Deutsches Institut für Bautechnik

Member of EOTA
www.eota.eu

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-09/0338 of 28 June 2021

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	JORDAHL anchor channel JTA and JXA
Product family to which the construction product belongs	Anchor channels
Manufacturer	JORDAHL GmbH Nobelstraße 51 12057 Berlin DEUTSCHLAND
Manufacturing plant	JORDAHL Herstellwerke
This European Technical Assessment contains	48 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 03/2021
This version replaces	ETA-09/0338 issued on 18 June 2018

The European Technical Assessment is issued by the Technical Assessment Body in its official language. Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and shall be identified as such.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full. However, partial reproduction may only be made with the written consent of the issuing Technical Assessment Body. Any partial reproduction shall be identified as such.

This European Technical Assessment may be withdrawn by the issuing Technical Assessment Body, in particular pursuant to information by the Commission in accordance with Article 25(3) of Regulation (EU) No 305/2011.

Specific Part

1 Technical description of the product

The JORDAHL anchor channel JTA and JXA is system consisting of C-shaped channel profile steel and 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. Channel bolts JORDAHL T-bolts 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, connection and channel lips	See Annex C1 to C3
- Resistance to steel failure of channel bolt	See Annex C6
- Resistance to steel failure by exceeding the bending strength of the channel	See Annex A9, A10 and C4 to C5
- Maximum installation torque	See Annex B5 and B6
- Resistance to pull-out failure of the anchor and to concrete cone failure	See Annex B3, B4 and C7 to C9
- Minimum edge distance, spacing and member thickness	See Annex A9, A10, B3 and B4
- Characteristic edge distance and spacing to avoid splitting of concrete under load	See Annex C7 to C9
- Resistance to blow-out failure – bearing area of anchor head	See Annex A7 and A8

Characteristic resistance under shear load (static and quasi-static loading)	
- Resistance to steel failure of channel bolt	See Annex C16
- Resistance to steel failure of channel lips, connection and anchor (shear load perpendicular to longitudinal axis of channel)	See Annex C11 to C13
- Resistance to steel failure of channel lips, anchor and connection (shear load in direction of longitudinal axis of channel)	See Annex C12
- Resistance to concrete failure	See Annex C14 and C15
Characteristic resistance under combined tension and shear load (static and quasi-static load)	See Annex C18
Characteristic resistances under cyclic fatigue tension load	See Annex C22 and C23
Displacements (static and quasi-static load)	See Annex C10 and C17

3.2 Safety in case of fire (BWR 2)

Essential characteristic	**Performance**
Reaction to fire	Class A1
Resistance to fire	See Annex C19 to C21

3.3 Other essential characteristics

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

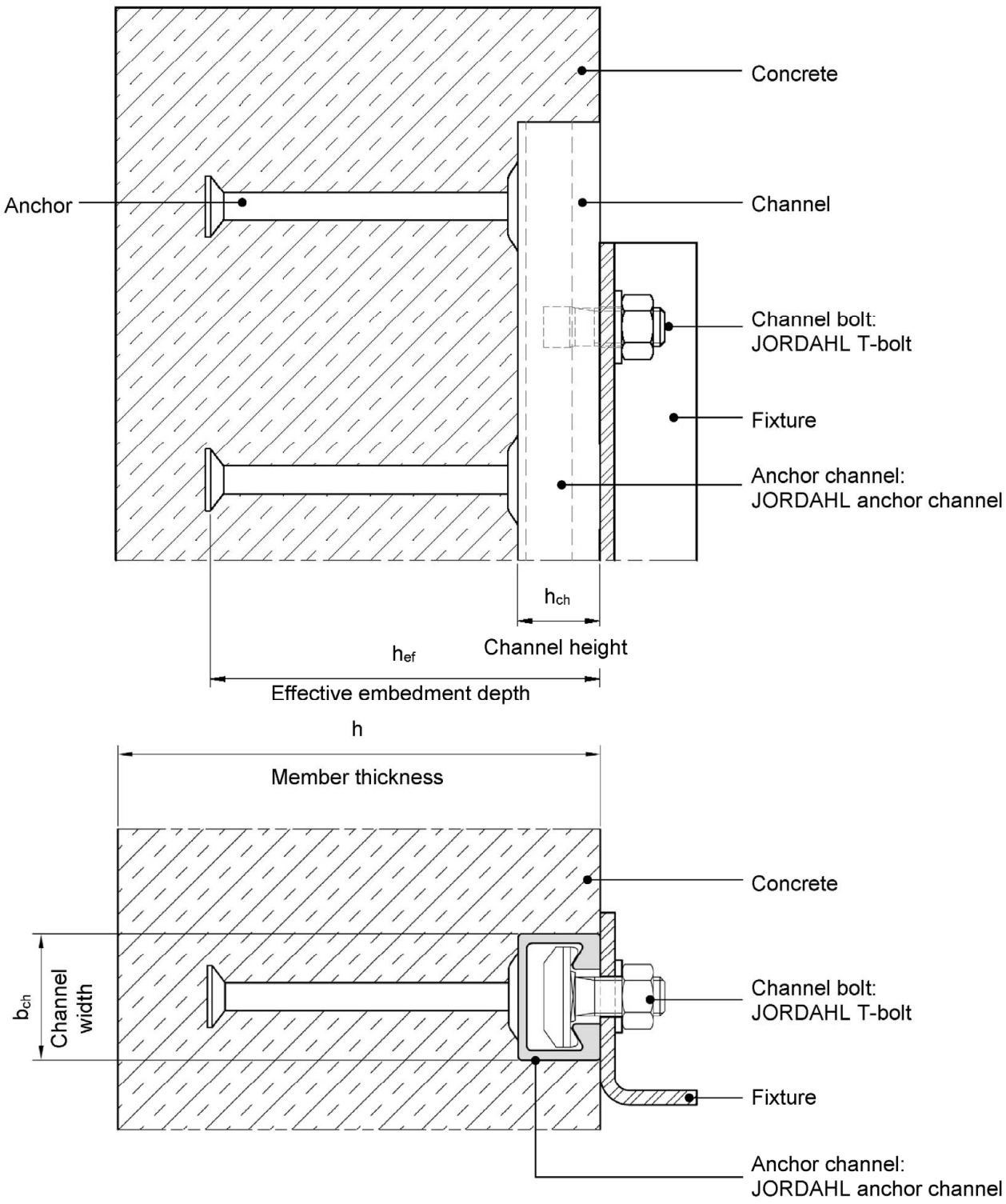
5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

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 28 June 2021 by Deutsches Institut für Bautechnik

Dipl.-Ing. Beatrix Wittstock
Head of Section

beglaubigt:
Müller



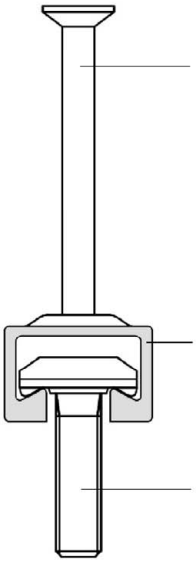
JORDAHL anchor channel JTA and JXA

Product description
Installed condition

Annex A1

Deutsches Institut für Bautechnik DIBt

JORDAHL anchor channel JTA
with W profile



Anchor
also possible as weld-on anchor (I-anchor and round anchor)

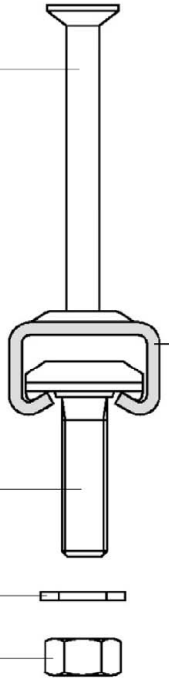
Channel
e.g. JTA W 53/34

Channel bolt
e.g. JB M16x60

Washer

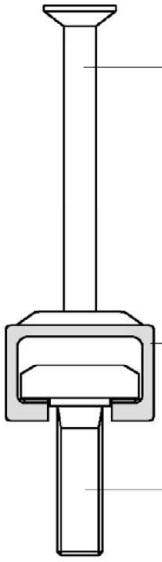
Hexagon nut

with K profile



Channel e.g.
JTA K 53/34

JORDAHL anchor channel JXA
with serrated W profile

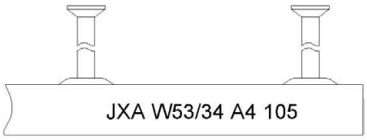


Anchor
also possible as weld-on anchor (I-anchor and T- anchor)

Channel e.g.
JXA W 53/34

Channel bolt
e.g. JXB M16x60

Example of marking of the JORDAHL anchor channels JTA and JXA: e.g. JXA W53/34 A4



J or JORDAHL	= Identifying mark of the manufacturer
JXA W	= Anchor channel type
53/34	= Size
A4	= Material
105	= Embedment depth if $h_{ef} > h_{ef,min}$

Material channels:

Carbon steel

No marking	= Hot-dip galvanized

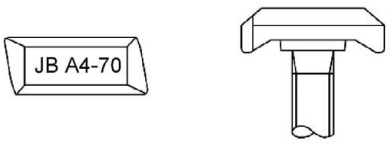
Stainless steel

A2	= CRC II [1)]
A4, L4	= CRC III [1)]
F4, FA	= CRC III [1)]
HCR	= CRC IV, V [1)]

[1)] Corrosion resistance class

Close to the anchors a nail hole is positioned

Example of marking of the JORDAHL T-bolt: e.g. JB A4-70



J or JORDAHL	= Identifying mark of the manufacturer
JB	= Channel bolt type
A4	= Material
70	= Strength grade

Material bolts:

Carbon steel

No marking	= Hot-dip galvanized
G	= Electroplated

Stainless steel

A2	= CRCII [1)]
A4, L4	= CRCIII [1)]
F4, FA	= CRC III [1)]
HCR	= CRC IV,V [1)]

Strength grade bolts:

