

National technical approval / General construction technique permit

Zulassungsstelle für Bauprodukte und Bauarten

Bautechnisches Prüfamt

Eine vom Bund und den Ländern
gemeinsam getragene Anstalt des öffentlichen Rechts

Mitglied der EOTA, der UEAtc und der WFTAO

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Number:

Z-21.4-1690

Applicant:

JORDAHL GmbH

Nobelstraße 51

12057 Berlin, Germany

Validity

from: **2 April 2018**

to: **2 April 2021**

Subject of decision:

**Jordahl JXA-W 29/20, JXA-W 38/23,
JXA-W 53/34 and JXA-W 64/44 anchor channels**

The subject named above is herewith granted a national technical approval (*allgemeine bauaufsichtliche Zulassung*)/general construction technique permit (*allgemeine Bauartgenehmigung*).
This decision contains eight pages and ten annexes

Translation authorised by DIBt

DIBt

I GENERAL PROVISIONS

- 1 This decision confirms the fitness for use and application of the subject concerned in accordance with the Building Codes of the federal states (*Landesbauordnungen*).
- 2 This decision does not replace the permits, approvals and certificates required by law for carrying out building projects.
- 3 This decision is granted without prejudice to the rights of third parties, in particular private property rights.
- 4 Notwithstanding further provisions in the 'Special Provisions', copies of this decision shall be made available to the user and installer of the subject concerned. The user and installer shall also be made aware that this decision must be made available at the place of use or place of application. Upon request, copies of the decision shall be provided to the authorities involved.
- 5 This decision shall be reproduced in full only. Partial publication requires the consent of DIBt. Texts and drawings in promotional material shall not contradict this decision. In the event of a discrepancy between the German original and this authorised translation, the German version shall prevail.
- 6 This decision may be revoked. The provisions may subsequently be supplemented and amended, in particular if this is required by new technical findings.
- 7 This decision is based on the information and documents provided by the applicant. Alterations to this basis are not covered by this decision and shall be notified to DIBt without delay.
- 8 The general construction technique permit (*allgemeine Bauartgenehmigung*) included in this decision also serves as a national technical approval (*allgemeine bauaufsichtliche Zulassung*) for the construction technique.

II SPECIAL PROVISIONS

1 Subject concerned and field of use and/or application

1.1 Subject concerned

The JORDAHL JXA anchor channels (type W 29/20, type W 38/23, type W 53/34 and type W 64/44) each consist of a C-shaped serrated channel profile with at least two welded anchors or forged round anchors fixed to the channel back, which are made of carbon steel or hot-dip galvanised steel and stainless steel.

Hammer-head or serrated channel bolts including the appropriate nuts and washers are inserted into the channel profile. Fixtures of any type can be fastened to the anchor channels.

The anchor channel is embedded surface-flush in the concrete.

The installed anchor channel is shown in Annex 1.

1.2 Field of use and application

The anchor channel may be used for anchorage under static and quasi-static loads in reinforced or unreinforced normal weight concrete with a minimum strength class of C20/25 in accordance with DIN EN 206-1 'Concrete; Part 1: Definition, properties, production and conformity'. If the concrete members in which the anchor channels are anchored need to meet fire resistance requirements, the restrictions in accordance with Section 3.2.7 shall be observed. In case of fire exposure, the anchor channel may only be loaded perpendicular to the longitudinal channel axis.

Anchor channels with channel bolts in accordance with Annex 8, Table 13 may also be used in reinforced normal weight concrete with a strength class of at least C20/25, including under fatigue axial tension loading.

For anchoring in tension zones in the concrete generated by load induced stresses or for utilisation of the minimum spacing of the anchor channels, additional reinforcement shall be provided to resist the local tension stresses of splitting provided that no structural measures or other favourable influences (e.g. shear compression) prevent cracking of the concrete.

The fields of application of the anchor channel (channel profile, anchor, channel bolt, nut and washer) with regard to corrosion are given in Annex 5, Table 7 according to the materials used.

A hot-dip galvanised anchor channel (channel profile and anchors) may only be in contact with the reinforcement if the temperature at the contact points between the reinforcement and the galvanised steel parts does not exceed 40 °C.

For prestressed concrete members, the distance from a hot-dip galvanised anchor channel (channel profiles and anchors) to the sheaths of the prestressed tendon or the pre-tensioned wire shall be at least 2 cm. If hot-dip galvanised channel profiles with stainless steel channel bolt anchors are used, the sheaths of the prestressed tendons or pre-tensioned wires may be in contact with the stainless steel channel bolt, but not with the hot-dip galvanised channel profile.

2 Provisions for the construction product

2.1 Properties and composition

The components of the anchor channel (channel profile, anchor, channel bolt, nut and washer) shall correspond to the drawings and specifications given in the annexes.

The material characteristics, dimensions and tolerances of the anchor channels and channel bolts which are not specified in this national technical approval shall comply with the specifications deposited with DIBt, the certification body and the external surveillance body.

2.2 Manufacture and marking

2.2.1 Manufacture (connection anchor/channel)

The manufacture of the connections (welding on, forging) between the anchor and the channel profile shall be carried out in the factory.

Depending on the design requirements, the provisions set out in DIN EN 1090-2:2011-10 shall apply to the execution of the welds, in agreement with the responsible structural engineer and the approval authority.

The round anchors shall be inserted into prepared holes on the channel back and forged to the channel profile in the factory.

2.2.2 Marking

Each delivery note for the anchor channels and channel bolts shall be marked by the manufacturer with the national conformity mark (*Ü-Zeichen*) in accordance with the Conformity Marking Ordinances (*Übereinstimmungszeichen-Verordnungen*) of the federal states. The identifying mark of the manufacturing plant, the approval number and the complete designation of the anchor channels shall also be indicated.

The conformity mark may only be affixed if the requirements given in Section 2.3 are met.

The anchor channel shall be designated according to the rounded outside profile dimensions of the channel (width / height in mm), e.g. profile JXA-W 38/23.

The channel bolts shall be designated according to the channel bolt type (serrated bolt types JXD, JXH and JXB, hammer-head bolt types JD and JH) and thread size; they shall be associated with the profile dimensions.

Each anchor channel shall be marked in accordance with Annex 5.

The channel bolts shall be marked and stamped in accordance with Annexes 3 and 4.

2.3 Confirmation of conformity

2.3.1 General

The manufacturer shall confirm for each manufacturing plant that the anchor channels and channel bolts comply with the provisions of the national technical approval included in this decision by way of a declaration of conformity based on factory production control and a certificate of conformity issued by a certification body recognised for these purposes as well as on regular external surveillance carried out by a recognised inspection body in accordance with the following provisions. To issue the certificate of conformity and for external surveillance including the associated product testing, the manufacturer of the anchor channels and channel bolts shall use a certification body and an inspection body recognised for these purposes.

