JORDAHL® Channels and Accessories

Making Light Work of the Heaviest Loads.

Technical Information

JORDAHL®
anchored in quality

Quality since 1907.

JORDAHL's registered office and administrative headquarters on the premises of its affiliate PUK

The JORDAHL Company

JORDAHL connects: concrete, steel, heavy loads and a whole lot more. And of course numerous customers around the world who have already decided to use high-quality and individual products from fastening, reinforcement and shear connection, mounting technology and facade connection systems. Customers who choose JORDAHL want more – higher quality, broader choice, better technical advice, wider experience. And they get all of this from us. Since our company was founded in Berlin in 1907 we have been at the forefront of connection and shear reinforcement systems development. JORDAHL products such as anchor channels have become milestones in the evolution of structural engineering and have brought lasting changes to construction, shaping the way buildings are designed and making them safer, not just in Germany.

The JORDAHL Seal

JORDAHL has over 100 years of unique experience in the market. And this experience forms the basis of our competence and high standards. Whether high-quality products, service or consulting – we aim to do everything for our customers to the same demanding standard of excellence. That is what the JORDAHL seal stands for. It is a guarantee of quality for our customers and also the standard that we strive to adhere to each and every day.

The sign of excellent JORDAHL® Quality.

The JORDAHL Experts

You are always well advised when you choose JORDAHL products. Whether from the point of view of static calculations, general technical advice or the development of customised solutions – competent and experienced JORDAHL product specialists offer you state-of-the-art, flexible and customised solutions for all your needs.

If you wish to contact JORDAHL's experts simply send an e-mail to experten@jordahl.de or call 030 68283-433.

Contents

Title: Canary Wharf, London, David Iliff

Overview Anchor Channels

W-Profiles
- Hot-rolled from a single block
- Free from internal stresses
- Optimised geometry with strengthened channel lips for high tightening torques
- Suitable for dynamic loads
- Resistant to fatigue up to the working load limit
- Proven against explosion or shock limit loads
- European Technical Approval ETA-09/0338

K-Profiles
- Cold-formed profiles
- Constant material strength
- Suitable for static loads
- European Technical Approval ETA-09/0338

Toothed W- and K-Profiles
- Universal load capacity also in the longitudinal direction of the channel
- Toothed profiles have German Technical Approval (W-profiles: Z-21.4-1690, K-profiles: Z-21.4-741)

JORDAHL® Bolts
- Hook-Head Bolt and Hammer-Head Bolt – matched to JORDAHL® profiles
- Galvanised or from stainless steel
- Strong connections using high bolt tightening torques

Round and I-anchors
are cold-forged on the back of the channels in a monitored production process. Welded I-anchors are also available for special applications.

work safety

reduces construction time

economical

simple assembly

fire prevention

sustainable construction

Proven Anchoring

For more than a century JORDAHL® anchor channels have been recognised as a secure way to anchor loads in concrete. Regardless of whether the concrete is reinforced or non-reinforced, cracked or non-cracked, JORDAHL® anchor channels always provide a load-carrying connection.

Planning

- Reinforcement can be recognised in the design
- Highest cost-effectiveness in series connection
- High bearing capacity even in delicate structural elements
- Independent of shrinkage and creep strain in the concrete element
- Suitable for prestressed structural elements
- Increased bearing capacity in the vicinity of reinforcement
- Small edge distances possible
- Simple, individual adaptation

Assembly

- Fastening on site reduces construction time
- Simple assembly of the attachment parts
- Suitable for heavily-reinforced concrete or delicate structural components
- Simple compensation of building tolerances

Safety

- Suitable for installation in structural components with fire prevention requirements
- High resistance to fatigue as well as loads resulting from seismic activities and explosions
- Maintenance-free for years using corrosion-resistant types of stainless steel
- Transparent safety concept
- Optimum mechanical undercut
- Anchoring without damaging the concrete or the reinforcement
- Suitable without restrictions for cracked and non-cracked concrete

Innovative Design Concept of JTA-CE Anchor Channels

The introduction of the new European approval for JORDAHL® JTA-CE anchor channels represents state of the art for anchoring in concrete and generally leads to optimised utilisation of anchor channels.

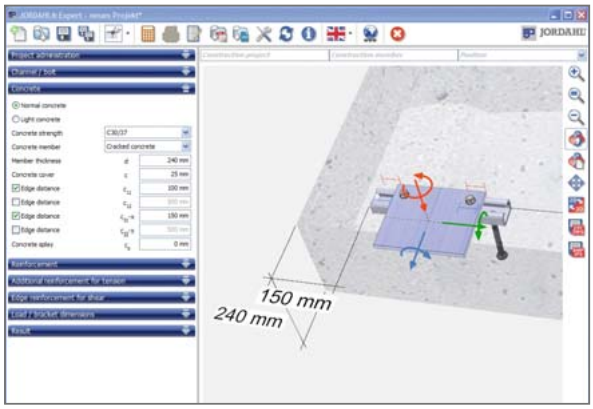
The design concept is based on the European partial safety concept CEN/TS 1992-4-3 and the European Technical Approval for JORDAHL® anchor channels (ETA-09/0338).

Optimised design taking into account:

- Edge distances
- Channel length
- Load distribution along the channels
- Concrete strength
- Additional reinforcement
- Thickness of the structural component

JORDAHL® EXPERT design software:

- Efficient design in accordance with CEN/TS
- Simple and quick to use
- Input with clear 3D graphics
- Easily comprehensible monitor output
- Testable print-out



JORDAHL® EXPERT Software

Further information on JORDAHL® anchor channels with European Technical Approval (ETA-09/0338) in catalogue "Anchor Channels JTA-CE".

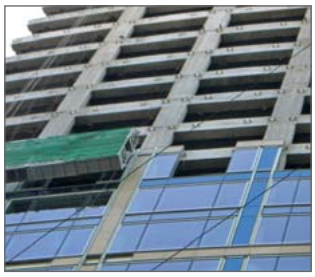
Applications

Attachment of crane rails to prefabricated concrete elements

Attachment of catenaries

Connection of prefabricated concrete elements

Attachment of elevator guide rails



Attachment of curtain-type façades

Fastening industrial machinery into foundations

Attachment of seats in stadia

Attachment of pipe-work

Attachment of cable support systems

Attachment of profiled metal sheets on the walls and roof

Attachment of railings

Standard Product Range

(JTA-CE; JXA and JZA)

JTA W 72 / 48 JTA W 55 / 42		JTA K 72 / 48		JXA W 64 / 44		JTA W 53 / 34 JTA K 53 / 34 JXA W 53 / 34 JXA W 38 / 23 JZA K 41 / 22		JTA W 50 / 30 JTA K 50 / 30 JTA K 40 / 25		JTA W 40 / 22		JTA K 38 / 17 JTA K 28 / 15 JXA W 29 / 20[1]	
Length [mm]	Number of anchors	Length [mm]	Number of anchors	Length [mm]	Number of anchors	Length [mm]	Number of anchors	Length [mm]	Number of anchors	Length [mm]	Number of anchors	Length [mm]	Number of anchors
150	2	150	2	150	2	150	2	150	2	150	2	100	2
200	2	200	2	200	2	200	2	200	2	200	2	150	2
250	2	250	2	250	2	250	2	250	2	250	2	200	2
300	2	300	2	300	2	300	2	300	2	300	2	250	2
350	2	350	2	350	3	350	3	350	3	350	3	300	3
400	3	450	3	400	3	400	3	400	3	400	3	350	3
550	3	550	3	550	3	550	3	550	3	550	3	450	3
900	4	900	4	900	5	800	4	800	4	800	4	550	4
6000	21	6000	21	6000	25	1050	5	1050	5	1050	5	800	5
						6000	25	3000	13	1300[1]	6	1050	6
								6000	25	1550[1]	7	3000	16
										1800[1]	8	6000	31
										2050[1]	9		
										2300[1]	10		
										2550[1]	11		
										3000[1]	13		
										6000	25		

Spacings of anchors ≤ 300 mm	Spacings of anchors ≤ 300 mm	Spacings of anchors ≤ 250 mm	Spacings of anchors ≤ 250 mm	Spacings of anchors ≤ 250 mm	Spacings of anchors ≤ 250 mm	Spacings of anchors ≤ 200 mm

[1] Only in hot-dip galvanised (HDG)

Material and design of profile

- Hot-dip galvanised steel (HDG)
- Stainless steel (A4)
- Standard filler polyethylene (PE) or polystyrene (PS)

Ordering example for JTA-CE anchor channels

Type	Profile size		Channel length [mm]		Anchor		Material		ETA-Compliant
JTA W	50/30	–	250	–	2A	–	HDG	–	CE

Ordering example for JXA anchor channels

Type	Profile size		Channel length [mm]		Material
JXA W	38/23	–	250	–	HDG

Material and Identification

JORDAHL® Product	Steel		Stainless steel	
Profiles	S235JR = 1.0038 S275JR = 1.0044	DIN EN 10025	1.4301 / 1.4541-A2[1] 1.4401 / 1.4404 / 1.4571-A4[2] 1.4529 / 1.4547[3]	DIN EN 10088
Anchors	S235JR = 1.0038	DIN EN 10025 DIN EN 10263	1.4401 / 1.4404 / 1.4571-A4[2] 1.4529 / 1.4547[3]	DIN EN 10088
Bolts	Strength class 4.6/8.8	DIN EN ISO 898-1	A4-50; A4-70[2] F4-70[3]	DIN EN ISO 3506-1
Hexagon nuts ISO 4032	Strength class 8	DIN EN 20898-2	A4-50; A4-70[2] 1.4529[3]	DIN EN ISO 3506-2
Washers	St	DIN EN ISO 7089 (DIN 125) DIN EN ISO 7093-1 (DIN 9021) DIN EN ISO 7097 (DIN 440)	1.4401 / 1.4404 / 1.4571-A4[2]	DIN EN 10088

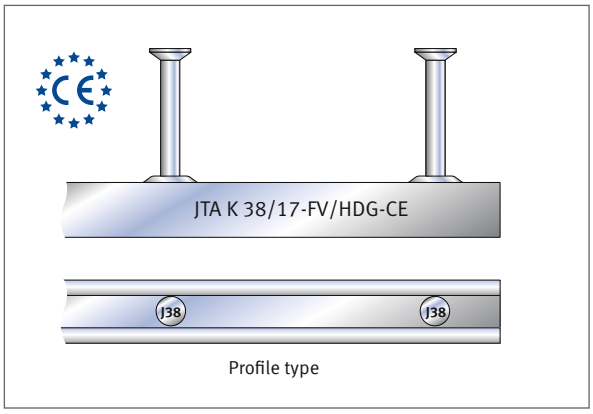
[1] Corrosion resistance class II according to Z-30.3-6 (not part of the general technical approval)
[2] Corrosivity class C4 (ISO 12944-2)
[3] Corrosivity class C5 (ISO 12944-2)

Identification of JORDAHL® Anchor Channels

JORDAHL® anchor channels are permanently identified on the profile side with type of profile and material specification.

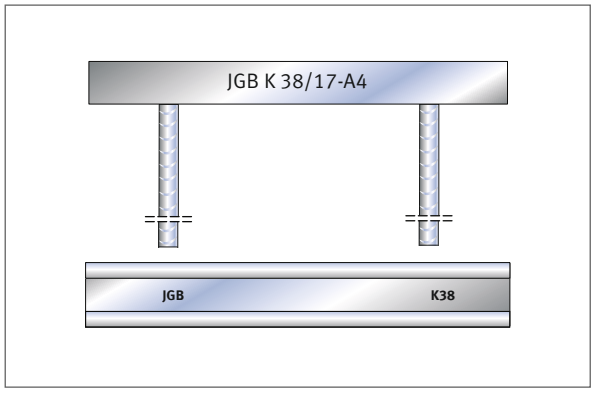
JORDAHL® anchor channels which are compliant with a European Technical Approval (ETA) show the designation "-CE".

JORDAHL® anchor channels with round anchors are additionally embossed with the profile designation on the rivet head on the inside chamber of the channel.

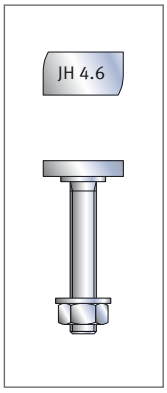


Profile type

Identification of JORDAHL® Railing Fastening JGB



Identification of JORDAHL® Bolts



JORDAHL® bolts are embossed on the bolt head with type and strength class.

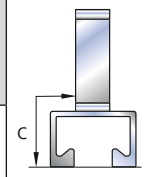
Corrosion Prevention

Categories of corrosion: ISO 12944-2	Profile	Anchor	Bolt, nut, washer	Intended purpose
C1 very low	mill finish	mill finish	mill finish without corrosion protection	Only possible when all the connection elements, depending on the ambient conditions, are protected, by a minimum concrete cover in accordance with Eurocode EC2.
C2 low	hot-dip galvanised (HDG), plating > 50 µm	hot-dip galvanised (HDG), plating > 50 µm	electro-zinc plated (ZP), plating > 5 µm	Concrete structural components in interior rooms, for example domestic properties, offices, schools, hospitals, retail premises – with the exception of wet rooms.
C3 medium	hot-dip galvanised (HDG), plating > 50 µm	hot-dip galvanised (HDG), plating > 50 µm	hot-dip galvanised (HDG), plating > 50 µm	Concrete structural components in interior rooms with normal atmospheric humidity (including kitchens, bathrooms and washrooms in domestic properties) – with the exception of permanent moisture penetration.
C4 high	Stainless steel 1.4401 } A4 1.4404 } 1.4571 } 1.4362 L4	Stainless steel 1.4401 } A4[1] 1.4404 } 1.4571 } 1.4362 L4[1] Weld-on anchor mill finish[2]	Stainless steel 1.4401 } A4-50, A4-70 1.4404 } 1.4571 } 1.4362 L4-70	Applications with medium corrosion resistance, for example in wet rooms, areas exposed to weather, industrial atmosphere, proximity to the sea and in inaccessible areas.
C5 severe	Stainless steel 1.4462[3] F4[4] 1.4529 } HC 1.4547 }	Stainless steel 1.4462[3] F4[4] 1.4529 HC Weld-on anchor mill finish[2]	Stainless steel 1.4462[3] F4-70[4] 1.4529 HC-50 1.4547 HC-70	Applications with severe corrosion resistance and high corrosion loading by chlorides and sulphur dioxide (including the concentration of pollutants, for example in the case of components in salt water and road tunnels).

[1] JORDAHL® anchor channels with stainless steel round anchors: anchor channel types JTA K 28/15 to JTA W 50/30, JXA W 29/20 to JXA 53/34 are manufactured from stainless steel round anchors. These anchor channels are not subject to any restrictions with respect to the concrete cover.

Anchor channel types JTA W 72/48, JTA K 72/48 and JTA W 53/34, JTA K 53/34, JXA W 64/44 and JXA W 53/34 can be manufactured from stainless steel round anchors or welded-on mill-finish steel I-anchors. The static properties of the round anchors or welded-on I-anchors are equivalent.

[2] JORDAHL® stainless steel anchor channels with mill finish weld-on anchors: the following concrete cover c must be used for corrosion protection of the welded anchors:

JTA W 53/34 JTA K 53/34 JXA W 53/34 [mm]	**JXA W 64/44** [mm]	**JTA W 72/48 JTA K 72/48** [mm]	
40	50	60	

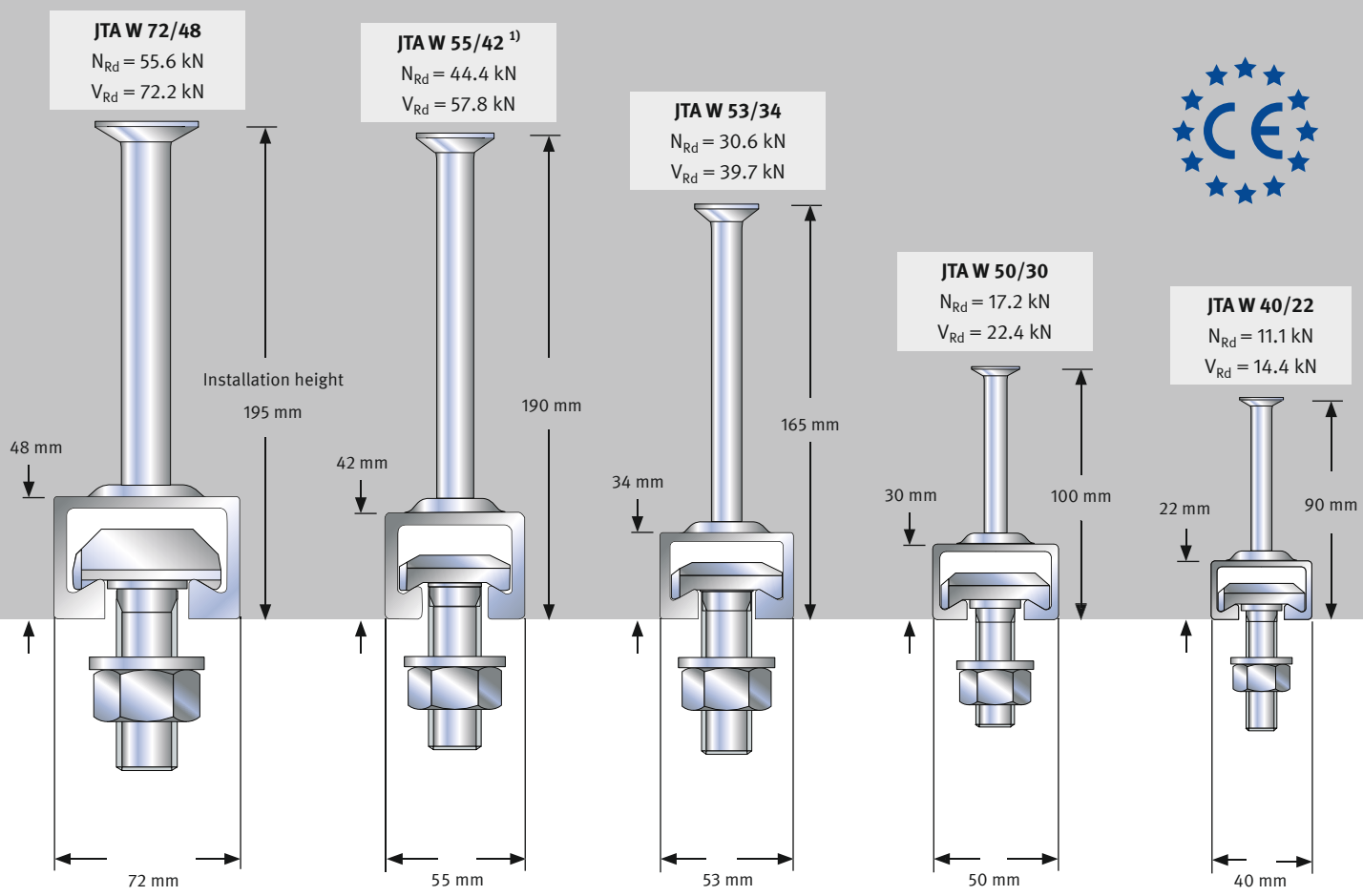
[3] Stainless steel 1.4462 is not approved for indoor swimming pool atmospheres in accordance with Z-30.3-6

[4] F4 is equivalent to FA

JORDAHL® Anchor Channels JTA-CE

European Technical Approval ETA-09/0338

Hot-rolled Anchor Channels



Bolts

JA	JB	JB	JB	JC
M 20	M 16	M 10	M 10	M 10
M 24	M 20	M 12	M 12	M 12
M 27	M 24 2)	M 16	M 16	M 16
M 30		M 20	M 20	

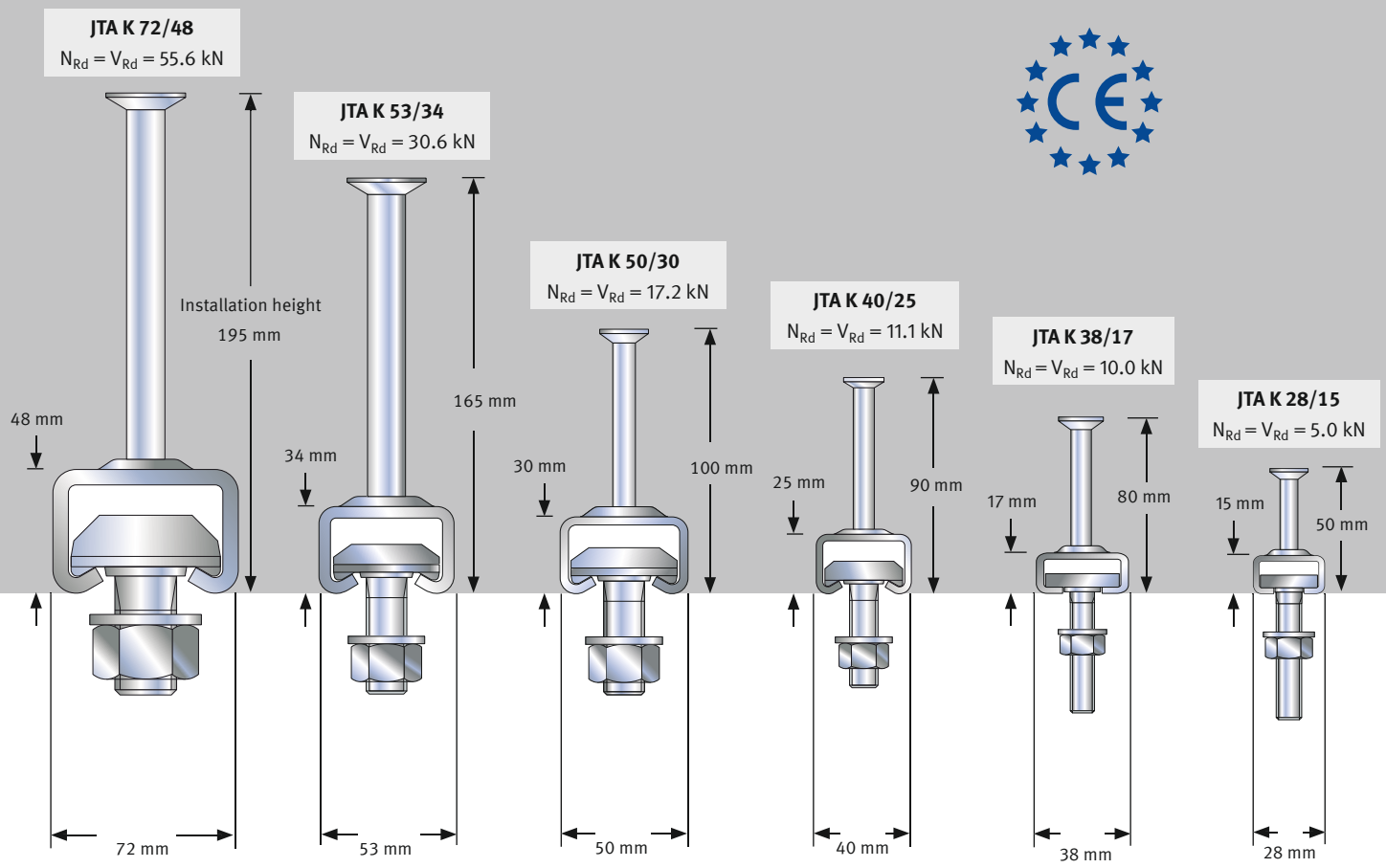
Material and design of profile
- Hot-dip galvanised steel (HDG)
- Stainless steel (A4)
- Standard filler polyethylene (PE) or polystyrene (PS)

Material and design of bolts
- Electro-zinc plated (ZP) or hot-dip galvanised steel (HDG)
- Stainless steel

1) Only in hot-dip galvanised (HDG)
2) B M 24 is equivalent to JE M 24
Profile dimensions may exhibit tolerances.