Carbon steel

4.6, 8.8	Strength grade 4.6, 8.8

Stainless steel

50, 70	Strength grade 50, 70

JORDAHL anchor channel JTA and JXA

Product description
Marking and materials

Annex A2

Table A1: Materials and intended use

Item no.	Specification	Intended use	
		1	2
		Anchor channels may only be used in structures subject to dry internal conditions	Anchor channels may also be used in structures subject to internal conditions with usual humidity
		Materials	
1	Channel profile	Carbon steel hot-dip galvanized ≥ 55 µm [4)]	Carbon steel hot-dip galvanized ≥ 55 µm [4)] Stainless steel [5)] CRC II
2	Anchor	Carbon steel hot-dip galvanized ≥ 55 µm [4)]	Carbon steel hot-dip galvanized ≥ 55 µm [4)] Stainless steel [5)] CRC II
3	Channel bolt with shaft and thread according to EN ISO 4018: 2011	Carbon steel strength grade 4.6, 8.8 electroplated ≥ 5 µm [2)]	Carbon steel strength grade 4.6, 8.8 hot-dip galvanized ≥ 50 µm [3)] Stainless steel [5)] CRC II strength grade 50, 70
4	Washer according to EN ISO 7089:2000 and EN ISO 7093-1:2000, production class A, 200 HV	Carbon steel electroplated ≥ 5 µm [2)]	Carbon steel hot-dip galvanized ≥ 50 µm [3)] Stainless steel [5)] steel type A2, A3, A4
5	Hexagonal nut EN ISO 4032:2012	Carbon steel strength grade 5, 8 electroplated ≥ 5 µm [2)]	Carbon steel strength grade 5, 8 hot-dip galvanized ≥ 50 µm [3)] Stainless steel [5)] steel type A2, A3, A4 strength grade 70, 80

[1)] Carbon steel only for welded anchors, with sufficient concrete cover according to EN 1992-1-1:2004+AC:2010 (c_{nom} ≥ 50 mm)
[2)] Electroplated according to EN ISO 4042:2018
[3)] Hot-dip galvanized according to EN ISO 10684:2004 + AC:2009
[4)] Hot-dip galvanized on the basis of EN ISO 1461:2009, but coating thickness ≥ 55 µm
[5)] Stainless steel anchors only in combination with stainless steel channels, bolts, washers and nuts

Table A1 (continuation): Materials and intended use

Item no.	Specification	Intended use		
		3	4	5
		For CRC III according to EN 1993-1-4:2006	For CRC IV according to EN 1993-1-4:2006	For CRC V according to EN 1993-1-4:2006
		Materials		
1	Channel profile	Stainless steel CRC III	Stainless steel CRC IV	Stainless steel CRC V
2	Anchor	Stainless steel CRC III	Stainless steel CRC IV	Stainless steel CRC V
		Carbon steel [1)]	Carbon steel [1)]	
3	Channel bolt with shaft and thread according to EN ISO 4018: 2011	Stainless steel CRC III strength grade 50, 70	Stainless steel CRC IV strength grade 50, 70	Stainless steel CRC V strength grade 50, 70
4	Washer according to EN ISO 7089:2000 and EN ISO 7093-1:2000, production class A, 200 HV	Stainless steel CRC III steel type A4	Stainless steel CRC IV steel type A5	Stainless steel CRC V steel type A8
5	Hexagonal nut EN ISO 4032:2012	Stainless steel CRC III steel type A4 strength grade 70, 80	Stainless steel CRC IV steel type A5 strength grade 70, 80	Stainless steel CRC V steel type A8 strength grade 70, 80

[1)] Carbon steel only for welded anchors, with sufficient concrete cover according to EN 1992-1-1:2004+AC:2010 (c_{nom} ≥ 50 mm)
[2)] Electroplated according to EN ISO 4042:2018
[3)] Hot-dip galvanized according to EN ISO 10684:2004 + AC:2009
[4)] Hot-dip galvanized on the basis of EN ISO 1461:2009, but coating thickness ≥ 55 µm
[5)] Stainless steel anchors only in combination with stainless steel channels, bolts, washers and nuts

JORDAHL anchor channel JTA and JXA

Product description
Materials and intended use

Annex A4

Deutsches Institut für Bautechnik DIBt

Anchor channel JTA
with W profile

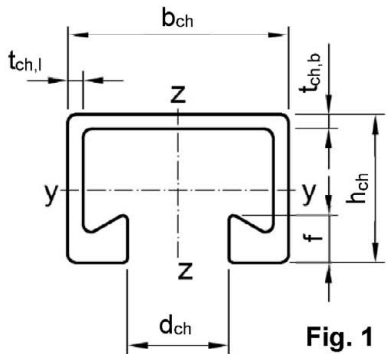


Fig. 1

with K profile

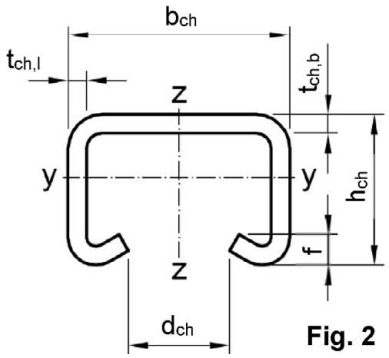


Fig. 2

Ankerschienen JXA
with W profile serrated

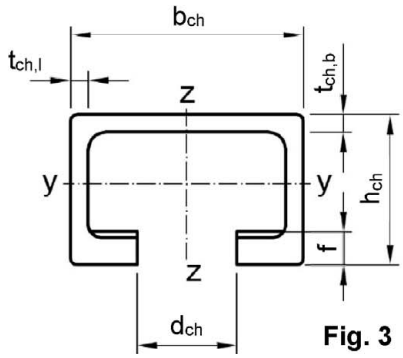


Fig. 3

Table A2: Dimensions of profile – carbon steel

Anchor channel		Fig.	Material	Dimension [mm]						[mm⁴]
				b_{ch}	h_{ch}	$t_{ch,b}$	$t_{ch,l}$	d_{ch}	f	I_y
JTA	K 28/15	2	Carbon steel	28,00	15,25	2,25	2,25	12,00	2,25	4060
	K 38/17	2		38,00	17,50	3,00	3,00	18,00	3,00	8547
	K 40/25	2		40,00	25,00	2,75	2,75	18,00	5,60	20570
	K 50/30	2		50,00	30,00	3,00	3,00	22,00	7,39	41827
	K 53/34	2		53,50	33,00	4,50	4,50	22,00	7,90	72079
	K 72/48	2		72,00	49,00	6,00	6,00	33,00	9,90	293579
	W 40/22 W 40+	1		39,50	23,00	2,60	2,40	18,00	6,00	20029
	W 50/30 W 50+	1		49,00	30,00	3,20	2,75	22,50	7,85	52896
	W 53/34	1		52,50	33,50	4,10	4,00	22,50	10,50	93262
	W 55/42	1		54,50	42,00	5,00	5,00	26,00	12,90	187464
	W 72/48	1		72,00	48,50	4,50	5,00	33,00	15,50	349721
JXA	W 38/23	3		38,00	23,00	3,50	3,00	18,00	4,00	20953
	W 53/34	3		52,50	34,00	4,00	4,00	22,50	6,00	92910

JORDAHL anchor channel JTA and JXA

Product description
Types of channels – carbon steel

Annex A5

Table A3: Dimensions of profile – stainless steel

Anchor channel		Fig.[1)]	Material	Dimension [mm]						[mm⁴]
				b_{ch}	h_{ch}	$t_{ch,b}$	$t_{ch,l}$	d_{ch}	f	I_y
JTA	K 28/15	2	Stainless steel	28,00	15,25	2,25	2,25	12,00	2,25	4060
	K 38/17	2		38,00	17,50	3,00	3,00	18,00	3,00	8547
	K 40/25	2		39,50	25,00	2,50	2,50	18,00	5,40	19097
	K 50/30	2		50,00	30,00	3,00	3,00	22,00	7,39	41827
	K 53/34	2		53,50	33,00	4,50	4,50	22,00	7,90	72079
	K 72/48	2		72,00	49,00	6,00	6,00	33,00	9,90	293579
	W 40/22 W 40+	1		39,50	23,00	2,60	2,40	18,00	6,00	20029
	W 50/30 W 50+	1		49,00	30,00	3,20	2,75	22,50	7,85	52896
	W 53/34	1		52,50	33,50	4,10	4,00	22,50	10,50	93262
	W 72/48	1		72,00	48,50	4,50	5,00	33,00	15,50	349721

[1)] Fig. according to Annex A5

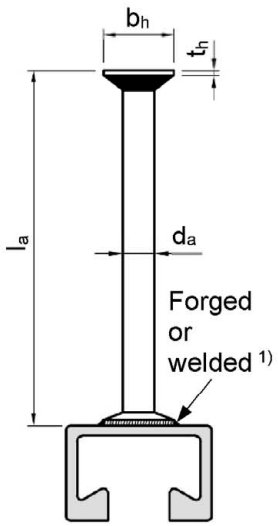
JORDAHL anchor channel JTA and JXA

Product description
Types of channels – stainless steel

Annex A6

Deutsches Institut für Bautechnik DIBt

Round anchor [1)]



[1)] Only anchor channel JTA: welded anchors

Table A4: Dimensions of round anchors

Anchor channel		Type	d_a [mm]	d_h [mm]	t_h [mm]	A_h [mm²]	$l_{a,min}$ [mm]
JTA	K 28/15	R	7,0	12,0	2,0	74,6	31,8
	W 40/22, K 40/25		8,5	15,0	2,0	120,0	56,0
	W 40+						70,0
	K 38/17		9,0	17,0	3,0	163,4	61,5
	W 40/22, K 40/25						57,0
	W 50/30, K 50/30		9,0	17,5	3,0	176,9	67,0
	W 50+		10,0	19,5	3,0	220,1	79,0
	W 40+		10,8	19,0	3,0	191,9	71,0
	W 50/30, K 50/30						67,0
	W 53/34, K 53/34		11,5	23,5	3,0	329,9	124,5
	W 55/42		15,5	28,0	3,5	427,1	136,5
	W 72/48, K 72/48		15,5	31,0	3,5	566,1	133,5
JXA	W 38/23		10,0	19,5	3,0	220,1	79,0
	W 53/34		11,5	23,5	3,0	329,9	124,5

