JORDAHL®
anchored in quality

Brickwork Support Systems

Deutsche Kahneisen Gesellschaft mbH

JORDAHL® Brickwork Support Systems

Creative design with masonry or faced brickwork demands perfect solutions for all of the details.
A secure and variable supporting system is needed for faced brickwork:

- For creative façade design, even on tall buildings
- To provide a durable system which offers protection against noise, dirt and the effects of weather
- With cost-effective solutions for the full range of different supporting scenarios
- Supplemented with competent technical consulting

The Solution
Deutsche Kahneisen Gesellschaft mbH supplies perfect solutions with the JORDAHL® product range of:

- JORDAHL® brickwork support brackets
- Suspension Loop
- Cavity wall tie
- Brick tie channels
- Brick ties
- Scaffold anchor
- Accessories

Advantages
JORDAHL® brickwork support brackets are:

- Vertically adjustable for effortless compensation of building tolerances
- Permanently corrosion-free, as they are made of stainless steel (approval no. Z-30.3-6 and Z-30.3-21)
- Available in different versions for different supporting scenarios, such as normal wall areas, corner areas, pillar areas or lintel areas

Approval and Structural Design Calculations
The bracket head of the JORDAHL® brickwork support brackets has been approved by the Deutschen Institut für Bautechnik (German Institute for Civil Engineering) (approval no. Z-21.8-1868). The type approval no. TP 08/004 represents proof of the load-bearing capacity of the JORDAHL® brickwork support brackets. The conditions of the semi-probabilistic safety concept of DIN 1053-100:2004-08, DIN 1045-1:2001-07 and DIN 18800:1990-11 are taken into account.

JORDAHL® brickwork support brackets are fastened cost-effectively to JORDAHL® anchor channels. This ensures trouble-free installation and easy compensation of building tolerances. Deutsche Kahneisen Gesellschaft also supplies short anchor channel sections and corner pieces. It is also possible to attach the brickwork support brackets with dowels provided the applicable dowel approvals are taken into account.

Service

- Object-related consultancy
- Cost-effective and cost-aware planning
- High-performance software with an intuitive user interface
- Preparation of static proofs
- Development of special solutions

Content

Introduction	4 – 5
Application Examples	6 – 7
Façade Design and Layout of Joints	8 – 9
Basis Calculation Principles	10 – 11
Corrosion Resistance	12
Handling Stainless Steel	13
Single Bracket JVA+ N / NA / NU	14 – 15
Angled Bracket JW	16 – 17
Single Bracket JVA+ P / PAR	18
Single Bracket JVA+ E / EA	19
Angled Bracket JVA+ F / FAR	20
Above Openings	21
Outside Corners	21
Angled Bracket Designs	22
Accessories: Suspension Loop JRH	23
Single Bracket JVA+ NFT / NAFT	24
Accessories: Suspension Systems	25
Individually Tailored Brackets	26 – 27
Angled Brackets L-F+	28
Angled Brackets L-DF+, L-DN+	29
Grout-in Bracket JMK- N / E / P, JMK+ N	30 – 33
Attic Brick Anchors JAV	34
Wind Posts JWP	35
Brick Tie Channels	36
Brick Ties	37
Cavity Wall Tie LSA	38 – 39
Scaffold Anchor JGA+ Q / Z	40 – 41
Attachment of Brickwork Support Brackets	42
Overview of Suitable Fixing Materials	43
Dowels	43
JORDAHL® Anchor Channels	44 – 45
Service	46
Subject Index	47

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Introduction

Masonry façades offer creative design opportunities to create unique architecture. At the same time, they also protect buildings against the effects of weather like cold, snow, rain or heat, as well as against noise and dirt. Brickwork can be attached durably and cost-effectively with JORDAHL® brickwork support brackets. These brackets absorb the loads of the facing masonry and transfer them via correctly positioned anchor channels or dowels to the load-bearing inner wall, which forms a two-shell outer wall with an insulation gap and an air space.