More information about anchor channel design can be found in brochure “Anchor Channels JTA-CE” and software JORDAHL® EXPERT under www.jordahl.de.

Cold-formed Anchor Channels



Bolts

JA	JB	JB	JC	JH	JD
M 20	M 10	M 10	M 10	M 10	M 6
M 24	M 12	M 12	M 12	M 12	M 8
M 27	M 16	M 16	M 16	M 16	M 10
M 30	M 20	M 20			M 12

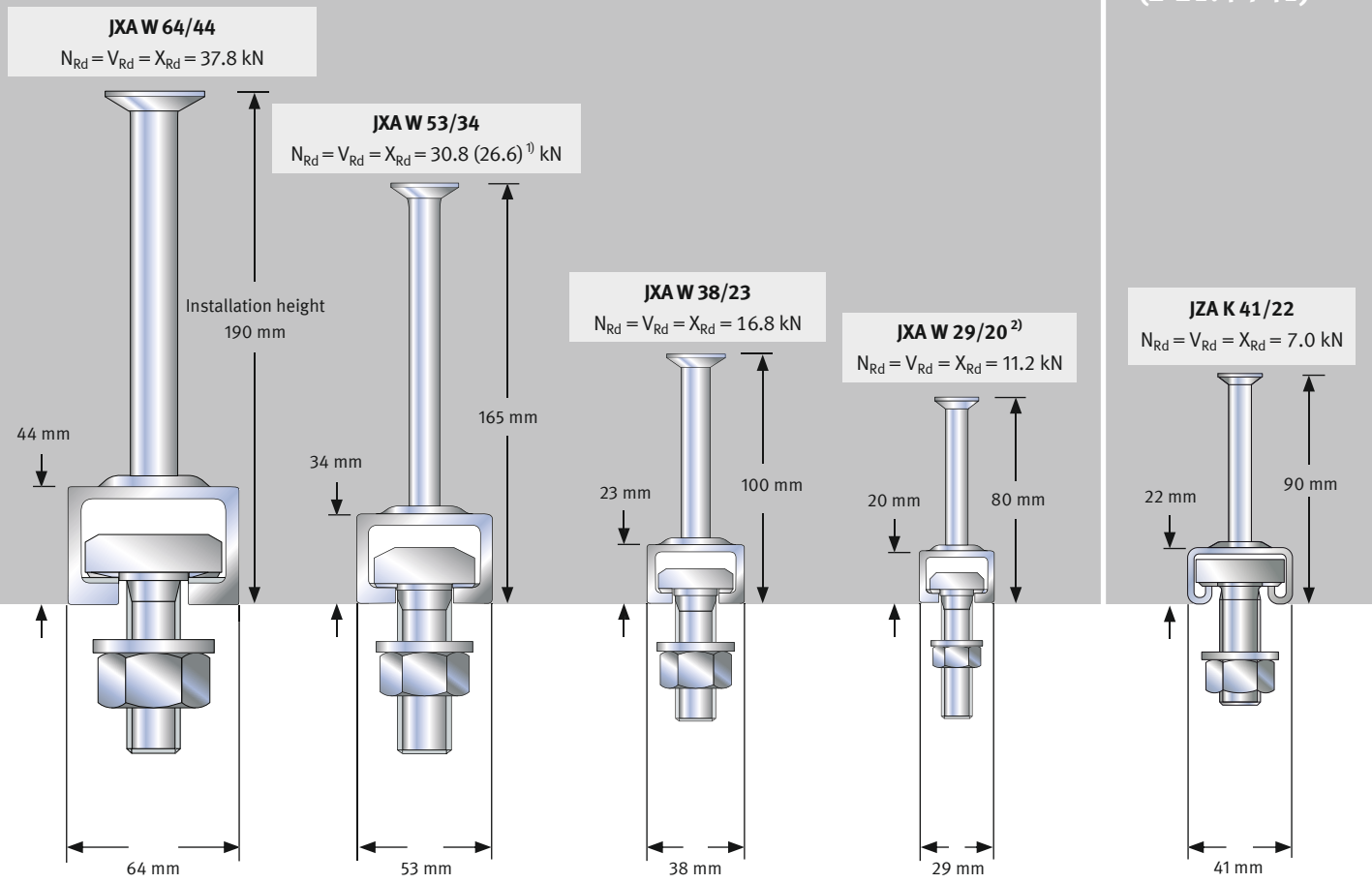
N_{Rd} = Design value for axial force
V_{Rd} = Design value for shear force

JORDAHL® Toothed Anchor Channels

German Technical Approval Z-21.4-1690

Hot-rolled Toothed Anchor Channels

Cold-formed Toothed Anchor Channels (Z-21.4-741)



Toothed Bolts

JXE	JXB	JXH	JXD	JZS
M 20	M 16	M 12	M 10	M 12
M 24	M 20	M 16	M 12	M 16

N_{Rd} = Design value for axial force
V_{Rd} = Design value for shear force
X_{Rd} = Design value for longitudinal force

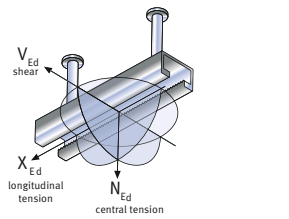
Material and design of profile
- Hot-dip galvanised steel (HDG)
- Stainless steel (A4)
- Standard filler polyethylene (PE) or polystyrene (PS)

Material and design of bolts
- Electro-zinc plated (ZP) or hot-dip galvanised steel (HDG)
- Stainless steel

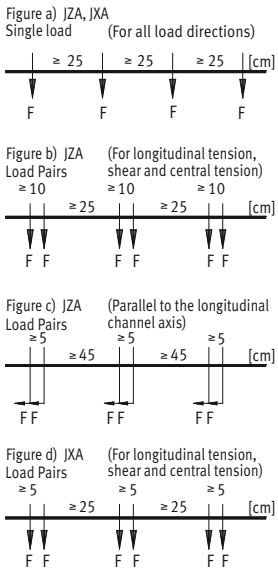
[1)] Approval requested
[2)] For profiles made in A4 = 26.6 kN

Design Resistances Toothed Anchor Channels

for all concrete strength classes ≥ C 20 / 25 [1)]



$$\sqrt{N_{Ed}^2 + V_{Ed}^2 + X_{Ed}^2} \leq F_{Rd}$$ [3)]



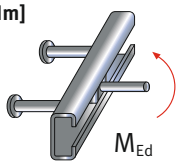
Profile JXA / JZA	Corresponding bolt		Design resistances F_{Rd} [kN] [2) 3)] stressing in all directions		
	Hammer-head bolts [4)]	Toothed bolts	Single load	Load pairs	
	Profile length [mm]		≥ 100	≥ 200	
	Load distance [mm]		≥ 250	≥ 50	≥ 150
W 29/20	JD M 12	JXD M 10	11.2	6.3 [5)]	9.0 [5)]
		JXD M 12			
W 38/23	JH M 16	JXH M 12	16.8	9.4 [5)]	12.0 [5)]
		JXH M 16			
W 53/34	–	JXB M 16	30.8 (26.6) [6)]	–	19.25 [7)]
		JXB M 20			
W 64/44	–	JXE M 20	37.8	–	23.7 [7)]
		JXE M 24			
K 41/22	–	JZS M 12	7.0	4.9	4.9
		JZS M 16			

$$\text{perm. } F = \frac{F_{Rd}}{1.4}$$

[1)] When anchoring in concrete with strength grade C 12/15, the permissible loads for C 20/25 must be reduced by a factor of 0.7 and for lightweight concrete with closed structure ≥ LC 25/28 by a factor of 2/3.
[2)] See page 14 for the minimum distance.
[3)] In the event of simultaneous stressing in different directions the resultant load must not exceed the design load.
[4)] Must not be used with loads in the longitudinal axis of the channel (x-x). See National Building Approval Z-21.4-1690.
[5)] Intermediate values may be interpolated.
[6)] Only applies to channels made of A4.
[7)] The minimum distance for profile W 53/34 and 64/44 is 100 mm.

JORDAHL® Toothed Bolts

Bending moment $M_{Rd,s}$ [Nm]



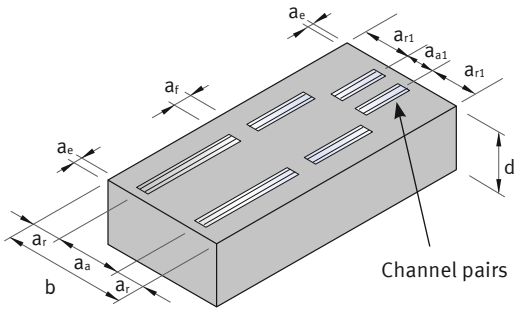
Profile	Bolts	M 10	M 12	M 16	M 20	M 24
	JXA W 29/20	Toothed bolt JXD		–	–	–
	JXA W 38/23	–	Toothed bolt JXH		–	–
	JXA W 53/34	–	–	Toothed bolt JXB		–
	JXA W 64/44	–	–	–	Toothed bolt JXE	
	JZA K 41/22	–	Toothed bolt JZS		–	–
Design resistance F_{Rd} [kN]	HDG 8.8	18.6	27.2	50.5	79.0	113.7
	A4-50	–	13.0	24.2	–	–
	A4-70	12.2	17.6	33.0	51.5	95.1
Bending moments M_{Rd} [Nm]	HDG 8.8	34.9	61.2	155.4	303.0	718.3
	A4-50	–	21.4	54.3	–	–
	A4-70	26.2	45.9	116.6	227.2	503.2
Through-hole in anchor element [mm]		12	14	18	22	26
Tightening torque M_A [Nm]	JXA W 29/20	40	80	–	–	–
	JXA W 38/23	–	80	120	–	–
	JXA W 53/34	–	–	200	350	–
	JXA W 64/44	–	–	–	350	450
	JZA K 41/22	–	50	90	–	–

Minimum Distances and Minimum Dimensions

for all concrete strength grades

Profile	a_r	a_a	a_e	a_f	b [2]	Channel pairs [4]	
						a_{r1}	a_{a1}
	[mm]						
JXA W 29/20	100	200	80	200	200	140	125
JXA W 38/23	150	300	130	250	300	225	150
JXA W 53/34	200	400	175	350	400	–	–
JXA W 64/44	250	500	225	450	500	–	–
JZA K 41/22	75	150	80	200	150	100	100
JSA K 28/15	50	100	40	80	100	50	100
JSA K 38/17	75	150	50	100	150	100	100

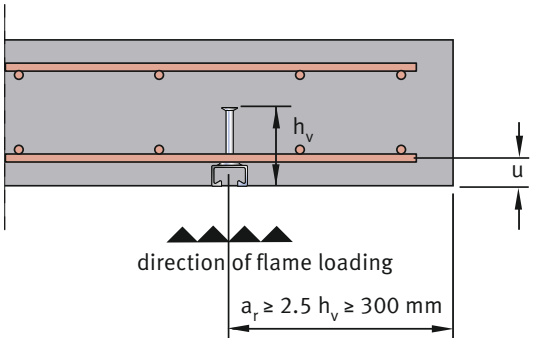
[1] The minimum spacings given in the table are valid for reinforced concrete. When increasing the distances by 30 % there are no demands for reinforcement.
[2] Applies to the use of one channel
[3] Is derived from the installation height of the anchor channel and the required concrete cover in accordance with DIN 1045-1:2008-08 or DIN EN 1992-1-1:2011-01 with DIN EN 1992-1-1/ NA-2011-01, Section 4.4
[4] Only permissible for tension



Anchor Channels under Fire Loading

Anchor channels JTA and JXA can also be used in components made of standard concrete with a fire prevention requirement F90 or F60 to DIN 4102 Part 2 (90 or 60 minutes time to failure under fire). Anchor channels in reinforced concrete beams stressed by fire on one side, reinforced concrete beams stressed by fire on three sides, and reinforced concrete columns stressed by fire on four sides were investigated. In this case, only dead loads at right angles to the channel longitudinal axis and central tension/oblique tension and shear load are permissible (no longitudinal tension).

Reinforced concrete ceilings of normal concrete with **JORDAHL® anchor channels** concreted in, with fire loading on one side



Required axial spacing u [mm] with fire resistance period F60 and F90 in the area of the JORDAHL® anchor channels

Profile		u [mm]	
		60 Minutes	90 Minutes
JTA	K 28/15 K 38/17	35	45
	W 40/22 K 40/25	35	45
	W 50/30 K 50/30	35	45
	W 53/34 K 53/34	50	50
	W 55/42 W 72/48 K 72/48	50	50
JXA	W 29/20	35	45
	W 38/23	35	45
	W 53/34	50	50
	W 64/44	50	50

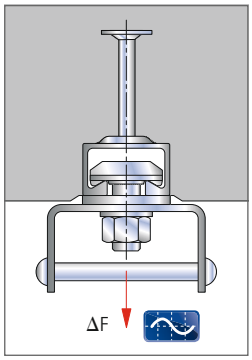
See details in approval text:
JTA: Z-21.4-151
JXA: Z-21.4-1690

Dynamic Stress

Hot-rolled JORDAHL® Anchor Channels

Permissible load range for load cycles N = 2 × 10⁶ according to JTA approval Z-21.4-151 and JXA approval Z-21.4-1690.

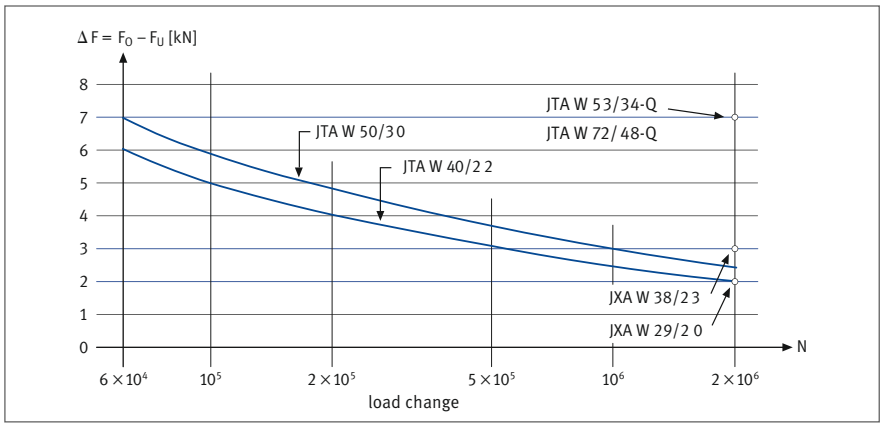
The loading information applies only to hot-rolled anchor channels in the specified material qualities and the anchor types according to column 5.
Only the associated bolts according to column 6 are approved.
For extremely high static and dynamic loads, see also anchor channel JRA W 74/48 page 22/23.



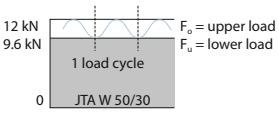
Profile	Material	Perm. load range [1] ΔF = F_O – F_U [kN] when stressed in tension	Perm. upper load [2] F_O [kN]	Anchor type	Approved bolts
JTA W 40/22	S235JR = 1.0038	2.0	8	I 60, R1, R3	JC M 16
	1.4401 / 1.4404 / 1.4571 (A4)	1.8		R3	
JTA W 50/30	S235JR = 1.0038	2.4	12	I 60, R1, R3	JB M 16 – 20
	1.4401 / 1.4404 / 1.4571 (A4)	2.2		R3	
JTA W 53/34	S235JR = 1.0038	7.0	25	I 125	JB M 20
JTA W 72/48	S235JR = 1.0038	7.0	32	I 125	JA M 24 – 30
JXA W 29/20	S275JR = 1.0044	2.0	8	I 60, R1	JXD M 12 JD M 12
	1.4401 / 1.4404 / 1.4571 (A4)	1.8			
JXA W 38/23	S275JR = 1.0044	3.0	12	I 125, R3	JXH M 16 JH M 16
	1.4401 / 1.4404 / 1.4571 (A4)	2.4			
JXA W 53/34 [3]	S275JR = 1.0044	6.0	22	I 128, I 140, R3	JXB M 16 JXB M 20
	1.4404 / 1.4404 / 1.4571 (A4)	4.0	19	I 128, I 140, R3	
JXA W 64/44 [3]	S275JR = 1.0044	7.0	27	I 128, I 140	JXE M 20 JXE M 24
	1.4404 / 1.4404 / 1.4571 (A4)	[3]	27	I 128, I 140	

[1] The specified load range apply for profiles with transversely welded-on I-anchors and the specified round anchors.
[2] The static load capacity must be proofed separately.
[3] Higher loads (up to 15 kN) possible with separate welding seam guidance

Permissible load range for load cycles below N = 2 × 10⁶



In the case of fewer load cycles than N = 2 × 10⁶ the permissible load range can be taken from the graph.



Calculation example for JTA W 50/30 profile channel length = 200 mm

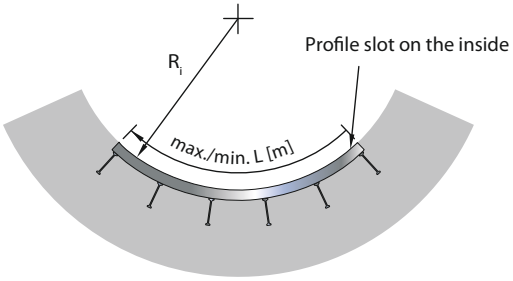
perm. upper load F_O	=	12.0 kN
perm. F_O		12.0 kN
$-\Delta F = (F_O - F_U)$	–	2.4 kN
remaining tensile load	=	9.6 kN

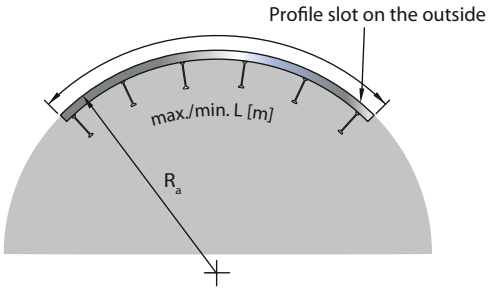
Customised Solutions

Curved Anchor Channels

For curved utility ducts, treatment plants or tunnel construction, JORDAHL can supply pre-curved anchor channels. The anchor channels can be curved in a concave direction (profile slot on the inside) or in a convex direction (profile slot on the outside).

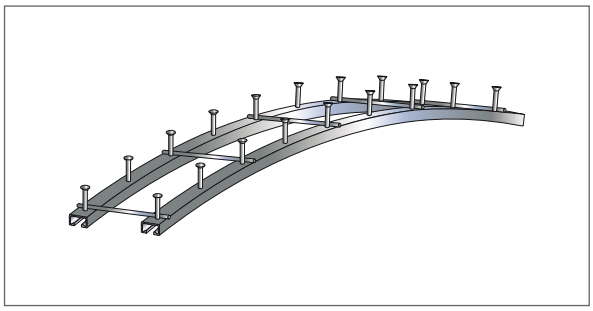
A high-precision approach is required, for example in the case of anchor channels for tubbing segments in tunnel construction. These are curved on site with the aid of specially prepared calipers.