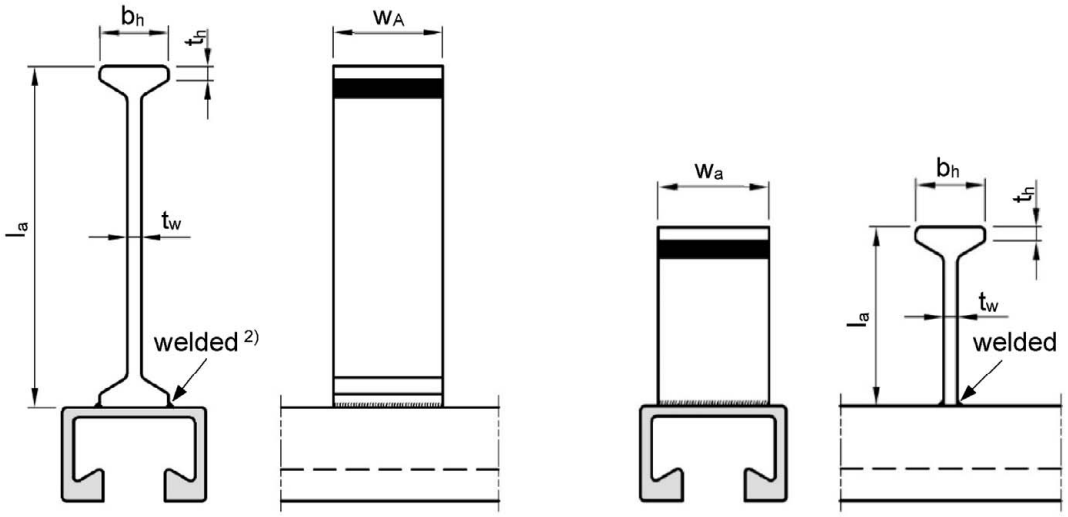
JORDAHL anchor channel JTA and JXA

Product description
Types of anchors – round anchors

Annex A7

Deutsches Institut für Bautechnik DIBt

I-anchor [1)] **T-anchor [2)]**



[1)] Only anchor channel JTA: different welding and anchor orientation possible, refer to Annex A9
[2)] Only anchor channel JXA

Table A5: Dimensions of I-anchors and T-anchors

Anchor channel		Type	w_a [mm]	b_h [mm]	t_w [mm]	t_h [mm]	A_h [mm²]	$l_{a,min}$ [mm]
JTA	K 28/15, K 38/17	I 60	10	18,0	5,0	3,3	130	62
	W40/22, K 40/25		12				234	62
	W 50/30, K 50/30	I 69	18	18,0	5,0	3,5	234	69
	W 40+	I 128	20	17,0	6,0	5,0	220	128
	W 50+		25				275	128
	W 53/34, K 53/34		26				286	128
	W 40+	I 140	20	20,0	7,1	6,0	258	140
	W 50+		25				322	140
	W 55/42		32				448	140
	W 72/48, K 72/48		40				516	140
JXA	W 38/23	I 128	20	17,0	6,0	5,0	220	128
	W 53/34		40				440	128
	W 38/23	T 128	20				220	36
	W 53/34		40				440	47

JORDAHL anchor channel JTA and JXA

Product description
Types of anchors – I-anchors and T-anchors

Annex A8

Deutsches Institut für Bautechnik DIBt

Fig. 1
Round anchor forged

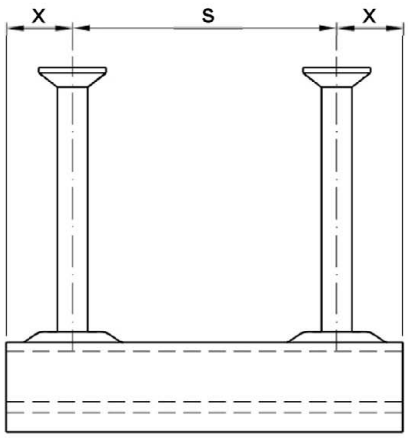


Fig. 2
Round anchor welded

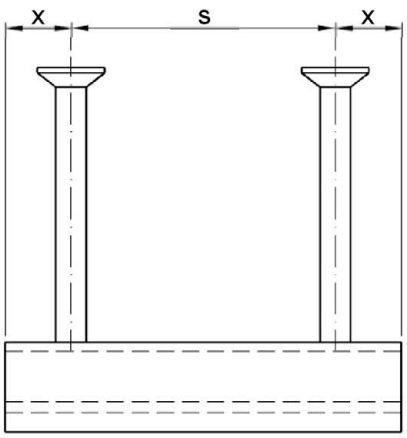


Fig. 3
I-anchor welded

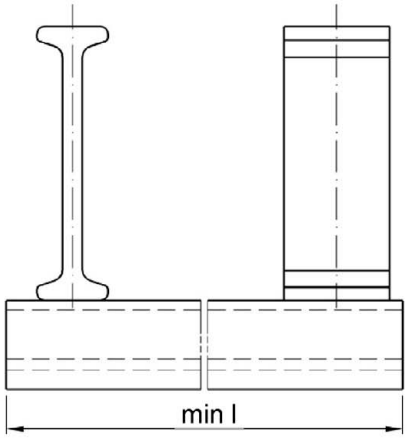


Fig. 4
T-anchor welded

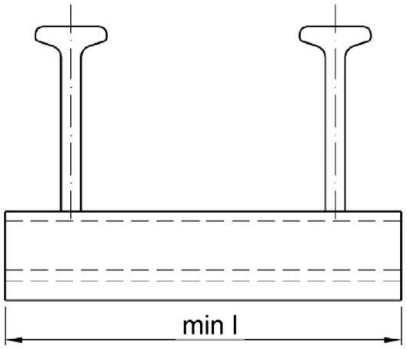


Table A6: Anchor positioning (JTA W and JTA K)

Anchor channel		Anchor spacing		End spacing	Min. channel length
		s_{min}	s_{max}	x	min l
		[mm]		[mm]	[mm]
JTA	K 28/15 K 38/17	50	200	25	100
	K 40/25 W 40/22 W 40+ K 50/30 W 50/30 W 50+	50	250	25	100
	K 53/34 W 53/34	80	250	35	150
	W 55/42	80	300	35	150
	K 72/48 W 72/48	100	400	35	150

JORDAHL anchor channel JTA and JXA

Annex A9

Product description
Anchor positioning and channel length (JTA W and JTA K)

Deutsches Institut für Bautechnik DIBt

Table A7: Anchor positioning (JXA)

Anchor channel		Anchor spacing		End spacing	Min. channel length
		s_{min}	s_{max}	x	min l
		[mm]		[mm]	[mm]
JXA	W 38/23	50	250	25	100
	W 53/34	80	250	35	150

JORDAHL anchor channel JTA and JXA

Product description
Anchor positioning and channel length (JXA)

Annex A10

Deutsches Institut für Bautechnik DIBt

Table A8: Dimensions of channel bolts

Anchor channel		Fig.	Channel bolt	Dimension [mm]			
				b_1	b_2	k	ø
JTA	K 28/15	1	JD	11,2	22,4	4,5	6
						4,5	8
						5,0	10
			JD/JUD	11,2	22,4	6,5	12
	K 38/17	1	JH	16,5	30,5	6,0	10
						7,0	12
			JH/JUH	16,5	30,5	8,0	16
	K 40/25 W 40/22 W 40+	2	JC	14,0	32,0	8,0	10
						8,0	12
				17,0	32,0	8,0	16
	W 40/22 W 40+	3	JKC	16,8	32,7	8,0	16
	K 50/30 W 50/30 W 50+ K 53/34 W 53/34	2	JB	17,0	41,5	9,0	10
						10,0	12
						11,0	16
				20,5	41,5	12,0	20
	W 50/30 W 50+ W 53/34	3	JKB	17,0	41,5	12,0	16
				20,5	41,5	13,5	20
	W 55/42	2	JB	17,0	41,5	9,0	10
						10,0	12
						11,0	16
				20,5	41,5	12,0	20
			JB/JE	24,5	41,5	16,0	24
	K 72/48 W 72/48	2	JA	25,0	58,0	14,0	20
				25,0		20,0	24
				28,0		20,0	27
				31,0		20,0	30
JXA	W 38/23	4	JXH	17,2	28,9	8,0	12
						8,0	16
	W 53/34	4	JXB	21,0	41,6	11,5	16
						13,0	20

Channel bolts JD, JH

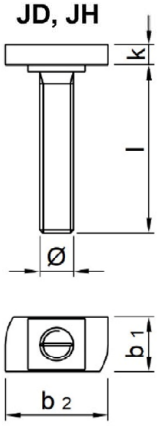


Fig. 1

Channel bolts JA, JB, JC

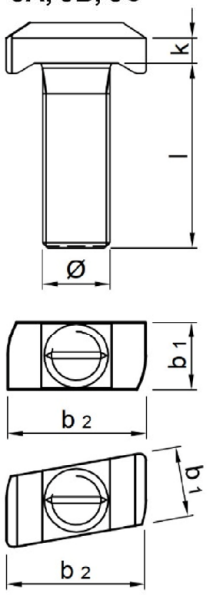


Fig. 2

Double notching channel bolts JKB, JKC

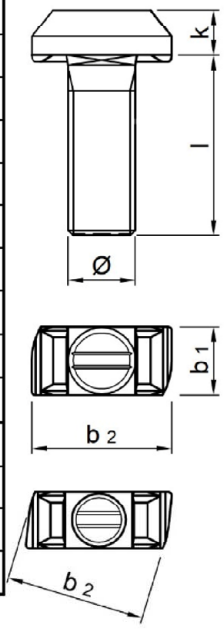


Fig. 3

Serrated channel bolts JXH, JXB

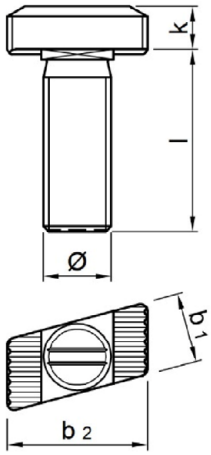


Fig. 4

Notch for marking the position

JORDAHL anchor channel JTA and JXA

Product description
Types of channel bolts – geometry

Annex A11

Deutsches Institut für Bautechnik DIBt

Table A9: Strength grades of bolts

Channel bolt		**Carbon steel** [1]		**Stainless steel** [1]	
Strength grade [2]		4.6	8.8	50	70
f_{uk}	[N/mm²]	400	800	500	700
f_{yk}		240	640	210	450
Finish		electroplated, hot-dip galvanized		–	

[1] Materials according to Annex A3 to A4, Table A1
[2] Material properties according to EN ISO 898-1:2013

JORDAHL anchor channel JTA and JXA

Product description
Types of channel bolts – material

Annex A12

Deutsches Institut für Bautechnik DIBt

Specifications of intended use

Anchor channels and channel bolts subject to:

- Static and quasi-static loads in tension as well as shear perpendicular to the longitudinal axis of the channel and shear in the direction of the longitudinal axis of the channel.
- Fatigue cyclic tension loading.
- Fire exposure for concrete class C20/25 to C50/60.

