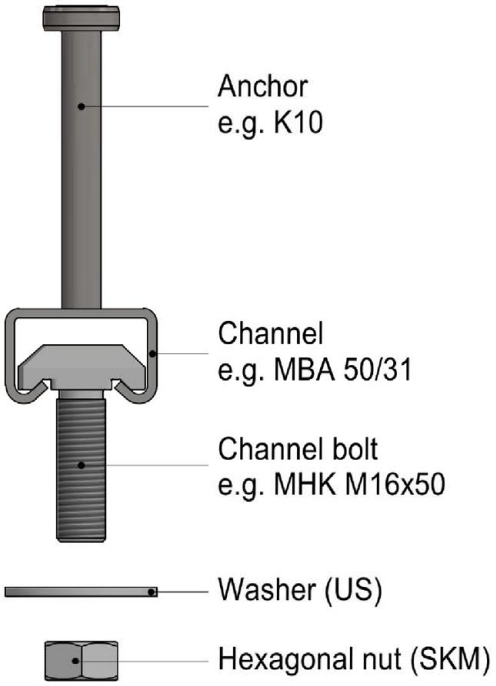
Modersohn® anchor channel

Profile:
28/15 + 38/17



Profile:
40/25, 50/31, 52/34 + 53/34



Legend

h_{ch}	Channel height
b_{ch}	Channel width
h_{ef}	Effective embedment depth
US	According to EN ISO 7089:2000 and EN ISO 7093-1:2000
SKM	According to EN ISO 4032:2012 (Strength grade of the nut according to strength grade of the channel bolt)

Marking of the Modersohn® anchor channel, e.g.:

Stamping on back of channel:

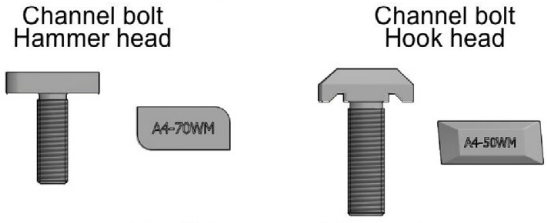
M	Identifying mark of the producer
BA	Type of anchor channel
38/17	Size
CRC III	Material

Close to the anchor a nail hole is positioned.

Material of the channel:

CRC I-V	Corrosion resistance class according to EN 1993-1-4:2006 + A1:2015 (table A.3)

Marking of the Modersohn® channel bolt, e.g.:



WM	Identifying mark of the producer
A4	Material

Strength grade of the channel bolt

50, 70	Strength grade

Material of the channel bolt:

Stamping	Corrosion resistance class according to EN 1993-1-4:2006 + A1:2015 (table A.3)
A2	CRC II
A4	CRC III
D6	CRC IV
D8	CRC V

Modersohn® Anchor Channel MBA

Product description
Anchor channel type and marking

Annex A2

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Figure 1

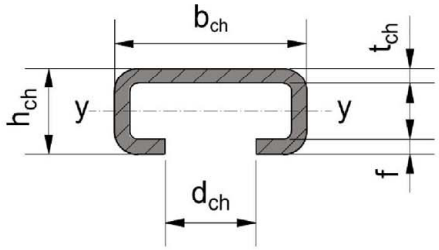


Figure 2

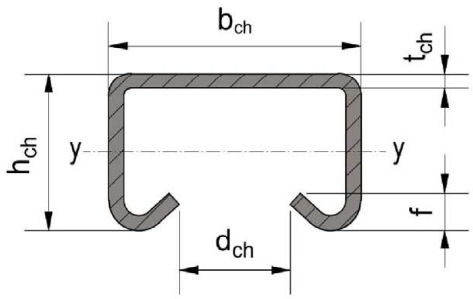
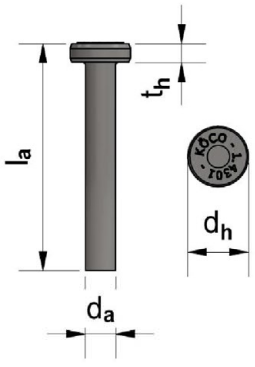


Table A1: Dimensions of profile

Anchor channel	Figure	Dimensions					Moment of inertia
		b_{ch}	h_{ch}	t_{ch}	d_{ch}	f	I_y
		[mm]					[mm⁴]
28/15	1	28,00	15,00	2,30	12,00	2,30	3874
38/17	1	38,00	17,00	3,00	18,00	3,00	7787
40/25	2	40,00	25,00	2,50	18,00	5,50	19095
50/31	2	50,00	31,00	3,00	22,00	7,35	44781
52/34	2	52,00	34,00	4,00	22,00	7,80	70663
53/34	2	53,00	34,00	4,50	22,00	7,70	76681

Table A2: Dimensions of anchor

Type	Anchor channel	Shaft d_a	Head d_h	Head thickness t_h	l_a	A_h
		[mm]				[mm²]
K6	28/15	6	13	5	35	104,5
K8	38/17, 40/25	8	16	5	60	150,8
K10	50/31	10	19	7	75	205,0
K13	52/34, 53/34	13	25	8	125	358,1