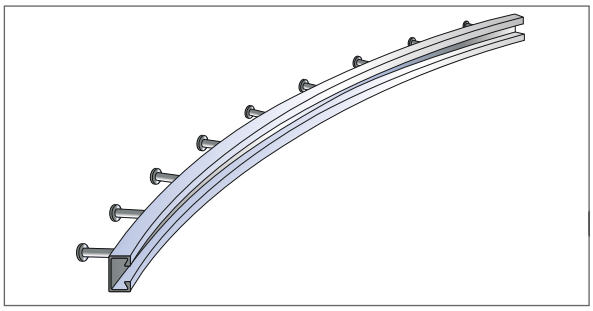


Minimum bending radius/ channel lengths (all materials)

	JTA / JM							JXA / JXM	
Profiles	**K 72/48 W 72/48**	**W 55/42**	**K 53/34 W 53/34**	**K 50/30 W 50/30**	**K 40/25 W 40/22**	**K 38/17**	**K 28/15**	**W 38/23**	**W 29/20**
min R_i [m]	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
min R_a [m]	3.0	3.0	2.5	2.0	2.0	1.5	1.0	2.0	2.0
min L [m] Minimum channel length	1.5	1.5	1.5	1.5	1.0	0.5	0.5	0.5	0.5
max L [m] Maximum channel length	5.5	5.5	5.8	5.8	5.8	5.8	5.8	5.8	5.8



Curved anchor channel pairs with welded-on spacers



Curved anchor channels, e. g. in railway tunnels

For further information about “Fastening technology in tunnels”, see JORDAHL brochure “Tunnel”

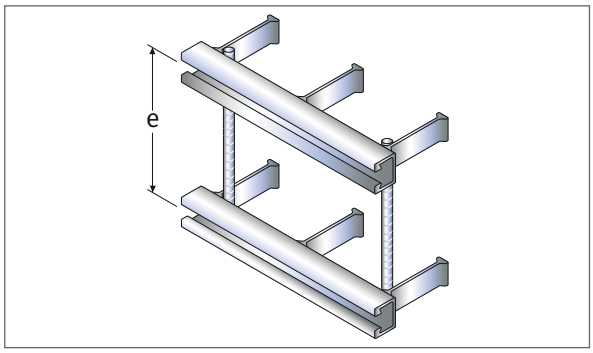
Curved anchor channels are used world wide to hold overhead electric lines in train tunnels.

Ordering example for curved anchor channels

Type	Profile		Stretched length [mm]		Anchor	Material	Bending radius [m]
JTA	W 53/34	–	1050	–	5A	HDG	R_i = 2.50

Anchor Channel Pairs

Typical applications for anchor channel pairs are for connecting glass or metal facades. Curved pairs of anchor channels are frequently used for connecting overhead lines in tunnel structures. JORDAHL® anchor channel pairs are customised for each project. Rebar is used as a spacer.



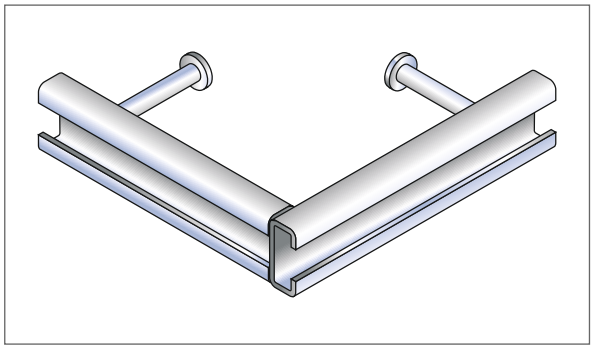
Ordering example for anchor channel pairs

Type	Profile		Length [mm]		Anchor		Material	Axial distance of channels [mm]
JTA	W 53/34	–	400	–	3A	–	HDG	e = 250

Anchor Channel Corner Pieces

Anchor channel corner pieces are used for connecting curtain wall brackets in facades. In addition to the standard corner pieces, special designs can also be supplied on request.

Standard corner piece	
Profile JTA	**Leg length [mm]**
K 38/17	125 × 250 150 × 250 200 × 200
K 50/30 **W 50/30**	250 × 250 300 × 300
K 53/34 **W 53/34**	250 × 250 300 × 300



Ordering example for anchor channel corner piece

Type	Profile		Length [mm]		Material
JTA	K 38/17	–	125 × 250	–	A4

Railing Fastening JGB

German Technical Approval Z-21.4-1913

The JORDAHL® System JGB guarantees secure and rapid fastening of railing posts on the face side of balcony slabs. It comprises special short lengths of anchor channels that are concreted directly into the balcony slab, and the associated JORDAHL® bolts, washers and nuts.

- Application in balcony slabs with straight steel reinforcements
- For application in narrow balustrades or upstand beams with welded-on, angled, steel reinforcements
- As an associated anchor channel corner piece for the formation of corners

Further designs are available on request.

Features

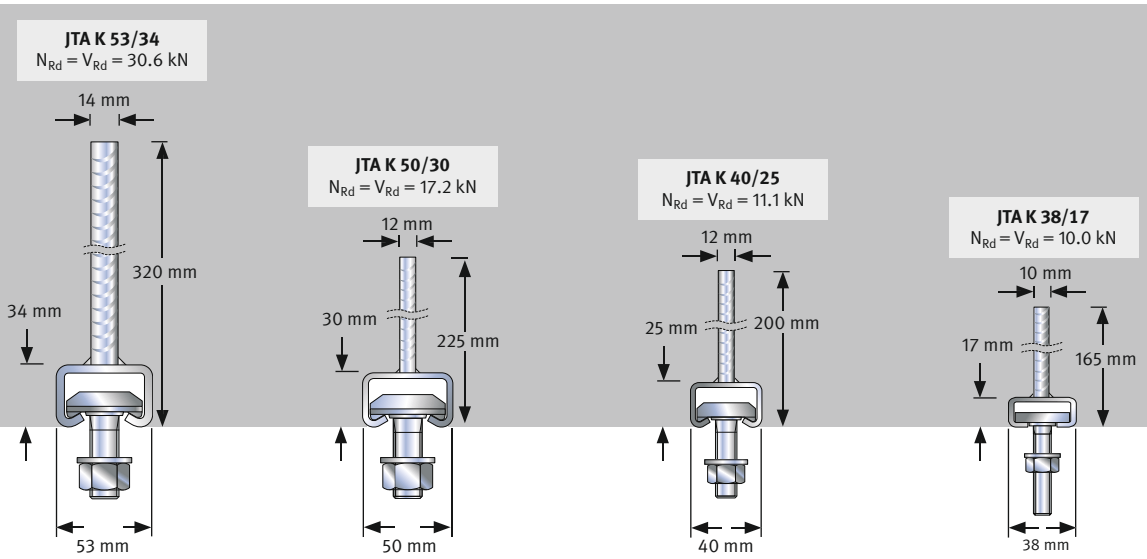
- Suitable for slab thicknesses from 10 cm
- Proven for single loads and load pairs
- Supplied in many lengths
- Resistant to corrosion by manufacturing in stainless steel
- Static proofing and selection using intuitive software
- Reliability for users, designers, craftsmen and construction management
- Easy assembly and perfect adjustment of the railing connections
- Flexible solution for connecting to rails with one or two bolts

Material and design

- Stainless steel (A4)
  Profile 1.4401/1.4404/1.4571 and anchor B500B or B500B NR for K 38/17
- hot-dip galvanised (HDG) › 50 µm
  (interior applications)
  Profile steel S235JR (1.0038) and anchor B500B
- PE foam filling

For further information refer to JORDAHL brochure "Railing fastening JGB"

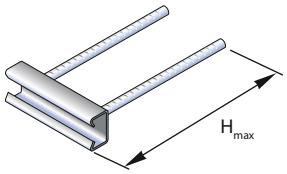
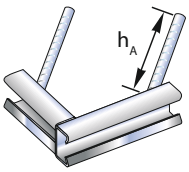
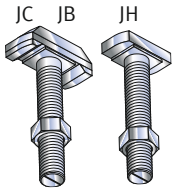
Overview of channels (K profiles; W profiles not illustrated)



Bolts

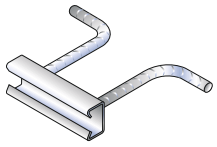
JB	JB	JC	JH
M 16 / 20	M 12 /16 / 20	M 12 / 16	M 12 / 16

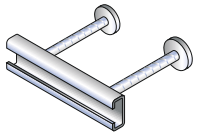
Standard JGB product range

Type	JGB G			JGB G corners [3]			Corresponding bolts [4]
JGB G anchor BSt with straight steel reinforcements							
	Dimensions [mm]			Dimensions [mm]			Type × dimension material
Profile	Profile length	Anchor ∅	Installation height H_{max}	Profile length	Anchor ∅	Installation height h_A	
JGB K 38/17-G	100 [1]	10	165	170/170	10	200	JH M 12 × 40 – A4-50 / 4.6 ZP JH M 16 × 40 – A4-50 / 4.6 ZP
	150						
	200						
	250						
JGB W 40/22-G JGB K 40/25-G	100 [1]	12	200	170/170	12	240	JC M 12 × 40 – F4-70 / 8.8 HDG JC M 16 × 40 – F4-70 / 8.8 HDG
	150						
	200						
	250						
JGB W 50/30-G JGB K 50/30-G	100 [1]	12	225	170/170	12	240	JB M 12 × 40 [2] – F4-70 / 8.8 HDG JB M 16 × 50 – F4-70 / 8.8 HDG JB M 20 × 55 – F4-70 / 8.8 HDG
	150						
	200						
	250						
JGB W 53/34-G JGB K 53/34-G	100 [1]	14	320	170/170	14	360	JB M 16 × 50 – F4-70 / 8.8 HDG JB M 20 × 55 – F4-70 / 8.8 HDG
	150						
	200						
	250						

All JGBs are available in stainless steel and hot-dip galvanised.
[1] Channel lengths available only for fastening with one bolt
[2] Profile W 50/30 only approved for fastening with 2 bolts
[3] Not included in the German technical approval
[4] When using smaller bolts the design resistance of the bolts must not be exceeded in acordance with Z-21.4-1913, annex 8.

Anchor forms for small structural component depths

JGB W anchor BSt with bent steel anchors	Profile	Profile length [mm]	Anchor ∅	Installation height H_{max} [mm]
	JGB K 38/17-W	100 – 250	10	120
	JGB K 40/25-W [5]		12	155
	JGB K 50/30-W [5]		12	170
	JGB K 53/34-W [5]		14	240

JGB DA anchor BSt with single-sided head	Profile	Profile length [mm]	Anchor ∅	Installation height H_{max} [mm]
	JGB K 38/17-DA [6]	100 – 250	10	120
	JGB K 40/25-DA [5]		10	125
	JGB K 50/30-DA [5]		12	150
	JGB K 53/34-DA [5]		14	250

[5] Available with hot profile on request
[6] only hot-dip galvanised (HDG)

Ordering example for JGB railing fastening

Type		Length [mm]		Material
JGB K 38/17-G	–	200	–	A4

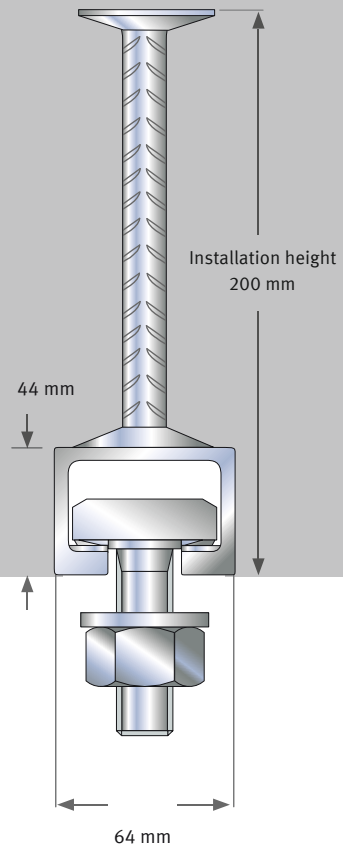
JORDAHL® Anchor Channels JXA-PC

Seismic, dynamic and static performance in all directions

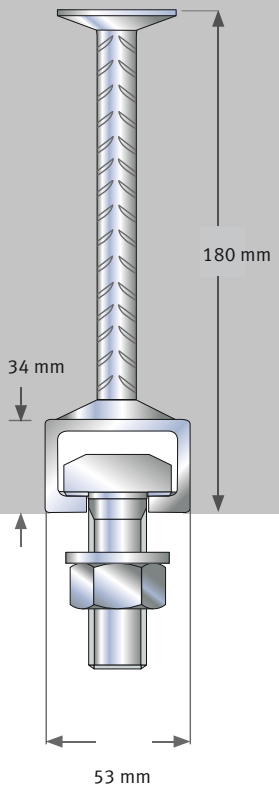
NEW

Hot-rolled Toothed Anchor Channels

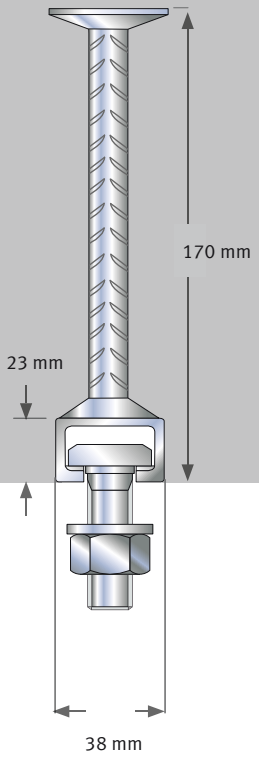
JXA-PC W 64/44
$N_{Rd} = V_{Rd} = X_{Rd} = 37.8$ kN



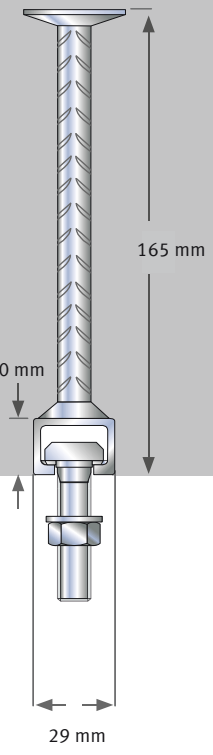
JXA-PC W 53/34
$N_{Rd} = V_{Rd} = X_{Rd} = 30.8\ (26.6)$ [1] kN



JXA-PC W 38/23
$N_{Rd} = V_{Rd} = X_{Rd} = 16.8$ kN



JXA-PC W 29/20 [2]
$N_{Rd} = V_{Rd} = X_{Rd} = 11.2$ kN



Toothed Bolts

JXE	JXB	JXH	JXD
M 20	M 16	M 12	M 10
M 24	M 20	M 16	M 12

[1] For profiles made in A4 = 26.6 kN

[2] Only in hot-dip galvanised (HDG)

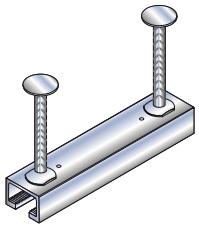
Profile dimensions may exhibit tolerances

Material and design of profile
- Hot-dip galvanised steel (HDG)
- Stainless steel on request (A4)
- Standard filler polyethylene (PE) or polystyrene (PS)

Material and design of bolts
- Electro-zinc plated (ZP) or hot-dip galvanised steel (HDG)
- Stainless steel

Technical Details

JORDAHL® anchor channels JXA-PC comprise a hot-rolled toothed profile and a ribbed anchor with a large undercut head.

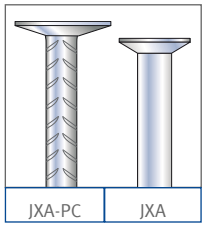


Features of JXA-PC toothed anchor channels

- Proven for dynamic, shock and fatigue loads
- Suitable for safety-related areas (for example in power plants)
- 3D load capacity in all directions
- High resistance under seismic impact
- Fire protection for up to 90 minutes
- Increased load capacity due to special anchor geometry
- Higher corrosion protection because of hot-dip galvanised surface

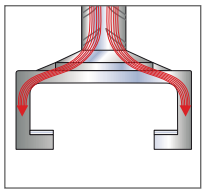
Anchor head and shaft

- Larger anchor head guarantees reliable grip also in large cracks
- Additional anchor length and ribbed surface facilitate optimum anchoring in concrete



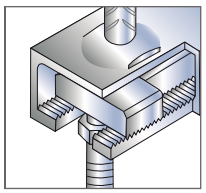
Anchor foot

- Circular weld allowing even load flow between anchor and channel

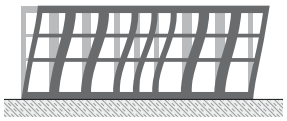


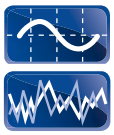
Toothed W profile

- Hot-rolled profile for high tightening torques
- Toothed channel lips, together with the matching toothed bolts, ensure high load capacity in the longitudinal direction of the channels even in the case of an earthquake



Requirements for safety-relevant connections

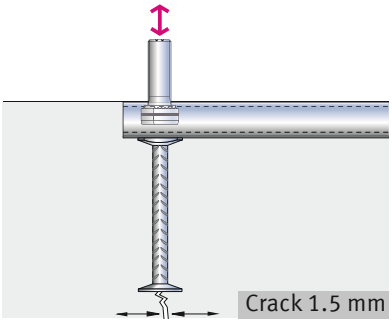




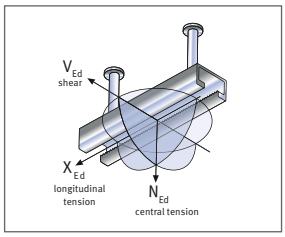
Under the extreme conditions of an earthquake or explosion it is indispensible that the functionality of the safety-related components is guaranteed. The effects of such events make it necessary to use special anchors. The suitability of the JXA-PC anchor channels was tested in simulated seismic and shock tests in 1.5 mm wide concrete cracks. The large anchor head and the toothed lips ensure very safe and reliable anchoring even under extreme effects.

Extreme loading can be:

- Earthquake
- Flood
- Explosion
- Fire
- Plane crash, etc.



JXA-PC: maximum reliability with high loads and large cracks



$$\sqrt{N_{Ed}^2 + V_{Ed}^2 + X_{Ed}^2} \leq F_{Rd}$$

For design resistance and minimum spacings refer to the technical data for toothed anchor channels, pages 13 and 14

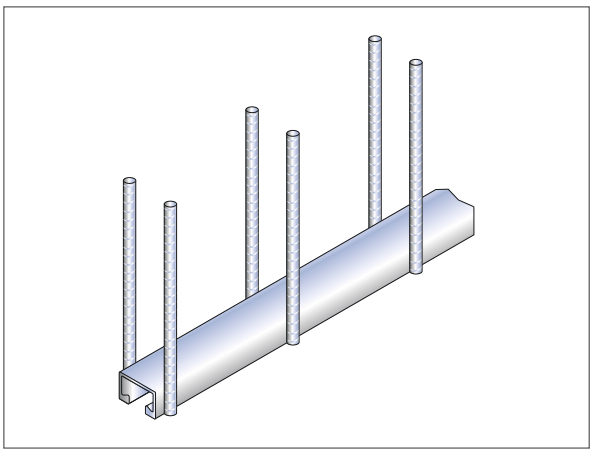
For further information about "Anchor channels in power plants", see JORDAHL brochure "Power plants"

Anchor Channel JRA W 74/48

for extremely high static and dynamic loads

$N_{Rd} = V_{Rd} = 56.0$ kN

$\Delta F = 30.0$ kN



Anchor channel type JRA with reinforced concrete anchors welded on both sides.

JORDAHL® anchor channels JRA consist of **W 74/48** profiles with reinforced concrete anchors welded on the sides. Other profile sizes can also be provided with reinforced concrete anchors.

Load capacity

JRA W 74/48 is suitable for absorbing extremely high static and dynamic loads. The construction has been tested by the German Federal Institute for Materials Testing under number 2.2/20247.
On the basis of experimental data with a load range of $F_o - F_u = 38$ kN, with an upper load of $F_o = 40$ kN these anchor channels have passed the long-term stress capability test for fatigue load ranges of up to 30 kN.

Applications

The system can be used for different application areas:

- Crane and conveyor systems
- Power plants
- Protective room constructions

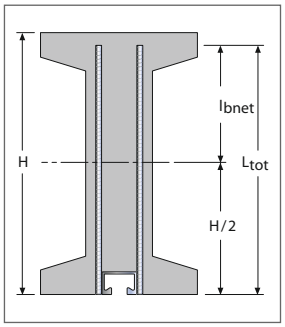
Material

Profile W 74/48		Anchor s ≤ 250 mm		Weight channel incl. anchor [1] [kg/m]
Material	Design	Ø [mm]	Material	
Steel	Hot-dip galvanised ≥ 50 µm	14	B500B [2]	14.0

[1] At anchor length $L_{total} = 40$ cm
[2] The anchors consist of B500B

Reinforced Concrete Anchors

Anchoring length l_{bnet}/l_{bd} according to DIN 1045-1: 2008-08 or l_{bd} according to DIN EN 1992-1-1:2011-01 with DIN EN 1992-1-1/ NA: 2011-01



The reinforcing bar must be anchored with anchoring length l_{bnet}/l_{bd} in the component compression zone. The anchoring length is calculated from half the component height plus anchoring length l_{bnet}/l_{bd} and must be specified with the order.

Concrete	Anchoring length l_{bnet}/l_{bd} [cm] B500B, \ 14; good bonding conditions	
	Straight rod ends	Hooks, angled hooks
C20/25	28	19
C30/37	21	15
C35/45	19	14

Length of the reinforced concrete anchor, calculation example

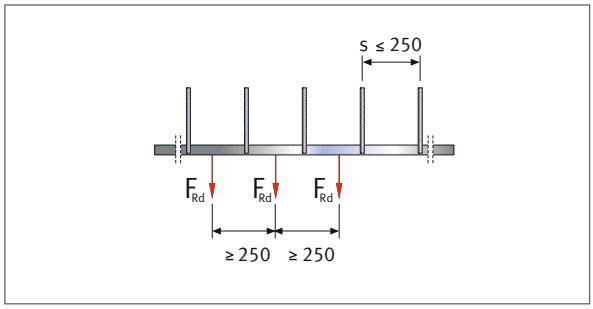
$$L_{total} = H/2 + l_{bnet}/L_{bd}\ [cm]$$

Anchor length L_{total} = Length from the outer edge of the channel profile as far as the top edge of the reinforced concrete anchor. Please specify when ordering.
H = Height of the reinforced concrete component
l_{bnet}/l_{bd} = Anchoring length according to DIN 1045-1: 2008-08

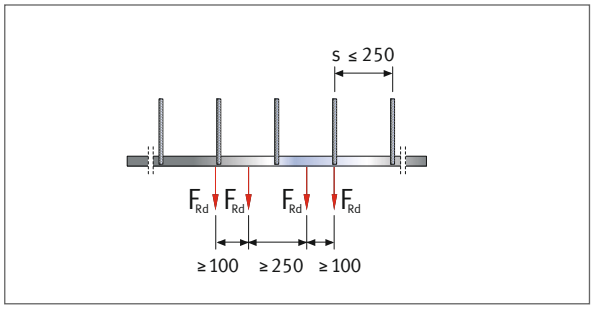
Note:
The reinforced concrete anchors can be included in the shear reinforcement, given suitable components and reinforcement design.