Proven Load-Bearing Capacity

Approval and Type Approval

The bracket head of the JORDAHL® brickwork support brackets has been approved by the Deutschen Institut für Bautechnik (German Institute for Civil Engineering, DIBt) (approval no. Z-21.8-1868). In the type approval no. TP 08 / 004, which is also from the DIBt, the load-bearing capacity of the JORDAHL® brickwork support brackets is certified up to a shell spacing of 24 cm.

Adjustability

For perfect alignment, the brickwork support brackets can be vertically adjusted by ± 30 mm via the teeth provided in the bracket head and wedge adjuster. The anchor channel allows horizontal adjustment. Together, these adjustment options mean that small construction tolerances can be perfectly compensated for.

Fastening

The brickwork support brackets are fastened to JORDAHL® anchor channels made of stainless steel which are cast into concrete components with a quality of C 20/25 or higher. Alternatively, they can also be fastened using approved dowels.

Extensive Range of Products

JORDAHL® brickwork support brackets are available in different lengths and sizes – we can also supply made-to-measure brackets on request. Numerous accessories complete the product range.

Cantilevered Length

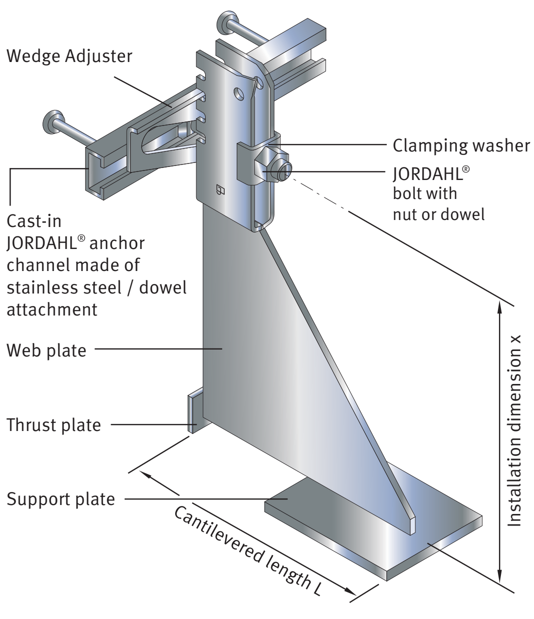
Standard cantilevered lengths of 150 – 330 mm are available. Other cantilevered lengths are available on request.

Material

JORDAHL® brickwork support brackets and accessories are made of stainless steel W1.4401, W1.4571, W1.4404, W1.4362 or W1.4462 (corrosion resistance class III). They are permanently corrosion-free and highly durable. For more information refer to pages 12 – 13.

Service

We offer a complete consulting service: we assist in dimensioning, static calculations and the choice of suitable brackets and anchor channels.



DIN 1053-1, November 1996, Brickwork, contains the following relevant passages relating to the design, dimensioning and support for twoshell external walls:

8.4.3 Two-shell external walls
8.4.3.1 Design types and general regulations for building Depending on the structure of the wall, a distinction is made between two-shell external walls

- with an air space
- with an air space and thermal insulation
- with core insulation
- with a layer of plaster

If a non load-bearing external shell (facing shell or plastered facing shell) is positioned in front of load-bearing inner shell (back-up shell) then the following must be taken into account:

a) When calculating dimensions, only the thickness of the inner shell should be counted towards the wall thickness. For the minimum thickness of the inner shell refer to section 8.1.2.1. Section 6.1 must be followed when applying the simplified method.

b) The **minimum thickness** of the outer shell is **90 mm**. Outer shells which are thinner than this are classed as facing, the building of which is governed by DIN 18 515. The outer shell should be evenly supported along its entire length and across its full surface area. If the support is interrupted (e.g. on brackets) then all bricks must be supported on both sides in the support plane.

c) **Outer shells with a thickness of 115 mm** should be supported **at height intervals of approximately 12m**. If the 115 mm thick outer shell is **not higher than two storeys**, or it is supported every two storeys, then it is permitted to protrude **from its support by one third of its thickness.** Refer to section 8.4.2.2 for details relating to the construction of the joints on visible facework.

d) **Outer shells with a thickness of less than 115 mm** must **not** be positioned **more than 20 m** above the ground and should be **supported at height intervals of approximately 6 m**. On buildings with up to 2 full storeys it is permissible to build a triangular pediment at a height of 4 m without additional support. These outer shells must not protrude by **more than 15 mm from their supports.** The joints of these facing shells should be finished with a trowel finished layer.

