

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-13/0224
of 26 March 2019

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

21 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

European Technical Assessment

ETA-13/0224

English translation prepared by DIBt

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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 static and quasi-static loading tension loading	See Annex C1, C2, C4
Characteristic resistance under static and quasi-static loading shear loading	See Annex C3, C5
Characteristic resistance to combined static and quasi-static tension and shear loading	See Annex C4
Displacements under static and quasi-static loading	See Annex C2, C4
Characteristic resistance under fatigue tension loading	No performance assessed

3.2 Safety in case of fire (BWR 2)

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

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

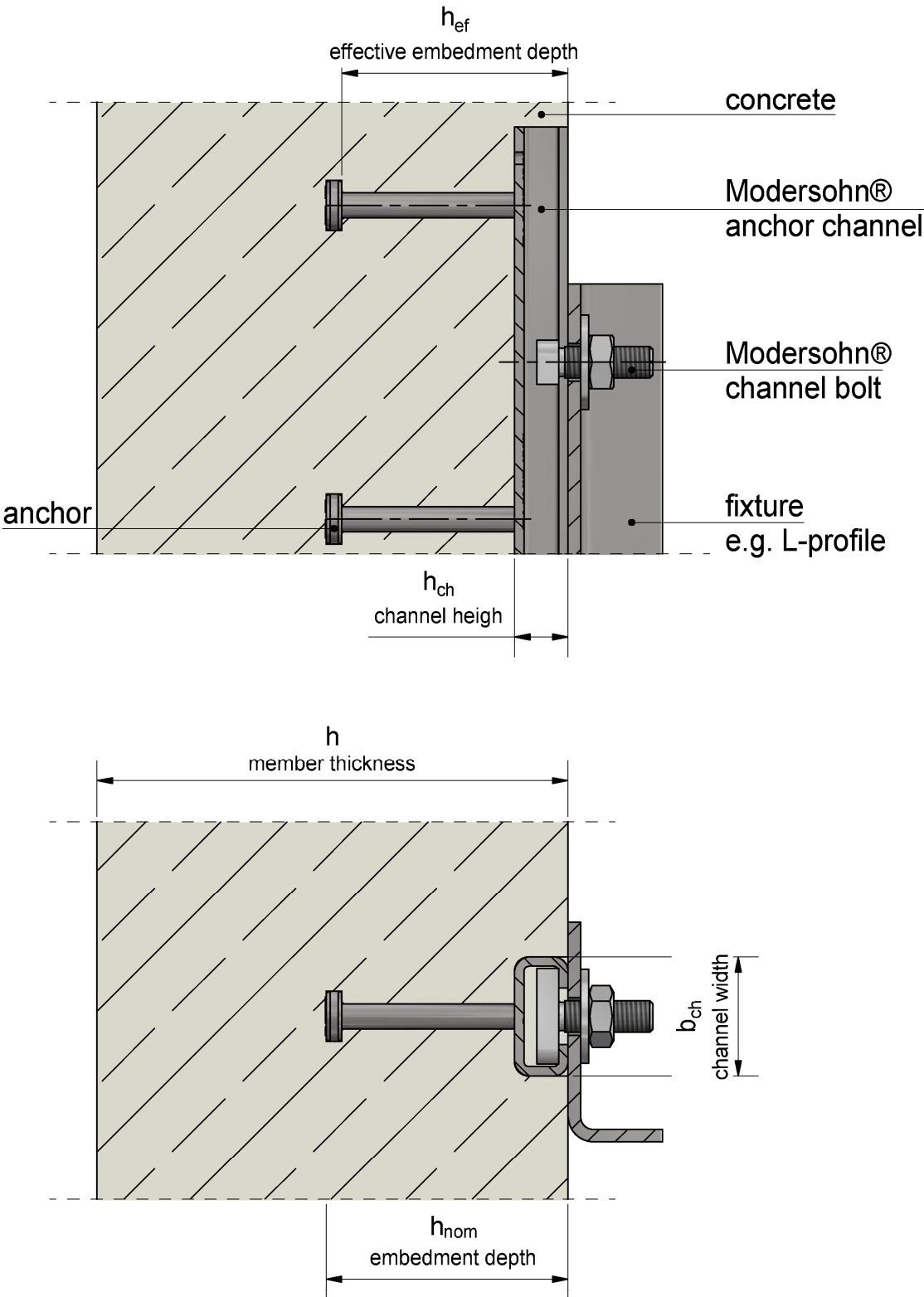
5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

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 26 March 2019 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