Modersohn® Anchor Channel MBA

Product description
Dimensions of profile and anchor

Annex A3

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Anchor positioning and channel length

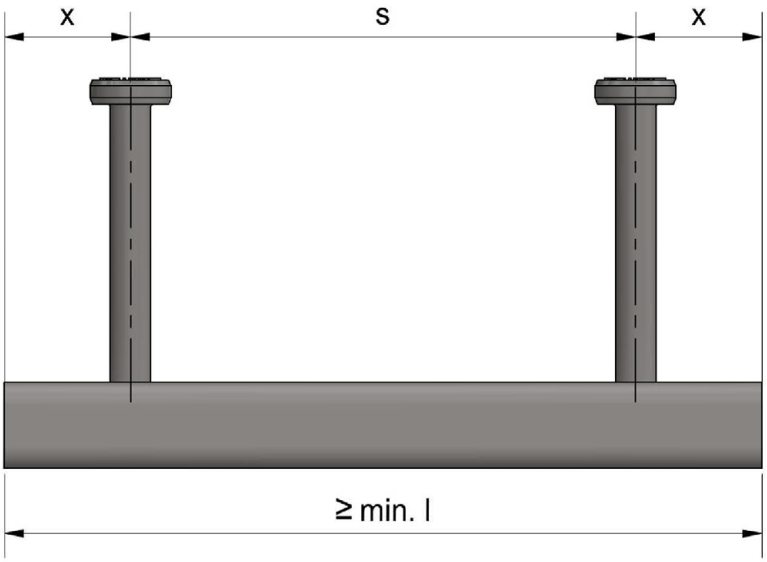

Table A3: Anchor positioning, channel length

Anchor channel	Anchor spacing		End spacing	Min. channel length
	s_{min}	s_{max}	x	min. l
	[mm]			
28/15 38/17	50	200	25	100
40/25 50/31	50	250	25	100
52/34 53/34	80	250	35	150

Modersohn® Anchor Channel MBA	**Annex A4**
Product description **Anchor positioning, channel length**	

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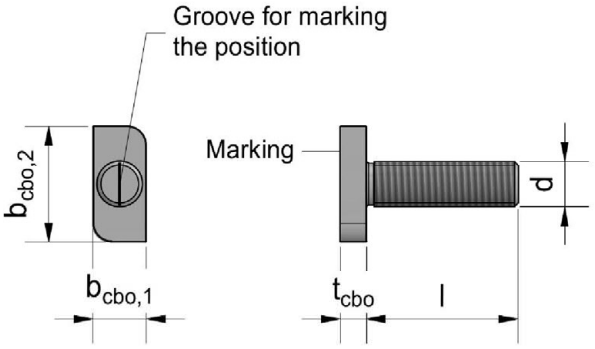
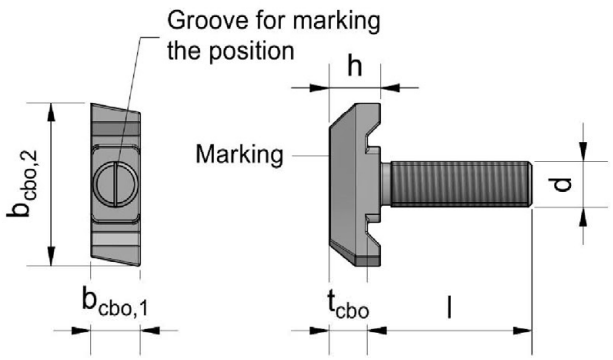
Modersohn® channel bolt

Hammer head geometry



Hook head geometry



Marking according to annex A2

Table A4: Dimensions of hammer head channel bolt [mm]

		Hammer head geometry			Alternative hammer head geometry				
MHK	**Thread diameter**	**Width $b_{cbo,1}$**	**Length $b_{cbo,2}$**	**Thickness t_{cbo}**	**Width $b_{cbo,1}$**	**Length $b_{cbo,2}$**	**Thickness t_{cbo}**	**Length l**	**Anchor channel**
28/15	M10	10,5	22,5	4,5	10	22,5	6	20 - 200	28/15
38/17	M10 M12 M16	14,1 14,1 16	30,5 30,5 31	7 7 8,5	15 15 - [1]	30,5 30,5 - [1]	7 7 - [1]	20 - 200 20 - 200 20 - 200	38/17

Table A5: Dimensions of hook head channel bolt [mm]