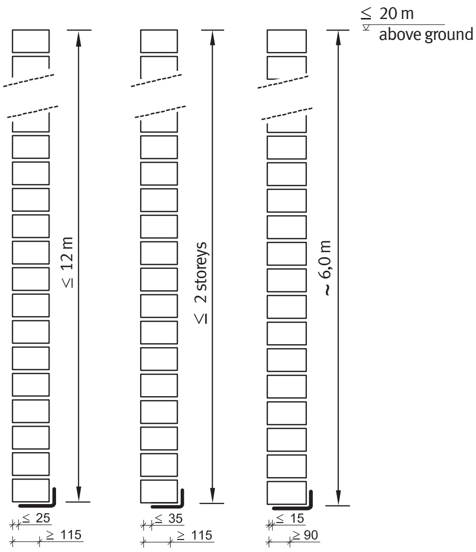
8.4.3.2 Two-shell external wall with an air space
The following should be taken into account on a two-shell external wall with an air space:

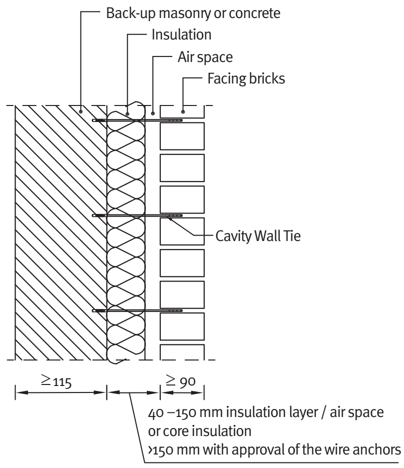
a) The air gap should be at least 60 mm and no more than 150 mm thick.

8.4.3.3 Two-shell external wall with an air space and thermal insulation
The following should be noted if any additional mat or panel shaped thermal insulation layer is placed on the outside of the inner shell:

a) The clear gap between shells must not exceed 150 mm.

b) The minimum air gap thickness of at least 40 mm must not be restricted by irregularities in the thermal insulation layer.





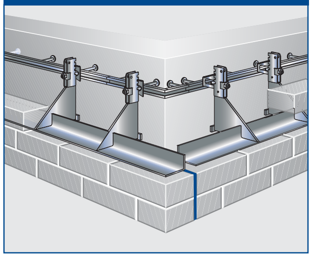
Application Examples

The JORDAHL® anchoring system for supporting brick facing comprises

- JORDAHL® brickwork support brackets JVA+ for supporting the facing shell
- JORDAHL® anchor channels JTA for attaching the brickwork support brackets at the wall of the building to concrete components made of concrete grade C ≥ 20 / 25; alternatively it is also possible to use approved dowels.
- Air anchors LSA or brick ties JMA for securing the facing shell against buckling and wind loads
- Scaffold anchors JGA for safe attachment of scaffolding to the building

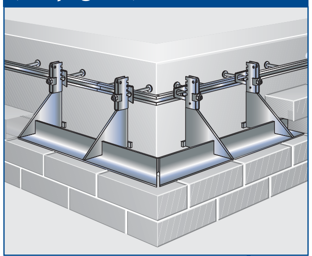
Depending on the type used, one or more bricks are supported. Most product types are manufactured as variants offering support either at the same height or with a height offset.

Outer Corner with Expansion joint JVA+ F (see page 21)



Supports in the Attic with Attic Brickwork Support JAV and JMA (see page 34)

Outer Corner without Expansion Joint JVA+ F (see page 21)



Openings JVA+ F/FAR (see page 22)

Openings with Prefabricated Lintels JVA+ NFT / NAFT (see page 24)

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Façade Design and Layout of Joints

Façades with Brickwork Support Offer Planning Engineers a Wide Range of Design Options

The character of a building is defined by its structure, the choice of materials and the layout of the joints of the facing masonry. These factors all influence each other and have an impact in terms of the design and construction of load-bearing components. Consequently, it is important for the façade to be carefully designed at an early stage so that the results can be incorporated in the load-bearing calculations.