Technical Details

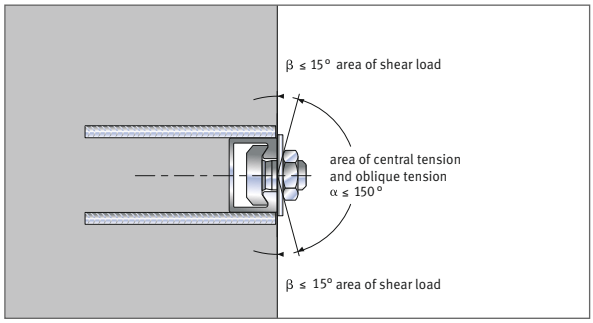
perm. $F = \frac{F_{Rd}}{1.4}$



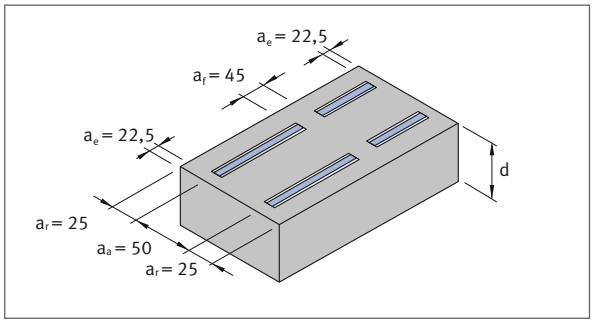
Load arrangement single load



Load arrangement load pairs



Load ranges



Associated edge distances [cm]

Profile JRA	Recommended maximum loads F_{Rd} [kN][1]				Technical details on associated bolts						
	Tension and oblique tension α ≤ 150°		Shear load β ≤ 15°		Bolts JA ∅	Tightening torque M_A [Nm]		Bending moment M_{Rd} [Nm]			
	Single load	Load pairs	Single load	Load pairs				Strength grade 4.6		Strength grade 8.8[2]	
						M 24	M 30	M 24	M 30	M 24	M 30
W 74/48	56.0	28.0	44.8	22.4	M 24, M 30	200	400	209.9	419.9	523.9	1059.6

[1] The application is permissible only in reinforced concrete. When installed in the tension zone of reinforced concrete components, it is necessary to verify the transfer of the loads in the concrete member.
[2] On request.

Permissible amplitude perm. $\Delta F = F_o - F_u$ [kN] under repeated tensile stress

In view of the high resistance to cycling of the profile, the limited dynamic load bearing capacity of the bolts is critical.

Profile JRA	Bolt	Strength	Amplitude Δ F
W 74/48	JA M 24	4,6	26
	JA M 30	4,6	26
	JA M 24	8,8	30
	JA M 30	8,8	30

Ordering example for JRA anchor channel with anchor L_{total} = 460 mm

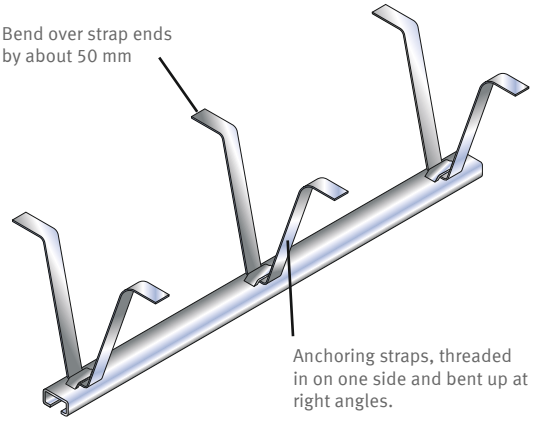
Type	Profile		Length [mm]		Material		Anchor length L_{total}
JRA	W 74/48	–	6000	–	HDG	–	460

Lengths supplied

Short pieces in lengths beginning at 150 mm as well as lengths by the metre, fixed lengths on request.

Anchor Channels JSA

for non-load bearing constructions and constructional applications



Anchor channel JSA with straps installed

JORDAHL® anchor channels JSA consist of profiles with punched-out loops and associated anchoring straps made of sheet metal strip which are installed on the building site and can easily be bent to shape by hand.

Applications

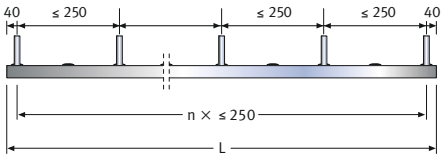
JORDAHL® anchor channel JSA should be used for fastening non-load bearing constructions. In this case, anchoring must be carried out only in normal reinforced concrete in strength class ≥ C12/15.

They may be used without further certification, if the load does not exceed 1 kN/m². Slippage at the anchoring straps is to be expected under service load. The anchor channel type is no longer approved by the German Institute for Structural Engineering (DIBt).

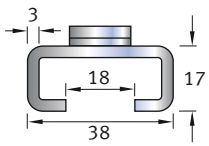
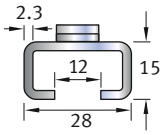
Installation

There are punched-out loops on the back of the channel at spacings of 125mm. Anchor straps are supplied loose, and must be inserted and bent into shape at no greater than 250mm centres. A strap must be placed at both ends of the channel. Edge distances from page 14 must be observed.

Lengths supplied and anchor arrangements

Stock length	6,000 (–0 / +50 mm)
Anchor distance	

Profile types and technical details

Profile JSA	Weight [1] of channel strap with anchor [kg/m]	Connection means		Channel		Anchoring strap t × b × l [mm]
		Bolt	Locking plate	Material	Design	
K 38/17 	2.3	JHM10 – 16	JGMH M5 – 12	Steel	mill finish, hot-dip galvanised	2 × 20 × 400
K 28/15 	1.34	JDM6 – 12	JGMD M4 – 10	Steel	mill finish, hot-dip galvanised	1.5 × 15 × 320

[1] Weights per unit metre for mill finish steel. For galvanised profiles: weight × 1.10 applies

Ordering example for JSA anchor channel

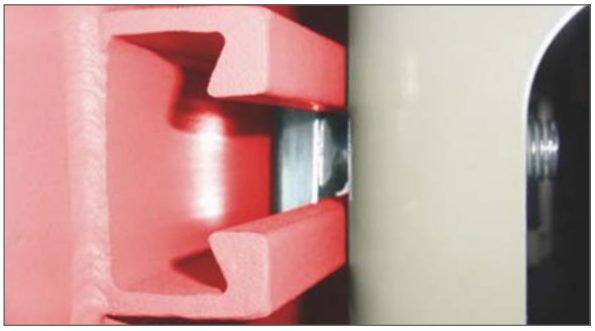
Type	Profile		Length of channel [mm]		Material
JSA	K 38/17	–	6,000	–	HDG

Mounting Channels

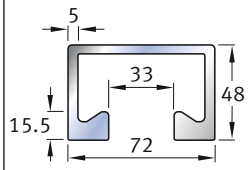
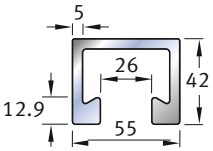
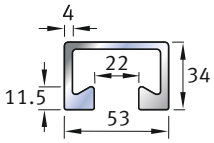
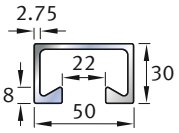
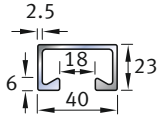
The JM W hot-rolled series, as mounting channels, are distinguished by

- Solid channel lips, large contact areas and high tightening torques
- Right-angled profile edges and low residual stresses of hot-rolled profiles for good weldability

For further information about mounting channels, see JORDAHL brochure “Mounting Technology”



Mounting Channels JM, Hot-rolled

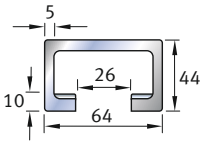
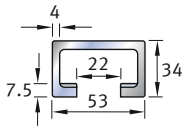
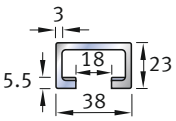
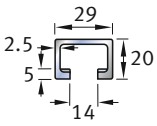
	Profile	Bolts/ locking plates
	**JM W 72/48** [2] black, HDG, A4 8.85 kg/m[1]	JA M 20 – 30 JGM A M 20
	**JM W 55/42** [3] black, HDG 6.75 kg/m[1]	JB M 10 – 24 JGM B M 6 – 16
	**JM W 53/34** black, HDG, A4 5.00 kg/m[1]	JB M 10 – 20 JGM B M 6 – 16
	**JM W 50/30** black, HDG, A4 3.25 kg/m[1]	JB M 10 – 20 JGM B M 6 – 16
	**JM W 40/22** black, HDG, A4 2.10 kg/m[1]	JC M 10 – 16 JGM B M 6 – 16

[1] Weights per metre for the mill finish design
(for galvanised profiles: weight per metre × 1.10)
(for stainless steel profiles: weight per metre × 1.02)

[2] JM W 72/48 is equivalent to JM W 74/48.

[3] JM W 55/42 is equivalent to JM W 54/43.

Toothed Mounting Channels JXM, Hot-rolled

	Profile	Bolts/ locking plates
	**JXM W 64/44** black, HDG, A4 7.19 kg/m[1]	Toothed bolts JXE M 20–24
	**JXM W 53/34** black, HDG, A4 4.65 kg/m[1]	Toothed bolts JXB M 16–20
	**JXM W 38/23** black, HDG, A4 2.42 kg/m[1]	Toothed bolts JXH M 12–16 hammer-head bolts JH M 16
	**JXM W 29/20** black, HDG 1.55 kg/m[1]	Toothed bolts JXD M 12 hammer-head bolts JD M 12

Material and design

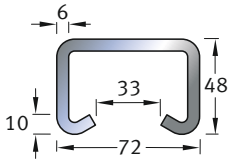
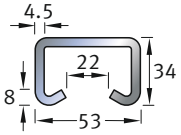
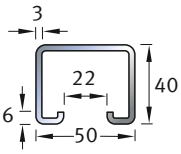
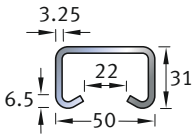
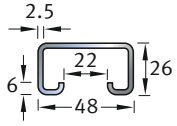
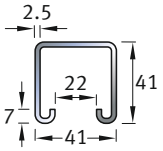
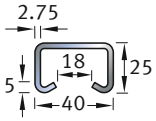
- black = mill finish steel
- hdg = hot-dip galvanised steel
- A2 = stainless steel 1.4301/1.4541
- A4 = stainless steel 1.4401/1.4404/1.4571

Ordering example for JM mounting channels

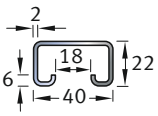
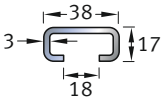
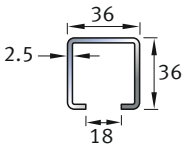
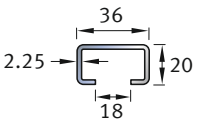
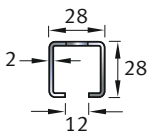
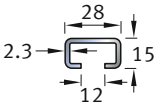
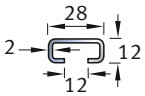
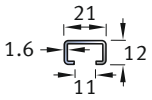
Type	Profile	Channel length [mm]			Material
JM	W 50/30	–	6,000	–	HDG

Mounting Channels

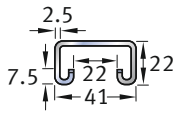
Framing Channels JM, Cold-formed

	Profile	Bolts/ locking plates
	**JM K 72/48** black, HDG, A4 8.10 kg/m[1)]	JA M 20–30, JGM A M 20
	**JM K 53/34** black, HDG, A4 4.50 kg/m[1)]	JB M 10–20, JGM B M 6–16
	**JM K 50/40** black, HDG 3.40 kg/m[1)]	JB M 10–20, JGM B M 6–16
	**JM K 50/30** black, HDG, A4 3.00 kg/m[1)]	JB M 10–20, JGM B M 6–16
	**JM K 48/26** black, HDG 2.25 kg/m[1)]	JB M 10–20, JGM B M 6–16
	**JM K 41/41** black, HDG 2.60 kg/m[1)]	JAM 22 M 6–12 JAM 22 F M 6–12
	**JM K 40/25** black, HDG, A4, A2 2.10 kg/m[1)]	JC M 10–16, JGM C M 6–16

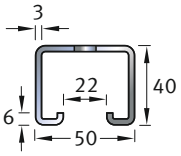
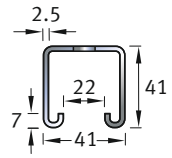
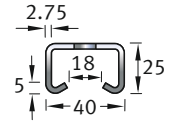
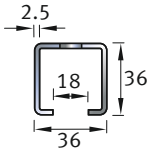
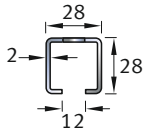
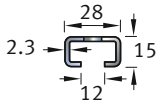
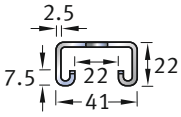
[1)] Weights per metre for mill finish design
(for galvanised profiles: weight per metre × 1.10)
(for stainless steel profiles: weight per metre × 1.02)

	Profile	Bolts/ locking plates
	**JM K 40/22** black, HDG 1.55 kg/m[1)]	JC M 10–16, JGM C M 6–16
	**JM K 38/17** black, HDG, A4, A2 1.80 kg/m[1)]	JH M 10–16, JGM H M 5–12
	**JM K 36/36** black, HDG, A4 2.20 kg/m[1)]	JH M 10–16, JGM H M 5–12
	**JM K 36/20** black, HDG 1.45 kg/m[1)]	JH M 10–16, JGM H M 5–12
	**JM K 28/28** black, HDG, A4 1.40 kg/m[1)]	JD M 6–12, JGM D M 4–10
	**JM K 28/15** black, HDG, A4, A2 1.10 kg/m[1)]	JD M 6–12, JGM D M 4–10
	**JM K 28/12** black, HDG, A4, A2 0.90 kg/m[1)]	JD M 6–10, JGM D M 4–10
	**JM K 21/12** black 0.60 kg/m[1)]	JG M 6–8, JGM G M 4–8

Toothed Framing Channels JZM, Cold-formed

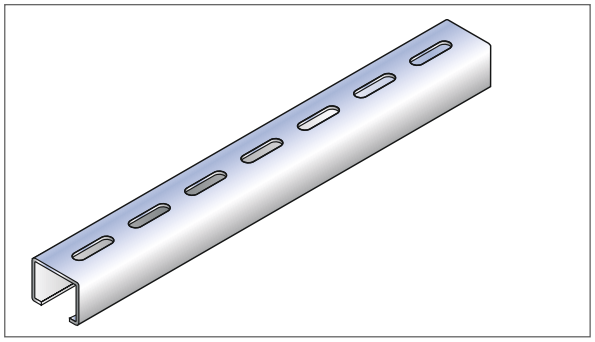
	Profile	Bolts
	**JZM K41/22** black, HDG, A4 1.88 kg/m[1)]	Toothed bolt JZS M 12–16

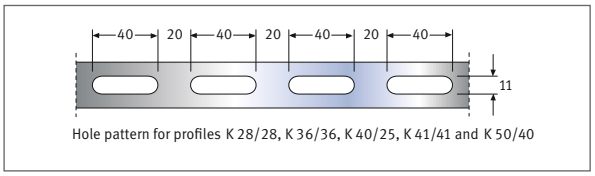
Slotted-Back Framing Channels JML, Cold-formed

	Profile	Bolts/ locking plates
	**JML K 50/40** black, HDG LL 11 × 40 3.25 kg/m[1)]	JB M 10–20, JGM B M 6–16
	**JML K 41/41** black, HDG LL 11 × 40 2.47 kg/m[1)]	JAM 22 M 6–12 JAM 22 F M6–12
	**JML K 40/25** black, HDG, A4 LL 11 × 40 1.86 kg/m[1)]	JC M 10–16, JGM C M 6–16
	**JML K 36/36** black, HDG, A4 LL 11 × 40 2.09 kg/m[1)]	JH M 10–16, JGM H M 5–12
	**JML K 28/28** black, HDG, A4 LL 11 × 40 1.28 kg/m[1)]	JD M 6–12, JGM D M 4–10
	**JML K 28/15** black, HDG, A4 LL 9 × 25 1.02 kg/m[1)]	JD M 6–12, JGM D M 4–10
	**JZML K41/22** black, HDG, A4 LL 11 × 40 1.74 kg/m[1)]	Toothed Bolt JZS M 12–16

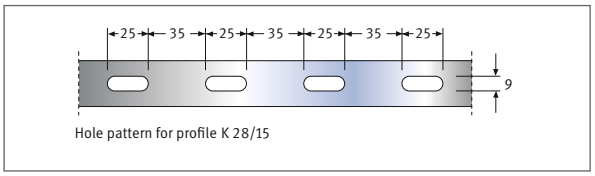
[1)] Weights per metre for the mill finish design
(for galvanised profiles: weight per metre × 1.10)
(for stainless steel profiles: weight per metre × 1.02)

JORDAHL® toothed framing channels and slotted back channels, as shown in the example, are commonly used for cable fastening.





Hole pattern for profiles K 28/28, K 36/36, K 40/25, K 41/41 and K 50/40



Hole pattern for profile K 28/15

Other hole dimensions on request.

Material and design

- black = mill finish steel
- hdg = hot-dip galvanised steel
- A2 = stainless steel 1.4301/1.4541
- A4 = stainless steel 1.4401/1.4404/1.4571

Ordering example for JML slotted-back framing channel

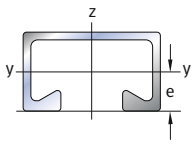
Type	Profile		Channel length [mm]		Material
JML	K 28/15	–	6,000	–	HDG

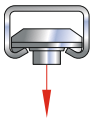
Mounting Channels

Technical Details

Weights, cross-section properties, point load-bearing capacity

perm. $F = \frac{F_{Rd}}{1.4}$



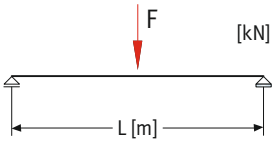
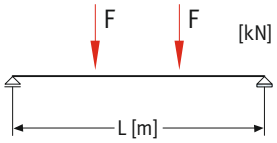
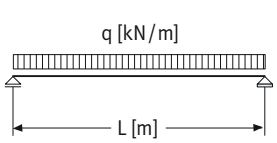


	Cross-section properties								
	Weights[1]	Cross-section	Centre of gravity	Moments of inertia		Moments of resistance			Max. point load bearing capacity[2]
	G [kg/m]	A [cm²]	e [cm]	I_y [cm⁴]	I_z [cm⁴]	W_y [cm³]	W_z [cm³]	$W_{pl,y}$ [cm³]	F_{Rd} [kN]
Hot-rolled mounting channels									
JM W 72/48[3]	8.85	11.27	24.0	34.99	83.46	14.31	23.18	18.29	55.6
JM W 55/42[4]	6.57	8.37	22.1	18.22	35.93	8.41	13.19	11.35	44.4
JM W 53/34	4.96	6.32	17.4	9.40	24.12	5.48	9.19	7.08	30.6
JM W 50/30	3.25	4.15	16.0	5.29	14.18	3.43	5.79	4.39	17.2
JM W 40/22	2.12	2.70	12.2	1.99	5.92	1.63	3.00	2.17	11.1
JXM W 64/44	7.19	9.16	2.29	24.12	54.20	10.52	16.94	13.80	37.8
JXM W 53/34	4.64	5.91	1.85	9.25	23.19	5.01	8.83	6.86	30.8[6]
JXM W 38/23	2.42	3.09	1.33	2.10	6.13	1.58	3.23	2.30	16.8
JXM W 29/20	1.55	1.98	1.12	1.02	2.39	0.91	1.65	1.30	11.2
Cold-formed framing channels									
JM K 72/48	8.09	10.31	2.83	28.12	75.36	9.92	20.93	15.30	55.6
JM K 53/34	4.47	5.69	2.01	8.08	22.25	4.02	8.32	6.12	30.6
JM K 50/40	3.41	4.34	2.23	9.37	16.46	4.19	6.59	5.81	16.8
JM K 50/30	3.04	3.87	1.82	4.68	13.71	2.56	5.49	3.85	17.2
JM K 48/26	2.25	2.87	1.50	2.65	9.23	1.76	3.85	2.52	11.1
JM K 41/41	2.61	3.32	2.30	7.03	9.02	3.05	4.40	4.37	11.1
JZM K 41/22	1.88	2.39	1.34	1.50	5.72	1.12	2.79	1.72	7.0
JM K 40/25	2.01	2.56	1.45	1.90	5.75	1.31	2.88	1.99	11.1
JM K 40/22	1.53	1.95	1.26	1.29	4.34	1.02	2.17	1.46	7.0
JM K 38/17	1.77	2.25	1.05	0.82	4.11	0.78	2.16	1.19	10.0
JM K 36/36	2.22	2.83	2.07	4.61	6.09	2.23	3.34	3.24	4.9
JM K 36/20	1.44	1.83	1.20	0.96	3.38	0.80	1.88	1.18	4.9
JM K 28/28	1.39	1.77	1.58	1.77	2.20	1.12	1.57	1.59	4.9
JM K 28/15	1.08	1.38	0.89	0.39	1.39	0.44	1.00	0.66	5.0
JM K 28/12	0.89	1.13	0.71	0.21	1.12	0.29	0.80	0.43	4.9
JM K 21/12	0.58	0.74	0.72	0.13	0.46	0.18	0.44	0.28	3.5
Slotted back framing channels, cold-formed									
JML K 50/40	3.25	4.01	2.10	8.44	16.41	4.02	6.56	5.29	16.8
JML K 41/41	2.47	3.04	2.15	6.19	8.99	2.87	4.39	3.91	11.1
JZML K 41/22	1.74	2.11	1.24	1.31	5.71	1.06	2.78	1.53	7.0
JML K 40/25	1.86	2.26	1.36	1.70	5.62	1.25	2.85	1.78	11.1
JML K 36/36	2.09	2.55	1.91	4.01	6.06	2.09	3.32	2.86	4.9
JML K 28/28	1.28	1.55	1.42	1.45	2.18	1.03	1.56	1.34	4.9
JML K 28/15	1.02	1.17	0.81	0.32	1.38	0.40	0.99	0.56	5.0

[1] All weights per metre for mill finish steel. For galvanised profiles: weights per metre × 1.10. For A4 profiles: weights per metre × 1.02.
[2] The bolt load-bearing capacity and the maximum point load-bearing capacity must be noted (see pages 13 and 36). The respective lower value is decisive.
[3] JM W 72/48 is equivalent to JM W 74/48.
[4] JM W 55/42 is equivalent to JM W 54/43.