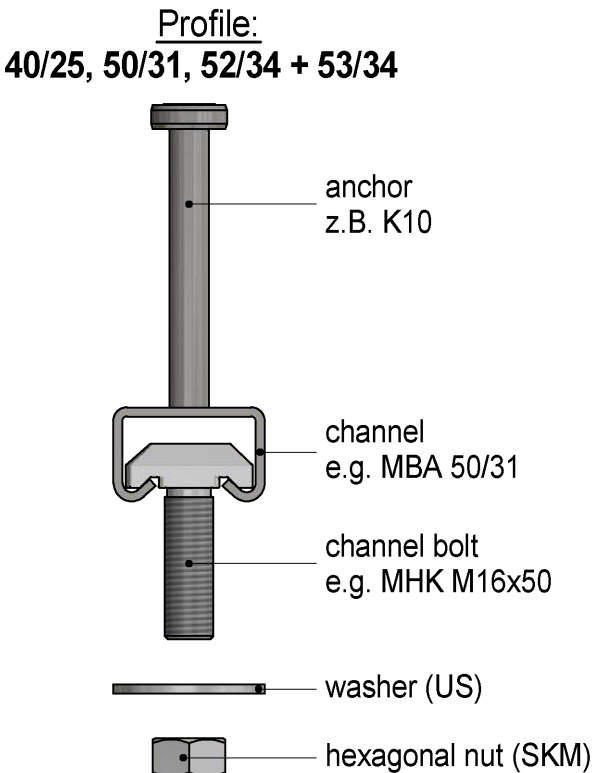
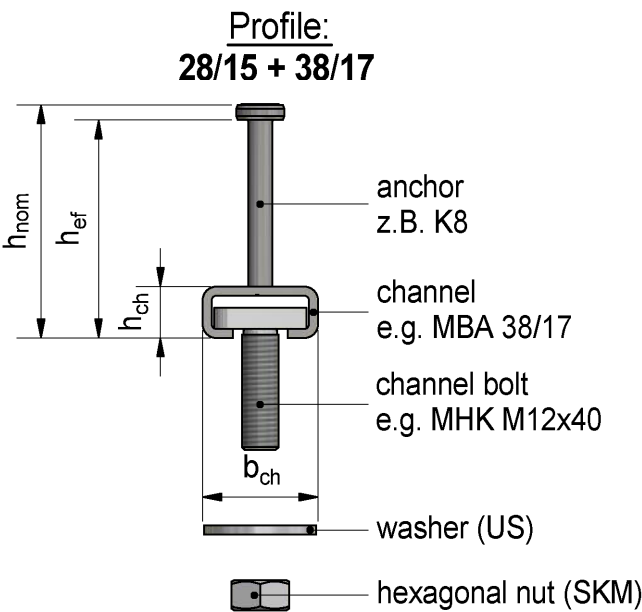
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Modersohn® Anchor Channel MBA	
Product description Installed condition	Annex A1

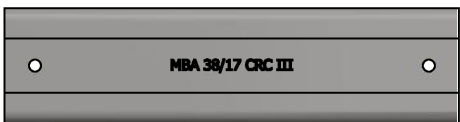
Modersohn® anchor channel



legend

h_{ch}	channel height
b_{ch}	channel width
h_{ef}	effective embedment depth
h_{nom}	embedment depth
US	according to EN ISO 7089:2000 and EN ISO 7093-1:2000
SKM	according to EN ISO 4032:2012

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



stamping on back of channel:

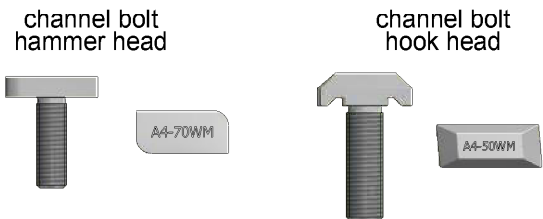
M	identifying mark of the producer
BA	type of anchor channel
38/17	size
CRC III	material

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

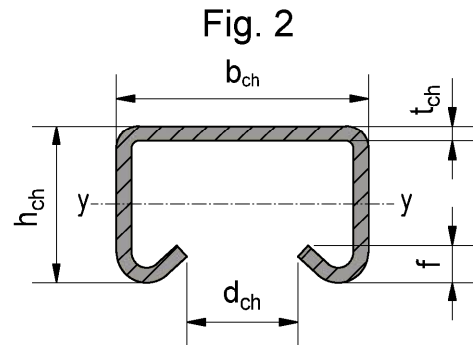
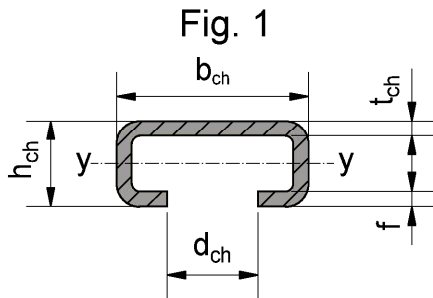
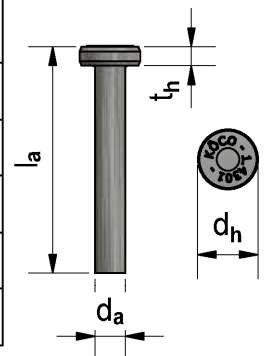