The declaration of conformity shall be submitted by the manufacturer through marking of the construction product with the national conformity mark including statement of the intended use.

The certification body shall send a copy of the certificate of conformity issued by it to DIBt.

2.3.2 Factory production control

A factory production control system shall be set up and implemented in each manufacturing plant. Factory production control shall be understood to be continuous surveillance of production by the manufacturer to ensure that the manufactured construction products satisfy the provisions of the national technical approval included in this decision.

Scope, type and frequency of factory production control shall be in accordance with the test plan deposited with DIBt and the external surveillance body.

The results of factory production control shall be recorded and evaluated. The records shall include at least the following information:

- designation of the construction product or the starting material and the components
- type of check or test
- date of manufacture and testing of the construction product or the starting material or the components
- results of checks and tests and, where applicable, comparison with the requirements
- signature of the person responsible for factory production control.

The records shall be kept for at least five years and submitted to the inspection body used for external surveillance. They shall be submitted to DIBt and the competent supreme building authority upon request.

If the test result is unsatisfactory, the manufacturer shall immediately take the necessary measures to resolve the defect. Construction products which do not meet the requirements shall be handled in such a way that they cannot be confused with compliant products. After the defect has been remedied, the relevant test shall be repeated immediately – where technically feasible and necessary to show that the defect has been eliminated.

2.3.3 External surveillance

In each manufacturing plant, factory production control shall be checked regularly at least twice a year by means of external surveillance.

Initial type-testing of the anchor channels and channel bolts shall be carried out within the scope of external surveillance. Samples for random testing shall also be taken. Sampling and testing shall be the responsibility of the respective recognised inspection body.

Scope, type and frequency of external surveillance shall be in accordance with the test plan deposited with DIBt and the external surveillance body.

The results of certification and external surveillance shall be kept for at least five years. They shall be presented by the certification or inspection body to DIBt and the competent supreme building authority upon request.

3 Provisions for planning, design and execution

3.1 Planning

The anchorage shall be planned in line with good engineering practice. Verifiable calculations and design drawings shall be prepared in consideration of the loads to be anchored.

The design drawings shall contain precise specifications concerning the position, size and length of the anchor channels as well as the types and sizes of the appropriate channel bolts.

3.2 Design

3.2.1 General

The anchorage shall be designed in line with good engineering practice. The verification of the immediate local force transmission into the concrete has been provided.

The transfer of the loads to be anchored in the concrete member shall be verified.

The reduction of the stiffness of the concrete cross section by the installation of the anchor channels shall be considered in the structural verification, where necessary.

Flexural loading of the channel bolt may only remain unconsidered if

- the fixture is made of metal and is fixed to the channel profile without an intermediate layer and
- the hole in the fixture does not exceed the values in Annexes 3 and 4, Tables 4 and 6.

Additional loads which may arise in the anchor channel, in the fixture or in the member in which the anchor channel is anchored due to restrained deformations (e.g. as a result of fluctuating temperature) shall be considered.

Single action or paired action can act anywhere on the anchor channels. The spacing and end spacing of the points of load application (channel bolts) are given in Annexes 7 and 8. The axis of the channel bolt shall be at least 25 mm away from the channel end.

The minimum distances of the anchor channels (spacing, edge distances) and the member dimensions (member width and thickness) shall at least correspond to the values given in Annex 6.

3.2.2 Design resistances

The design resistances of the anchor channels are given in Annex 8, Table 12 as a function of the profile length, the loading distances and the appropriate channel bolts for concrete strength classes $\geq C30/37$.

The design resistances of the channel bolts are given in Annexes 3 and 4 as a function of channel bolt type, diameter and strength class.

The permissible load directions (loading zones) for the anchor channels are shown in Annex 7 according to the channel bolt type. If hammer-head channel bolts (types JD or JH) are used, the anchor channel shall only be loaded perpendicular to the longitudinal channel axis (shear load y and tension load z). If serrated channel bolts (types JXD, JXH or JXB) are used, the anchor channel may be loaded in all directions (shear load x, shear load y and tension load z).

The design value of the resulting load shall not exceed the design resistance for the anchor channel and the channel bolts calculated in accordance with the verification method in Annex 7.

3.2.3 Flexural loading of the channel bolts

The design bending resistances are given in Annexes 3 and 4. For calculations, the upper edge of the anchor channel shall be used as a reference point.

For cases in which, in accordance with Section 3.2.1, flexural loading may not remain unconsidered, the design value of the bending moment of the channel bolt shall not exceed the design bending resistance.

In the case of bending with additional tension loading, the loads shall be verified as follows:

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

F_{Rd} = design resistance of channel bolt in accordance with Annex 3 or 4

M_{Rd} = design bending resistance of channel bolt in accordance with Annex 3 or 4

$F_{z,Ed}$ = design value of acting tension load component

M_{Ed} = design value of acting bending moment.

For façade claddings with variable flexural loads (e.g. as a result of fluctuating temperature), a stress amplitude of $\sigma_A = \pm 50 \text{ N/mm}^2$ around the mean σ_M , based on the calculated stressed cross section of the channel bolt, shall not be exceeded.

3.2.4 Fatigue axial tension loading in reinforced normal weight concrete \geq C20/25

For fatigue axial tension loading with a load cycle number of $N \leq 2 \cdot 10^6$, the JXA-W 29/20, JXA-W 38/23, JXA-W53/34 and JXA-W 64/44 anchor channels in the versions with transverse hammer-head anchors and with round anchors may be used. The permissible load range for a load cycle number of $N \leq 2 \cdot 10^6$ is given in Annex 8, Table 13. The anchor channels may only be anchored in reinforced normal weight concrete of at least C20/25. Only the appropriate channel bolts in accordance with Annex 8, Table 13 are permissible.

For the overload, the design resistances in accordance with Section 3.2.2 shall apply.

3.2.5 Special case: narrow reinforced concrete members

An anchor channel installed in the front side of a minimally loaded reinforced concrete member with a minimum thickness of 10 cm (e.g. façade panel, weakly loaded wall) may only be subjected to axial tension loading with the design resistance in accordance with Annex 8, Table 12 if supplementary reinforcement in accordance with Annex 9 is provided.

3.2.6 Displacement behaviour

Under a load equivalent to the load under SLS conditions, displacements of ≤ 0.6 mm in the direction of the load can be assumed.

For shear loads, the existing gap between the channel bolt and the fixture shall also be taken into account.

3.2.7 Fire safety

If the concrete members need to meet fire resistance requirements, the anchor channels may only be loaded under static and quasi-static loading perpendicular to the channel axis (tension load z and shear load y) in reinforced and unreinforced normal weight concrete with a strength class of at least C20/25. The design resistances for the individual anchor channels according to the channel bolt size for fire resistance durations of 90 minutes (F90) and 60 minutes (F60) are given in Annex 10, Table 14; they shall not be exceeded.