Base materials:

- Reinforced or unreinforced normal weight concrete according to EN 206-1:2000.
- Strength classes C12/15 to C90/105 according to EN 206-1:2000.
- Cracked or uncracked concrete.

Service conditions (environmental conditions):

- Structures subject to dry internal conditions
  (anchor channels and channel bolts according to Annex A3 and A4, Table A1, column 1 – 5).
- Structures subject to internal conditions with usual humidity (e.g. kitchen, bath and laundry in residential buildings, exceptional permanent damp conditions and applications under water)
  (anchor channels and channel bolts according to Annex A3 and A4, Table A1, column 2 – 5)
- According to EN 1993-1-4:2006 + A2:2015 relating to corrosion resistance class CRC III
  (anchor channels and channel bolts according to A4, Table A1, column 3 – 5)
- According to EN 1993-1-4:2006 + A2:2015 relating to corrosion resistance class CRC IV
  (anchor channels and channel bolts according to A4, Table A1, column 4 – 5)
- According to EN 1993-1-4:2006 + A2:2015 relating to corrosion resistance class CRC V
  (anchor channels and channel bolts according to A4, Table A1, column 5)

Design:

- Anchor channels are designed under the responsibility on 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 EOTA TR 047 “Design of Anchor Channels”, March 2018 or EN 1992-4:2018.
- For fatigue loading the anchor channels are designed in accordance with EOTA TR 050, Oktober 2018 “Calculation Method for the Performance of Anchor Channels under Fatigue Loading”, November 2015.
- The characteristic resistances are calculated with the minimum effective embedment depth.

JORDAHL anchor channel JTA and JXA	**Annex B1**
Intended use Specifications	

Deutsches Institut für Bautechnik DIBt

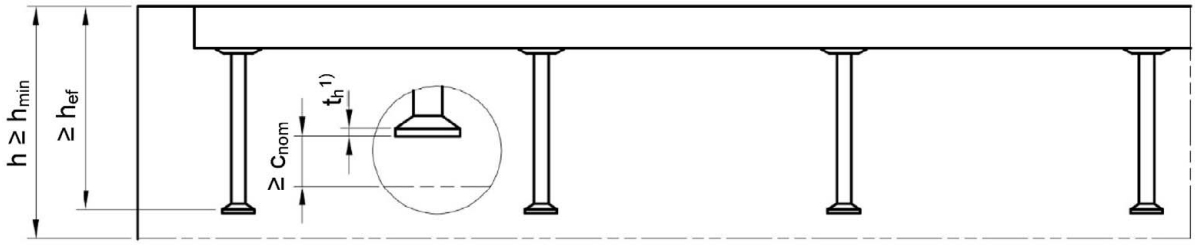
Installation:

- 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 A9, Table A6 and Annex A10, Table A7 are generated including end spacing and minimum channel length and only to be used in dry internal conditions (Annex A3 and A4, Table A1, column 1). For anchor channels made of stainless steel there are no restrictions regarding corrosion resistance when using cut channel pieces, if cutting is done professionally and contamination of cutting edges with corroding material is avoided.
- Installation in accordance with the installation instructions given in Annexes B8 and B9
- 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 channel.
- Washer may be chosen according to Annex A3 and provided separately by the user.
- Orientating the channel bolt (groove according to Annex A11) perpendicular to the channel axis.
- The required installation torques given in Annex B5 and B6 must be applied and must not be exceeded.

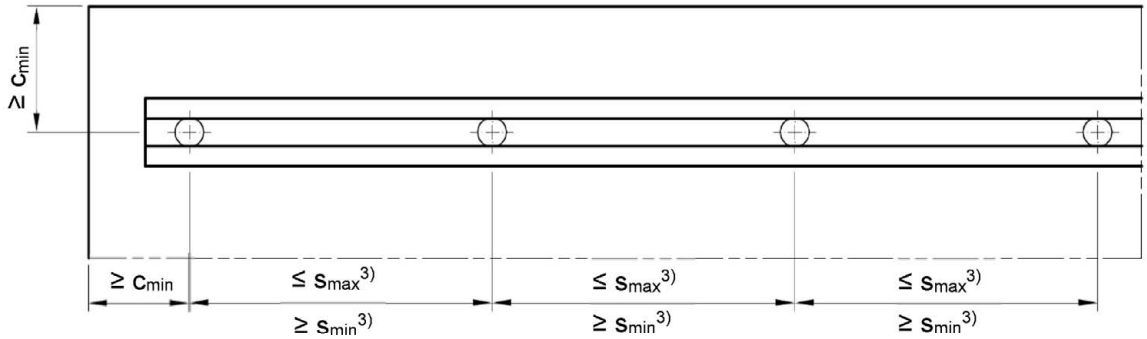
JORDAHL anchor channel JTA and JXA	**Annex B2**
Intended use Specifications	

Deutsches Institut für Bautechnik DIBt

Side view



Plan view



3) s_{min}, s_{max} according to Annex A9, Table A6 and Annex A10, Table A7

Table B1: Minimum effective embedment depth, edge distance and member thickness (JTA W)

Anchor channel			JTA						
			W 40/22	W 40+	W 50/30	W 50+	W 53/34	W 55/42	W 72/48
Min. effective embedment depth round anchors and I-anchors	$h_{ef,min}$	[mm]	79	91	94	106	155	175	179
Min. edge distance round anchors and I-anchors	c_{min}		50	50	75	75	100	100	150
Min. member thickness round anchors and I-anchors	h_{min}		90	102	105	118	170	191	195
Min. member thickness in general	h_{min}		$h_{ef} + t_h$ 1) + c_{nom} 2)						

1) t_h according to Annex A7, Table A4 and Annex A8, Table A5
2) c_{nom} according to EN 1992-1-1:2004 + AC:2010

JORDAHL anchor channel JTA and JXA

Intended use
Installation parameters of anchor channels (JTA W)

Annex B3

Table B2: Minimum effective embedment depth, edge distance and member thickness (JXA)

Anchor channel			JXA	
			W 38/23	W 53/34
Min. effective embedment depth round anchors and I-anchors	$h_{ef,min}$	[mm]	95	155
Min. effective embedment depth T-anchors	$h_{ef,min}$		54	76
Min. edge distance round anchors and I-anchors	c_{min}		75	100
Min. edge distance T-anchors	c_{min}		50	100
Min. member thickness round anchors and I-anchors	h_{min}		120	190
Min. member thickness T-anchors	h_{min}		100	110
Min. member thickness in general	h_{min}		$h_{ef} + t_h$ [1] + c_{nom} [2]	

[1] t_h according to Annex A7, Table A4 and Annex A8, Table A5
[2] c_{nom} according to EN 1992-1-1:2004 + AC:2010

Table B3: Minimum effective embedment depth, edge distance and member thickness (JTA K)

Anchor channel			JTA					
			K 28/15	K 38/17	K 40/25	K 50/30	K 53/34	K 72/48
Min. effective embedment depth round anchors and I-anchors	$h_{ef,min}$	[mm]	45	76	79	94	155	179
Min. edge distance round anchors and I-anchors	c_{min}		40	50	50	75	100	150
Min. member thickness round anchors and I-anchors	h_{min}		55	87	90	105	170	195
Min. member thickness in general	h_{min}		$h_{ef} + t_h$ [1] + c_{nom} [2]					

[1] t_h according to Annex A7, Table A4 and Annex A8, Table A5
[2] c_{nom} according to EN 1992-1-1:2004 + AC:2010

JORDAHL anchor channel JTA and JXA

Intended use
Installation parameters of anchor channels (JXA and JTA K)

Annex B4

Deutsches Institut für Bautechnik DIBt

Table B4: Minimum spacing and installation torque of channel bolts (for JTA W and JTA K)

Anchor channel		JORDAHL T-bolt ø	Min. spacing of the channel bolt $s_{min,cbo}$	Installation torque T_{inst} [4]		
				General [2] $T_{inst,g}$	Steel-steel contact [3] $T_{inst,s}$	
				Steel 4.6; 8.8 [1] Stainless steel 50; 70 [1]	Steel 4.6 [1] Stainless steel 50 [1]	Steel 8.8 [1] Stainless steel 70 [1]
		[mm]	[mm]	[Nm]		
JTA	K 28/15	6	30	3	3	8
		8	40	8	8	20
		10	50	13	15	40
		12	60	15	25	70
	K 38/17	10	50	15	15	40
		12	60	25	25	70
		16	80	40	65	180
	K 40/25 W 40/22 W 40+	10	50	15	15	40
		12	60	25	25	70
		16	80	45	65	180
	K 50/30 W 50/30 W 50+	10	50	15	15	40
		12	60	25	25	70
		16	80	60	65	180
		20	100	75	130	360
	K 53/34 W 53/34	10	50	15	15	40
		12	60	25	25	70
		16	80	60	65	180
		20	100	120	130	360
	W 55/42	10	50	15	15	40
		12	60	25	25	70
		16	80	60	65	180
		20	100	120	130	360
		24	120	200	230	620
	K 72/48 W 72/48	20	100	120	130	360
		24	120	200	230	620
		27	135	300	340	900
		30	150	380	460	1200

[1] Materials according to Annex A2 to A4
[2] According to Annex B5, Fig. 1
[3] According to Annex B5, Fig. 2
[4] T_{inst} must not be exceeded

JORDAHL anchor channel JTA and JXA

Intended use
Installation parameters of channel bolts (for JTA W and JTA K)

Annex B5

Table B5: Minimum spacing and installation torque of channel bolts (for JXA)

Anchor channel		JORDAHL T-bolt ø	Min. spacing of the channel bolt $s_{min,cbo}$	Installation torque T_{inst} [4]		
				General [2] $T_{inst,g}$	Steel-steel contact [3] $T_{inst,s}$	
				Steel 4.6; 8.8 [1] Stainless steel 50; 70 [1]	Steel 4.6 [1] Stainless steel 50 [1]	Steel 8.8 [1] Stainless steel 70 [1]
		[mm]	[mm]	[Nm]		
JXA	W 38/23	12	60	70	– [5]	70
		16	80	120	– [5]	180
	W 53/34	16	80	180	– [5]	180
		20	100	300	– [5]	360