		Hook head geometry				Alternative hook head geometry					
MHK	**Thread diameter**	**Width $b_{cbo,1}$**	**Length $b_{cbo,2}$**	**Thickness t_{cbo}**	**Thickness h all**	**Width $b_{cbo,1}$**	**Length $b_{cbo,2}$**	**Thickness t_{cbo}**	**Thickness h all**	**Length l**	**Anchor channel**
40/25	M10 M12 M16	14 14 17	33,7 33,7 32,7	8 8 9	10,5 10,5 12	15 14 17	33,7 35 34	10 8,5 9	12,5 11 11,5	20 - 150 20 - 200 30 - 200	40/25
50/30	M12 M16 M20	13 17 21	43,3 43,3 43,3	10 11 12	13,5 14,5 15,5	15 20 20	43,3 43,3 43,3	12 14 15	15,5 17,5 18,5	20 - 200 30 - 200 30 - 200	50/31, 52/34, 53/34

Table A6: Strength grade

Strength grade	**50**	**70**
f_{uk} [N/mm²]	500	700
f_{yk} [N/mm²]	210	450

1) Product not available.

Modersohn® Anchor Channel MBA

Product description
Dimensions, strength grade of channel bolts

Annex A5

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Specification of intended use

Anchor channels and channel bolts subject to:
- Static and quasi-static tension and shear perpendicular to the longitudinal axis of the channel

Base materials:
- Compacted reinforced or unreinforced concrete without fibres according to EN 206:2013 + A1:2016
- Strength classes C12/15 to C90/105 according to EN 206:2013 + A1:2016
- Cracked or uncracked concrete

Use conditions (Environmental conditions):
- According to EN 1993-1-4:2006 + A1:2015 relating to corrosion resistance class (CRC) of all parts of the Modersohn® anchor channel according to Annex A2
- In case of using the material of the channel profile in CRC III, the anchors of the channel may be used in CRC II.

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 into account of the loads to be anchored. The position of the anchor channel and channel bolt are indicated on the design drawings (e.g. position of the anchor channel relative to reinforcements or to supports, etc.).
- For static and quasi-static loading the anchor channels are designed in accordance with EOTA TR 047 "Design of Anchor Channels", March 2018 or EN 1992-4:2018.

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 manipulations, repositioning or exchanging of channel components.
- Cutting of anchor channels is allowed only if pieces according to Annex A4, Table A3 are generated including end spacing and minimum channel length and 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 B4, 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 under the head of the anchors is properly compacted. The channels are protected from penetration of concrete into the internal space of the channels.
- Washer to the threaded bold may be chosen based on Annex A2 and Annex A5 and provided separately by the user.
- Orientating the channel bolt (groove according to Annex B5) rectangular to the channel axis.
- The required installation torques given in Annex B3, Table B2 have to be applied by a calibrated torque wrench and must not be exceeded.

Modersohn® Anchor Channel MBA	**Annex B1**
Intended Use **Specification and installation**	