The minimum spacing in accordance with Annex 10, Table 15 shall be observed.

Fire resistance verifications for the concrete member and the fixture are not covered by this decision.

3.3 Execution

3.3.1 Installation of the anchor channels

No anchors shall be fixed to the channel at a later stage and no other alterations shall be made to the anchor channel.

Installation of the anchor channel shall be carried out in accordance with the design drawings prepared in accordance with Section 3.1.1.

The anchor channels shall be fixed to the formwork such that no movement of the channels will occur during the laying of the reinforcement and the placing and compacting of the concrete. The concrete shall be properly compacted in the area of the channel and under the anchor heads. The anchor channels shall be protected against concrete penetrating into the channel interiors.

3.3.2 Installation of the fixture

The required channel bolt type and size shall be taken from the design drawings. Only serrated channel bolts of types JXD and JXH shall be used in case of loading in the direction of the longitudinal channel axis. This channel bolt is marked by two grooves on the shaft end.

If the anchor channel lips are not flush with the concrete surface because the concrete has been poured incorrectly or for similar reasons, the gaps shall be completely filled before the fixture is fastened.

The channel bolt heads are inserted into the channel openings and after they have been rotated clockwise by 90°, they shall be completely flush with both legs of the anchor channels and be fastened by tightening the nuts with the torque wrench. The installation torques given in Annexes 3 and 4 shall be adhered to.

After assembly, the correct positioning of the channel bolt shall be checked; the groove (grooves) on the shaft end of the channel bolt shall be perpendicular to the longitudinal channel axis. The spacing of the channel bolts (loading distance) shall at least correspond to the values given in Annex 7 or Annex 8.

3.3.3 Inspection of execution

During the installation of the anchor channels and the fixtures the contractor commissioned with the installation of the anchor channels or the site manager assigned by them or a competent representative of the site manager shall be present at the construction site. They shall ensure that the work is executed correctly.

In particular, they shall check the execution and positioning of the anchor channels as well as any supplementary reinforcement.

The records shall be available at the construction site during the construction period and shall be submitted to the inspection supervisor upon request. Like the delivery notes, they shall be kept by the contractor for a minimum of five years after completion of the project.

Beatrix Wittstock
Head of Section

Drawn up by

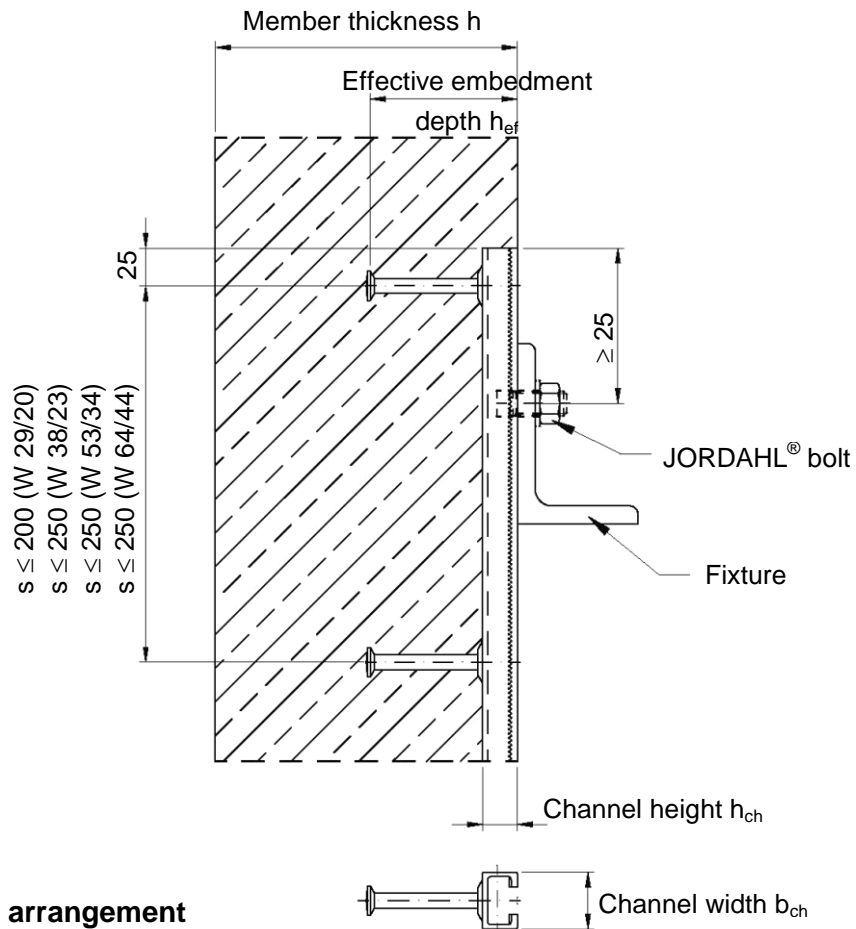


Table 1: Anchor arrangement

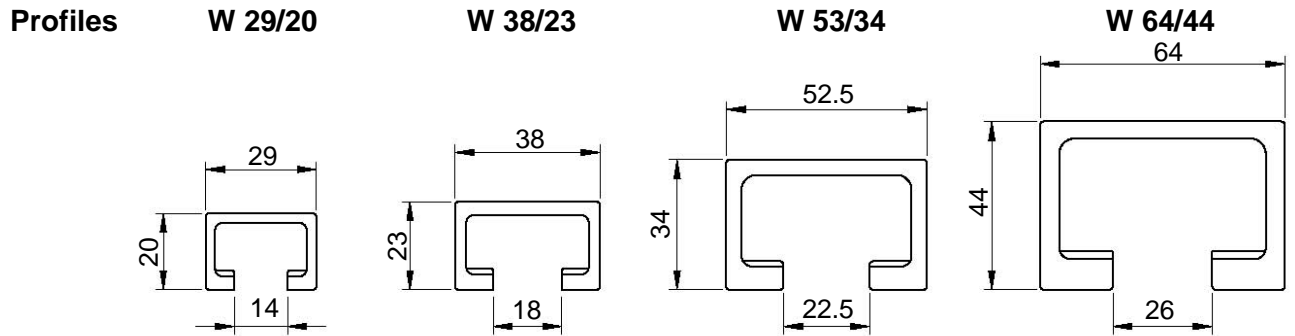
Channel length [mm]		Spacing and end spacing of anchors ¹⁾ [mm]	
100			
150			
200			
250			
≥ 250	W 29/20		
	W 38/23 W 53/34 W 64/44		

¹⁾ End spacing alternatively 35 mm rather than 25 mm.