Bending load bearing capacities [2) 5)] for support width L

perm. $F = \frac{F_{Rd}}{1.4}$

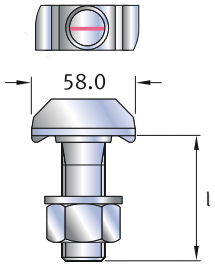
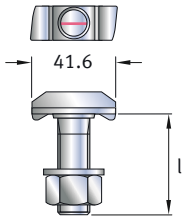
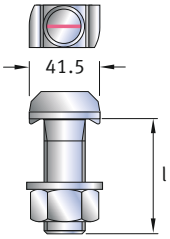
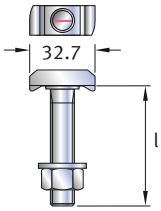
									
	L = 0.5 m	L = 1.0 m	L = 1.5 m	L = 0.5 m	L = 1.0 m	L = 1.5 m	L = 0.5 m	L = 1.0 m	L = 1.5 m
	F_{Rd} [kN]			F_{Rd} [kN]			F_{Rd} [kN]		
Hot-rolled mounting channels									
JM W 72/48 [3)]	31.2	15.7	10.4	23.4	11.8	7.8	125.0	31.2	13.9
JM W 55/42 [4)]	22.7	11.3	7.6	17.1	8.5	4.5	90.9	22.7	8.1
JM W 53/34	12.0	6.0	3.9	9.1	4.5	2.2	48.4	12.0	4.2
JM W 50/30	7.6	3.8	2.2	5.6	2.8	1.3	30.0	7.6	2.4
JM W 40/22	3.9	1.8	0.8	2.9	1.1	0.4	15.8	2.9	0.8
JXM W 64/44	35.1	17.6	10.1	26.4	13.2	5.9	140.5	35.1	10.8
JXM W 53/34	17.5	8.7	3.9	13.1	5.1	2.3	69.8	13.9	4.1
JXM W 38/23	5.9	2.0	0.8	4.3	1.1	0.6	23.4	3.2	1.0
JXM W 29/20	3.4	1.0	0.4	2.2	0.6	–	12.3	1.5	0.4
Cold-formed framing channels									
JM K 72/48	30.7	15.3	10.2	23.0	11.5	6.9	122.4	30.7	12.6
JM K 53/34	11.6	5.7	3.4	8.7	4.3	2.0	46.3	11.6	3.6
JM K 50/40	9.9	4.9	3.4	7.4	3.8	2.2	39.8	9.9	4.2
JM K 50/30	7.3	3.6	2.0	5.5	2.5	1.1	29.1	7.0	2.1
JM K 48/26	4.3	2.1	1.1	3.2	1.4	0.7	17.2	3.9	1.1
JM K 41/41	7.4	3.8	2.5	5.6	2.8	1.7	29.8	7.4	3.1
JZM K 41/22	2.9	1.4	0.6	2.2	0.8	0.4	11.8	2.2	0.7
JM K 40/25	3.8	1.8	0.8	2.8	1.0	0.4	15.1	2.8	0.8
JM K 40/22	2.5	1.3	0.6	1.8	0.7	–	9.9	2.0	0.6
JM K 38/17	2.2	0.8	–	1.7	0.4	–	9.0	1.3	0.4
JM K 36/36	5.6	2.8	1.8	4.2	2.1	1.1	22.1	5.6	2.1
JM K 36/20	2.0	0.8	0.4	1.5	0.6	–	8.1	1.4	0.4
JM K 28/28	2.7	1.4	0.7	2.1	1.0	0.4	10.9	2.7	0.8
JM K 28/15	1.1	0.4	–	0.8	–	–	4.5	0.6	–
JM K 28/12	0.7	–	–	0.4	–	–	2.5	–	–
JM K 21/12	0.4	–	–	–	–	–	1.5	–	–
Slotted back framing channels, cold-formed									
JML K 50/40	9.1	4.5	3.1	6.7	3.4	2.1	36.1	9.1	3.8
JML K 41/41	6.7	3.4	2.2	5.0	2.5	1.5	26.7	6.7	2.8
JZML K 41/22	2.7	1.3	0.6	2.0	0.7	–	10.5	2.0	0.6
JML K 40/25	3.1	1.5	0.7	2.2	1.0	0.4	12.2	2.5	0.7
JML K 36/36	4.9	2.4	1.7	3.6	1.8	1.0	19.6	4.9	1.8
JML K 28/28	2.2	1.1	0.6	1.7	0.8	0.4	9.1	2.2	0.7
JML K 28/15	1.0	–	–	0.7	–	–	3.8	0.4	–

[5)] All load capacities are calculated elastic-plastic in accordance with DIN 18800 $\gamma = 1.4$ deflection $f < l / 150$ for steel.
Given more accurate knowledge, verifications with partial safety margins must be carried out by the static designer.
We recommend an estimate of approx. 80 % of the values given above.

[6)] The value only applies for St; A4: $F_{Rd} = 26.6$ kN.

Bolts

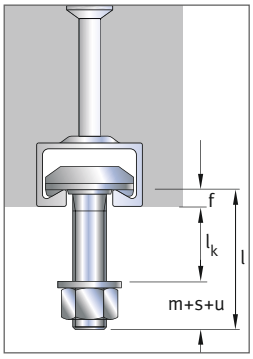
Hook-Head Bolts

Bolt	Type JA				Type JB			Type JE [2]		Type JC		
												
For Profile	W 72/48, K 72/48				W 55/42, K 53/34, W 53/34, K 50/40, W 50/30, K 50/30, K 48/26 [3]				W 55/42	W 40/22, K 40/22, K 40/25		
Bolt Length l [mm]	JA M 20	JA M 24	JA M 27	JA M 30	JB M 10	JB M 12	JB M 16	JB M 20	JB M 24 [2]	JC M 10	JC M 12	JC M 16
	Material and design											
15												
20										△	△	
25												
30					△□	○△□	△□			○△□	△□	△□
35								△				
40					△	●△□	△□			○△□	○●△□	○●△□
45								△□				
50	○□	○			△	○●△□■	○●△□■			△□	○●△□■	○△□ [3] ■
55								△□				
60						○●△□	○●△□		△	○△	○●△□	○●△□
65								○●△□				
70												
75	○●	○	○	○				○●△□	△			
80					△	○●△	○△□■			○△	○△□	○●△□
100	○●□	○●	○	○		○△□■	○●△	○●△□■		△	○△□	●△□
125	●					○△□	●△□	●△□			△	●△
150	○	○●		○		△	△□■	△□■			△□	△□
200	○	○		○		△	△□	△			△	△□
250												△
300							△	△				△

Profile (profile nose f) [mm]	**W 72/48** (15.5), **K 72/48** (10)	**W 55/42** (12.9), **K 53/34** (8), **W 53/34** (11.5), **K 50/40** (6), **W 50/30** (8), **K 50/30** (6.5), **K 48/26** (6)	**W 40/22** (6), **K 40/22** (6), **K 40/25** (5)

Will be supplied including nuts. Washers must be ordered separately. See page 37.

Determining required bolt length req. L



l = Bolt length
l_k = Clamping length (thickness of the attached part)
f = Profile nose
m = Nut height EN ISO 4032
s = Washer thickness EN ISO 7093-1
u = Bolt projection EN ISO 4753

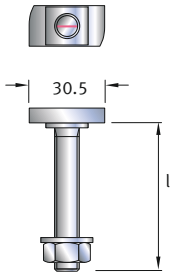
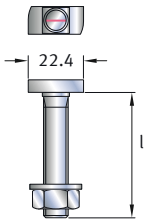
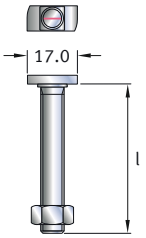
Bolt	Total m+s+u [mm]
M 6	8.8
M 8	11.3
M 10	13.9
M 12	17.3
M 16	21.8
M 20	27.0
M 24	32.5
M 27	35.8
M 30	38.6

req. l [mm] = l_k + f + (m + s + u)

Example
JORDAHL® anchor channel K53/34,
f = 8 mm, existing clamping length
lk = 65 mm, JORDAHL® bolt JB M16 ZP
req. l = 65 + 8 + 21.8 = 94.8 mm
selected: JB M 16 × 100 ZP

Bolts

Hammer-Head Bolts

Type JH			Type JD				Type JG		Bolt
									
K 38/17, K 36/36, K 36/20			K 28/28, K 28/15, K 28/12			K 28/28 K 28/15	K 21/12		**For profile**
JH M 10	**JH M 12**	**JH M 16**	**JD M 6**	**JD M 8**	**JD M 10**	**JD M 12**	**JG M 6**	**JG M 8**	**Bolt length l [mm]**
Material and design									
			△	△	△		△	△	**15**
△	△		△	△	△□		△	△	**20**
	□	□	△	△	△□			△	**25**
△□	○△□	△□	△	△□	○△□	△	△	△□	**30**
									35
△□	○△□	△□	△	△	○△□	△	△	△□	**40**
									45
○△□	△□[1]	△□[1]	△	△	△□[1]	○△	△	△□	**50**
									55
○△□	○△□	●△□	△	△	△□		△	△	**60**
									65
									70
									75
○△	○△□	△□[1]		△	△□	△		△	**80**
△	○●△□	△□		△	△□			△	**100**
	○△	△			△□				**125**
△	△□	△□		△	△□				**150**
	△□	△□			△□				**200**
									250
									300

K 38/17 (3), **K 36/36** (2.5), **K 36/20** (2.3)	**K 28/28** (2), **K 28/15** (2.3), **K 28/12** (2)	**K 21/12** (1.6)	**Profile** (profile nose f) [mm]

[1] Can be supplied with right-hand or left-hand thread.
[2] JB M 24 is equivalent to JE M 24.
[3] K 48/26 – M 20 8.8 not applicable

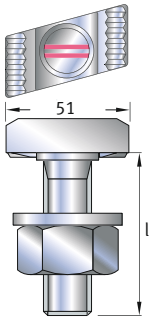
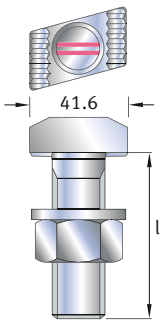
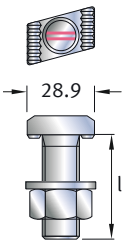
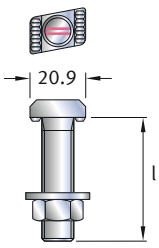
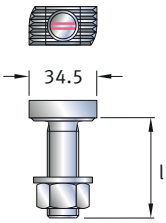
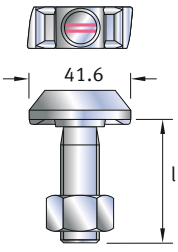
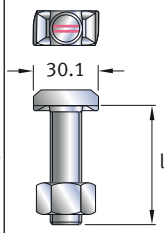
Material and design bolts

○ = Hot-dip galvanised steel (HDG), strength class 4.6
● = Hot-dip galvanised steel (HDG), strength class 8.8
△ = Electro-zinc plated steel (ZP), strength class 4.6
□ = Stainless steel A4-50
■ = Stainless steel F4-70 (≙ FA-70)

Ordering example of JORDAHL® bolts

Type	Thread Ø		Length [mm]	Material	Strength class
JB	M 16	×	100	ZP	4.6

Toothed and Double-Notch Toothed Bolts

Bolt	Toothed bolts										Double-notch toothed bolts		
	Type JXE		Type JXB		Type JXH		Type JXD		Type JZS		Type JKB		Type JKC
													
For profile	JXA W 64/44		JXA W 53/34		JXA W 38/23		JXA W 29/20		JZA K 41/22		JTA W 50/30, JTA W 53/34, JTA W 55/42		JTA W 40/22
Bolt length l [mm]	JXE M 20	JXE M 24	JXB M 16	JXB M 20	JXH M 12	JXH M 16	JXD M 10	JXD M 12	JZS M 12	JZS M 16	JKB M 16	JKB M 20	JKC M 16
	Material and design												
15													
20													
25													
30					●	●		●					
35									●□	□			
40					●■	●	●	●■					●
45													
50					●	●		●	●□	●□			
55													
60			●■		●■	●■		●■			●	●	●
65													
70													
75													
80			●■	●■	●	●		●■	●□	□		●	
100	●■	●■	●■	●■	●	●		●		●			
125						●		●					
150				●■		●		●					
200													
250													
300													

Profile (profile nose f) [mm]	W 64/44 (10)	W 53/34 (7.5)	W 38/23 (5.5)	W 29/20 (5)	K 41/22 (7.5)	W 50/30 (8), W 53/34 (11.5), W 55/42 (12.9)	W 40/22 (6)

Material

○ = HDG 4.6
● = HDG 8.8
△ = ZP 4.6
□ = A4-50
■ = F4-70
(≙ FA-70)

Position identification

Hook and hammer-head bolts are identified by **one notch** at the end of the shank.

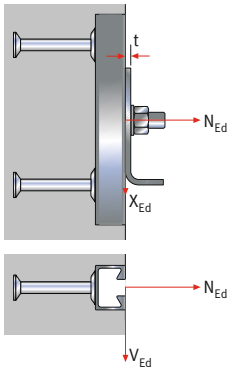
Toothed bolts and notched toothed bolts are identified by **two notches** at the end of the shank.

Following installation, the notch(es) must be at right angles to the channel longitudinal direction.

Double-Notch Toothed Bolts

Design resistance

The two notches of the JORDAHL® notched toothed bolt avoid slippage in the direction of the longitudinal channel. This bolt can take a shear load X_{Ed} parallel to the channel axis up to 10.5 kN with a global safety factor of 3.0. The application is intended only in galvanised hot-rolled profiles JTA-CE. Corrosion protection is assured once installation is completed.



$$\sqrt{N_{Ed}^2 + V_{Ed}^2 + X_{Ed}^2} \leq F_{Rd}$$

Type 8.8, HDG	For profile JTA HDG, black	Recommended tightening torque M_A [Nm]	Min. thickness of attached part t [mm]	Shear load[1] X_{Rd} $\gamma = 3.0$ $X_{Ed} \leq X_{Rd}$ [kN]
JKB M 16	W 50/30 W 53/34	180	6	7.0
JKB M 20		360	8	10.5
JKB M 20	W 55/42	360	8	10.5
JKC M 16	W 40/22	180	6	7.0

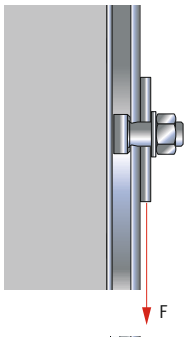
[1] In the event of simultaneous stressing in several directions, the resultant load must not exceed the permissible loads according to ETA-09/0338.

$$\text{perm. } F = \frac{F_{Rd}}{1.4}$$

The notched teeth of the bolt are pressed into the channel lips

Stress in Channel Longitudinal Direction

This application is documented by means of internal tests and is not part of the building approval. The load that can be absorbed depends on the anchor channel material, the bolt type and bolt material used and the tightening torque. The safety factor against slippage is approximately $\gamma = 5.0$ with the specified tightening torques. The specified loads in the channel longitudinal direction can be absorbed safely in conjunction with hot-rolled profiles and bolts in qualities 4.6 and A4-50.



For constructions with higher loads in the channel longitudinal direction, JORDAHL® toothed channels JXA and JZA with approval should be used.

Load-bearing capacity of JTA anchor channels in the longitudinal direction

Profile JTA	Bolts		Tightening torque M_A [Nm]	Recommended load-bearing capacity for shear load parallel to channel axis F [kN]		Minimum thickness of the attached part [mm]
	Type	∅		Profile / steel hot-dip galvanised	Profile / degreased stainless steel	
				Bolt quality 8.8	Bolt quality FA-70	
W 72/48	JA	M 24	620	4.2	1.96	10
		M 20	360	2.9	1.36	
W 55/42	(JE) JB	M 24	620	4.2	1.96	10
		M 20	360	2.9	1.36	
		M 16	180	1.9	0.85	
W 53/34	JB	M 20	360	2.9	1.36	6
		M 16	180	1.9	0.85	
W 50/30	JB	M 20	360	2.9	1.36	6
		M 16	180	1.9	0.85	
		M 12	70	0.9	0.44	
W 40/22	JC	M 16	180	1.9	0.85	5
		M 12	70	0.9	0.44	

$$F_{Rd} = \text{perm. } F \times 1.4$$

Prestressed Bolted Joints

Prestressing forces of T-bolts

In connection technology, for the applications

- **Suspended direct and stand-off installation**
- **Stress in the channel longitudinal direction**

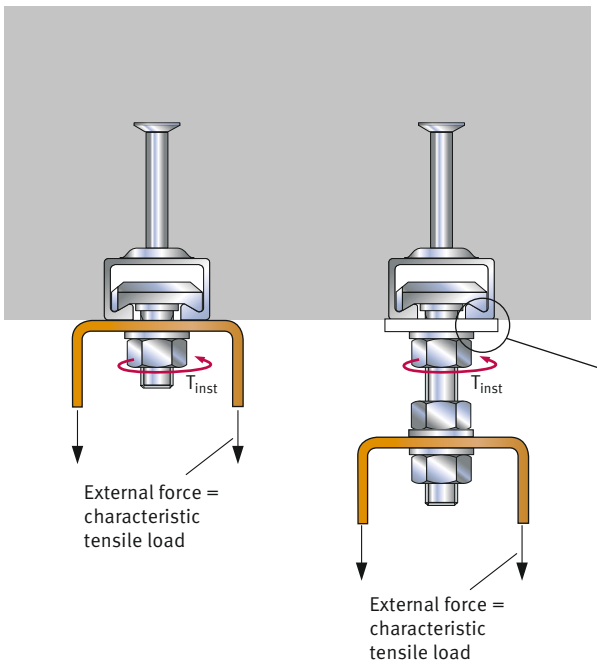
it is important to prestress the bolted connections in order to prevent undesired loosening or slippage of the bolted connections. Higher-strength bolts (8.8) are not absolutely necessary for this purpose. Grade 4.6 and A4-50 bolts are also adequate if the following points are taken into consideration:

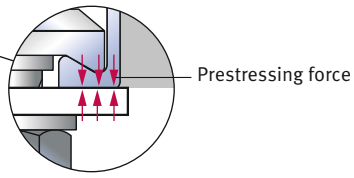
- In the short term, a force arising from prestressing with tightening torque is normally higher than the external load.
- The applied pre-stressing force is reduced by approximately 30% due to relaxation.
- Bolts made of stainless steel exhibit higher friction than zinc-plated or hot-dip galvanised bolts. Therefore, stainless steel bolts produce lower prestressing forces.
- JORDAHL® bolts are supplied ready for installation. They should not be additionally oiled or treated with lubricants before the tightening torque is applied.
- The bolted joint may be prestressed only when there is steel-to-steel contact.

If the channel is set back behind the concrete surface, then the connection must be shimmed by means of a suitable washer (see page 37). If this is not followed and the attached part is prestressed against the concrete surface, it leads to residual stresses in the component. These can cause cracks or splitting of the concrete component and damage the anchor channel.

Suspended direct and stand-off installation

For these applications, cold-formed and hot-rolled profiles can be used. In order to prestress a bolted joint with electro zinc plated bolts or stainless steel bolts, we recommend the use of the tightening torques according to page 36.





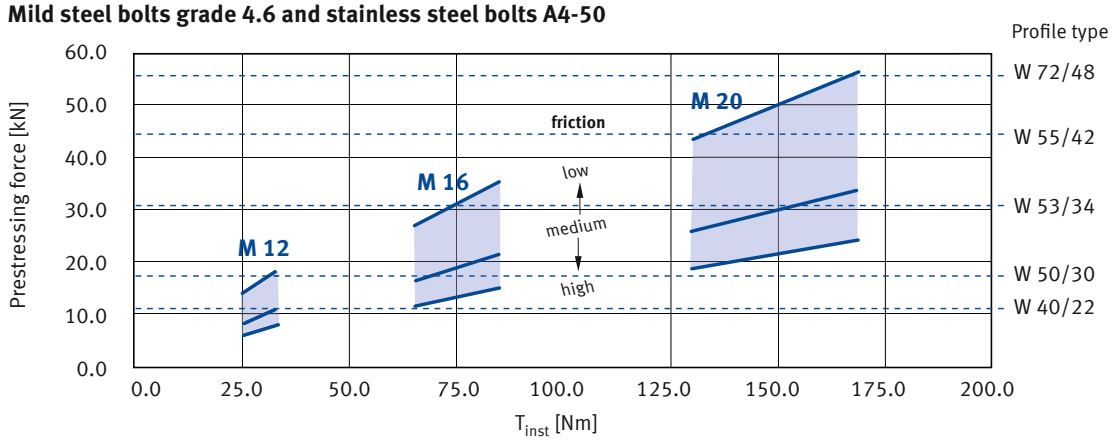
Hot-rolled profile, hook-head bolt and washer ensure uniformly distributed surface pressure and allow high torque moments.

The relationship between prestressing force and tightening torque can be seen from the graphs below. The prestressing forces vary strongly with the friction in the thread between the nut and the bolt. Low friction causes high pre-load, typical for hot-dip galvanised bolts with lubricated nuts.