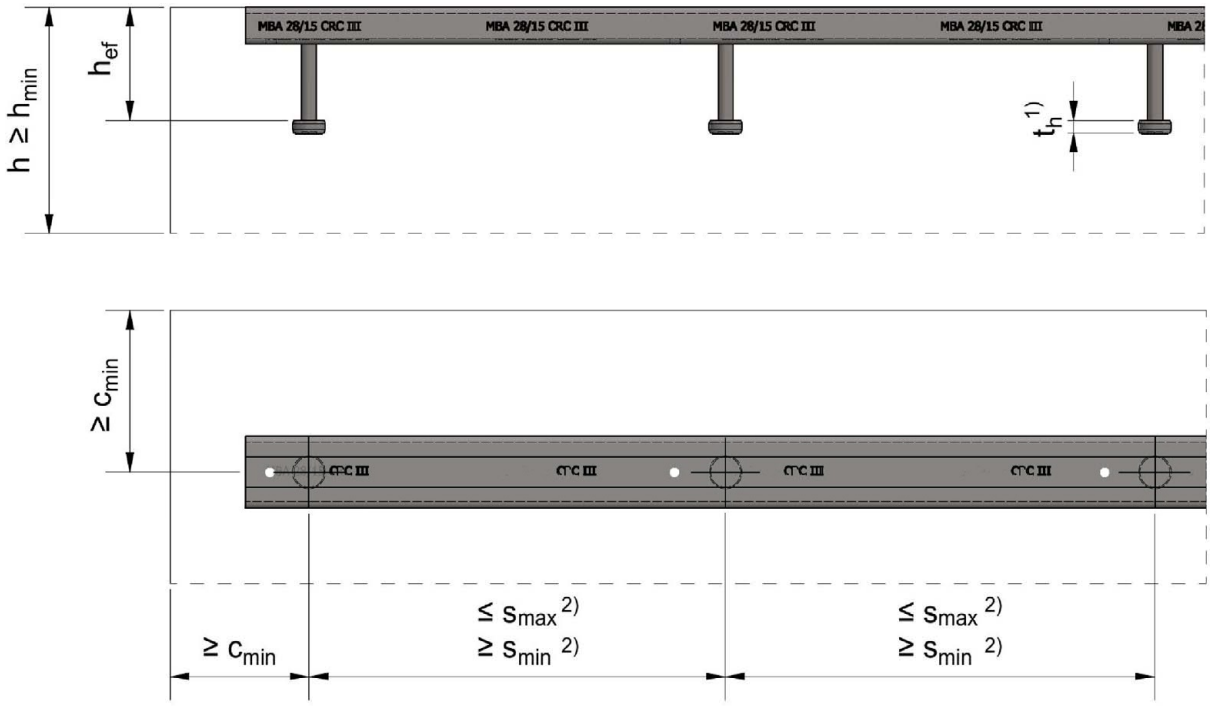


Table B1: Effective embedment depth, minimum edge distance and member thickness

Anchor channel			28/15	38/17	40/25	50/31	52/34	53/34
Effective embedment depth	**[mm]**	h_{ef}	45	72	80	99	151	151
Min. edge distance		c_{min}	40	50	50	75	100	100
Minimum thickness of concrete member		h_{min}	75	100	110	130	185	185

1) t_h = anchor head thickness according to Annex A3, Table A2

2) s_{min}, s_{max} according to Annex A4, Table A3

Modersohn® Anchor Channel MBA

Intended use
Installation parameters of Modersohn® anchor channel

Annex B2

Deutsches Institut für Bautechnik DIBt

Table B2: Minimum spacing and installation torque of Modersohn® channel bolt

Anchor channel	Channel bolt d	Min. spacing $s_{min,cbo}$ of the channel bolt	Installation torque [1]			
			$T_{inst,g}$		$T_{inst,s}$	
			General [2]		Steel to steel contact [3]	
			50 [4]	70 [4]	50 [4]	70 [4]
	[mm]	[mm]	[Nm]			
28/15	10	50	- [5]	13 (10) [6]	- [5]	40
38/17	10	50	- [5]	15	- [5]	40
	12	60	- [5]	25 (20) [6]	- [5]	50
	16	80	- [5]	30 (27) [6]	- [5]	110
40/25	10	50	15	- [5]	15	- [5]
	12	60	25 (20) [6]	25 (20) [6]	25	50
	16	80	30	30	65	110
50/31	12	60	25	25	25	50
	16	80	60	60	65	110
	20	100	75	75	130	210
52/34 53/34	12	60	25	25	25	50
	16	80	60	60	65	110
	20	100	75	75	130	210

1) $T_{inst,g}$ and $T_{inst,s}$ must not be exceeded
2) According to Annex B7, Figure 1
3) According to Annex B7, Figure 2
4) Strength class
5) Product not available
6) Values in brackets for applications in concrete of strength classes C12/15 and C16/20

Modersohn® Anchor Channel MBA

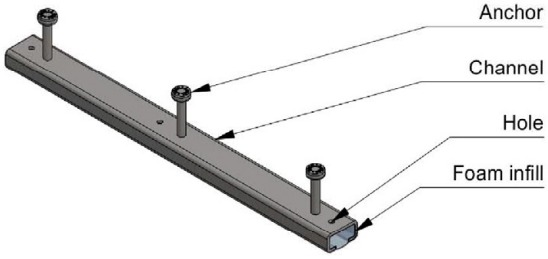
Intended use
Installation parameters of Modersohn® channel bolt

Annex B3

Deutsches Institut für Bautechnik DIBt

Instructions for fixing the Modersohn® anchor channel

Modersohn® anchor channels are filled with foam and have pre-punched holes in the back. The foam has to be cut flush to the edge of the channel. The channels should be installed according to the reinforcement plans and even with the concrete surface. To avoid displacing them, the anchor channels have to be fixed to the formwork while pouring the concrete.



Fixing the anchor channel to formwork

Steel formwork:

Figure **A**

Fixing the anchor channel to the steel formwork with Modersohn® channel bolts and nuts.

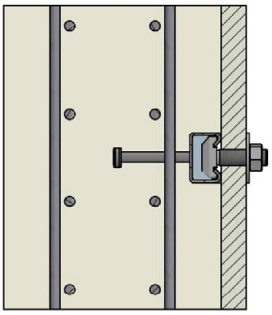
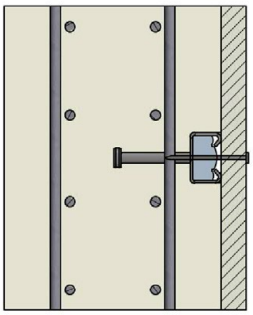


Figure **B**

Fixing the anchor channel to the formwork with rivets through the pre-punched holes in the back of the channel.



Timber formwork:

Figure **C**

Fixing the anchor channel to the timber formwork with nails through the pre-punched holes in the back of the channel. Stainless steel channels and channels in external use are to be fixed with stainless steel nails.