[1] Materials according to Annex A2 to A4
[2] According to Annex B5, Fig. 1
[3] According to Annex B5, Fig. 2
[4] T_{inst} must not be exceeded
[5] Product not available

JORDAHL anchor channel JTA and JXA

Intended use
Installation parameters of channel bolts (for JXA)

Annex B6

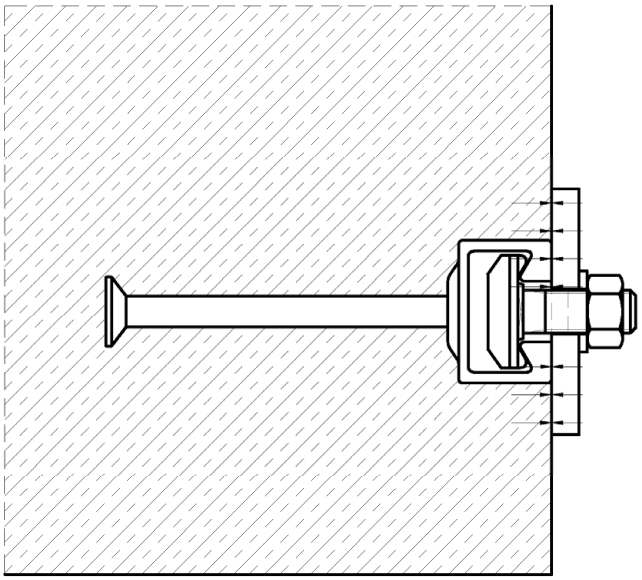


Fig. 1

General:

The fixture is in contact with the channel profile and the concrete surface. The installation torques according to Annex B5, Table B4 and Annex B6, Table B5 shall be applied and must not be exceeded.

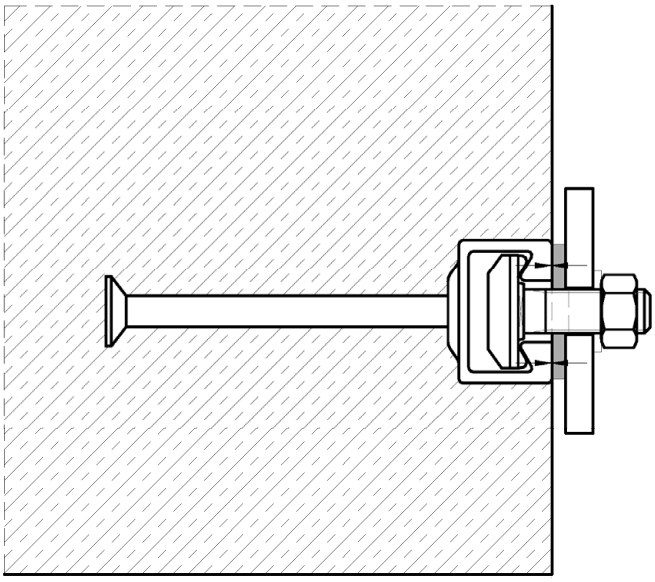


Fig. 2

Steel-steel contact:

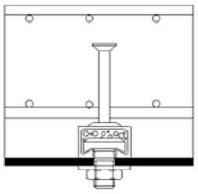
The fixture is not in contact with the concrete surface. The fixture is fastened to the anchor channel by suitable steel part (e.g. washer). The installation torques according to Annex B5, Table B4 and Annex B6, Table B5 shall be applied and must not be exceeded.

JORDAHL anchor channel JTA and JXA	**Annex B7**
Intended use Position of the fixture	

Deutsches Institut für Bautechnik DIBt

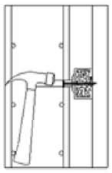
1. Fixing anchor channel

Install the channel surface flush and fix the channel undisplaceable to the formwork or to the reinforcement.



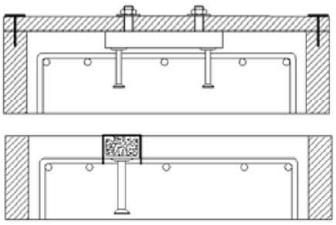
a) Fixing to steel formwork
With JORDAHL T-bolts and nuts, with rivets, cramps or with magnet fixings.

or



b) Fixing to timber formwork
With nails through the pre punched holes in the back of the channels and with staples.

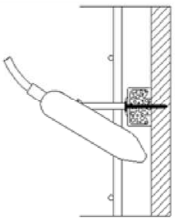
or



c) Fixing to anchor channels at the top
- To timber batten on the side formwork (e.g. with JORDAHL T-bolts).
- Fixing from above directly to the reinforcement or to a mounting rebar, attach the channel by wire binding.

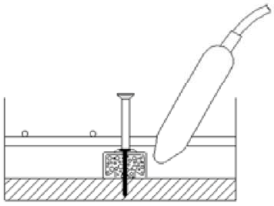
2. Pouring concrete and regular compacting of concrete

Compact the concrete properly around the channel and the anchors.



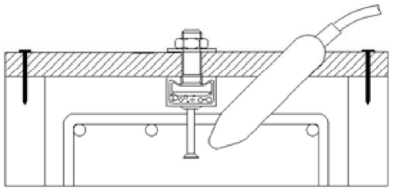
a) at side of member

or



b) at bottom of member

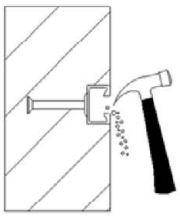
or



c) at top of member

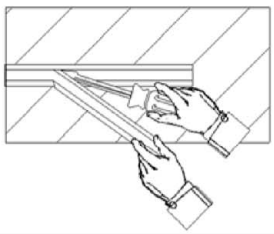
3. Removing of the infill

Clean the channel on the outside after removing the formwork



a) PS foam infill
With a hammer or a hook.

or



b) PE foam infill
By hand or with help of a screw driver in one piece.

JORDAHL anchor channel JTA and JXA	**Annex B8**
Intended use Installation instruction anchor channels	

Deutsches Institut für Bautechnik DIBt

4. Fastening the JORDAHL T-bolt to the JORDAHL anchor channel

Fig. 1

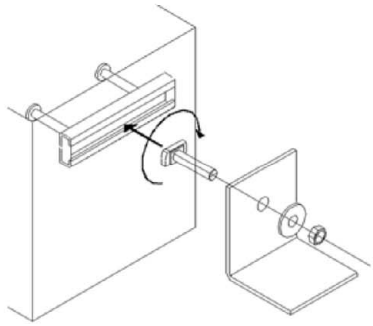
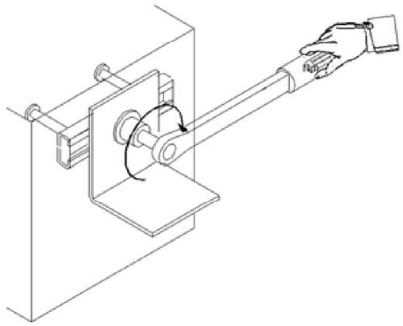


Fig. 2



a) Installation torques (general)

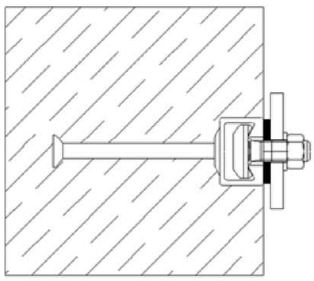
1. Insert the JORDAHL T-bolt into the channel slot at any point along the channel length (Fig. 1).
2. Turn the channel bolt 90° clockwise and the head of the channel bolt locks into position (Fig. 1).
3. Do not mount the channel bolt at the end of the channel within the end spacing x according to Annex A9 and A10.
4. Use the washer under the nut (Fig. 1).
5. Check the correct fit of the channel bolt. The groove on the shank end of the channel bolt must be perpendicular to the channel longitudinal axis.
6. Tighten the nuts to the installation torque according to Table 1 (Fig. 2). The installation torque must not be exceeded.

Table 1 – Installation torques (general)

Strength grade	Anchor channel		T_{inst} [Nm]								
			M6	M8	M10	M12	M16	M20	M24	M27	M30
Carbon steel 4.6, 8.8; Stainless steel 50, 70	JTA	K 28/15	3	8	13	15	-	-	-	-	-
		K 38/17	-	-	15	25	40	-	-	-	-
		K 40/25 W 40/22 W 40+	-	-	15	25	45	-	-	-	-
		K 50/30 W 50/30 W 50+	-	-	15	25	60	75	-	-	-
		K 53/34 W 53/34	-	-	15	25	60	120	-	-	-
		W 55/42	-	-	15	25	60	120	200	-	-
		K 72/48 W 72/48	-	-	-	-	-	120	200	300	380
	JXA	W 38/23	-	-	-	70	120	-	-	-	-
		W 53/34	-	-	-	-	180	300	-	-	-

or

Fig. 3



b) Installation torques (steel-steel contact)

1. Use washers between the channel and the fixture to create a defined contact.
2. Tighten the nuts to the installation torque according to Table 2. The installation torque must not be exceeded.