Table A1: Geometrical profile properties

anchor channel	figure	dimensions					moment of inertia	
		b _{ch}	h _{ch}	t _{ch}	d _{ch}	f	I _y	
		[mm]					[mm ⁴]	
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: Types of anchors

type	anchor channel	shaft ød _a	head ød _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
Geometrical profile properties, types of anchor

Annex A3

Anchor positioning and channel length

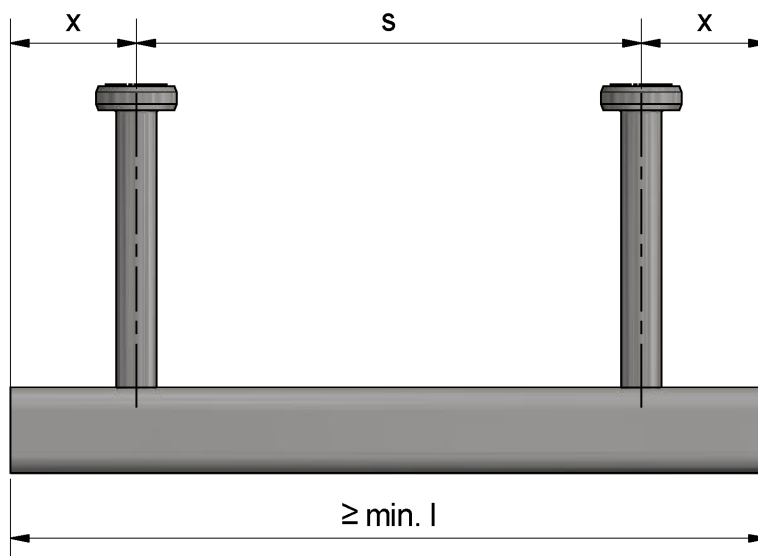


Table A3: Anchor positioning, channel length

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

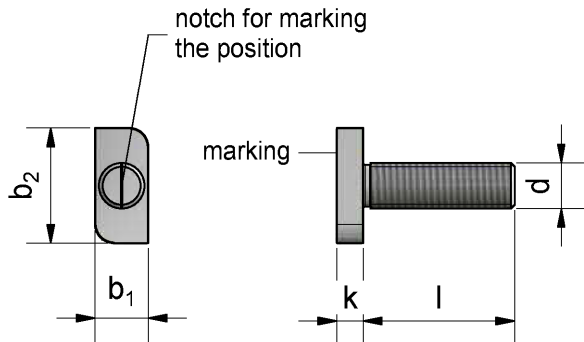
Modersohn® Anchor Channel MBA

Product description
Anchor positioning, channel length

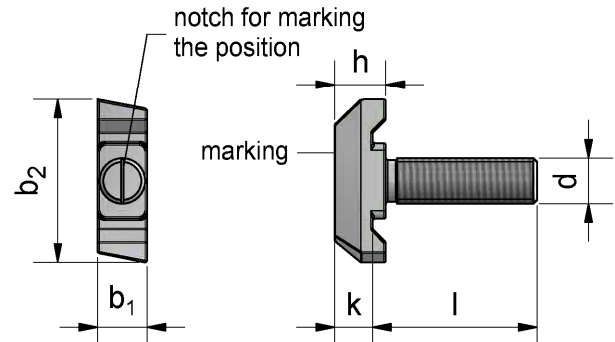
Annex A4

Modersohn® channel bolt

hammer head geometry



hook head geometry



marking acc. annex A2

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

		hammer head geometry			alternative hammer head geometry				
MHK	thread d	width b ₁	length b ₂	thickness k	width b ₁	length b ₂	thickness k	length l	anchor channel
28/15	M10	10,5	22,5	4,5	10	22,5	6	20 - 200	28/15
38/17	M10	14,1	30,5	7	15	30,5	7	20 - 200	38/17
	M12	14,1	30,5	7	15	30,5	7	20 - 200	