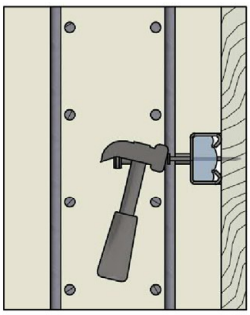
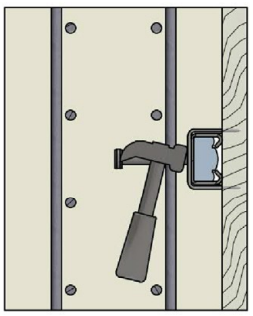


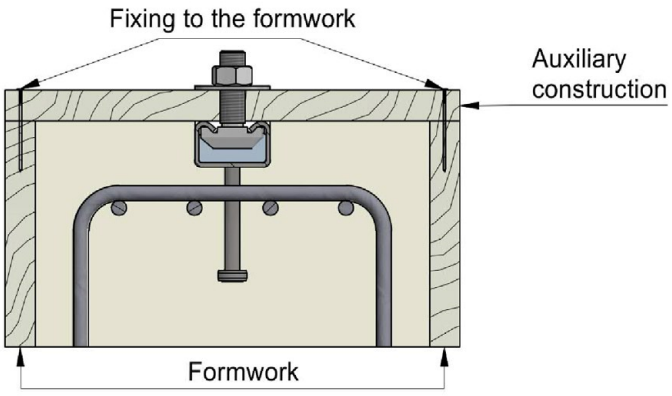
Figure **D**

Fixing the anchor channel to the timber formwork with staples.



Fixing the anchor channel at the top

If the anchor channel is installed on the top of the component, it has to be fixed to an auxiliary construction, e.g. with a Modersohn® channel bolt.
This auxiliary construction prevents the displacing or slipping of the anchor channel while compacting the concrete.



Modersohn® Anchor Channel MBA

Intended use
Installation instructions for anchor channel - part 1

Annex B4

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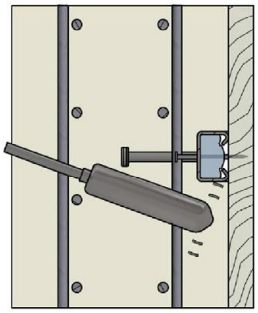
Regular compacting of concrete

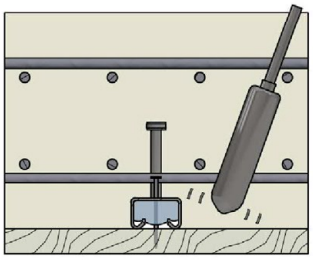
If anchor channels are installed at the side of the component, the concrete below the anchor channel has to be thoroughly compacted. Improper compaction of the concrete can lead to air entrapments and thereby to reduced load capacity.

Figure **E**



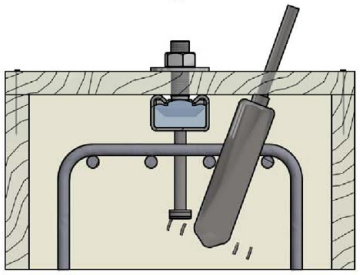
When installing an anchor channel at the bottom side of a member, the concrete needs to be compacted thoroughly to ensure a sufficient bonding.

Figure **F**



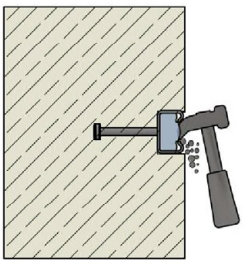
Anchor channels installed at the top of the component have to be fixed to an auxiliary construction to prevent displacing or slipping. A suitable vibrator has to be used to compact the concrete. If you press the anchor channel into the concrete, you have to compact the concrete with a vibrator!

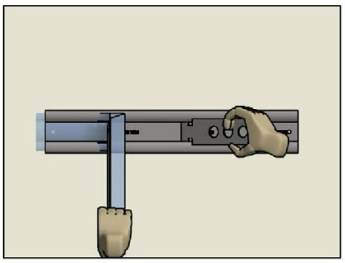
Figure **G**



How to remove the channel filling

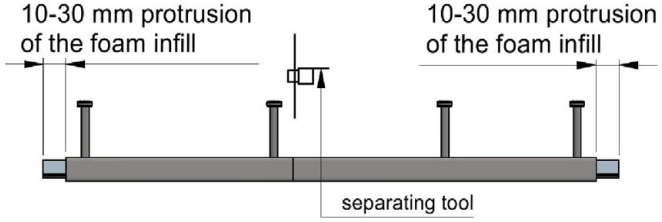
After dismantling the formwork, remove the fixing material and the remaining concrete. Next remove the foam infill with a suitable tool, e.g. a screwdriver.





Cutting to size long anchor channels

Modersohn® anchor channels will be delivered prefabricated. The channels can be cut to size at the construction site. Then please follow these instructions:



1. Every piece of channel at least has to have two anchors.
2. The channel has to be cut to size according to Annex A4 Table A3.
3. The protrusion of the foam infill with 10-30 mm (delivery condition) has to be cut flush to the edge of the Modersohn® anchor channel before installing.