Table 2 – Installation torques (steel-steel contact)

Strength grade	Anchor channel	T_{inst} [Nm]								
		M6	M8	M10	M12	M16	M20	M24	M27	M30
Steel 4.6; Stainless steel 50	JTA and JXA	3	8	15	25	65	130	230	340	460
Steel 8.8; Stainless steel 70		8	20	40	70	180	360	620	900	1200

JORDAHL anchor channel JTA and JXA

Intended use
Installation instruction channel bolts

Annex B9

Table C1: Characteristic resistances under tension load – Steel failure of anchor channel (JTA W)

Anchor channel			**JTA**						
			W40/22	**W40+**	**W50/30**	**W50+**	**W53/34**	**W55/42**	**W72/48**
Steel failure: Anchor									
Characteristic resistance	$N_{Rk,s,a}$	[kN]	20	30	32	39	56	82	102
Partial factor	γ_{Ms} [1)]		1,8						
Steel failure: Connection between anchor and channel									
Characteristic resistance	$N_{Rk,s,c}$	[kN]	20	29	31	39	55	80	100
Partial factor	$\gamma_{Ms,ca}$ [1)]		1,8						
Steel failure: Local flexure of channel lips									
Spacing of channel bolts for $N_{Rk,s,l}$	$s_{l,N}$	[mm]	79	79	98	98	105	109	144
Characteristic resistance	$N^0_{Rk,s,l}$	[kN]	38	38	43	43	72	110	120
Partial factor	$\gamma_{Ms,l}$ [1)]		1,8						

[1)] In absence of other national regulations

Table C2: Characteristic resistances under tension load – Steel failure of anchor channel (JXA)

Anchor channel			**JXA**	
			W38/23	**W53/34**
Steel failure: Anchor				
Characteristic resistance	$N_{Rk,s,a}$	[kN]	31,4	51,7
Partial factor	γ_{Ms} [1)]		1,8	
Steel failure: Connection between anchor and channel				
Characteristic resistance	$N_{Rk,s,c}$	[kN]	35,3	72,6
Partial factor	$\gamma_{Ms,ca}$ [1)]		1,8	
Steel failure: Local flexure of channel lips				
Spacing of channel bolts for $N_{Rk,s,l}$	$s_{l,N}$	[mm]	76	106
Characteristic resistance	$N^0_{Rk,s,l}$	[kN]	35,3	72,6
Partial factor	$\gamma_{Ms,l}$ [1)]		1,8	

[1)] In absence of other national regulations

Table C3: Characteristic resistances under tension load – Steel failure of anchor channel (JTA K)

Anchor channel			**JTA**					
			K28/15	**K38/17**	**K40/25**	**K50/30**	**K53/34**	**K72/48**
Steel failure: Anchor								
Characteristic resistance	$N_{Rk,s,a}$	[kN]	13	18	20	32	56	102
Partial factor	γ_{Ms} [1)]		1,8					
Steel failure: Connection between anchor and channel								
Characteristic resistance	$N_{Rk,s,c}$	[kN]	9	18	20	31	55	100
Partial factor	$\gamma_{Ms,ca}$ [1)]		1,8					
Steel failure: Local flexure of channel lips								
Spacing of channel bolts for $N_{Rk,s,l}$	$s_{l,N}$	[mm]	56	76	80	100	107	144
Characteristic resistance	$N^0_{Rk,s,l}$	[kN]	9	18	20	31	55	100
Partial factor	$\gamma_{Ms,l}$ [1)]		1,8					

[1)] In absence of other national regulations

Table C4: Characteristic flexural resistance of anchor channel (JTA W)

Anchor channel				**JTA**				
				W40/22 W40+	**W50/30 W50+**	**W53/34**	**W55/42**	**W72/48**
Steel failure: Flexure of channel								
Characteristic flexural resistance of channel	$M_{Rk,s,flex}$ [Nm]	Round anchors, I-anchors	Carbon steel	1406	2830	3373	6447	8593
			Stainless steel	1580	3184	3445	– [2]	8775
Partial factor		$\gamma_{Ms,flex}$ [1]		1,15				

[1] In absence of other national regulations
[2] No performance assessed

Table C5: Characteristic flexural resistance of anchor channel (JXA)

Anchor channel				**JXA**	
				W38/23	**W53/34**
Steel failure: Flexure of channel					
Characteristic flexural resistance of channel	$M_{Rk,s,flex}$ [Nm]	Round anchors, I-anchors	Carbon steel	1598	4152
		T-anchors	Carbon steel	832	2476
Partial factor		$\gamma_{Ms,flex}$ [1]		1,15	

[1] In absence of other national regulations

Table C6: Characteristic flexural resistance of anchor channel (JTA K)

Anchor channel				**JTA**					
				K28/15	**K38/17**	**K40/25**	**K50/30**	**K53/34**	**K72/48**
Steel failure: Flexure of channel									
Characteristic flexural resistance of channel	$M_{Rk,s,flex}$ [Nm]	Round anchors, I-anchors	Carbon steel	317	580	1099	1673	2984	8617
			Stainless steel	324	593	1071	1708	2984	8617
Partial factor		$\gamma_{Ms,flex}$ [1)]		1,15					

[1)] In absence of other national regulations

JORDAHL anchor channel JTA and JXA

Performance
Characteristic resistances under tension load – steel failure anchor channels (JTA K)

Annex C5

Table C7: Characteristic resistances under tension load – Steel failure of channel bolts

Channel bolt ø				**M6**	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**	**M30**
Steel failure: Channel bolt												
Characteristic resistance [2]	$N_{Rk,s}$	[kN]	4,6 [1]	8,0	14,6	23,2	33,7	62,8	98,0	141,2	183,6	224,4
			8,8 [1]	16,1	29,3	46,4	67,4	125,6	196,0	282,4	367,2	448,8
			50 [1]	10,1	18,3	29,0	42,2	78,5	122,5	176,5	229,5	280,5
			70 [1]	14,1	25,6	40,6	59,0	109,9	171,5	247,1	321,3	392,7
Partial factor	γ_{Ms} [3]		4.6 [1]	2,00								
			8.8 [1]	1,50								
			50 [1]	2,86								
			70 [1]	1,87								

[1] Materials according to Annex A2 to A4
[2] In conformity to EN ISO 898-1:2013
[3] In absence of other national regulations

JORDAHL anchor channel JTA and JXA

Performance
Characteristic resistances under tension load – steel failure channel bolts

Annex C6

Table C8: Characteristic resistances under tension load – Concrete failure of anchor channel (JTA W)

Anchor channel				**JTA**						
				W40/22	**W40+**	**W50/30**	**W50+**	**W53/34**	**W55/42**	**W72/48**
Concrete failure: Pullout										
Characteristic resistance in cracked concrete C12/15	Round anchor	$N_{Rk,p}$	[kN]	10,8	17,3 (10,8)[2)]	15,9	19,8	29,7	38,4	50,9
	I-anchor T-anchor			14,0	19,8	21,1	24,8	25,7	37,2	46,4
Characteristic resistance in uncracked concrete C12/15	Round anchor	$N_{Rk,p}$	[kN]	15,1	24,2 (15,1)[2)]	22,3	27,7	41,6	53,8	71,3
	I-anchor T-anchor			19,7	27,7	29,5	34,7	36,0	52,1	65,0
Factor of $N_{Rk,p} = N_{Rk,p}$ (C12/15) · ψ_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		γ_{Mp}[3)]		1,5						
Concrete failure: Concrete cone										
Produkt factor k_1		$k_{cr,N}$		$8,9 \cdot (h_{ef,min}/180)^{0,15}$ [1)]						
		$k_{ucr,N}$		$12,7 \cdot (h_{ef,min}/180)^{0,15}$ [1)]						
Partial factor		γ_{Mc}[3)]		1,5						
Concrete failure: Splitting										
Characteristic edge distance		$c_{cr,sp}$		$3h_{ef,min}$ [1)]						
Characteristic spacing		$s_{cr,sp}$		$6h_{ef,min}$ [1)]						
Partial factor		γ_{Msp}[3)]		1,5						

[1)] $h_{ef,min}$ according to Annex B3, Table B1
[2)] Values in brackets for stainless steel anchors
[3)] In absence of other national regulations

JORDAHL anchor channel JTA and JXA

Performance
Characteristic resistances under tension load – concrete failure anchor channels (JTA W)

Annex C7

Table C9: Characteristic resistances under tension load – Concrete failure of anchor channel (JXA)

Anchor channel				**JXA**	
				W38/23	**W53/34**
Concrete failure: Pullout					
Characteristic resistance in cracked concrete C12/15	Round anchor	$N_{Rk.p}$	[kN]	19,8	29,7
	I-anchor T-anchor			19,8	39,6
Characteristic resistance in uncracked concrete C12/15	Round anchor	$N_{Rk.p}$	[kN]	27,7	41,6
	I-anchor T-anchor			27,7	55,4
Factor of $N_{Rk,p} = N_{Rk,p}$ (C12/15) · ψ_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		γ_{Mp} [2]		1,5	
Concrete failure: Concrete cone					
Produkt factor k_1		$k_{cr,N}$		$8,9 \cdot (h_{ef,min}/180)^{0,15}$ [1]	
		$k_{ucr,N}$		$12,7 \cdot (h_{ef,min}/180)^{0,15}$ [1]	
Partial factor		γ_{Mc} [2]		1,5	
Concrete failure: Splitting					
Characteristic edge distance		$c_{cr,sp}$		$3h_{ef,min}$ [1]	
Characteristic spacing		$s_{cr,sp}$		$6h_{ef,min}$ [1]	
Partial factor		γ_{Msp} [2]		1,5	

[1] $h_{ef,min}$ according to Annex B4, Table B2
[2] In absence of other national regulations

Table C10: Characteristic resistances under tension load – Concrete failure of anchor channel (JTA K)

Anchor channel				**JTA**					
				K28/15	**K38/17**	**K40/25**	**K50/30**	**K53/34**	**K72/48**
Concrete failure: Pullout									
Characteristic resistance in cracked concrete C12/15	Round anchor	$N_{Rk,p}$	[kN]	6,7	14,7	10,8	15,9	29,7	50,9
	I-anchor T-anchor			11,7	11,7	14,0	21,1	25,7	46,4
Characteristic resistance in uncracked concrete C12/15	Round anchor	$N_{Rk,p}$	[kN]	9,4	20,6	15,1	22,3	41,6	71,3
	I-anchor T-anchor			16,4	16,4	19,7	29,5	36,0	65,0
Factor of $N_{Rk,p} = N_{Rk,p}$ (C12/15) · ψ_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		γ_{Mp} [2)]		1,5					
Concrete failure: Concrete cone									
Produkt factor k_1		$k_{cr,N}$		$8,9 \cdot (h_{ef,min}/180)^{0,15}$ [1)]					
		$k_{ucr,N}$		$12,7 \cdot (h_{ef,min}/180)^{0,15}$ [1)]					
Partial factor		γ_{Mc} [2)]		1,5					
Concrete failure: Splitting									
Characteristic edge distance		$c_{cr,sp}$		$3h_{ef,min}$ [1)]					
Characteristic spacing		$s_{cr,sp}$		$6h_{ef,min}$ [1)]					
Partial factor		γ_{Msp} [2)]		1,5					

[1)] $h_{ef,min}$ according to Annex B4, Table B3
[2)] In absence of other national regulations

JORDAHL anchor channel JTA and JXA

Performance
Characteristic resistances under tension load – concrete failure anchor channels (JTA K)

Annex C9

Table C11: Displacements under tension load (JTA W)

Anchor channel			**JTA**						
			W40/22	**W40+**	**W50/30**	**W50+**	**W53/34**	**W55/42**	**W72/48**
Tension load	N	[kN]	7,9	11,5	12,3	15,5	21,8	31,7	39,7
Short-term displacement	δ_{N0}	[mm]	0,4	0,4	0,4	0,5	0,5	0,5	0,5
Long-term displacement	$\delta_{N\infty}$	[mm]	0,8	0,8	0,8	1,0	1,0	1,0	1,0