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

		hook head geometry				alternative hook head geometry					
MHK	thread d	width b ₁	length b ₂	thickness		width b ₁	length b ₂	thickness		length l	anchor channel
40/25	M10	14	33,7	8	10,5	15	33,7	10	12,5	20 - 150	40/25
	M12	14	33,7	8	10,5	15	33,7	11	13,5	20 - 200	
	M16	17	32,7	9	12					30 - 200	
50/30	M12	13	43,3	10	13,5	15	43,3	12	15,5	20 - 200	50/31,
	M16	17	43,3	11	14,5	20	43,3	14	17,5	30 - 200	52/34,
	M20	21	43,3	12	15,5	20	43,3	15	18,5	30 - 200	53/34

Table A6: Strength grade

strength grade	50	70
f _{uk} [N/mm ²]	500	700
f _{yk} [N/mm ²]	210	450

Modersohn® Anchor Channel MBA

Product description
Dimensions, strength grade of channel bolts

Annex A5

Specification of intended use

Anchor channels and channel bolts subject to:

- Static and quasi-static loads in 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 EN 1993-1-4:2006 + A1:2015 to the corrosion resistance class (CRC) to Annex A2

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.
- 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 are properly compacted. The channels are protected from penetration of concrete into the internal space of the channels.
- Washer may be chosen according to 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 must be applied and must not be exceeded.

Modersohn® Anchor Channel MBA

**Intended Use
Specification and installation**

Annex B1

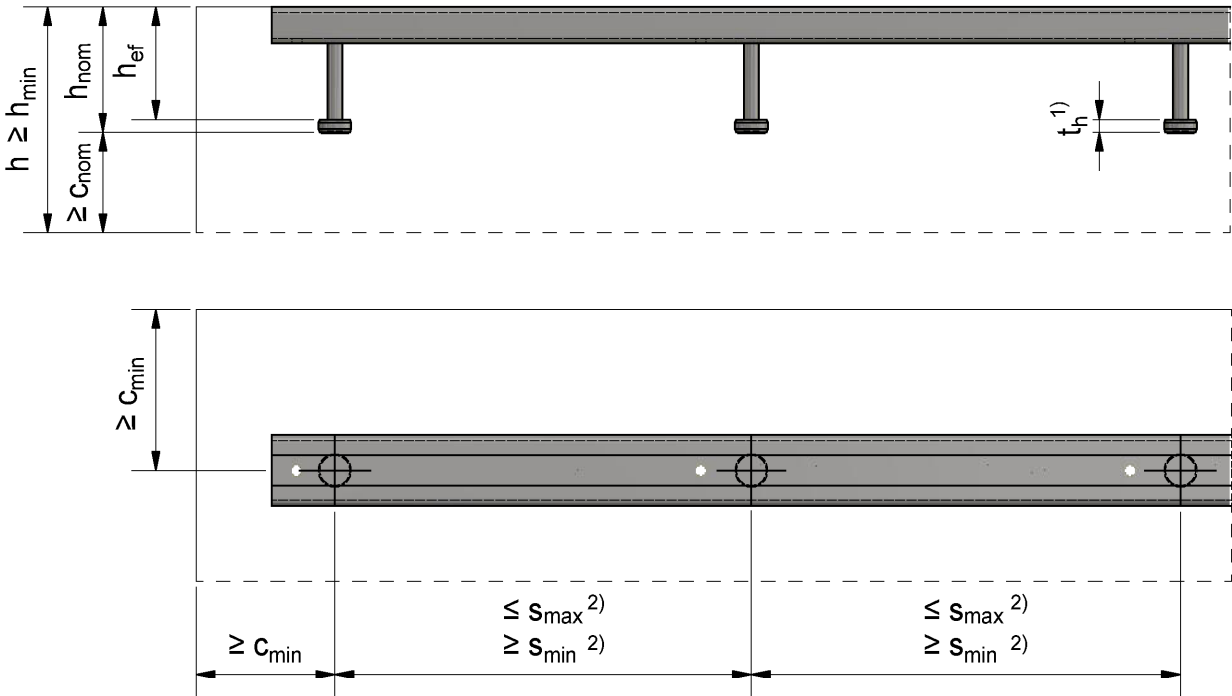


Table B1: Effective embedment depth, minimum edge distance and member thickness

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
min. member thickness		h_{min}	$h_{ef} + t_h^{1)} + c_{nom}^{3)}$					

1) t_h = anchor head thickness acc. Annex A3, Table A2
2) s_{min} , s_{max} acc. Annex A4, Table A3
3) $c_{nom} \geq 30$ mm