Structure

The structure of every façade is defined by the following:

- The storey height
- The position, number and shape of openings; plus
- Any protrusions or recesses

When making choices for the brickwork support, other aspects can be accentuated by the arrangement of edge courses or rows of endbricks, as well by careful arrangement of expansion joints.

Arrangement of Joints

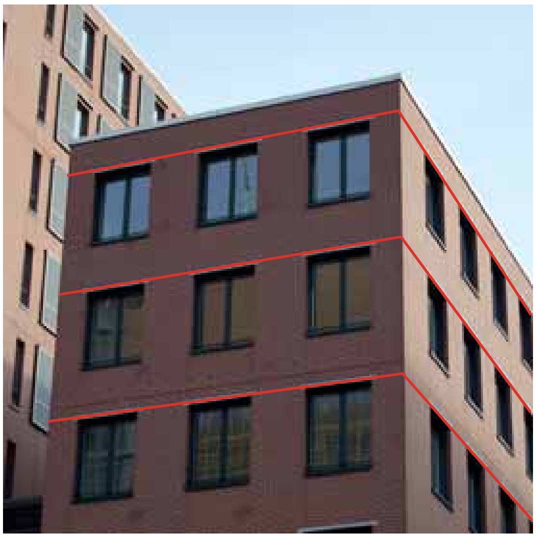
Horizontal and vertical expansion joints are used to compensate for changes in length and / or volume and thereby prevent cracks from forming. In addition, these joints also dissipate stress peaks at the upper corners of openings.

In the case of brickwork support, horizontal expansion joints are in the support level. The distance between support levels is defined by the permissible bricking-up height and the requirements described in DIN 1053-1 (see page 5).

The distances between the vertical expansion joints depend on climate, the type of materials used and the colour of the external wall shell (see page 9). Depending on the geographic locations, continuous shear walls must not be constructed with a width greater than 7–14 m. The walls can be interrupted with a vertical joint in the corner area or built around the corner. Expansion joints in the load-bearing structure must be continued in the facing shell. Two examples are shown in the illustrations.

Arrangement of Expansion Joints

Continuous vertical expansion joints next to openings



Storey-by-storey support, flush with the top edge of the openings

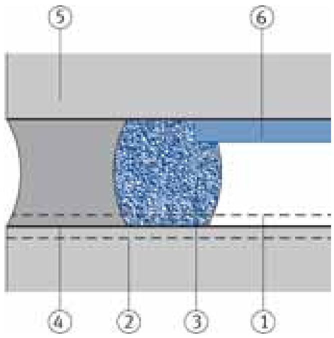
Load-bearing Structure

The design of the façade has a direct impact on the design and construction of the supporting structure. The arrangement of a horizontal expansion joint and / or a supporting level in the facing masonry necessitates the positioning of a solid component behind it, so that the façade supporting forces can be safely deflected into the load bearing. Special brickwork support brackets can be used for limited height offset between the solid component and the support level.

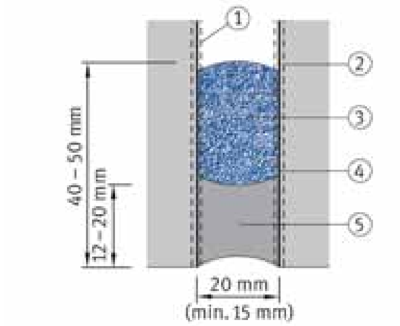
DIN 1053-1, November 1996, Brickwork, contains the following passages relevant to the layout and design of expansion joints.

8.4.3.1 Two-shell external walls with an air gap...

h) Vertical expansion joints should be integrated in the external shell. The distances between the joints depend on the climatic loads (temperature, humidity etc.), the type of materials used and the colour of the external wall surfaces. In addition, free mobility of the external shell in a vertical direction must also be safeguarded. ... The expansion joints are to be durably and tightly sealed with a suitable material.