JORDAHL JXA anchor channels

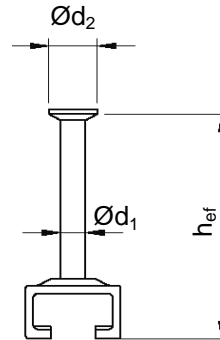
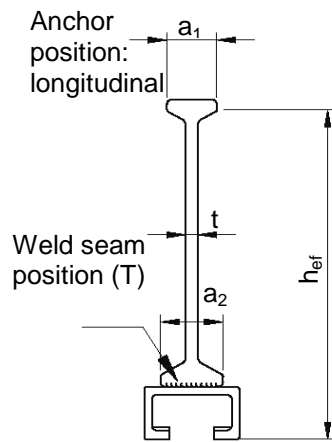
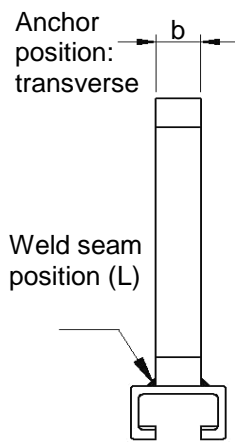
Installed condition
 Anchor arrangement

Annex 1

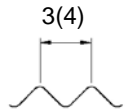


Anchor Welded anchor type I

Round anchor type R



Serration pitch:
Value in brackets for JXA W 64/44



Profile material:
S275JR (1.0044) in acc. with
DIN EN 10025:2005-04 or
stainless steel 1.4571 / 1.4404 / 1.4401 (A4)
in acc. with DIN EN 10088:2009-08

Hammer-head bolt material:
S235JRG2 in acc. with DIN EN 10025:2005-04
or stainless steel 1.4571 / 1.4404 / 1.4401 (A4)
in acc. with DIN EN 10088:2009-08

Round anchor material:
QSt36 in acc. with DIN EN 10263:2018-02 or
stainless steel 1.4571 / 1.4404 / 1.4401 (A4);
in acc. with DIN EN 10088:2009-08

Table 2: Anchors

Type	Anchor type		Welded anchor							Round anchor	
	Effective embedment depth min h_{ef} [mm]	Minimum section width b [mm]	Head width a_1 [mm]	Base width a_2 [mm]	Web thickness t [mm]	Anchor position	Weld seam position	Minimum weld seam a/l	Shaft diameter min d_1 [mm]	Head diameter min d_2 [mm]	
W 29/20	R1	78	—	—	—	—	—	—	9	17	
	I60	75	12	18.5	18.5	5	T/L	T/L	3 / 12	—	
W 38/23	R3	95	—	—	—	—	—	—	10	19.5	
	I128	146	15	17	25	6	T/L	T/L	3 / 14	—	
	I140	156	15	20	40	7.1	T	T/L	3 / 14	—	
W 53/34	R3	155	—	—	—	—	—	—	11.5	23.5	
	I128	157	30	17	25	6	T/L	T/L	4 / 19	—	
	I140	164	30	40	20	7.1	T/L	T/L	4 / 19	—	
	I140	164	30	20	40	7.1	T/L	T/L	4 / 19	—	
W 64/44	R3	179	—	—	—	—	—	—	15.5	28.0	
	I140	179	40	40	20	7.1	T/L	T / L	4 / 40	—	
	I140	179	40	20	40	7.1	T/L	T / L	4 / 40	—	

JORDAHL JXA anchor channels

Profile dimensions
Anchor designs

Annex 2

Serrated channel bolt types JXD, JXH, JXB and JXE - for loading in all directions (x, y and z in acc. with Annex 7, Table 11)

Marking stamped on head: at least identifying mark of manufacturer 'J' material abbreviation

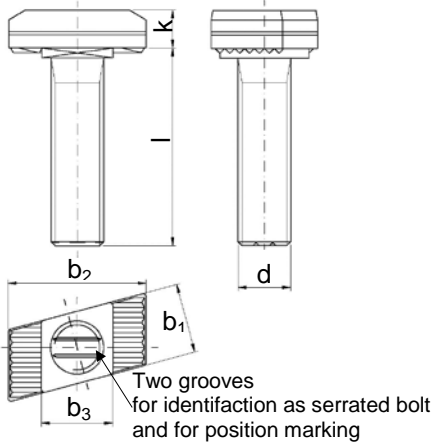


Table 3: Channel bolt dimensions

Anchor channel	Type [mm]	d [mm]	b ₁ [mm]	b ₂ [mm]	b ₃ [mm]	k [mm]	min l [mm]
JXA W 29/20	JXD	M10	13.4	20.9	11.8	6.5	≥ 15
		M12	13.4	20.9	11.8	6.5	≥ 20
JXA W 38/23	JXH	M12	17.2	28.9	16.9	8.0	≥ 20
		M16	17.2	28.9	16.9	8.0	≥ 30
JXA W 53/34	JXB	M16	21.0	41.6	21.5	11.5	≥ 30
		M20	21.0	41.6	21.5	13.0	≥ 35
JXA W 64/44	JXE	M20	24.7	51.0	25.0	14	≥ 35
		M24	24.7	51.0	25.0	16	≥ 40

Channel bolts:

Shaft and thread design in acc. with DIN EN ISO 4018:2011-07

- electroplated steel 8.8 in acc. with DIN EN ISO 898-1:2013-05 or
- stainless steel A4-70 (1.4571 / 1.4404 / 1.4401); F4-70 (1.4462) in acc. with DIN EN ISO 3506-1:2010-04

Hexagonal nuts:

Design in acc. with DIN EN ISO 4032:2013-04 or DIN EN ISO 4034:2013-04

- electroplated steel, strength class 8 in acc. with DIN EN ISO 898-2:2012-08 or
- stainless steel, strength class 70 in acc. with DIN EN ISO 3506-2:2010-04

Washers:

Design in acc. with DIN EN ISO 7089:2000-11, DIN EN ISO 7093-1:2000-11 product class A

- electroplated steel in acc. with DIN EN 10025:2005-04 or
- stainless steel 1.4571 / 1.4404 / 1.4401(A4) in acc. with DIN EN 10088:2009-08

Table 4: Installation torques, design bending resistances and design resistances of serrated channel bolts

Type	Diameter of channel bolt d [mm]	Diameter of hole on fixture d ₂ [mm]	Installation torques T _{inst} [Nm]	Design bending resistances ²⁾		Design resistances ^{1) 3)}	
				M _{Rd} [Nm]	F _{Rd} [kN]	8.8	A4-70
JXD JXH	M10	12	40	47.8	33.5	18.6	15.6
	M12	14	80	83.8	58.8	27.0	22.7
	M16	18	120	213.1	149.4	50.2	42.2
JXB	M16	18	200	213.1	149.4	50.2	42.2
	M20	22	350	415.4	291.3	78.4	66.0
JXE	M20	22	350	415.4	291.3	78.4	66.0
	M24	26	450	718.4	503.7	113.0	95.1

¹⁾ See Annex 7 for loading zones. For combined loading in all directions, the resulting load shall not exceed the design resistances in acc. with this table.