Modersohn® Anchor Channel MBA

Intended use
Installation parameters of Modersohn® anchor channel

Annex B2

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

anchor channel	channel bolt Ø	min spacing $s_{min,cbo}^{4)}$ of the channel bolt	installation torque ⁵⁾			
			$T_{inst,g}$		$T_{inst,s}$	
			general ²⁾		steel-steel contact ³⁾	
			50 ¹⁾	70 ¹⁾	50 ¹⁾	70 ¹⁾
	[mm]	[mm]	[Nm]			
28/15	10	50	-	13	-	40
38/17	10	50	-	15	-	40
	12	60	-	25	-	70
40/25	10	50	13 ⁶⁾	-	15	-
	12	60	22 ⁶⁾	-	25	-
	16	80	40 ⁶⁾	-	65	-
50/31	12	60	25	-	25	-
	16	80	60	-	65	-
	20	100	75	-	130	-
52/34 53/34	12	60	25	-	25	-
	16	80	60	-	65	-
	20	100	75	-	130	-

1) strength class

2) acc. Annex B7, Fig. 1

3) acc. Annex B7, Fig. 2

4) acc. Annex C1, Fig. 1

5) $T_{inst,g}$ and $T_{inst,s}$ = 10 Nm must not be exceeded

6) For installation in C12/15 and C16/20:

M10 : $T_{inst,g}$ = 10 Nm

M12 : $T_{inst,g}$ = 17 Nm

M16 : $T_{inst,g}$ = 30 Nm

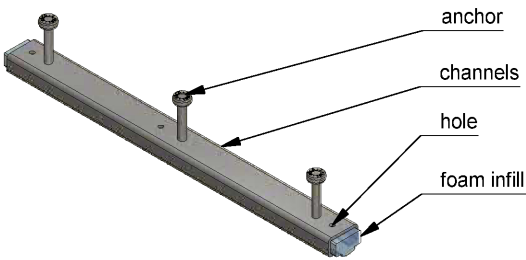
Modersohn® Anchor Channel MBA

Intended use
Installation parameters of Modersohn® channel bolt

Annex B3

Instructions for fixing the Modersohn® anchor channel

Modersohn® anchor channels are filled with foam and have pre-punched holes in the back. The foam is 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 anchor channel to formwork

Steel formwork:

Figure A

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

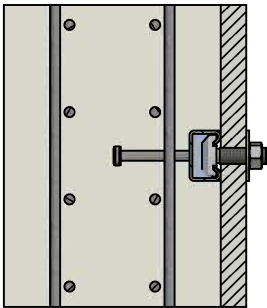
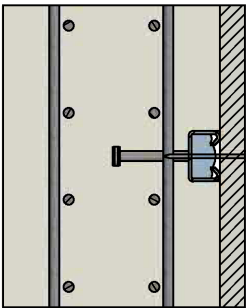


Figure B

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



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.

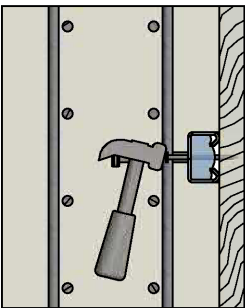
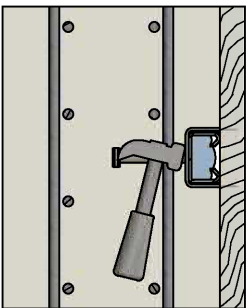


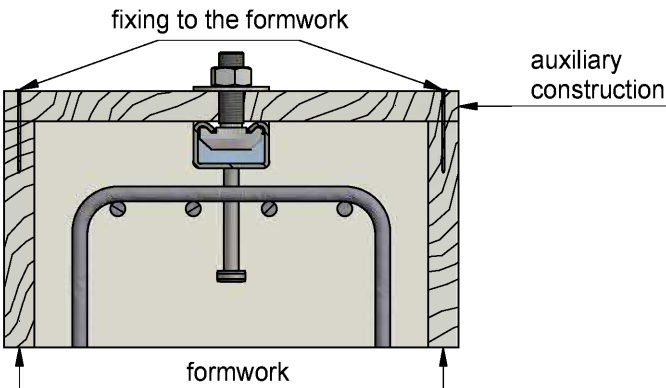
Figure D

Fixing the anchor channel to the timber formwork with staples.



Fixing anchor channel at the top

If the anchor channel is installed on the top of the component, it must 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

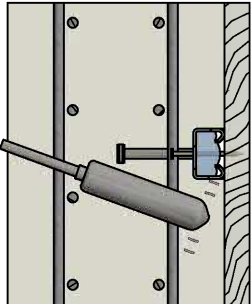
Intended use
Installation instructions for anchor channel - part 1

Annex B4

Regular compacting of concrete

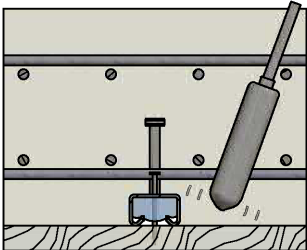
Figure E

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



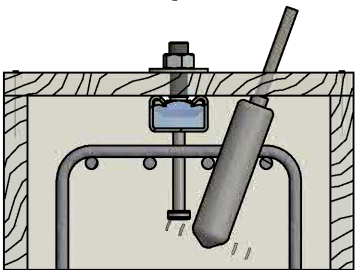
When installing an anchor channel at the bottom side of a member, the concrete needs to be compacted thoroughly to ensure a sufficient bonding.