Table C12: Displacements under tension load (JXA)

Anchor channel			**JXA**	
			W38/23	**W53/34**
Tension load	N	[kN]	14,7	31,2
Short-term displacement	δ_{N0}	[mm]	1,0	0,9
Long-term displacement	$\delta_{N\infty}$	[mm]	2,0	1,8

Table C13: Displacements under tension load (JTA K)

Anchor channel			**JTA**					
			K28/15	**K38/17**	**K40/25**	**K50/30**	**K53/34**	**K72/48**
Tension load	N	[kN]	3,6	7,1	7,9	12,3	21,8	39,7
Short-term displacement	δ_{N0}	[mm]	0,3	0,3	0,4	0,4	0,5	0,5
Long-term displacement	$\delta_{N\infty}$	[mm]	0,6	0,6	0,8	0,8	1,0	1,0

Table C14: Characteristic resistances under shear load – Steel failure of anchor channel (JTA W)

Anchor channel			**JTA**						
			W40/22	**W40+**	**W50/30**	**W50+**	**W53/34**	**W55/42**	**W72/48**
Steel failure: Anchor									
Characteristic resistance	$V_{Rk,s,a,y}$	[kN]	35	35	52	59	78	110	146
Partial factor	γ_{Ms} [1)]		1,5						
Steel failure: Connection between anchor and channel									
Characteristic resistance	$V_{Rk,s,c,y}$	[kN]	35	35	52	59	78	110	146
Partial factor	$\gamma_{Ms,ca}$ [1)]		1,8						
Steel failure: Local flexure of channel lips									
Spacing of channel bolts for $V_{Rk,s,l}$	$s_{l,V}$	[mm]	79	79	98	98	105	109	144
Characteristic resistance	$V^0_{Rk,s,l,y}$	[kN]	35	35	52	59	78	110	146
Partial factor	$\gamma_{Ms,l}$ [1)]		1,8						

[1)] In absence of other national regulations

JORDAHL anchor channel JTA and JXA	**Annex C11**
Performance Characteristic resistances under shear load – steel failure anchor channels (JTA W)	

Table C15: Characteristic resistances under shear load – Steel failure of anchor channel (JXA)

Anchor channel			**JXA**	
			W38/23	**W53/34**
Steel failure: Anchor				
Characteristic resistance	$V_{Rk,s,a,y}$	[kN]	48,3	101,1
Characteristic resistance	$V_{Rk,s,a,x}$	[kN]	15,7	28,6
Partial factor	γ_{Ms} [1)]		1,5	
Steel failure: Connection between anchor and channel				
Characteristic resistance	$V_{Rk,s,c,y}$	[kN]	48,3	101,1
Characteristic resistance	$V_{Rk,s,c,x}$	[kN]	17,7	36,3
Partial factor	$\gamma_{Ms,ca}$ [1)]		1,8	
Steel failure: Local flexure of channel lips				
Spacing of channel bolts for $V_{Rk,s,l}$	$s_{l,V}$	[mm]	76	106
Characteristic resistance	$V^0_{Rk,s,l,y}$	[kN]	48,3	101,1
Partial factor	$\gamma_{Ms,l}$ [1)]		1,8	
Characteristic resistance	$V_{Rk,s,l,x}$	[kN]	19,4	33,8
Installation factor	γ_{inst}		1,0	
Partial factor	$\gamma_{Ms,l,x}$ [1)]		1,8	

[1)] In absence of other national regulations

Table C16: Characteristic resistances under shear load – Steel failure of anchor channel (JTA K)

Anchor channel			**JTA**					
			K28/15	**K38/17**	**K40/25**	**K50/30**	**K53/34**	**K72/48**
Steel failure: Anchor								
Characteristic resistance	$V_{Rk,s,a,y}$	[kN]	13	18	20	32	56	102
Partial factor	γ_{Ms} [1)]		1,5					
Steel failure: Connection between anchor and channel								
Characteristic resistance	$V_{Rk,s,c,y}$	[kN]	9	18	20	31	55	100
Partial factor	$\gamma_{Ms,ca}$ [1)]		1,8					
Steel failure: Local flexure of channel lips								
Spacing of channel bolts for $V_{Rk,s,l}$	$s_{l,V}$	[mm]	56	76	80	100	107	144
Characteristic resistance	$V^0_{Rk,s,l,y}$	[kN]	9	18	20	31	55	100
Partial factor	$\gamma_{Ms,l}$ [1)]		1,8					

[1)] In absence of other national regulations

Table C17: Characteristic resistances under shear load – Concrete failure of anchor channel (JTA W)

Anchor channel			**JTA**						
			W40/22	**W40+**	**W50/30**	**W50+**	**W53/34**	**W55/42**	**W72/48**
Concrete failure: Pry-out									
Product factor		k_8	2,0						
Partial factor		γ_{Mc} [1)]	1,5						
Concrete failure: Concrete edge									
Product factor k_{12}	cracked concrete	$k_{cr,V}$	7,5						
	uncracked concrete	$k_{ucr,V}$	10,5						
Partial factor		γ_{Mc} [1)]	1,5						

[1)] In absence of other national regulations

Table C18: Characteristic resistances under shear load – Concrete failure of anchor channel (JXA)

Anchor channel			**JXA**	
			W38/23	**W53/34**
Concrete failure: Pry-out				
Product factor		k_8	2,0 (1,0) [2)]	2,0
Partial factor		γ_{Mc} [1)]	1,5	
Concrete failure: Concrete edge				
Product factor k_{12}	cracked concrete	$k_{cr,V}$	7,5 (5,6) [2)]	7,5 (6,4) [2)]
	uncracked concrete	$k_{ucr,V}$	10,5 (7,8) [2)]	10,5 (8,9) [2)]
Partial factor		γ_{Mc} [1)]	1,5	

[1)] In absence of other national regulations
[2)] Values in brackets for T-anchors

Table C19: Characteristic resistances under shear load – Concrete failure of anchor channel (JTA K)

Anchor channel			**JTA**					
			K28/15	**K38/17**	**K40/25**	**K50/30**	**K53/34**	**K72/48**
Concrete failure: Pry-out								
Product factor		k_8	1,0	2,0				
Partial factor		γ_{Mc} [1)]	1,5					
Concrete failure: Concrete edge								
Product factor k_{12}	cracked concrete	$k_{cr,V}$	4,5	7,5				
	uncracked concrete	$k_{ucr,V}$	6,3	10,5				
Partial factor		γ_{Mc} [1)]	1,5					

[1)] In absence of other national regulations

Table C20: Characteristic resistances under shear loads – Steel failure of channel bolts

Channel bolt ø				**M6**	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**	**M30**
Steel failure: Channel bolt												
Characteristic resistance [2]	$V_{Rk,s}$	[kN]	4,6[1]	4,8	8,8	13,9	20,2	37,7	58,8	84,7	110,2	134,6
			8,8[1]	8,0	14,6	23,2	33,7	62,8	98,0	141,2	183,6	224,4
			50[1]	6,0	11,0	17,4	25,3	47,1	73,5	105,9	137,7	168,3
			70[1]	8,4	15,4	24,4	35,4	65,9	102,9	148,3	192,8	235,6
Characteristic flexural resistance	$M^0_{Rk,s}$	[Nm]	4,6[1]	6,3	15,0	29,9	52,4	133,2	259,6	449,0	665,8	889,6
			8,8[1]	12,2	30,0	59,8	104,8 [3]	266,4 [4]	519,3	898,0	1331,5	1799,2
			50[1]	7,6	18,7	37,4	65,5	166,5	324,5	561,3	832,2	1124,5
			70[1]	10,7	26,2	52,3	91,7 [3]	233,1	454,4	785,8	1165,1	1574,3
Partial factor	γ_{Ms} [5]		4.6[1]	1,67								
			8.8[1]	1,25								
			50[1]	2,38								
			70[1]	1,56								

[1] Materials according to Annex A2 to A4
[2] In conformity to EN ISO 898-1:2013
[3] In combination with anchor channel K 28/15 limited to 85,5 Nm
[4] In combination with anchor channel K 38/17 limited to 234,0 Nm
[5] In absence of other national regulations

Table C21: Displacements under shear load (JTA W)

Anchor channel			**JTA**						
			W40/22	**W40+**	**W50/30**	**W50+**	**W53/34**	**W55/42**	**W72/48**
Shear load	V_y	[kN]	13,9	13,9	20,6	23,4	31,0	43,7	57,9
Short-term displacement	$\delta_{V,y,0}$	[mm]	0,6	0,6	0,6	0,6	1,2	1,2	1,2
Long-term displacement	$\delta_{V,y,\infty}$	[mm]	0,9	0,9	0,9	0,9	1,8	1,8	1,8

Table C22: Displacements under shear load (JXA)

Anchor channel			**JXA**	
			W38/23	**W53/34**
Shear load	V_y	[kN]	27,6	57,5
Short-term displacement	$\delta_{V,y,0}$	[mm]	9,1	11,1
Long-term displacement	$\delta_{V,y,\infty}$	[mm]	13,7	16,7
Shear load	V_x	[kN]	9,0	16,3
Short-term displacement	$\delta_{V,x,0}$	[mm]	4,8	3,1
Long-term displacement	$\delta_{V,x,\infty}$	[mm]	7,2	4,7

Table C23: Displacements under shear load (JTA K)

Anchor channel			**JTA**					
			K28/15	**K38/17**	**K40/25**	**K50/30**	**K53/34**	**K72/48**
Shear load	V_y	[kN]	3,6	7,1	7,9	12,3	21,8	39,7
Short-term displacement	$\delta_{V,y,0}$	[mm]	0,6	0,6	0,6	0,6	1,2	1,2
Long-term displacement	$\delta_{V,y,\infty}$	[mm]	0,9	0,9	0,9	0,9	1,8	1,8

Table C24: Characteristic resistances under combined tension and shear load (JTA W)

Anchor channel		**JTA**						
		W40/22	**W40+**	**W50/30**	**W50+**	**W53/34**	**W55/42**	**W72/48**
Steel failure								
Product factors	k_{13}, k_{14}	Values are taken from EN 1992-4:2018						

Table C25: Characteristic resistances under combined tension and shear load (JXA)