²⁾ In relation to channel or concrete surface.

³⁾ The design resistances of the anchor channels in acc. with Annex 8 shall not be exceeded.

JORDAHL JXA anchor channels	Annex 3
Serrated channel bolts	

Hammer-head channel bolt types JD and JH - for loading perpendicular to longitudinal channel axis
(y and z in acc. with Annex 7, Table 11)

Marking stamped on head: at least identifying mark of the manufacturer 'J', material abbreviation

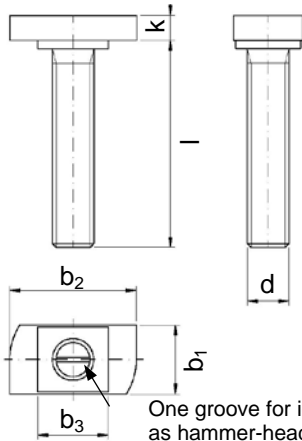


Table 5: Channel bolt dimensions

Anchor channel	Type	d [mm]	b ₁ [mm]	b ₂ [mm]	b ₃ [mm]	k [mm]	min l [mm]
JXA W 29/20	JD	M6	11.2	22.4	11.0	4.5	≥ 15
		M8	11.2	22.4	11.0	4.5	≥ 15
		M10	11.2	22.4	11.0	5.0	≥ 20
		M12	11.2	22.4	11.0	6.5	≥ 20
JXA W 38/23	JH	M10	16.5	30.5	17.0	6.0	≥ 20
		M12	16.5	30.5	17.0	7.0	≥ 20
		M16	16.5	30.5	17.0	8.0	≥ 30

Channel bolts:

Shaft and thread design in acc. with DIN EN ISO 4018:2011-07

- electroplated steel 4.6 or 8.8 in acc. with DIN EN ISO 898-1:2013-05 or
- stainless steel A4-50, A4-70 (1.4571/1.4404/1.4401); F4-50, F4-70 (1.4462) in acc. with DIN EN ISO 3506-1:2010-04

Hexagonal nuts:

Design in acc. with DIN EN ISO 4032:2013-04 or DIN EN ISO 4034:2013-04

- electroplated steel, strength class 5/8 in acc. with DIN EN ISO 898-2:2012-08 or
- stainless steel, strength class 50 or 70 in acc. with DIN EN ISO 3506-2:2010-04

Washers:

Design in acc. with DIN EN ISO 7089:2000-11, DIN EN ISO 7093-1:2000-11 product class A

- electroplated steel in acc. with DIN EN 10025:2005-04 or
- stainless steel 1.4571 / 1.4404 / 1.4401(A4) in acc. with DIN EN 10088:2009-08

Table 6: Installation torques, design bending resistances and design resistances of hammer-head bolts

Type	Diameter of channel bolt d [mm]	Diameter of hole on fixture d ₂ [mm]	Installation torques T _{inst} [Nm]	Design bending resistances ²⁾ M _{Rd} [Nm]				Design resistances ^{1) 3)} F _{Rd} [kN]			
				4.6	8.8	A4-50	A4-70	4.6	8.8	A4-50	A4-70
JD JH	M6	7	3	3.8	9.8	3.2	6.9	2.9	6.4	2.5	5.4
	M8	9	8	9.0	24.0	7.9	16.8	5.3	11.7	4.6	9.9
	M10	12	15	17.9	47.9	15.7	33.5	8.3	18.6	7.3	15.6
	M12	14	25	31.4	83.8	27.5	58.8	12.1	27.0	10.6	22.7
	M16	18	60	79.8	213.1	70.0	149.4	22.6	50.2	19.8	42.2

¹⁾ See Annex 7 for loading zones. For combined loading in all directions, the resulting load shall not exceed the design resistances given in this table.

²⁾ In relation to channel or concrete surface.

³⁾ The design resistances of the anchor channels in acc. with Annex 8 shall not be exceeded.

JORDAHL JXA anchor channels

Hammer-head channel bolts

Annex 4

Table 7: Application areas depending on corrosion protection

	Components			Field of application
	Channel profile	Anchor	Channel bolt, nut, washer	
1	carbon steel	carbon steel	without corrosion protection	Use only possible if all fastening elements are protected by a minimum concrete cover depending on the environmental conditions in acc. with DIN EN 1992-1-1:2011-01 in conjunction with DIN EN 1992-1-1/NA:2013-04, Section 4.4.
2	hot-dip galvanised ($\geq 50 \mu\text{m}$)	hot-dip galvanised ($\geq 50 \mu\text{m}$)	electroplated electroplated ($\geq 5 \mu\text{m}$)	Structures subject to dry internal conditions, e.g. dwellings, offices, schools, hospitals, shops – with the exception of wet rooms
3	hot-dip galvanised ($\geq 50 \mu\text{m}$)	hot-dip galvanised ($\geq 50 \mu\text{m}$)	hot-dip galvanised ($\geq 40 \mu\text{m}$)	Structures subject to internal conditions with usual humidity (including kitchens, bathrooms and utility rooms in residential buildings)
4	stainless steel 1.4571 1.4401 1.4404	welded anchor, carbon steel ¹⁾	stainless steel 1.4571 / 1.4404 / 1.4401 / 1.4462 strength class 50 or 70	Structures corresponding to corrosion resistance class III in acc. with Z-30.3-6
		stainless steel 1.4571 1.4401 1.4404		

¹⁾ Only permissible for profiles W 38/23, W 53/34 and W 64/44. With respect to the corrosion protection of the welded anchors, the concrete cover thicknesses c given in Table 8 may be used as a basis.

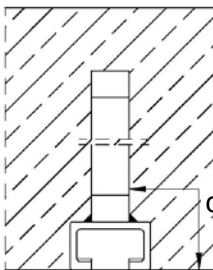
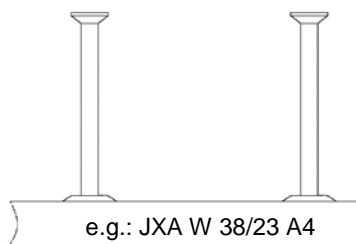


Table 8: Concrete cover for welded anchor

Anchor channel	Existing concrete cover c for welded anchors [mm]
JXA W 38/23	30
JXA W 53/34	40
JXA W 64/44	50



Marking

The marking of each anchor channel shall be made permanently on the channel back, on the side on the channel profile or on the anchor. It can be made via imprint, stamping or other suitable measures. Minimum requirement: profile specification, for stainless steel version additionally material specification.