Figure F



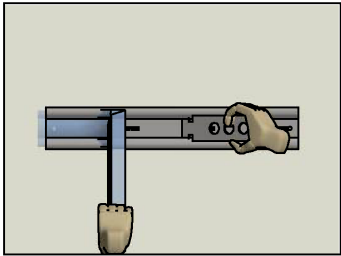
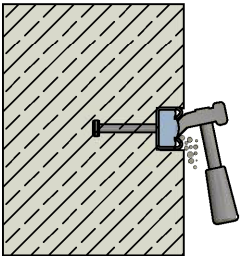
Anchor channels installed at the top of the component must be fixed to an auxiliary construction to prevent displacing or slipping. A suitable vibrator has to be used to compact the concrete. If you press the anchor channel into the concrete, you have to compact the concrete with a vibrator!

Figure G



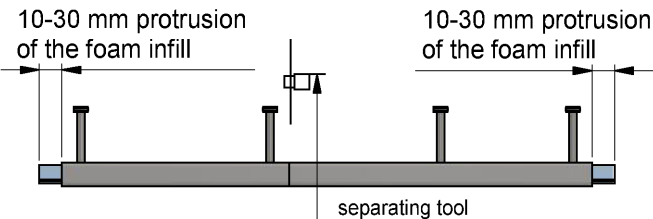
How to remove the channel filling

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 the instructions:



1. Every piece of channel must have at least two anchors.
2. The channel must be cut according to Annex A4 Table A3.
3. The protrusion of the foam infill with 10-30 mm (delivery condition) must 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

Fastening the Modersohn® channel bolt to the anchor channel

Fig. 1

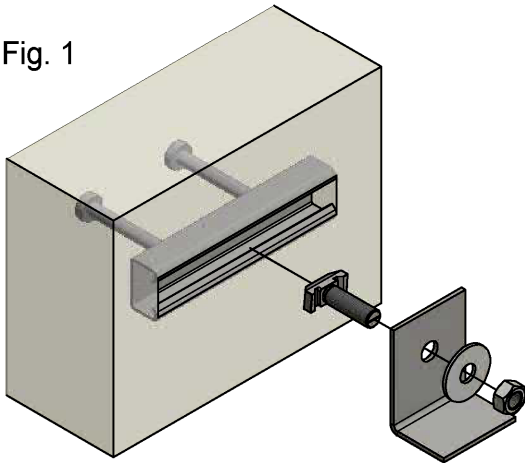


Fig. 2

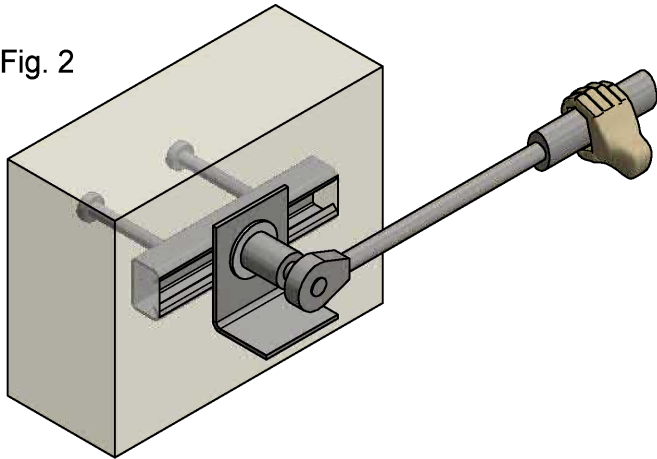
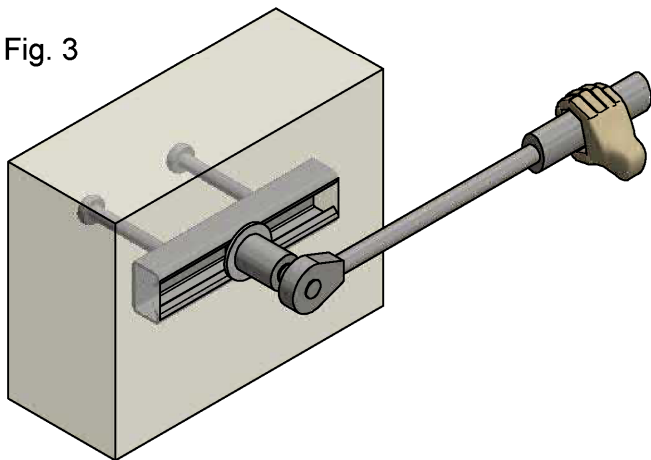