Anchor channel		**JXA**	
		W38/23	**W53/34**
Steel failure			
Product factors	k_{13}, k_{14}	Values are taken from EN 1992-4:2018	

Table C26: Characteristic resistances under combined tension and shear load (JTA K)

Anchor channel		**JTA**					
		K28/15	**K38/17**	**K40/25**	**K50/30**	**K53/34**	**K72/48**
Steel failure							
Product factor	k_{13}, k_{14}	Values are taken from EN 1992-4:2018					

Table C27: Characteristic resistances under fire exposure

Anchor channel					JTA								
					K28/15	K38/17	K40/25 W40/22	W40+	K50/30 W50/30	W50+	K53/34 W53/34	W55/42	K72/48 W72/48
Steel failure: Anchor, connection between anchor and channel, local flexure of channel lip, channel bolt													
Characteristic resistance	R30	M8	$N_{Rk,s,fi}$ = $V_{Rk,s,y,fi}$	[kN]	1,0	– [1]	– [1]	– [1]	– [1]	– [1]	– [1]	– [1]	– [1]
		M10			1,0	1,7	1,9	1,9	1,9	1,9	1,9	– [1]	– [1]
		M12			1,9	1,7	1,9 3,0	3,0	2,5	2,5	2,5	– [1]	– [1]
		M16			– [1]	3,2	3,6 7,8	7,8	4,0 6,0	6,0	6,0	6,3	– [1]
		M20			– [1]	– [1]	– [1]	– [1]	4,0 9,5	9,5	8,9 10,1	10,3	10,3
		M24			– [1]	– [1]	– [1]	– [1]	– [1]	– [1]	– [1]	14,8	14,8
	R60	M8			0,8	– [1]	– [1]	– [1]	– [1]	– [1]	– [1]	– [1]	– [1]
		M10			0,8	1,5	1,5	1,5	1,5	1,5	1,5	– [1]	– [1]
		M12			1,3	1,5	1,5 2,6	2,6	2,5	2,5	2,5	– [1]	– [1]
		M16			– [1]	2,4	3,6 5,3	5,3	3,5 4,5	4,5	4,5	4,8	– [1]
		M20			– [1]	– [1]	– [1]	– [1]	3,5 7,1	7,1	6,5 7,5	7,6	7,6
		M24			– [1]	– [1]	– [1]	– [1]	– [1]	– [1]	– [1]	11,1	11,1
	R90	M8			0,6	– [1]	– [1]	– [1]	– [1]	– [1]	– [1]	– [1]	– [1]
		M10			0,6	1,0	1,1	1,1	1,1	1,1	1,1	– [1]	– [1]
		M12			0,7	1,0	1,1 1,6	1,6	1,6	1,6	1,6	– [1]	– [1]
		M16			– [1]	1,4	2,0 2,9	2,9	2,5 3,0	3,0	3,0	3,3	– [1]
		M20			– [1]	– [1]	– [1]	– [1]	2,5 4,8	4,8	4,2 4,8	4,9	4,9
		M24			– [1]	– [1]	– [1]	– [1]	– [1]	– [1]	– [1]	7,3	7,3
Partial factor			$\gamma_{Ms,fi}$ [2]		1,0								

[1] No performance assessed
[2] In absence of other national regulations

Table C27 (continuation): Characteristic resistances under fire exposure

Anchor channel					JTA								
					K28/15	K38/17	K40/25 W40/22	W40+	K50/30 W50/30	W50+	K53/34 W53/34	W55/42	K72/48 W72/48
Steel failure: Anchor, connection between anchor and channel, local flexure of channel lip, channel bolt													
Characteristic resistance	R120	M8	$N_{Rk,s,fi}$ = $V_{Rk,s,y,fi}$	[kN]	0,5	– [1]	– [1]	– [1]	– [1]	– [1]	– [1]	– [1]	– [1]
		M10			0,5	0,8	0,8	0,8	0,8	0,8	0,8	– [1]	– [1]
		M12			0,5	0,8	0,8 1,1	1,1	1,2	1,2	1,2	– [1]	– [1]
		M16			– [1]	1,0	1,2 1,6	1,6	2,1 2,3	2,2 2,3	2,2 2,3	2,6	– [1]
		M20			– [1]	– [1]	– [1]	– [1]	2,1 3,6	3,6	3,0 3,5	3,6	3,6
		M24			– [1]	– [1]	– [1]	– [1]	– [1]	– [1]	– [1]	5,4	5,4
Partial factor			$\gamma_{Ms,fi}$ [2]		1,0								

[1] No performance assessed
[2] In absence of other national regulations

JORDAHL anchor channel JTA and JXA

Performance
Characteristic resistances under fire exposure

Annex C20

Deutsches Institut für Bautechnik DIBt

Fig. 1

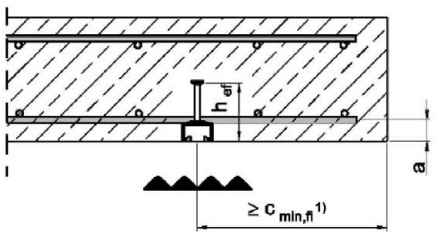


Fig. 2

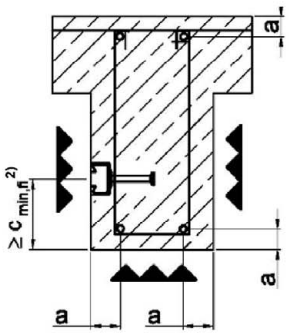


Table C28: Minimum axis distance under fire exposure

Anchor channel				JTA						
				K 28/15	K 38/17	K 40/25 W 40/22 W 40+	K 50/30 W 50/30 W 50+	K 53/34 W53/34	W 55/42	K 72/48 W 72/48
Minimum axis distance	R30	a	[mm]	35	35	35	35	50	50	50
	R60			35	35	35	35	50	50	50
	R90			45	45	45	45	50	50	50
	R120			60	60	60	60	65	70	70

[1] Fire exposure from one side only. $c_{min,fi} = 2\ h_{ef,min}$
[2] Fire exposure from more than one side. $c_{min,fi}$ = MAX (2 $h_{ef,min}$;300 mm)

JORDAHL anchor channel JTA and JXA

Performance
Concrete cover under fire exposure

Annex C21

Table C29: Combinations of anchor channels and channel bolts for fatigue tension loading

Anchor channel		Anchor		Channel bolt			
		Type	d_a (t_w) [mm]	Type	d	Strength grade	Surface
JTA	W 40/22	R	9,0	JC	M12	8.8	Electroplated, hot-dip galvanized
					M16	4.6, 8.8	
	W 40+		10,8	JC	M12	8.8	
					M16	4.6, 8.8	
	W 50/30		9,0	JB	M16, M20	4.6, 8.8	
	W 50+		10,0	JB	M16, M20	4.6, 8.8	
	W 53/34		11,5	JB	M16, M20	8.8	

Table C30: Characteristic resistances under fatigue tension load with n load cycles without static preload (N_{Ed} = 0) – Steel failure (Design method I according to EOTA TR 050, October 2018)

Anchor channel		JTA				
		W 40/22	W 40+	W 50/30	W 50+	W 53/34
Characteristic resistances under fatigue load in tension without static preload	Load cycles n	$\Delta N_{Rk,s,0,n}$ [kN]				
	$\leq 10^4$	11,7	12,8	16,5	16,5	22,2
	$\leq 10^5$	6,7	7,7	9,8	9,8	13,2
	$\leq 10^6$	3,8	4,7	5,8	5,8	7,9
	$\leq 2 \cdot 10^6$	3,2	4,0	4,9	4,9	6,7
	$\leq 5 \cdot 10^6$	2,6	3,3	4,0	4,0	5,5
	$\leq 10^8$	1,2				
	$\geq 10^8$	– [1]				

[1] No performance assessed

Table C31: Reduction factor for concrete cone and pullout failure without static preload (N_{Ed} = 0) (Design method I according to EOTA TR 050, October 2018)

Anchor channel		JTA W
	Load cycles n	$\eta_{k,c,fat} = \eta_{k,p,fat}$ [-]
Reduction factor for $\Delta N_{Rk,c,0,n} = \eta_{c,fat} \cdot N_{Rk,c}$ [1] $\Delta N_{Rk,p,0,n} = \eta_{p,fat} \cdot N_{Rk,p}$ [2]	$\leq 10^4$	0,736
	$\leq 10^5$	0,665
	$\leq 10^6$	0,600
	$\leq 2 \cdot 10^6$	0,582
	$\leq 5 \cdot 10^6$	0,559
	$\leq 6 \cdot 10^7$	0,500
	$\leq 10^8$	0,500
	$\geq 10^8$	0,500

[1] Static resistance according to Annex C7 and EOTA TR 047, March 2018 or EN 1992-4:2018
[2] Static resistance according to Annex C7

Table C32: Characteristic limit resistances under fatigue tension load without static preload ($n \rightarrow \infty$, $N_{Ed} = 0$) – Steel failure (Design method II according to EOTA TR 050, October 2018)

Anchor channel		**JTA**				
		W 40/22	**W 40+**	**W 50/30**	**W 50+**	**W 53/34**
Characteristic resistances under fatigue tension load	$\Delta N_{Rk,s,0,\infty}$ [kN]	– [1)]	3,3	4,0	4,0	5,5

[1)] No performance assessed

Table C33: Characteristic limit resistances under fatigue tension load without static preload ($n \rightarrow \infty$, $N_{Ed} = 0$) – Concrete cone and pullout failure (Design method II according to EOTA TR 050, October 2018)

Characteristic resistances under fatigue tension load	$\eta_{c,fat} = \eta_{p,fat}$ **[-]**
$\Delta N_{Rk,c;0;\infty} = \eta_{c,fat} \cdot N_{Rk,c}$ [1)] $\Delta N_{Rk,p;0;\infty} = \eta_{p,fat} \cdot N_{Rk,p}$ [2)]	0,5

[1)] Static resistance according to Annex C7 and EOTA TR 047, March 2018 or EN 1992-4:2018
[2)] Static resistance according to Annex C7

In absence of other national regulations the following partial factors are recommended for design method I and II for all modes of failure (Table C30 to C33) according to EOTA TR 050:Oktober 2018 and EN 1992-4:2018:

$\gamma_{Ms,fat}$ = 1,35 (steel)
$\gamma_{Mc,fat} = \gamma_{Mp,fat}$ = 1,50 (concrete)