JORDAHL JXA anchor channels

Corrosion protection and application areas
Marking

Annex 5

Table 9: Minimum distances and minimum member dimensions for reinforced concrete ¹⁾

Anchor channel	a_r [mm]	a_e [mm]	a_a [mm]	a_f [mm]	h_{min} ²⁾ [mm]	Minimum supplementary reinforcement		
						For shear load $V_{x,Ed}$ in direction of rail	For shear load $V_{y,Ed}$ perpendicular to rail	$\Sigma A_{s,l,x}$ or $\Sigma A_{s,l,y}$ ⁵⁾
						$A_{s,x}$ ³⁾	$a_{s,y}$ ⁴⁾	
JXA W 29/20	110	90	2 x a_r	220	120	2 Ø6	Ø6/200	2 Ø10
JXA W 38/23	150	130		250	120	2 Ø8	Ø8/200	
JXA W 53/34	200	165		350	170	2 Ø8	Ø8/200	
JXA W 64/44	250	215		450	225	2 Ø10	Ø10/200	

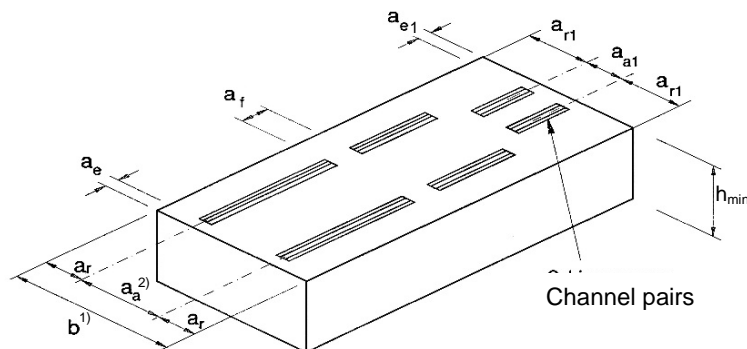
¹⁾ Applies to cracked concrete of concrete strength class $\geq C30/37$. For concrete strength class C20/25 or C25/30, the distances shall be increased by a factor of 1.25 or 1.15 respectively. Alternatively, the design resistances can be reduced by the reciprocal value.

²⁾ Results from the length of the anchors and the required concrete cover in acc. with DIN EN 1992-1-1:2011-01 in conjunction with DIN EN 1992-1-1/NA:2013-04 and may need to be increased depending on exposure class.

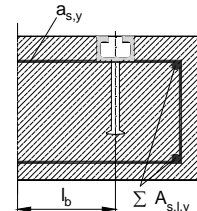
³⁾ In the vicinity of the anchors.

⁴⁾ Symmetrical arrangement, distribution along the entire anchor channel length and by a_r past the anchor channel end; anchorage length l_b in acc. with DIN EN 1992-1-1.

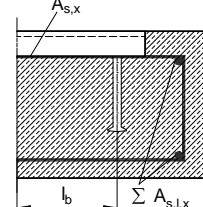
⁵⁾ Install at least one reinforcing bar in each of the corners.



Minimum supplementary reinforcement for shear load $V_{x,Ed}$



Minimum supplementary reinforcement for shear load $V_{y,Ed}$



¹⁾ $b = 2 \cdot a_r$, for a single channel arrangement

²⁾ $a_a = 2 \cdot a_r$

Table 10: Minimum distances ¹⁾ for unreinforced concrete

Anchor channel	2 anchors [mm]		> 2 anchors [mm]		a_a [mm]	a_f [mm]	h_{min} ²⁾ [mm]	Channel pairs ³⁾		
	a_r	a_e	a_r	a_e				a_{r1}	a_{a1}	a_{e1}
JXA W 29/20	120	240	190	330	2 x a_r	220	120	55	110	150
JXA W 38/23	200	410	335	550		250	120	90	180	170
JXA W 53/34	340	700	535	950		350	170	-	-	-
JXA W 64/44	345	720	600	1000		450	225	-	-	-

¹⁾ Applies to uncracked concrete of concrete strength class $\geq C30/37$. For concrete strength class C20/25 or C25/30, the distances shall be increased by a factor of 1.25 or 1.15 respectively. Alternatively, the design resistances can be reduced by the reciprocal value. For consideration of the cracked condition, the distances shall be increased by a factor of 1.5. Alternatively, the design resistances can be reduced by a factor of 1.4.

²⁾ Results from the length of the anchors and the required concrete cover in acc. with DIN EN 1992-1-1:2011-01 in conjunction with DIN EN 1992-1-1/NA:2013-04 and may need to be increased depending on exposure class.

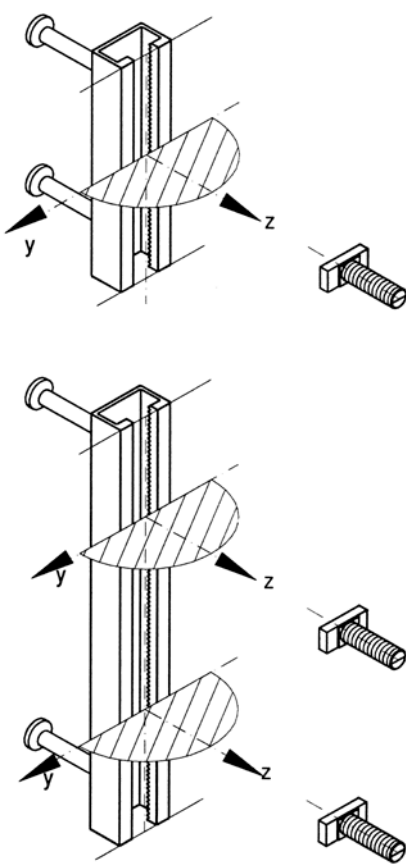
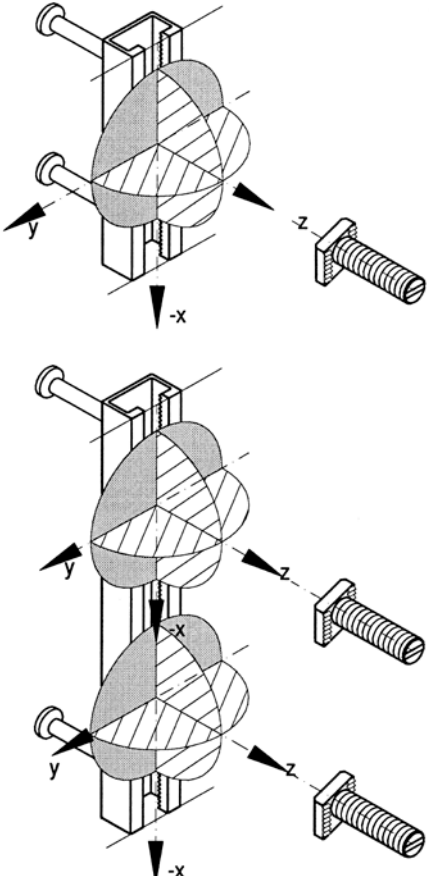
³⁾ Only permissible for axial tension. Distances also apply to reinforced concrete. For consideration of the cracked conditions for unreinforced concrete, the distances a_{r1} and a_{a1} shall be doubled or the design resistances shall be reduced by a factor of 1.4.