Fig. 3



- a) Torque (general)
1. Insert the Modersohn® channel bolt into the horizontal slot of the channel (Fig. 1).
 2. Turn the channel bolt 90° in clockwise direction, then the head of the bolt locks into position (Fig. 1).
 3. Minimum distance to the edge of the channel is to be set acc. Annex A4, Table A3.
 4. Place washer under the nut (Fig. 1).
 5. Check if the Modersohn® channel bolt is installed correctly.
The notch on the bottom of the threaded bolt of the screw must be set crosswise to the longitudinal axis.
 6. Tighten the nut with the torque mentioned in Annex B3 Table B2.
The torque must not be exceeded.

- b) 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 torque mentioned in Annex B3, Table B2. The torque must not be exceeded.

Modersohn® Anchor Channel MBA

Intended use
Installation instructions for anchor channel - part 3

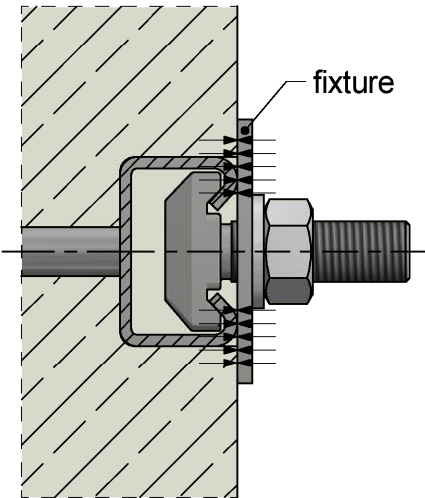
Annex B6

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.

Fig. 1

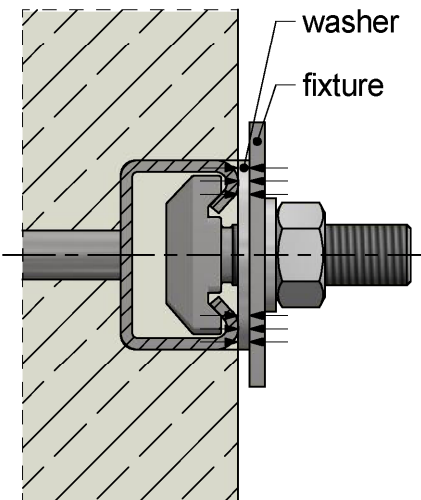


Steel-to-steel contact

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.

Fig. 2



Modersohn® Anchor Channel MBA

Intended use
Position of fixture

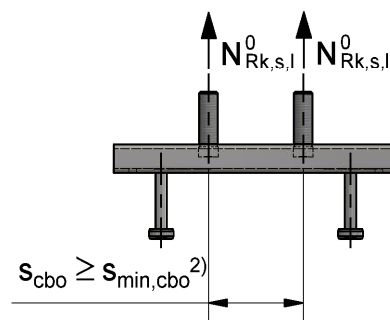
Annex B7

**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	γ _{Ms,ca} ¹⁾		1,8				
steel failure, local flexure of channel lips							
characteristic spacing of channel bolts for N _{Rk,s,l} ⁰	s _{l,N}	[mm]	56	76	80	100	106
characteristic resistance	N _{Rk,s,l} ⁰	[kN]	18	28	20	32	76
partial factor	γ _{Ms,l} ¹⁾		1,8				
steel failure, flexure resistance of channel							
characteristic flexure resistance of channel	M _{Rk,s,flex}	[Nm]	432	836	1262	2528	3297
partial factor	γ _{Ms,flex} ¹⁾		1,15				

1) in absence of other national regulations

Fig. 1: Spacing



2) $s_{min,cbo}$ acc. Annex B3, Table B2

Modersohn® Anchor Channel MBA

**Characteristic resistances under tension load
Steel failure of anchor channel**

Annex C1

**Table C2: Characteristic resistances under tension load
concrete failure**

anchor channel			28/15	38/17	40/25	50/31	52/34, 53/34	
pullout failure								
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	16,3	19,0	25,8	45,1
increasing factor for N _{RK,p}	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		γ _{Mp} = γ _{Mc} ¹⁾		1,5				
concrete cone failure								
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
effective embedment depth		h _{ef}	[mm]	45	72	80	99	151
partial factor		γ _{Mc} ¹⁾		1,5				
splitting failure								
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 time displacement	δ_{N0}	[mm]	0,4	0,4	0,5	0,5	0,6
long time 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