Modersohn® Anchor Channel MBA

Intended use
Installation instructions for anchor channel - part 2

Annex B5

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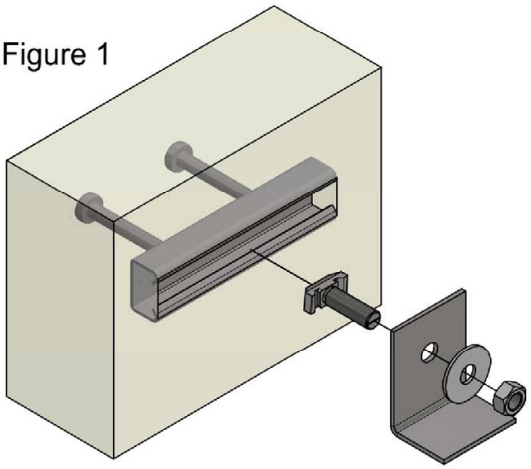
Fastening the Modersohn® channel bolt to the anchor channel

Figure 1



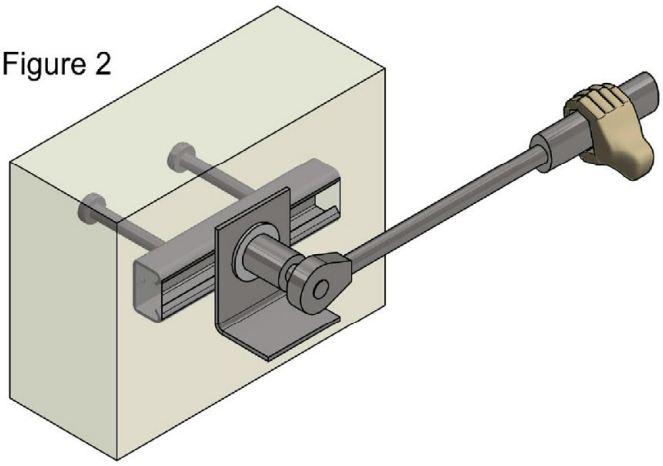
a) Installation torque (General)

1. Insert the Modersohn® channel bolt into the horizontal slot of the channel (Figure 1).

2. Turn the channel bolt 90° in clockwise direction, to lock the head of the bolt into position (Figure 1).

3. Minimum distance to the edge of the channel is to be set according to Annex A4, Table A3.

Figure 2

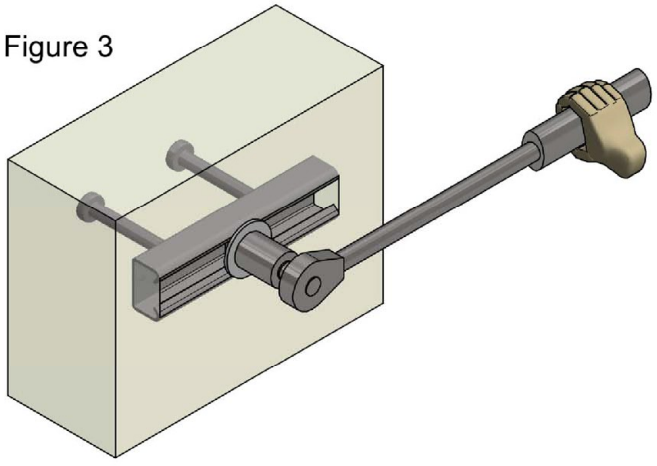


4. Place the washer under the nut (Figure 1).

5. Check the correct installation of the Modersohn® channel bolt.
The groove at the bottom of the threaded bolt of the screw has to be set crosswise to the longitudinal axis.

6. Tighten the nut with the installation torque mentioned in Annex B3 Table B2 by using a calibrated torque wrench.
The installation torque must not be exceeded.

Figure 3



b) Installation torque (Steel to steel contact)

1. Place a washer between the channel and the attachment to create a defined contact.

2. Tighten the nut with the installation torque mentioned in Annex B3, Table B2 by using a calibrated torque wrench.
The installation torque must not be exceeded.

Modersohn® Anchor Channel MBA	**Annex B6**
Intended use **Installation instructions for anchor channel - part 3**	

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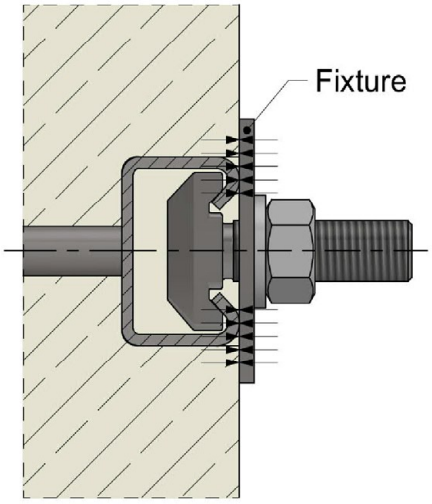
General

The fixture is in contact with the channel profile and the concrete surface.