JORDAHL JXA anchor channels

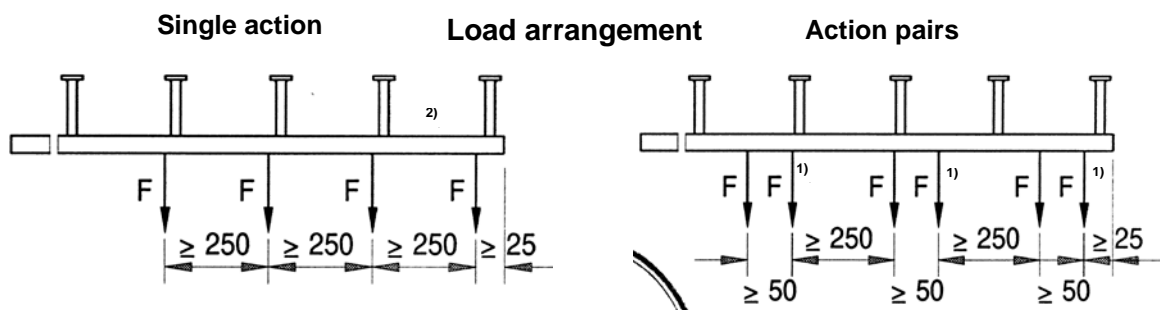
Installation parameters

Annex 6

Table 11: Loading zones
 according to channel bolt type

Hammer-head channel bolt types JD and JH Loading perpendicular to longitudinal channel axis (shear load y, tension load z)	Serrated channel bolt types JXD, JXH, JXB and JXE Loading in all directions (shear load x, shear load y, tension load z)
	
$F_{Ed} = \sqrt{N_{Ed}^2 + V_{y,Ed}^2} \leq F_{Rd}$	$F_{Ed} = \sqrt{N_{Ed}^2 + V_{y,Ed}^2 + V_{x,Ed}^2} \leq F_{Rd}$

F_{Rd} in acc. with Annex 3, Table 4 or Annex 4, Table 5 and Annex 8, Table 12. The lower value is relevant.



¹⁾ ≥ 100 mm for anchor channels JXA W 53/34 and W 64/44.

²⁾ For an inclined resulting load, distance in end field ≥ 265 mm for anchor channel JXA W 38/23 or ≥ 275 mm for JXA W 53/34 or W 64/44.

JORDAHL JXA anchor channels

Loading zones,
 load arrangement

Annex 7

Table 12: Design resistances of anchor channels for static and quasi-static loading
 - for all concrete strength classes $\geq C30/37$ ¹⁾

Anchor channel	Channel bolts		Design resistances ^{2) 3)} in all load directions F_{Rd} [kN]		
	Hammer-head bolts ⁴⁾	Serrated bolts	Single action	Action pairs	
	Profile length [mm]		≥ 100	≥ 200	
	Load distance [mm]		≥ 250	≥ 50	≥ 150
JXA W 29/20	JD M12	JXD M10	11.2	6.3 ⁵⁾	9.0 ⁵⁾
		JXD M12			
JXA W 38/23	JH M16	JXH M12	16.8	9.4 ⁵⁾	12.0 ⁵⁾
		JXH M16			
JXA W 53/34	—	JXB M16	30.8 (26.6) ⁶⁾	—	19.3 ⁷⁾
		JXB M20			
JXA W 64/44	—	JXE M20	37.8	—	22.4 ⁷⁾
		JXB M24			

- ¹⁾ Applies to concrete of concrete strength class $\geq C30/37$. For concrete strength class C20/25 or C25/30, the distances shall be increased by a factor of 1.25 or 1.15 respectively. Alternatively, the design resistances can be reduced by the reciprocal value.
²⁾ For combined loading in several directions (see Annex 7 Table 11), the design value of the the resulting load shall not exceed the design resistances in accordance with Table 12.
³⁾ See Annex 7, Table 11 for loading zones.
⁴⁾ Hammer-head bolt types JD and JH are not permissible for loads in the direction of the longitudinal channel axis (x-x). For use of smaller bolts of type JD or JH in acc. with Annex 4, the design resistances of the bolts in acc. with Annex 4, Table 6 shall not be exceeded.
⁵⁾ Intermediate values may be interpolated.
⁶⁾ The value in brackets applies to profiles made of A4.
⁷⁾ The minimum load distance for profiles JXA W 53/34 and W 64/44 is 100 mm.

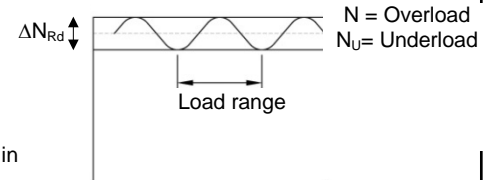
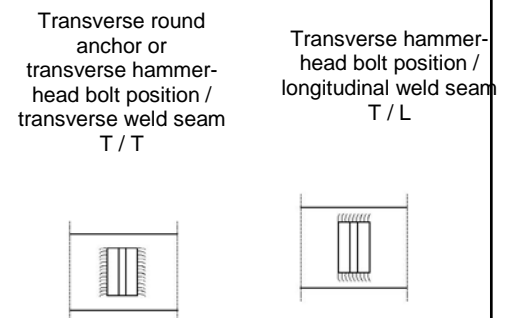


Table 13: Design fatigue resistances -
 ranges ΔN_{Rd} for load cycle number $n \leq 2 \times 10^6$

Application is only permissible in reinforced members. For installation in the tension zones in reinforced concrete members generated by load-induced stresses, the transmission of the forces shall be verified.

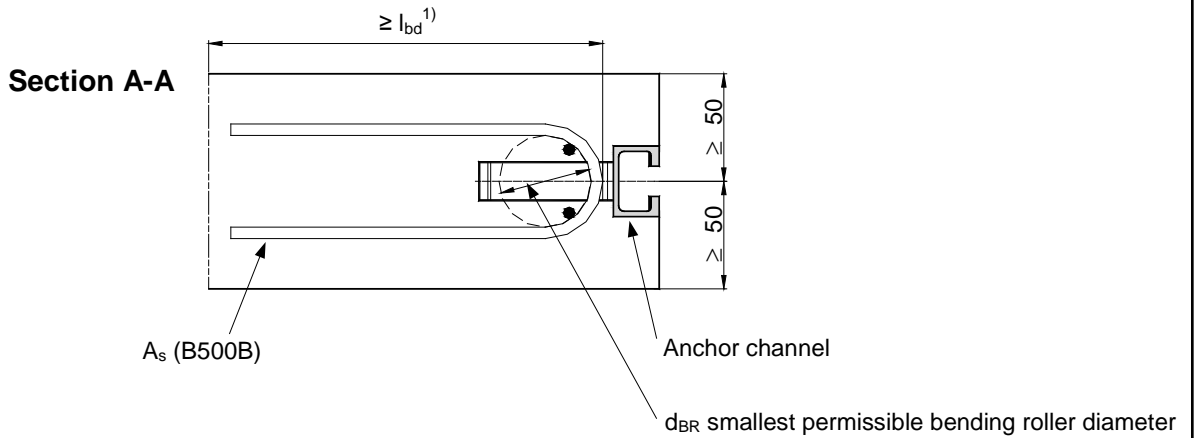
Anchor channel	Range $\Delta N_{Rd} = N_u - N_l$ for tension loading ^{1) 2)} [kN]		Permissible channel bolts
	Hot-dip galvanised steel	stainless steel (A4)	
JXA W 29/20	2	1.8	JXD M12 JD M12
JXA W 38/23	3	2.4	JXH M16 JH M16
JXA W 53/34	6 (T/T)	4 (T/T)	JXB M16 JXB M20
JXA W 53/34	12 (T/L)	10 (T/L)	
JXA W 64/44	7 (T/T)	—	JXE M20 JXE M24
JXA W 64/44	15 (T/L)	11 (T/L)	