**Table C4: Load perpendicular to longitudinal axis of channel
steel failure of Modersohn® anchor channel and concrete failure**

anchor channel	28/15	38/17	40/25	50/31	52/34, 53/34
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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	$\gamma_{Ms,c}^{1)}$		1,8				

steel failure, local flexure of channel lips

characteristic resistance	$V_{Rk,s,l,y}^0$	[kN]	18	30	31	59	74
partial factor	$\gamma_{Ms,l}^{1)}$		1,8				
characteristic spacing of channel bolts for $V_{Rk,s,l}^0$	$s_{l,v}$	[mm]	56	76	80	100	106

pry out failure

factor k	$k_8^{2)}$	1,0	2,0
partial factor	$\gamma_{Mc}^{1)}$	1,5	

concrete edge failure

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	$\gamma_{Mc}^{1)}$		1,5				

Characteristic resistances for load in channel longitudinal direction are not rated.

1) in absence of other national regulations

2) without reinforcement

In case of supplementary reinforcement the factor k_8 could be multiplied with 0,75.

Modersohn® Anchor Channel MBA

**Load perpendicular to longitudinal axis of channel
Steel failure of anchor channel and concrete failure**

Annex C3

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 time displacement	$\delta_{V,y,0}$	[mm]	0,4	0,6	0,6	0,8	0,9
long time displacement	$\delta_{V,y,\infty}$	[mm]	0,6	0,9	0,9	1,2	1,4

Table C6: Characteristic resistances with combined shear and tension load

anchor channel			28/15	38/17	40/25	50/31	52/34, 53/34
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steel failure, local flexure of channel lips

factor	k_{13}	1,0	1,0	1,0	1,0	1,0
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steel failure, anchor and connection between anchor and channel

factor	k_{14}	1,0	1,0	1,0	1,0	1,0
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Table C7: Characteristic resistances under tension load

steel failure of Modersohn® channel bolt

channel bolt			28/15	38/17	40/25	50/30
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steel failure, channel bolt

characteristic resistance	N _{Rk,s}	[kN]	M10	50 ¹⁾	-	-	25,4	-
				70 ¹⁾	30,9	40,6	-	-
			M12	50 ¹⁾	-	-	41,9	42,2
				70 ¹⁾	-	45,7	-	-
			M16	50 ¹⁾	-	-	55,7	68,3
				70 ¹⁾	-	-	-	-
			M20	50 ¹⁾	-	-	-	88,9
				70 ¹⁾	-	-	-	-
partial factor	$\gamma_{Ms}^{2)}$			50 ¹⁾	2,86			
				70 ¹⁾	1,87			

1) strength class

2) in absence of other national regulations

Modersohn® Anchor Channel MBA

Displacements under shear load
Characteristic resistance of Modersohn® channel bolt

Annex C4

**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	V _{Rk,s}	[kN]	M10	50 ¹⁾	-	-	17,4	-
				70 ¹⁾	24,4	24,4	-	-
			M12	50 ¹⁾	-	-	25,3	25,3
				70 ¹⁾	-	35,4	-	-
			M16	50 ¹⁾	-	-	47,1	47,1
				70 ¹⁾	-	-	-	-
			M20	50 ¹⁾	-	-	-	73,5
				70 ¹⁾	-	-	-	-
partial factor	γ _{Ms} ²⁾			50 ¹⁾	2,38			
				70 ¹⁾	1,56			

**Table C9: Characteristic flexure resistances
steel failure of Modersohn® channel bolt**

channel bolt					28/15	38/17	40/25	50/30
steel failure, channel bolt								
characteristic flexure resistance	$M_{Rk,s}^0$	[Nm]	M10	50 ¹⁾	-	-	37,4	-
				70 ¹⁾	52,3	52,3	-	-
			M12	50 ¹⁾	-	-	65,5	65,5
				70 ¹⁾	-	91,7	-	-
			M16	50 ¹⁾	-	-	166,5	166,5
				70 ¹⁾	-	-	-	-
			M20	50 ¹⁾	-	-	-	324,5
				70 ¹⁾	-	-	-	-
partial factor	$\gamma_{Ms}^{2)}$			50 ¹⁾	2,38			
				70 ¹⁾	1,56			

1) strength class

2) in absence of other national regulations

Modersohn® Anchor Channel MBA

**Characteristic resistances under shear load
Characteristic flexure resistances**

Annex C5