The installation torques according to Annex B3, Table B2 shall be applied and must not be exceeded.

Figure 1

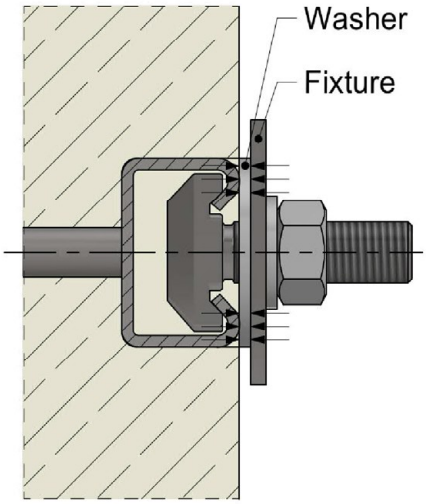


Steel to steel contact

The fixture is not in contact with the concrete surface. The fixture is fastened to the anchor channel by suitable steel part (e.g. washer).

The installation torques according to Annex B3 Table B2 shall be applied and must not be exceeded.

Figure 2



Modersohn® Anchor Channel MBA	**Annex B7**
Intended use **Position of fixture**	

Deutsches Institut für Bautechnik DIBt

Table C1: Characteristic resistances under tension load steel failure of Modersohn® anchor channel

Anchor channel			28/15	38/17	40/25	50/31	52/34, 53/34
Steel failure: Anchor							
Characteristic resistance	$N_{Rk,s,a}$	[kN]	15,3	27,1	27,1	42,4	71,7
Partial factor	γ_{Ms} [1)]		1,85				
Steel failure: Connection between anchor and channel							
Characteristic resistance	$N_{Rk,s,c}$	[kN]	18	28	20	32	76
Partial factor	$\gamma_{Ms,ca}$ [1)]		1,8				
Steel failure: Local flexure of channel lips							
Characteristic spacing of channel bolts for $N_{Rk,s,l}$	$s_{l,N}$	[mm]	56	76	80	100	106
Characteristic resistance	$N^0_{Rk,s,l}$	[kN]	18	28	20	32	76
Partial factor	$\gamma_{Ms,l}$ [1)]		1,8				
Steel failure: Flexure of channel							
Characteristic resistance of channel	$M_{Rk,s,flex}$	[Nm]	432	836	1262	2528	3297
Partial factor	$\gamma_{Ms,flex}$ [1)]		1,15				

1) In absence of other national regulations.

Modersohn® Anchor Channel MBA

Characteristic resistances under tension load Steel failure of anchor channel

Annex C1

Deutsches Institut für Bautechnik DIBt

Table C2: Characteristic resistances under tension load concrete failure

Anchor channel				28/15	38/17	40/25	50/31	52/34, 53/34
Concrete failure: Pullout								
Characteristic resistance in cracked concrete C12/15		$N_{Rk,p}$	[kN]	9,4	13,6	13,6	18,4	32,2
Characteristic resistance in uncracked concrete C12/15				13,2	19,0	19,0	25,8	45,1
Increasing factor for $N_{Rk,p}$ = $N_{Rk,p}(C12/15) \cdot \Psi_c$	C20/25	Ψ_c	[-]	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		$\gamma_{Mp} = \gamma_{Mc}$ [1)]		1,5				
Concrete failure: Concrete cone								
Factor for cracked concrete		$k_{cr,N}$		7,2	7,8	7,9	8,1	8,7
Factor for uncracked concrete		$k_{ucr,N}$		10,3	11,1	11,3	11,6	12,4
Partial factor		γ_{Mc} [1)]		1,5				
Concrete failure: Splitting								
Characteristic edge distance		$c_{cr,sp}$	[mm]	3·h_{ef}				
Characteristic spacing		$s_{cr,sp}$		6·h_{ef}				
Partial factor		γ_{Msp} [1)]		1,5				

1) In absence of other national regulations.

Table C3: Displacements under tension load

Anchor channel			28/15	38/17	40/25	50/31	52/34, 53/34
Tension load	N	[kN]	4,2	7,6	9,9	18,7	29,2
Short-term displacement	δ_{N0}	[mm]	0,4	0,4	0,5	0,5	0,6
Long-term displacement	$\delta_{N\infty}$	[mm]	1,6	1,6	1,6	1,6	1,6

Modersohn® Anchor Channel MBA

Characteristic resistances under tension load Concrete failure and displacements

Annex C2

Deutsches Institut für Bautechnik DIBt

Table C4: Characteristic resistances under shear load steel failure of Modersohn® anchor channel and concrete failure