- ¹⁾ The specified ranges apply to profiles with round anchors or transverse hammer-head bolts. They only apply to single action. For profiles W 53/34 and W 64/44, the weld seam position should be observed for the hammer-head bolts.
²⁾ The overload shall be verified separately with the design resistances in acc. with Table 12.

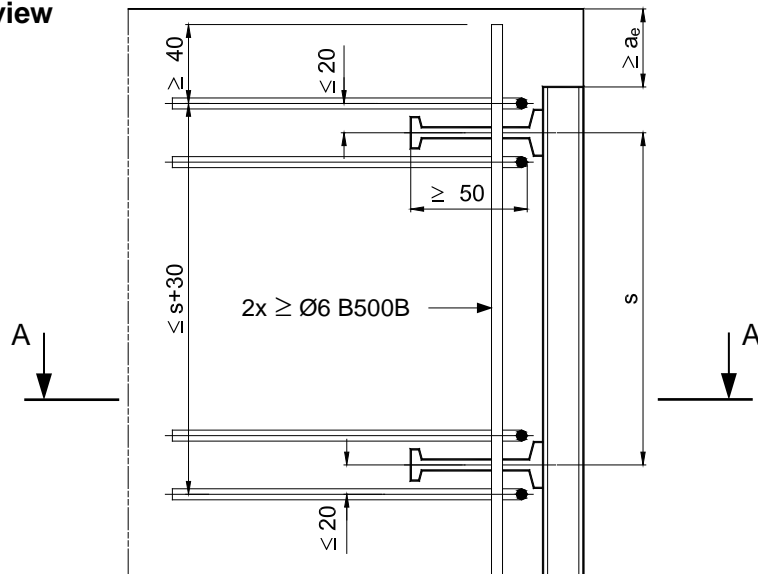
JORDAHL JXA anchor channels	Annex 8
Design resistances for static and quasi-static loading and fatigue	

Reduced edge distance in narrow members for tension loading and installation of supplementary reinforcement in acc. with Section 3.2.5 for profiles W 29/20 and W 38/23



¹⁾ l_{bd} in acc. with DIN EN 1992-1-1:2011-01 in conjunction with DIN EN 1992-1-1/NA:2013-04

Top view



$$\text{erf } A_s = \frac{F_{Rd}}{4 \cdot \sigma_{sd}}$$

applicable steel stress $\sigma_{Rd} = 11.0 \text{ kN/cm}^2$
 erf A_s [cm^2] = reinforcement cross-section of a stirrup leg
 F_{Ed} = maximum design value of the action

Table 14: Design resistances of channel bolts

for loading perpendicular to longitudinal channel axis (axial tension, shear) and fire exposure according to fire resistance class F90 or F60 (values in brackets) for cast-in JORDAHL® anchor channels in consideration of the appropriate channel bolts

Anchor channel ²⁾	Design resistances ¹⁾ of JORDAHL® channel bolts grade 4.6 / 8.8 or A4-50 / A4-70 F_{Rd} [kN]				
	M8	M10	M12	M16	≥ M20
JXA W 29/20	0.5 (0.7)	1.3	1.8	—	—
JXA W 38/23	—	1.3	1.8	4.0	—
JXA W 53/34	—	—	—	4.0	4.0
JXA W 64/44	—	—	—	—	4.0

¹⁾ Only for load direction perpendicular to longitudinal channel axis (tension, shear) in acc. with Annex 7.

²⁾ Profiles made of carbon steel or electroplated steel and of stainless steel.

Reinforced concrete slabs made of normal weight concrete with cast-in JORDAHL® anchor channels with one-sided and multiple-sided fire exposure

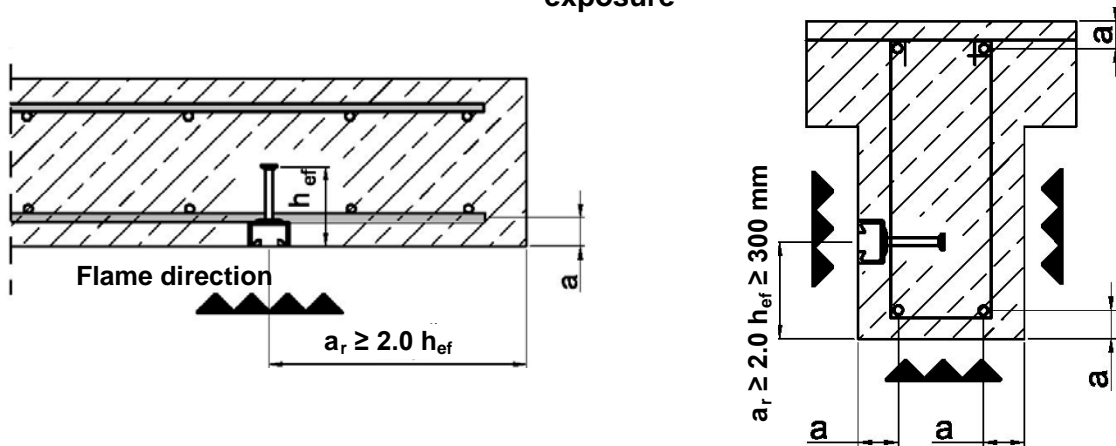


Table 15: Required spacing for fire resistance durations F60 and F90 in the area of the JORDAHL® anchor channels

Anchor channel ²⁾	Required spacing a [mm] for fire resistance duration	
	60 minutes (F60)	90 minutes (F90)
JXA W 29/20	35	45
JXA W 38/23		
JXA W 53/34	50	50
JXA W 64/44		

JORDAHL JXA anchor channels

Fire exposure:
 Anchor channels in reinforced concrete slabs
 Design resistances of channel bolts

Annex 10