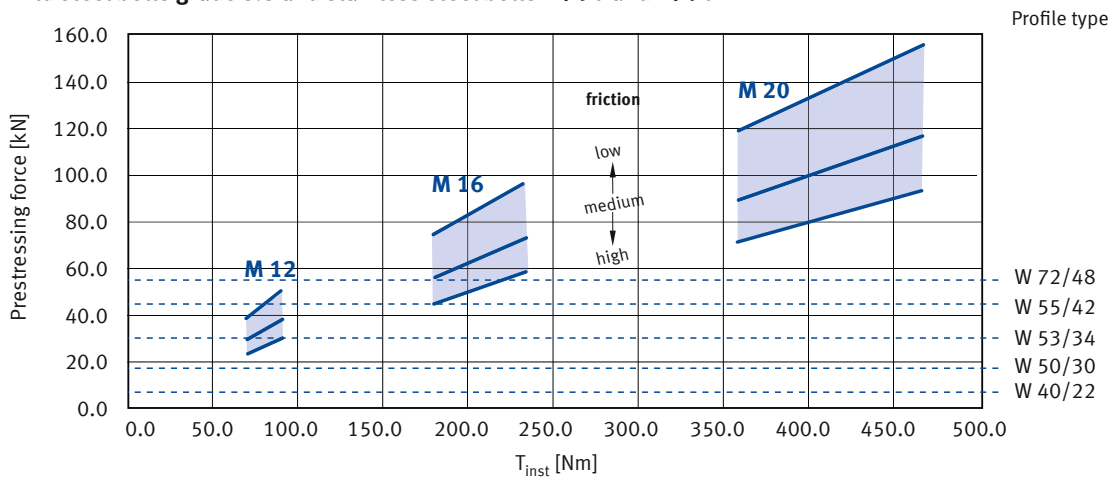
Friction is increased for electro-zinc plated (medium) and stainless steel (high) nuts and bolts. The recommended installation torque may be increased by 30 % without danger of reaching the yield strength of the bolts.

Relationship between prestressing force and installation torque

Mild steel bolts grade 4.6 and stainless steel bolts A4-50



Mild steel bolts grade 8.8 and stainless steel bolts A4-70 and F4-70

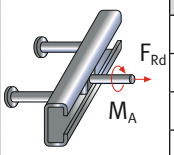


perm. $F = \frac{F_{Rd}}{1.4}$

Design Resistance/Tightening Torques of Hook-Head and Hammer-Head Bolts, Approval Z-21.4-151

JORDAHL® channel-bolt combinations are extremely robust and simple to install.

However, full service ability is achieved only if the fitted part is mounted directly with steel contact.

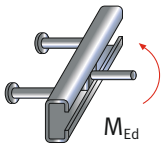


Bolts Ø [mm]	Design resistance F_{Rd} [1] [kN]				Tightening torque M_A [2] [Nm]	
	Steel		Stainless steel		4.6 A4-50 A4-70 F4-70	8.8 [3]
	4.6	8.8	A4-50	A4-70 F4-70		
M 6	3.1	–	3.1	4.2	3	–
M 8	5.6	–	5.6	7.7	8	–
M 10	9.0	18.6	9.0	12.2	15	48
M 12	13.0	27.2	13.0	17.6	25	70
M 16	24.4	50.5	24.2	33.0	60	200
M 20	37.8	79.0	37.8	51.5	120	400
M 24	54.3	113.7	54.3	–	200	680
M 27	70.7	148.4	70.7	–	300	1000
M 30	86.4	180.6	86.4	–	400	1400

Note:
Bolt capacity may be limited by anchor channel capacity.

[1] Observe profile load-bearing capacity.
[2] The recommended tightening torques achieve a firm connection without overloading the components in the case of direct installation. Higher tightening torques in the case of stand-off installation may require compensation of installation tolerances in order not to overload the concrete. (Produce steel-steel contact)
[3] Recommended only for W-profiles.

Permissible Bending Moments According to Approval Z-21.4-151 [4]



Bolts Ø [mm]	Through-hole in anchor element [mm]	Bolt bending moment M_{Rd} [5] based on upper edges of channel and concrete [Nm]			
		Steel		Stainless steel	
		4.6	8.8	A4-50	A4-70 F4-70
M 6	7.0	2.8	–	2.5	5.3
M 8	9.0	7.0	–	6.2	13.2
M 10	12.0	14.0	34.9	12.2	26.2
M 12	14.0	24.5	61.2	21.4	46.0 [6]
M 16	18.0	62.2	155.4	54.3	116.6 [7]
M 20	22.0	121.1	303.0	106.0	227.2
M 24	26.0	209.9	–	183.3	367.4
M 27	30.0	310.7	–	–	–
M 30	33.0	420.0	–	–	–

[4] The bending moment is based on the upper edge of profile and concrete.
[5] In the event of bending with additional central tension or oblique tension, the bending moment must be superimposed:

$$F_{Ed} \leq F_{Rd} \times (1 - M_{Ed} / M_{Rd})$$

F_{Rd} = permissible load
M_{Rd} = permissible bending moment
F_{Ed} = existing tensile load component
M_{Ed} = existing bending moment

Variable bending stress:
In the case of curtain wall cladding with variable bending stresses (e.g. because of temperature changes), the strain must not exceed $\sigma_A = \pm 50$ N / mm² about the average σ_M based on the stress cross-section of the bolt.
[6] For the JTA K 28/15 profile, the permissible bolt bending moment must be reduced to 42 Nm in the case of a channel length L > 250 mm.
[7] For the JTA K 38/17 profile, the permissible bolt bending moment must be reduced to 100 Nm in the case of a channel length L > 250 mm.

Stand-Off Installation

In case of stand-off installation, a connection can be stressed by a bending moment as well as by tension and shear. Therefore, when choosing the bolt, the permissible bending moment must be considered.

The suitable washer is chosen in accordance with the table below.

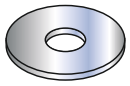
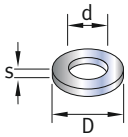
Stand-Off Installation

Dimensions of the washers for stand-off installation

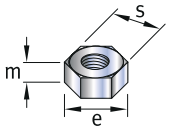
Profile	Bolt Type	M 8	M 10	M 12	M 16	M 20	M 24	M 27	M 30
JTA K 28/15	JD	ISO 7093-1	ISO 7093-1	ISO 7089	–	–	–	–	–
JTA K 38/17	JH	–	38 × 38 × 5	ISO 7093-1	ISO 7093-1	–	–	–	–
JXA W 29/20	JXD	–	ISO 7093-1	ISO 7093-1	–	–	–	–	–
JTA W 40/22	JC	–	38 × 38 × 5	ISO 7093-1	ISO 7093-1	–	–	–	–
JTA K 40/25	JC	–	38 × 38 × 5	38 × 38 × 5	38 × 38 × 5	–	–	–	–
JZA K 41/22	JZS	–	–	38 × 38 × 5	38 × 38 × 5	–	–	–	–
JXA W 38/23	JXH	–	–	38 × 38 × 5	38 × 38 × 5	–	–	–	–
JTA W 50/30 JTA K 50/30	JB	–	50 × 50 × 6	50 × 50 × 6	50 × 50 × 6	50 × 50 × 6	–	–	–
JXA W 53/34	JXB	–	–	–	50 × 50 × 6	50 × 50 × 6	–	–	–
JTA W 53/34 JTA K 53/34	JB	–	50 × 50 × 6	50 × 50 × 6	50 × 50 × 6	50 × 50 × 6	–	–	–
JTA W 55/42	JB [1)]	–	50 × 50 × 6	50 × 50 × 6	50 × 50 × 6	50 × 50 × 6	50 × 50 × 6	–	–
JXA W 64/44	JXE	–	–	–	–	70 × 70 × 8	70 × 70 × 8	–	–
JTA W 72/48 JTA K 72/48	JA	–	–	–	–	70 × 70 × 8	70 × 70 × 8	70 × 70 × 8	70 × 70 × 8

[1)] JB M 24 is equivalent to JE M 24.

Washers

Material ZP, A4				
Washers	**Dimension**	**d [mm]**	**D [mm]**	**s [mm]**
ISO 7093-1 (DIN 9021) 	M 6	6.4	18.0	1.6
	M 8	8.4	24.0	2.0
	M 10	10.5	30.0	2.5
	M 12	13.0	37.0	3.0
	M 16	17.0	50.0	3.0
	M 20	22.0	60.0	4.0
ISO 7089 -200HV (DIN 125 -140HV) 	M 6	6.4	12.0	1.6
	M 8	8.4	16.0	1.6
	M 10	10.5	20.0	2.0
	M 12	13.0	24.0	2.5
	M 16	17.0	30.0	3.0
	M 20	21.0	37.0	3.0
	M 24	25.0	44.0	4.0
	M 27	28.0	50.0	4.0
	M 30	31.0	56.0	4.0

Hexagon Nuts According to ISO 4032 [2)]



Material ZP, A4 strength class 8			
Thread	**e [mm]**	**s [mm]**	**m [mm]**
M 6	11.05	10.0	5.2
M 8	14.38	13.0	6.8
M 10	18.90	16.0	8.4
M 12	21.10	18.0	10.8
M 16	26.75	24.0	14.8
M 20	32.95	30.0	18.0
M 24	39.55	36.0	21.5
M 27	45.20	41.0	23.8
M 30	50.85	46.0	25.6

[2)] For alternating loads we recommend self-locking nuts.

Accessories

Locking Plates

perm. $F = \frac{F_{Rd}}{1.4}$

Use

JORDAHL® locking plates can be used at any point on the JORDAHL® channel. As a result of a 90 degree rotation after being inserted or tilted in, the threaded hole is at the centre. Locking plates are preferably used for stand-off installation with long bolts or threaded rods. Because of the hidden installation, they are not approved by the German Institute for Structural Engineering.

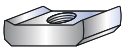
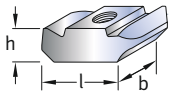
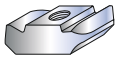
Hooked-head locking plates

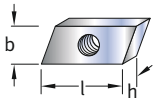
They are forged with an accurate shape and that ensures that they do not rotate back. In order to make installation easier, we recommend a thin strip of foam inside the channel behind the locking plate, to hold it in place.

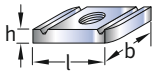
Hammer-head locking plates

Hammer-head locking plates can be used for the temporary fixation of components of lesser importance. They clamp without a particular form fit like the hook-head locking plates.

On request, we also produce captive strips suitable for fixed thread spacings.

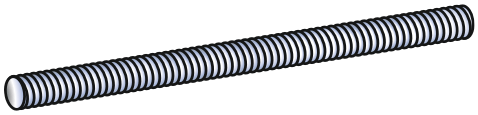
Hooked-head locking plates (forged)	Type	Geometry l × b × h	With thread	F_{Rd} [kN] [1]	Material	Associated profile
	JGM A	57 × 31 × 22	M 20	37.8	ZP	K 72/48 W 72/48
	JGM B	41 × 21 × 16	M 6	3.1	ZP, A4	K 48/26 W 50/30 K 50/30 K 50/40 W 53/34 K 53/34 W 55/42
			M 8	5.6		
			M 10	9.0		
			M 12	13.0		
		41 × 26 × 16	M 16	16.8		
				24.2 [2]		
	JGM C	32 × 17 × 11	M 6	3.1	ZP, A4	W 40/22 K 40/25 K 40/22
			M 8	5.6		
			M 10	9.0		
			M 12	11.2		
		32 × 23 × 13	M 16	11.2		

Hammer-head locking plates JGM (flat steel)	Type	Geometry l × b × h	With thread	F_{Rd} [kN] [1]	Material	Associated profile
	JGM H	30 × 14 × 6	M 5	2.2	ZP, A4	K 38/17 K 36/36 K 36/20
			M 6	3.1		
			M 8	5.6		
		30 × 18 × 8	M 10	9.0		
			M 12	9.8		
	JGM D	21 × 12 × 4	M 4	1.4	ZP, A4	K 28/15 K 28/28 K 28/12
			M 5	2.2		
			M 6	3.1		
		21 × 12 × 6	M 8	4.9		
		18 × 14 × 6	M 10	4.9		
	JGM G	16 × 12 × 4	M 4	1.4	ZP, A4	K 21/12
			M 5	2.2		
			M 6	3.1		
		16 × 12 × 6	M 8	3.5		

Channel nuts	Type	Geometry l × b	With thread	h	F_{Rd} [kN] [1]	Material	Associated profile
	JAM 22	35 × 20	M 6	6	3.1	ZP	K 41/41
			M 8	6	5.6		
	JAM F 22 with spring		M 10	8	9.0		
			M 12	9.5	11.2		

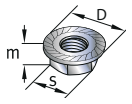
[1] The load-bearing capacities of the anchor channels according to ETA and the mounting profiles according to p. 28/29 must be noted. The respectively smaller value is decisive.
[2] 24.2 kN permissible only in the W 53/34 and W 55/42 profile.

Threaded Rod DIN 976-1 (Length L = 1000 mm)



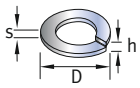
Thread	M 6	M 8	M 10	M 12	M 16	M 20
Load Bearing Capacity F_{Rd} [kN]	3.1	5.6	9.0	13.0	24.0	37.8
Material	ZP, A4					

Self-Locking Nut with Serrated Bearing



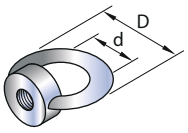
Thread	D [mm]	m [mm]	s [mm]	t [mm]	Material
M 12	26.0	12	18	2.3	ZP, strength class 8
M 16	34.5	16	24	2.1	

Spring Washers DIN 127



Dimensions	h_{min} [mm]	D_{max} [mm]	s [mm]	Material
A 6	3.6	11.8	1.6	ZP, A4
A 8	4.6	14.8	2.0	
A 10	5.0	18.1	2.2	
A 12	5.8	21.1	2.5	
A 16	7.8	27.4	3.5	
A 20	8.8	33.6	4.0	
A 24	11.0	40.0	5.0	
A 30	13.6	48.2	6.0	

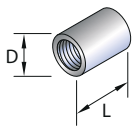
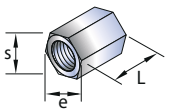
Ring Nuts DIN 582



Thread	d [mm]	D [mm]	F_{Rd} [kN][1)]	Material
M 8	20.0	36.0	2.0	mill finish, ZP
M 10	25.0	45.0	3.2	
M 12	30.0	54.0	4.8	
M 16	35.0	63.0	9.8	
M 20	40.0	72.0	16.8	
M 24	50.0	90.0	25.2	

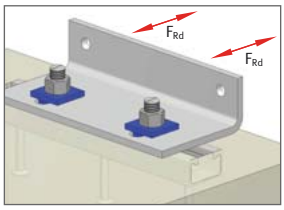
[1)] Load in central tension

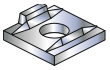
Coupling Sleeves

Round	Thread	D [mm]		L [mm]	F_{Rd} [kN]	Material
	M 6	10.0		20.0	3.1	ZP; A4 on request
	M 8	11.0		20.0	5.6	
	M 10	13.0		25.0	9.0	
	M 12	15.0		30.0	13.0	
	M 16	22.0		40.0	24.0	
	M 20	28.0		50.0	37.8	
Hexagon	**Thread**	**e [mm]**	**s [mm]**	**L [mm]**	**F_{Rd} [kN]**	**Material**
	M 6	11.05	10.0	15.0	3.1	ZP; A4 on reguest
	M 8	14.38	13.0	20.0	5.6	
	M 10	18.90	17.0	25.0	9.0	
	M 12	21.10	19.0	30.0	13.0	
	M 16	26.75	24.0	40.0	24.0	
	M 20	32.95	30.0	50.0	37.8	

Notched Toothed Washer

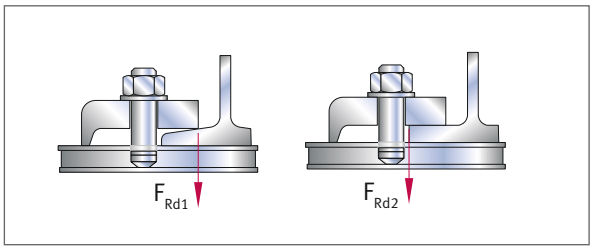
JORDAHL® notched toothed washers guarantee a slip-resistant screw connection in slot holes. Using two notched teeth on the underside of the washer provides a force-fitting connection up to V_{Ed} = 7.5 kN with a safety factor of 3 which simultaneously offers the advantage of tolerance compensation in the slot hole.

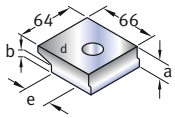


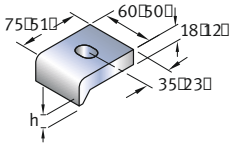
Notched-toothed washer	Type and material	Geometry l x b x h [mm]	For bolts	F_{Rd} [kN]	Tightening torque [Nm]	Attachment part	
						Minimum thickness [mm]	Yield strength [N/mm²]
	**JKZS M 16 HDG**	40 × 40 × 6	M 16 8.8	7.5	200	8	≤ 240

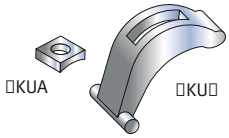
Clamping Plates

JORDAHL® clamping plates are suitable for fastening standard profiles from the I and IPB series and also crane channels.
Material: HDG



Clamping plates for crane rails [1]	Suitable for crane rails		Type	a [mm]	b [mm]	For bolts Ø	d [mm]	e [mm]
	A 45	(KS 22)	**KP-A 45**	22.0	8.5	M 20	∅ 22	18
	A 55	(KS 32)	**KP-A 55**	22.5	9			
	A 65	(KS 43)	**KP-A 65**	23.5	10			
	A 75	(KS 56)	**KP-A 75**	24.5	11			

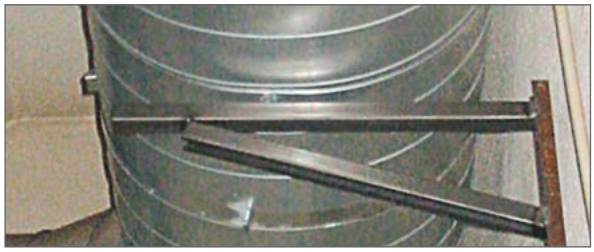
Clamping plates previously DIN 3568	Type	h [mm]	For bolts Ø	Suitable for I-Beam [5]	IPB Beam (HEB) [5]	F_{Rd} [kN] acc. to DIN 3568
 LL 18 × 24 (14 × 20)	**50 / 7** [4]	7	M 12	80 – 120	–	F_{Rd} = 5.25 kN
	60 / 10	10	M 16	120 – 160	100	F_{Rd1} = 9.8 kN F_{Rd2} = 15.8 kN
	60 / 11	11		180 – 200	120	
	60 / 12 [2]	12		220 – 240	140	
	60 / 14 [3]	14		260 – 280	160 – 180	
	60 / 16	16		300 – 340	200 – 220	
	60 / 18	18		360 – 380	240 – 260	
	60 / 20	20		400 – 450	280 – 300	

Clamping claws with adapter	Type	h [mm]	Bolt dimension [mm]	F_{Rd} [kN]
 □KUA □KU□	**SKU**	5–40 (35)	M 12 × 100 (80) strength class 8.8 washer ISO 7093-1 (DIN 9021)	F_{Rd} = 7.0 kN

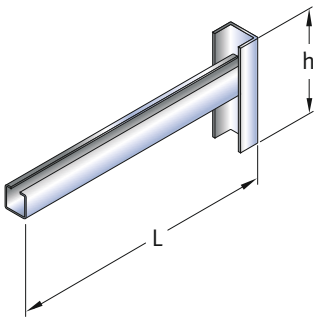
[1] Crane rail acc. to DIN 536 on request: M 16 ∅ 18, M 24 ∅ 26
[2] Also for crane rails A100 (KS75)
[3] Also for crane rails A120 (KS101)
[4] Dimension in brackets
[5] Other carrier types also available

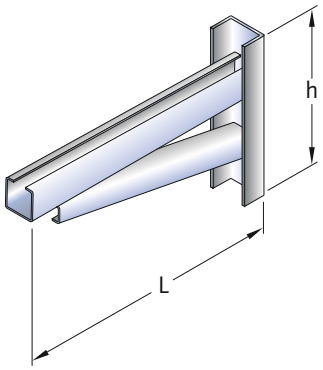
Profile Bracket JK

JORDAHL® profile brackets JK 28/28-1, 36/36-1 and 36/36-2 are ready-to-mount constructions for holding clips, pipes, cable trays and other objects. They are fixed to the anchor channels or directly to the structure with anchor bolts. Special designs can also be supplied on request.