Anchor channel			28/15	38/17	40/25	50/31	52/34, 53/34
Steel failure: Anchor							
Characteristic resistance	$V_{Rk,s,a,y}$	[kN]	18	30	31	59	74
Partial factor	$\gamma_{Ms,a}$ [1)]		1,54				
Steel failure: Connection between anchor and channel							
Characteristic resistance	$V_{Rk,s,c,y}$	[kN]	18	30	31	59	74
Partial factor	$\gamma_{Ms,ca}$ [1)]		1,8				
Steel failure: Local flexure of channel lips							
Characteristic resistance	$V^0_{Rk,s,l,y}$	[kN]	18	30	31	59	74
Partial factor	$\gamma_{Ms,l}$ [1)]		1,8				
Characteristic spacing of channel bolts for $V_{Rk,s,l}$	$s_{l,V}$	[mm]	56	76	80	100	106
Concrete failure: Pry-out							
Factor k	k_8 [2)]		1,0	2,0			
Partial factor	γ_{Mc} [1)]		1,5				
Concrete failure: Concrete edge							
Factor for cracked concrete	$k_{cr,V}$		3,1	7,3	6,5	5,6	6,4
Factor for uncracked concrete	$k_{ucr,V}$		4,3	10,2	9,1	7,8	9,0
Partial factor	γ_{Mc} [1)]		1,5				

1) In absence of other national regulations.
2) Without reinforcement.
In case of supplementary reinforcement the factor k_8 should be multiplied with 0,75.

Modersohn® Anchor Channel MBA

Characteristic resistances under shear load
Steel failure of anchor channel and concrete failure

Annex C3

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Table C5: Displacements under shear load

Anchor channel			28/15	38/17	40/25	50/31	52/34, 53/34
Shear load	V	[kN]	2,7	7,8	7,6	9,4	16,2
Short-term displacement	$\delta_{V,y,0}$	[mm]	0,4	0,6	0,6	0,8	0,9
Long-term displacement	$\delta_{V,y,\infty}$	[mm]	0,6	0,9	0,9	1,2	1,4

Table C6: Characteristic resistances under combined tension and shear load

Anchor channel	28/15	38/17	40/25	50/31	52/34, 53/34

Steel failure: Local flexure of channel lips

Factor	k_{13}	values are taken from EN 1992-4:2018

Steel failure: Anchor and connection between anchor and channel

Factor	k_{14}	values are taken from EN 1992-4:2018

Modersohn® Anchor Channel MBA	
Displacements under shear load Characteristic resistances under combined tension and shear loads	**Annex C4**

Deutsches Institut für Bautechnik DIBt

Table C7: Characteristic resistances under tension load steel failure of Modersohn® channel bolt

Channel bolt					28/15	38/17	40/25	50/30
Steel failure: Channel bolt								
Characteristic resistance under tension	$N_{Rk,s}$	[kN]	**M10**	50 [1]	- [3]	- [3]	25,4	- [3]
				70 [1]	30,9	40,6	- [3]	- [3]
			M12	50 [1]	- [3]	- [3]	41,9	42,2
				70 [1]	- [3]	45,7	59,0	59,0
			M16	50 [1]	- [3]	- [3]	55,7	68,3
				70 [1]	- [3]	101,7	94,4	109,9
			M20	50 [1]	- [3]	- [3]	- [3]	88,9
				70 [1]	- [3]	- [3]	- [3]	145,2
Partial factor	γ_{Ms} [2]			50 [1]	2,86			
				70 [1]	1,87			

Table C8: Characteristic resistances under shear load steel failure of Modersohn® channel bolt

Channel bolt					28/15	38/17	40/25	50/30
Steel failure: Channel bolt								
Characteristic resistance under shear	$V_{Rk,s}$	[kN]	**M10**	50 [1]	- [3]	- [3]	17,4	- [3]
				70 [1]	24,4	24,4	- [3]	- [3]
			M12	50 [1]	- [3]	- [3]	25,3	25,3
				70 [1]	- [3]	35,4	35,4	35,4
			M16	50 [1]	- [3]	- [3]	47,1	47,1
				70 [1]	- [3]	65,9	65,9	65,9
			M20	50 [1]	- [3]	- [3]	- [3]	73,5
				70 [1]	- [3]	- [3]	- [3]	102,9
Characteristic flexural resistance	$M^0_{Rk,s}$	[Nm]	**M10**	50 [1]	- [3]	- [3]	37,4	- [3]
				70 [1]	52,3	52,3	- [3]	- [3]
			M12	50 [1]	- [3]	- [3]	65,5	65,5
				70 [1]	- [3]	91,6	91,6	91,6
			M16	50 [1]	- [3]	- [3]	166,5	166,5
				70 [1]	- [3]	232,3	232,3	232,3
			M20	50 [1]	- [3]	- [3]	- [3]	324,5
				70 [1]	- [3]	- [3]	- [3]	453,8
Partial factor	γ_{Ms} [2]			50 [1]	2,38			
				70 [1]	1,56			

1) Strength class
2) In absence of other national regulations.
3) No performance assessed.

Modersohn® Anchor Channel MBA

Characteristic resistances under tension and shear load Steel failure of channel bolt

Annex C5