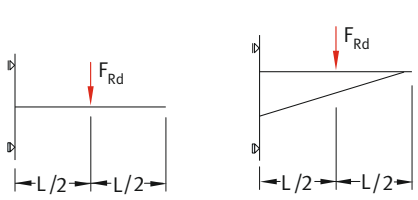
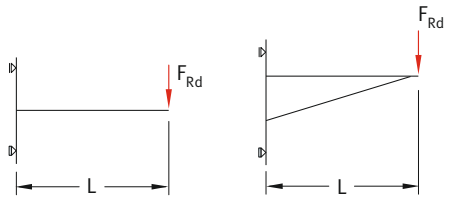


perm. $F = \frac{F_{Rd}}{1.4}$





	JK 28/28-1	JK 36/36-1	JK 36/36-2				
Cantilever profile	K 28/28	K 36/36	K 36/36				
Associated bolt	Type JD, M 6–12	Type JH, M 10–16	Type JH, M 10–16				
Connection profile for bolts	U 36/24 M 12	U 45/27 M 12	U 45/27 M 12				
Cantilever length L [mm]	100, 200, 300, 400	300, 400, 500, 600	300	400	500	600	700
Total height h [mm]	120	180	208	238	269	300	330
Material/design	Hot-dip galvanised steel ≥ 50 µm, stainless steel on request						

F_{Rd} [kN][1)]														
	Load case 1: 							**Load case 2:** 						
	Cantilever length l [mm]							**Cantilever length l [mm]**						
	100	200	300	400	500	600	700	100	200	300	400	500	600	700
JK 28/28-1	3.78	1.89	1.26	0.98	–	–	–	1.89	0.95	0.63	0.49	–	–	–
JK 36/36-1	–	–	2.80	2.10	1.68	1.40	–	–	–	1.40	1.05	0.84	0.70	–
JK 36/36-2	–	–	7.00	5.81	4.41	3.57	2.94	–	–	5.88	5.74	5.11	4.69	4.41

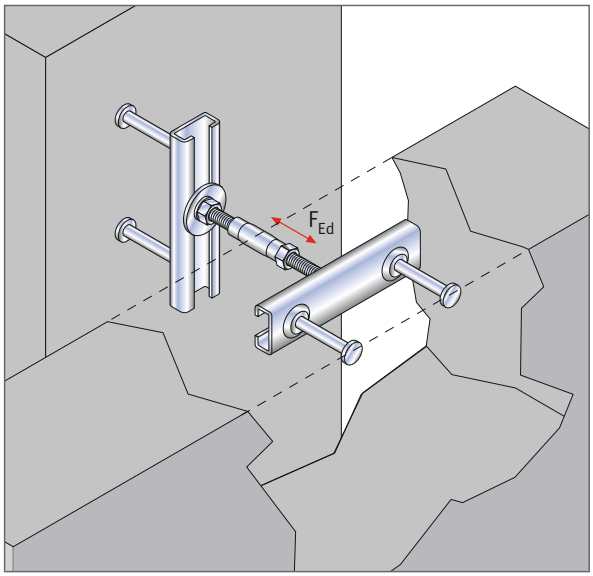
[1)] All load-bearing capacities are calculated elastically-plastically in accordance with DIN 18 800 (1/90) with the following assumptions: $\gamma_F = 1.4$; $\gamma_{MS} = 1.1$; yield point $f_{y,K} = 235\ N/mm^2$; deflection $f \leq l / 150$ for steel.

Ordering example for JORDAHL® JK profile brackets

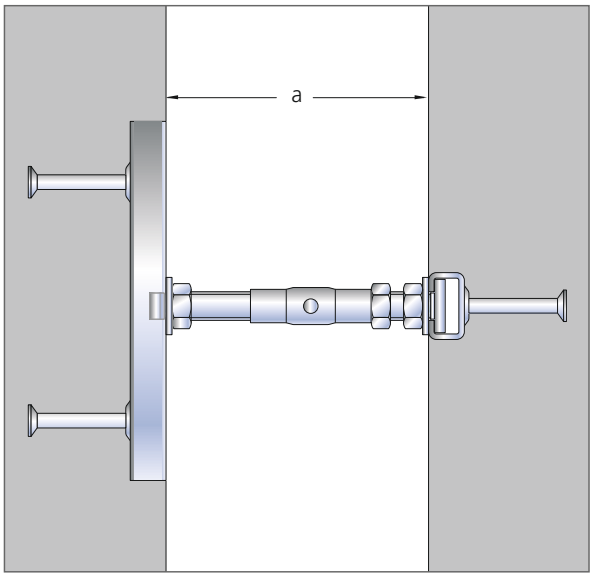
Type	Profile size		Length [mm]
JK	28/28-1	–	200

Clamp Connection JSV

perm. $F = \frac{F_{Rd}}{1.4}$



Clamp connection JSV



General view of installation

JORDAHL® clamp connections produce a clearance-free joint resistant to tension and compression between two components. Exact, three-dimensional alignment of the connection is ensured by arrangement between a vertical and a horizontal JORDAHL® anchor channel (minimum length 150 mm).

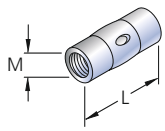
Scope of supply

JORDAHL® clamp connections comprise:

- Clamping sleeve (1 piece)
- JORDAHL® bolt L with left-hand thread (1 piece)
- JORDAHL® bolt R with right-hand thread (1 piece)
- One nut to lock the clamping sleeve
- Washer EN ISO 7093–1 (2 pieces)

Material

- Stainless steel (A4)



Turnbuckle

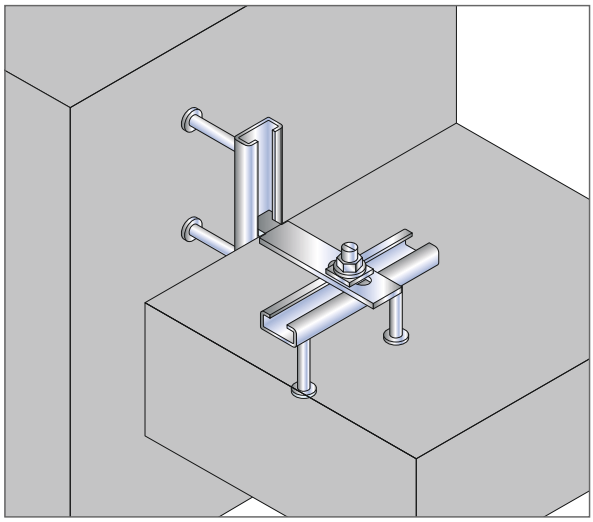
Type	F_{Rd} [kN]	Wall spacing [1] a [mm]	Sleeve M × L	Bolt left-hand thread	Bolt right-hand thread	Associated short anchor channel piece l = 150 – 250 mm
JSV-28-1	4.9	85–110	SP 10 × 50	JDL-M 10 × 50	JD-M 10 × 40	JTA K 28/15
JSV-28-2		110–160	SP 10 × 80	JDL-M 10 × 50	JD-M 10 × 60	
JSV-38-1	7.0	95–115	SP 12 × 50	JHL-M 12 × 50	JH-M 12 × 50	JTA K 38/17
JSV-38-2		115–155	SP 12 × 80	JHL-M 12 × 50	JH-M 12 × 60	
JSV-38-3		145–195	SP 12 × 80	JHL-M 12 × 50	JH-M 12 × 100	
JSV-38-4	9.8	95–115	SP 16 × 50	JHL-M 16 × 50	JH-M 16 × 50	JTA K 38/17
JSV-38-5		125–175	SP 16 × 80	JHL-M 16 × 50	JH-M 16 × 80	
JSV-38-6		145–195	SP 16 × 80	JHL-M 16 × 50	JH-M 16 × 100	
JSV-40-1	11.2	95–115	SP 16 × 50	JCL-M 16 × 50	JC-M 16 × 60	JTA K 40/25 JTA W 40/22
JSV-40-2		125–145	SP 16 × 80	JCL-M 16 × 50	JC-M 16 × 60	
JSV-40-3		140–185	SP 16 × 80	JCL-M 16 × 50	JC-M 16 × 100	

[1] For all load ranges the wall spacings can be varied by means of adapted right-hand thread bolts.

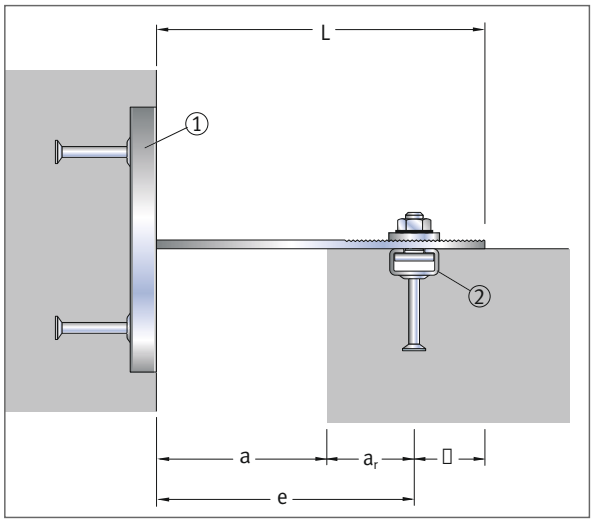
Ordering example for JSV clamp connection load range 7.0 kN for existing wall spacing of 120 mm

Type		Profile size		
JSV	–	38	–	2

Toothed Straps JVB



JORDAHL® toothed straps JVB-Z



General view of installation

JORDAHL® toothed straps JVB-Z and JVB-ZS produce joints between two components:

- Type JVB-Z with hammer-head for joints loaded only in tension,
- Type JVB-ZS with welded-on JORDAHL® bolt for transmitting tensile and compressive forces.

Exact, three-dimensional alignment of the connection is ensured by arrangement between a vertical and a horizontal JORDAHL® anchor channel (minimum length 150 mm).

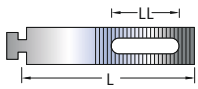
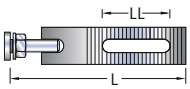
Variants supplied

JORDAHL® toothed straps as

- Type JVB-Z (toothed) with matching plate or
- Type JVB-ZS (toothed) with matching plate, bolt, washer and nut.

Material

- Electro-zinc plated steel (ZP)
- Stainless steel (A4)

F_{Rd} [kN]	Type JVB-Z	Type JVB-ZS	Area of use		Dimensions [mm]			Fastening anchor channels' (①+②) bolt [1]	Edge distance a_r [mm]
			Axial spacing e ± 20 [mm]	Wall spacing a [mm]	Plate length L = a + a_r + ü	Protrusion ü	Slot LL		
4.9	**JVB- 90-Z/12**	—	50	0–20	90	40	11 × 55	JTA K 28/15 JD M10 × 30	50
	JVB-115-Z/12	**JVB-115-ZS/12**	75	5–45	115				
	JVB-140-Z/12	**JVB-140-ZS/12**	100	30–70	140				
	JVB-165-Z/12	**JVB-165-ZS/12**	125	55–95	165				
	JVB-190-Z/12	**JVB-190-ZS/12**	150	80–120	190				
	JVB-215-Z/12	**JVB-215-ZS/12**	175	105–145	215				
	JVB-240-Z/12	—	200	130–170	240				
9.8	**JVB-115-Z/18**	—	75	0–20	115	40	13 × 55	JTA K 38/17 JH M12 × 40	75
	JVB-140-Z/18	**JVB-140-ZS/18**	100	5–45	140				
	JVB-165-Z/18	**JVB-165-ZS/18**	125	30–70	165				
	JVB-190-Z/18	**JVB-190-ZS/18**	150	55 – 95	190				
	JVB-215-Z/18	**JVB-215-ZS/18**	175	80 –120	215				
	JVB-240-Z/18	—	200	105 –145	240				

[1] Order separately.

Note:
At the time of installation care must be taken that the straps rest square on the anchor channel and component.

Ordering example for JVB-Z toothed strap for wall spacing a = 40 mm

Type		Length l		Series
JVB	–	115	–	Z/12

Brick Tie Channels

perm. $F = \frac{F_{Rd}}{1.4}$

Brick tie channels and the associated ties ensure the permanent and secure connection of masonry or timber components to an adjacent reinforced concrete background. The brick tie channels are cast into the reinforced concrete. The corresponding ties are introduced into the channels and connected to the timber or masonry. Masonry tie anchors are set into the mortar joint at intervals of about 25 cm.

Connection of brickwork support on reinforced concrete components with brick tie channel Kt 28/15-D and brick tie timber fixing strip

Material

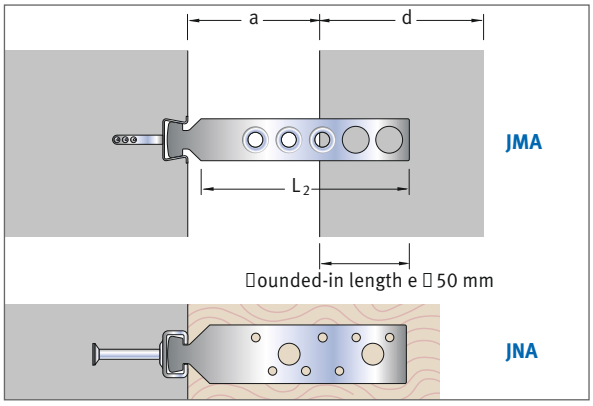
Channels and ties are manufactured from stainless steel 1.4571/1.4404/1.4401 (A4) for use in the external walling area. In interiors, it is possible to use hot-dip galvanised or sendzimir galvanised steel products.

Product options

Joining channels can be obtained in various cross-sections. The masonry restraint channel Kt 25/15-D consists of a channel with integrated punched anchors which can be bent out. It ensures secure anchoring even in freshly deshuttered conditions. The associated brick ties of corresponding sizes can be obtained.

- JMA: in a straight design
- JMA-...-Q: as transverse anchors (double-sided)
- JMA-...-QE: as transverse anchors (one-sided)
- JMA-...-D: as thin-bed masonry joining anchors for joining large-format porous concrete masonry at the adhesive joint.

Joining elements with nail holes for fastening timber constructions to the anchor channels are designated timber fixing straps JNA-...

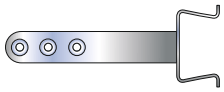
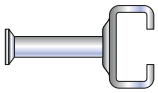
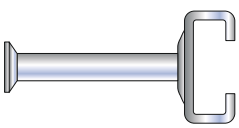


Example of joints with JORDAHL® brick tie channels and brick ties

Advice on static loads

All the load-bearing capacities mentioned in relation to brick tie channels apply to anchoring in concrete ≥ C20/25.

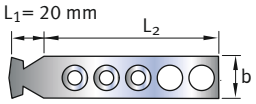
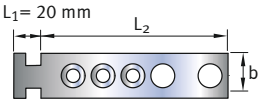
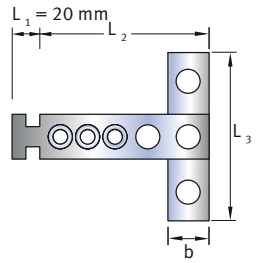
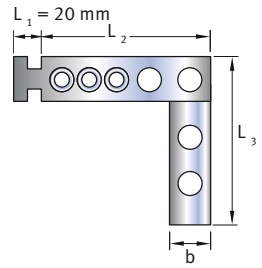
More products and solutions can be found in brochure: “Brickwork Support Systems”.

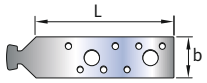
Brick tie channel	Cross-sectional groups	Design	Load-bearing capacity F_{Rd} [kN]	Associated brick tie and timber fixing strap
	Kt 25/15-D with punched anchor	sv A4	1.7	**Series 12** JMA-.../12 JMA-...-Q/12 JMA-...-QE/12 JMA-...-D/12 JNA-.../12
	JTA K 28/15[1] JM K 28/15[2] JML K 28/15[2]	HDG A2 A4	4.2	
	JTA K 38/17[1] JM K 38/17[2]	HDG A2 A4	6.3	**Series 18** JMA-.../18 JMA-...-Q/18 JMA-...-QE/18 JNA-.../18

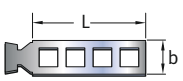
[1] European Technical Approval ETA-09/0338

[2] No image available

Brick Ties
Timber Fixing Strap

Brick ties JMA HDG, A4	Cross-section		In the following lengths L_2, L_3 may be choosen freely:			
	b [mm]	t [mm]	L_2 [mm]	For facing brickwork with		L_3 [mm]
				Wall thickness d [mm]	Wall spacing a [mm]	
JMA-.../12, Series 12 	25	2	85	115	20–40	—
			120	115	40–80	
			180	115	85–140	
		3	300	—	160	
JMA-.../18, Series 18 	30	3	85	115	20–40	
			120	115	40–80	
			180	115	85–140	
			300	—	160	
JMA-...-Q/12, Series 12 (no image) **JMA-...-Q/18, Serie 18** 	25	2	85	115	20–40	120 180 300
			120	115	40–80	
			180	115	85–140	
		3	300	—	160	
	30	3	85	115	20–40	
			120	115	40–80	
			180	115	85–140	
			300	—	160	
JMA-...-QE/12, Series 12 (no image) **JMA-...-QE/18, Serie 18** 	25	2	85	115	20–40	
			120	115	40–80	
			180	115	85–140	
		3	300	—	160	
	30	3	85	115	20–40	
			120	115	40–80	
			180	115	85–140	
			300	—	160	

Timber fixing strap JNA HDG	Cross-section		Length L [mm]
	b [mm]	t [mm]	
JNA-.../12, Series 12 JNA-.../18, Series 18 (no image) 	35	3	100
			130
			200
	35	3	100
			130
			200

Brick tie anchor A2	Cross-section		Length L [mm]
	b [mm]	t [mm]	
JMA...D/12, Series 12 	25	1	125
			185
			245

Joist attachment to ring beam with timber fixing straps and brick tie channels

Ordering example for JMA QE brick tie

Type		Length L [mm]		Series
JMA	–	85 × 120	–	QE /12

Profiled Metal Sheet Channels JTB

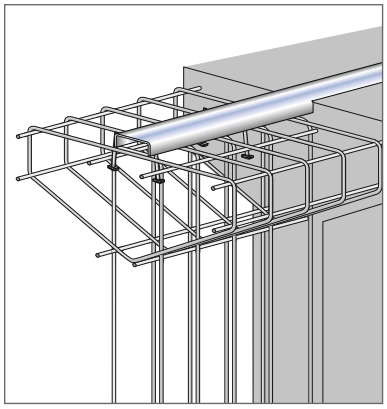
German Technical Approval Z.21.4-161

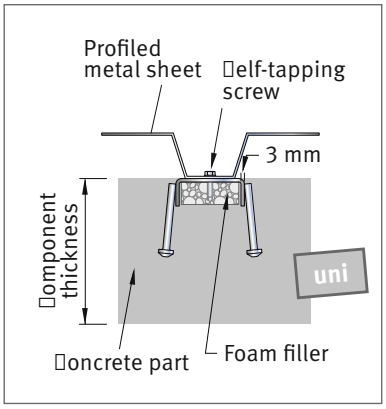
Profiled metal sheet channels permit fast, cost-effective installation of profiled metal sheets on reinforced concrete components. The anchors on such conventional channels are often difficult to insert into pre-formed reinforcement cages. The profiled metal sheet channels JTB-AR and JTB-uni from JORDAHL can be installed more easily into the existing reinforcement due to their slim anchor format.

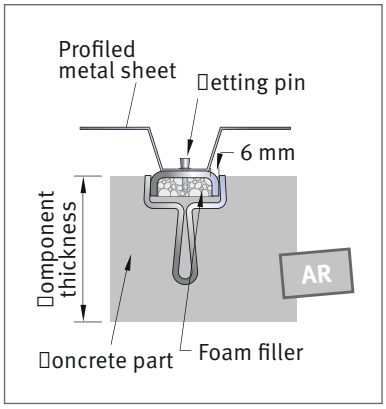
JORDAHL has suitable channel connection arrangements available for any application requirement or concentration of reinforcement.

The types JTB-AR and JTB-uni are suitable for all typical applications. They are recommended in particular for all reinforced components. Profiled metal sheet channels from JORDAHL and the associated end anchors have Building Approval: JTB: Z-21.4-161.

Material
Profiled metal sheet channels from JORDAHL are produced from steel to EN 10 025, hot-dip galvanised with ≥ 50 µm zinc layer or from stainless steel 1.4571 or 1.4401/1.4404 (A4).







Connection to wall

Connection to roof

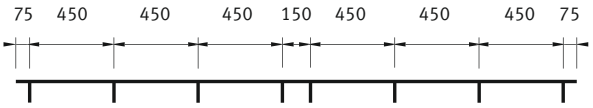
Storage of JTB-AR

JTB-uni with the lowest possible storage space requirement

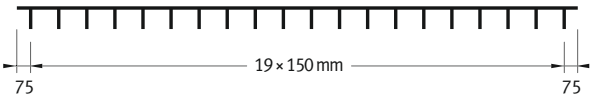
Forms supplied

Profiled metal sheet channels JTB-AR and JTB-uni are supplied in two standard options (stock length 3000 mm in each case).

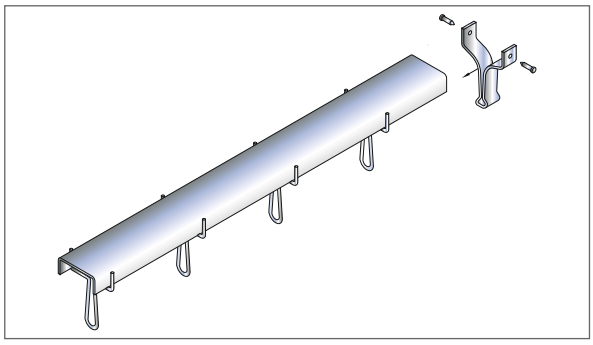
- Centrally divisible, allow cutting in half, therefore often particularly cost-effective anchor spacings e = 450 mm



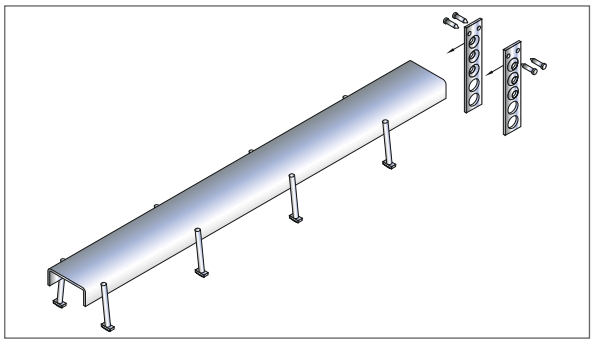
- Divisible as required, can be cut to suit, anchor spacing e = 150 mm



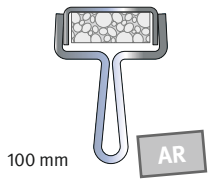
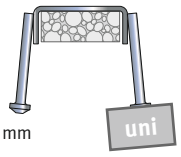
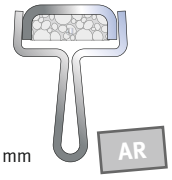
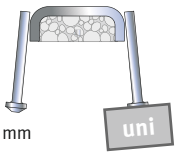
For special cases which cannot be covered by these supply variants,a pproved end anchors are available which are fixed to the channels by self-tapping screws.



JTB-AR with end anchor



JTB-uni with end anchor

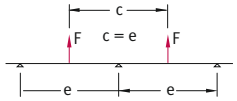
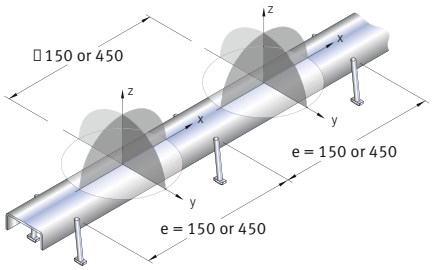
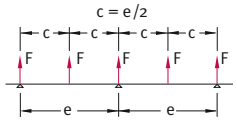
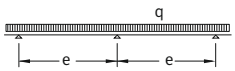
Technical details					
Profile (b/h/t) [mm]		**JTB 60/24/3-AR**	**JTB 60/24/3-uni**	**JTB 60/22/6-AR**	**JTB 60/22/6-uni**
Installation height					
Anchor spacing e [mm]		150	450	150	450
Cross-section A [cm^2]		2.97		5.06	
Moment of inertia I_y [cm^4]		1.51		1.88	
Moment of resistance W_y [cm^3]		0.87		1.286	
Weight with anchors [kg/m]		2.5	2.4	4.1	4.0
Material and corrosion protection		S 235 JR (St 37-2), hot-dip galvanised ≥ 50 µm or 1.4571 / 1.4401 (A4)			
Joining means [1] for profiled metal sheet channels	HDG	e. g. EJOT self-tapping screw: JT 2-6-6.3 ×22, V16		e. g. EJOT setting bolt: SBR 14	
	Stainless steel	e. g. EJOT-Cronimax: JZ 7-6.3 ×22, E16 drill before ∅5.5 mm			

1) Producer's admission has to be regarded.

Technical Details Profiled Metal Sheet Channels

Design resistance F_{Rd}

$$\text{perm. } F = \frac{F_{Rd}}{1.4}$$

Profile	JTB 60/24/3		JTB 60/22/6		Stress ranges
Anchor spacing e [mm]	150	450	150	450	$\sqrt{F_{Ed,x}^2 + F_{Ed,z}^2 + F_{Ed,y}^2} \leq F_{Rd}$
Single load F_{Rd} [kN] 	7.0	4.6	7.0	7.0	
	3.5	3.5	3.5	3.5	
Line load q [kN/m] 	46.6	15.5	46.6	15.5	

The minimum edge distance is 100 mm.
The minimum spacing between 2 channels is 200 mm.

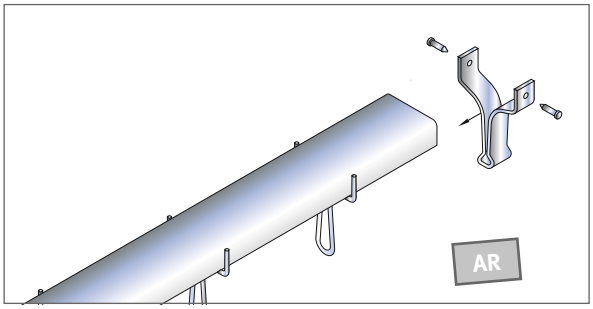
Mounting and Installation

Profiled metal sheet channels with inserted foam filling are concreted into the smooth and flat concrete surface of the load-bearing component, flush with the surface and in the correct alignment. End joints between two channels should be about 20 mm. Following the removal of the formwork, the profiled metal sheets are fixed to the channel by approved connecting means, self-tapping screws or set screws. The profiled metal sheet must be fixed in the central third of the width of the rear of the channel. The axis of the bolt must be at least 2.5 cm from the end of the channel. The applicable standards and regulations for profiled metal sheets and fixing means (DIN 18 807, Approval Z-14.1-4) must be observed.

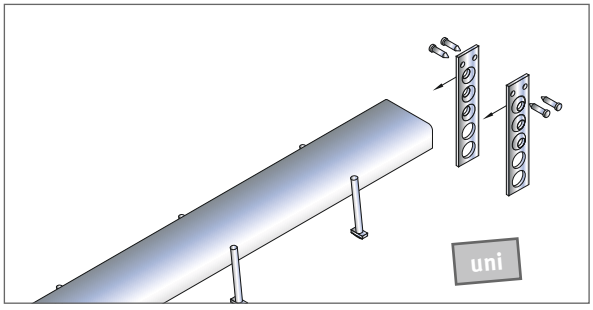
End anchors

Hot-dip galvanised channels which are shortened individually are secured at the end by end anchors approved by the German Institute for Structural Engineering. The end anchors are connected 75 mm away from the end of the channels.

The connections means used for the end anchors can be self-tapping drill screws ST 4.8 × 16 ZP to EN ISO 15481.



JTB-AR channel with JTB-EA end anchor



JTB-uni channel with JTB-EB end anchor

Design resistance F_{Rd}

End anchors		
Connecting channel	**End anchor**	**F_{Rd} [kN]**
JTB-AR	JTB-EA	4.9
JTB-uni	JTB-EB	4.9

Minimum component dimensions [mm]

	a_a [1]	a_r [2]	a_e [3]	a_f [4]	d [5]	b [6]
Type JTB-AR	200	100	20	20	100 + c	200
End anchor EA	160	80	20	20	105 + c	200
Type JTB-uni	200	120	20	20	68 + c	240
End anchor EB	200	100	20	20	125 + c	200

[1] If the adjacent channels are arranged in a staggered manner in such a way that the anchors are spaced apart by at least 150 mm from each other, the lateral spacing a_a may be reduced to 80 mm.

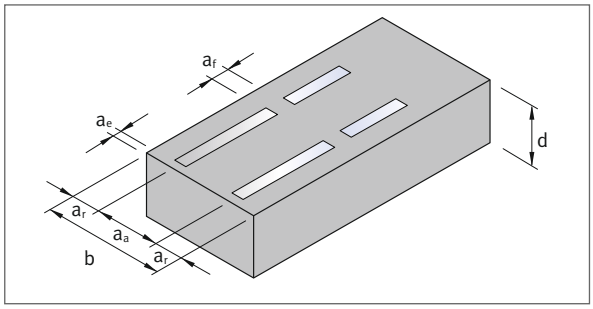
[2] In the event that the permissible anchor force is not fully utilised, the edge spacing a_r in the case of exclusively central tensile loading may be **reduced** to:
red. $a_r = N_{Ed}/N_{Rd} \times a_r \geq 5$ cm
N_{Ed} = existing anchor force,
N_{Rd} = permissible anchor force

[3] If the anchor force is fully utilised, the last anchor must be at least 90 mm away from the edge.

[4] If the anchor force is fully utilised, the two end anchors must have a mutual spacing of at least 150 mm.

[5] This is given by the dimensions of the anchor and the required concrete covering c according to DIN 1045-1: 2008-08, Abs. 6.3 or DIN EN 1992-1-1:2011-01 with DIN EN 1992-1-1/NA: 2011-01, Section 4.4.

[6] Minimum component width when only one channel is provided.



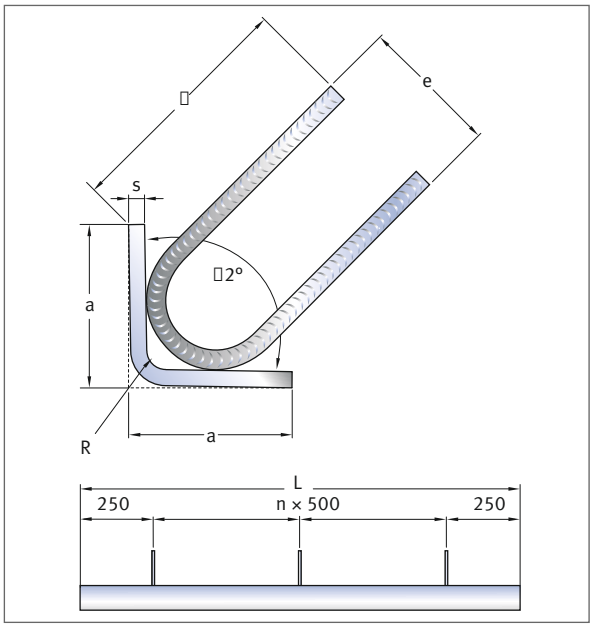
Ordering example for JTB profiled metal sheet channels

Type	Size	Anchor distance [mm]	Anchor	Material
JTB	60/24/3	– 450 –	uni –	A4

Installation of a multi-layer insulated corrugated metal siding wall

Edge Protection Angle JKW

JORDAHL edge protection angle for casting into the corners of columns and walls in car parks and warehouse loading bays. JORDAHL edge protection angles are supplied with anchors ready to install. The round steel anchors bent in a U-shape may be fitted easily into the reinforcing cage and do not conflict with the corner reinforcement. JORDAHL edge protection angles are bent over at an angle of 92°. This ensures good contact with the formwork and a clean edge to the concrete.



Material

Stainless steel on request:

- Angle – 1.4301 (A2)
  – 1.4401/1.4404/1.4571 (A4)
  – 1.4362 (L4 Lean Duplex)
- Anchor – B500B NR or B500B

Hot-dip galvanised:

- Angle – 1.0038 (St)
- Anchor – B500B

Type	Angle dimensions a × a × s [mm]	Length supplied L [mm]	No. of anchors [pcs.]	Approx. anchor dimension l × e [mm]	Bend angle bending radius R [mm]
JKW-50/5-L	50 × 50 × 5	500, 750, 1000	2	80 × 50	5
		1500	3		
		2000	4		
JKW-80/6-L	80 × 80 × 6	500, 750, 1000	2	125 × 50	13
		1500	3		
		2000	4		
JKW-100/6-L	100 × 100 × 6	500, 750, 1000	2	115 × 50	13
		1500	3		
		2000	4		
JKW-100/8-L	100 × 100 × 8	500, 750, 1000	2	115 × 50	13
		1500	3		
		2000	4		

Ordering example for JKW edge protection angle

Type		Profile size		Length [mm]		Material
JKW	–	80/6	–	750	–	A2

Anchor Plates JAP

JORDAHL® anchor plates are the solution for joining concrete to steel components. The anchor plates are cast into the relevant elements flush with the component surface. Corresponding steel or stainless steel elements can be welded to their surface.

Product options

JORDAHL supplies:

- Anchor plates with approved headed studs for applications relevant to building inspection
- Particularly economical anchor plates with smaller studs for less important constructional applications and plates
- Anchor plates in all desired sizes, pre-perforated if desired for fastening to the formwork (2 × 7 mm) or with nailing plate
- Special designs, for example with threading bolt welded on or eyelet sleeves at customer's request

perm. $F = \frac{F_{Rd}}{1.4}$

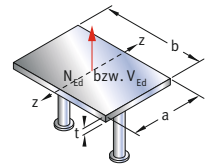
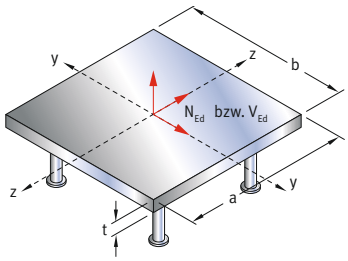
The perm. load values specified help in an approximate estimation. They are based on a concrete grade C20/25 and apply to loading in tension or shear.

Material and design:

- Stainless steel – 1.4571 / 1.4401 / 1.4404 (A4)
  – 1.4301 / 1.4303 (A2)
- Steel mill finish (black) or hot-dip galvanised

Studs ∅ [mm]	Studs length [mm]	Perm. load F_{Rd} [kN] [1]	Plate thickness [mm] optional
6	50	4.9	4 / 6 / 8 / 10 / 12
9	50	9.8	
10	75	11.2	
13	100	21.0	
16	125	28.0	

[1] Failure criterion for one stud

Anchor plate JAP	Plate a × b × t [mm]	Stud ∅ × length [mm]	Maximum recommended individual load [2]	
			Tension N_{Rd} [kN]	Shear V_{Rd} [kN]
	70 × 100 × 6	2 pieces 9 × 50 [3]	10.5	10.5
	160 × 160 × 12	4 pieces 9 × 50 [3]	22.4	22.4
160/160/12 with eyelet sockets 2 × 16 × 80 (no image)				

2) For loading in one direction. In the case of combined stress, interaction relationships must be taken into account.

3) Upon request, also with headed bolt 10 × 50 according to building approval.

Pressure Bolts JDS

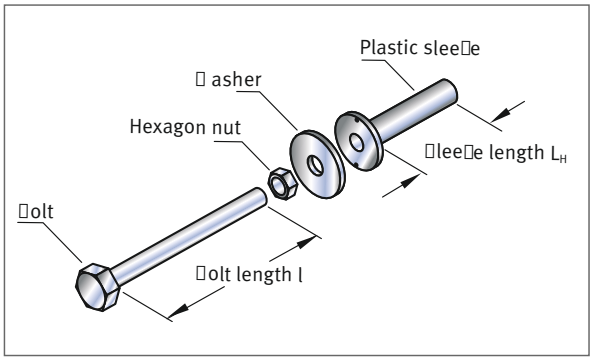
perm. $F = \frac{F_{Rd}}{1.4}$

JORDAHL® pressure bolts are spacer bolts.They are primarily used in the installation of precast elements and are used to transmit compressive forces resulting from dead weight or wind loads. Tensile forces cannot be absorbed.

Constituent parts

The construction comprises

- A plastic sleeve with a nail plate, which is arranged in the precast element or in the in-situ concrete,
- A suitable bolt with nuts and washer made of stainless steel (A4)



JORDAHL® pressure bolt

Bolt length [mm]	For wall spacing a ± 20 [mm]	Pressure F_{Rd} [1] [kN]			
		M 10	M 12	M 16	M 20
80	40	10.2	15.4	30.0	47.0
100	60	9.1	14.0	28.0	45.6
120	80	8.1	12.7	26.2	43.1
140	100	7.3	11.6	24.5	40.9
160	120	6.4	10.6	23.0	38.8
180	140	5.7	9.7	21.4	36.7
200	160	5.2	8.8	20.0	34.7
220[2]	180	4.6	8.0	18.6	32.9
240[2]	200	4.2	7.3	17.4	31.2

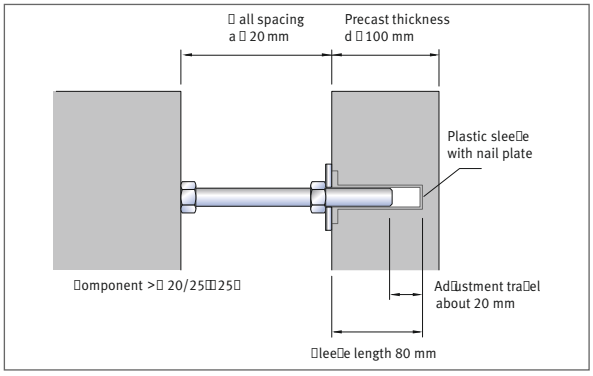
[1] Calculation of the load-bearing capacity (steel failure) to DIN 18 800 and Z-30.3-6 “Components and joining means of stainless steels”.
[2] Special lengths on request

Ordering example for JDS pressure bolt

Type	Thread Ø		Bolt length [mm]	Design
JDS	M 10	x	80	A4

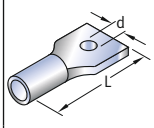
Application advice

In order to permit adjustment, the bolt should be arranged about 15 cm away from the edge of the fabricated part. In this case, the edge spacing from the upper edge of the plate should be $a_r \geq 1.5 \times d$ (d = plate thickness). The fact that the forces are passed on in the concrete must be verified and ensured by adequate reinforcement in the force introduction region. In combination with an eyelet socket, the pressure bolt joint can also be braced against inadvertent detachment.

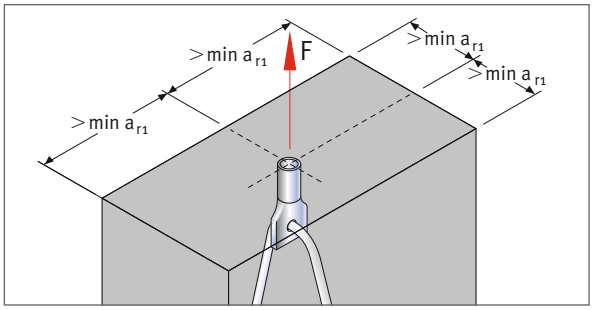


Installation

Eyelet Sockets



Thread	L [mm]	d [mm]	F_{Rd} [kN]	min a_{r1} [mm]	Material
M 8	50	6.2	3.5	75	1.4401 (A4) (electro-zinc plated steel on request)
M 10	50	6.2	4.9	75	
M 12	60	7.2	7.0	90	
M 16	80	12.2	11.2	120	
M 20	100	12.2	17.5	150	



JORDAHL® eyelet sockets are used to transfer tensile forces into concrete components, which as occur during the transport of fabricated parts. The eyelet sockets are cast into the reinforced concrete components. To transmit a force, a reinforcing rod is needed as an anchorage. To do this, a rod with the largest possible diameter is fed through the transverse hole and bent over as per the drawing.

Ordering example for eyelet socket

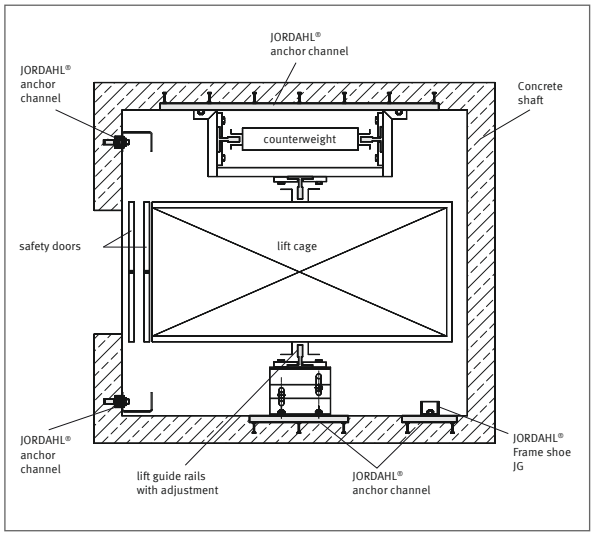
Type	Thread Ø		Length [mm]	Material
ÖM	M 10	x	50	A4

Lift Construction

The JORDAHL range for lift construction extends from anchor channels and bolts to special frame shoes. Fastening elements for the lift guide channel are attached securely, quickly and adjustably to cast-in JORDAHL® anchor channels.

Particularly suitable for this purpose are the anchor channel profiles JTA W 40/22 or W 50/30, which are approved for dynamic loadings.

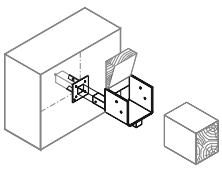
Example of a lift shaft (ground plan)



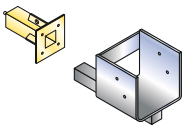
Frame Shoes JG

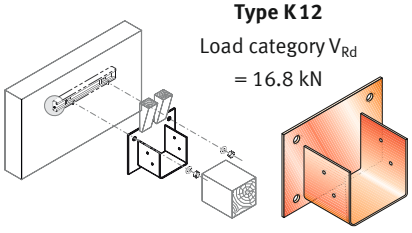
JORDAHL® frame shoes are used for the safe installation of mounting platforms in lift shafts. Frame shoes are available in various designs for load ranges. The standard design is intended for square timber widths of 10 cm. Square timber widths of 12 cm are possible on request. They are supplied in hot-dip galvanised steel or with a coloured anti-corrosion paint corresponding to the load range.

TÜV Rheinland Product Safety – BAUART GEPRÜFT – TYPE APPROVED
Certificate No. R 60022882



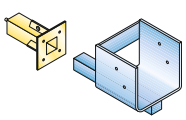
Type H 2,5
Load category V_{Rd}
= 3.5 kN



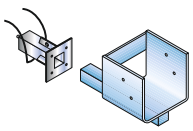


Type K 12
Load category V_{Rd}
= 16.8 kN

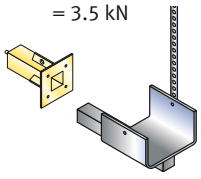
Type H 5
Load category V_{Rd}
= 7.0 kN



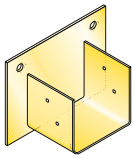
Type H 9[1)]
Load category V_{Rd}
= 12.6 kN



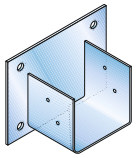
Type L 2,5
Load category V_{Rd}
= 3.5 kN



Type K 4
Load category V_{Rd}
= 5.6 kN



Type K 9
Load category V_{Rd}
= 12.6 kN



[1)] Suspension reinforcement on-site, stirrup BSt 10

Ordering example for JG frame shoe

Type
JG – K 4

Installation

Efficient, Easy and Fast

JORDAHL supplies anchor channels in any required lengths. In order to avoid fresh concrete flowing into the profile, JORDAHL® anchor channels are filled with either polystyrene (PS) or polyethylene (PE) foam. If self-compacting concrete and concretes of slump class F4/F6 (in accordance with DIN 1045-2) are used, there is the risk that concrete can seep behind the PE foam filling where it can contaminate the inside chamber of the profile. In these cases the anchor channels with polystyrene (PS) filling are suitable. After concreting, it is very easy to remove both PS and PE foam.

1. Connecting
JORDAHL® anchor channels are installed according to the reinforcement/formwork drawings. To prevent displacement during concrete pouring, the channels are held in place:

- On wooden formwork by nails through the nail holes in the back of the profile
- On steel formwork by bonding with hot-melt adhesives, or by bolting on with JORDAHL® T-bolts, or with magnets
- On the surface of a concrete slab by wiring the anchors to reinforcement bars or, if required, by means of special spacers spot-welded to the anchors.

Nailing the anchor channel to the wood form

2. Concrete
After the anchor channels have been attached in the formwork, the form is filled with concrete

3. Removal of foam filler
After the concrete has set the formwork can be removed. The anchor channel closes flush with the concrete. The foam filling can be easily removed using a hammer or other tools.

4. Mounting connections
T-bolts can now be inserted into the anchor channel slot at any desired point and, following 90° rotation, can be fastened by tightening with the appropriate torque. The slot on the end of the bolt shank must be transverse in relation to the channel direction.

Index

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