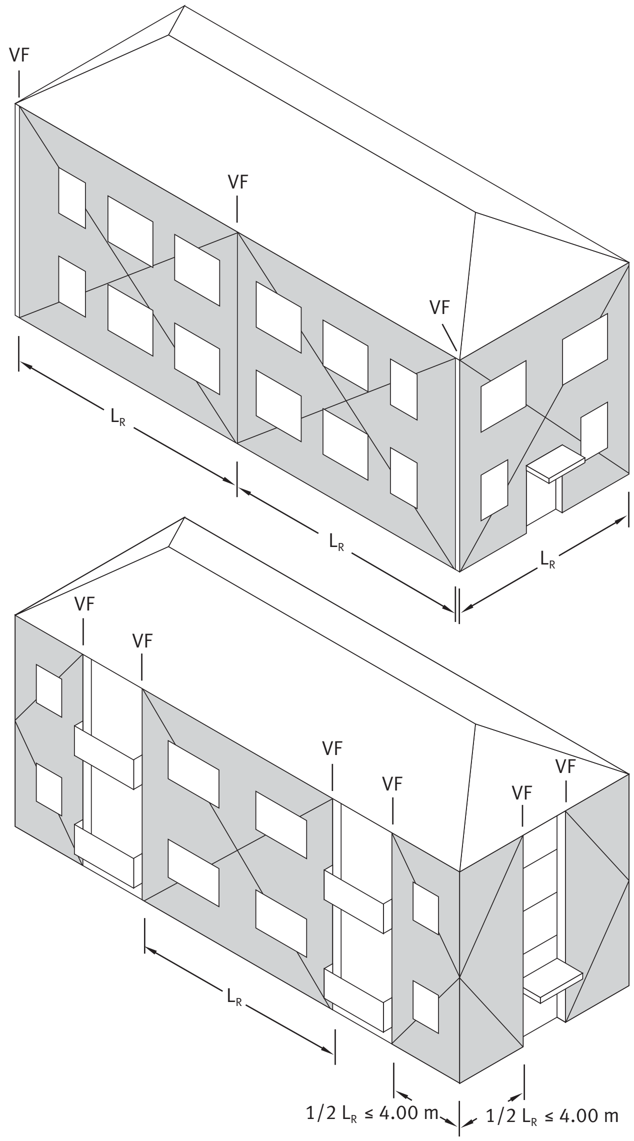
Suggestion for the execution of horizontal expansion joints in facing shells



Suggestion for the layout of vertical expansion joints in facing shells

Design and Layout of Expansion Joints	
1	Compressed joint
2	Stretched joint
3	Closed-cell foam profile
4	Keyed surface
5	Elastoplastic sealant (joint sealing compound)
6	Brickwork support branchets

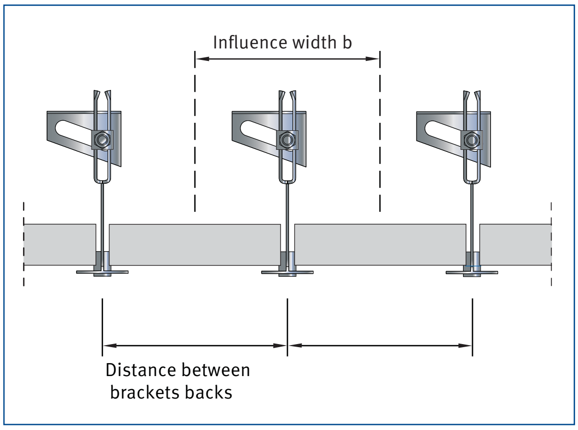
Possible Arrangement of Vertical Expansion Joints (VF)



Recommended Distances between Expansion Joints	
Direction	Max. distance between expansion joints L_R
Northern side	12 – 14 m
Western side	7 – 8 m
Southern side	8 – 9 m
Eastern side	10 – 12 m

Basis Calculation Principles

The design values F_{Ed} and Z_{Ed} are decisive in terms of dimensioning the attachments. For the anchor channels, the resulting design value R_{Ed} also needs to be calculated. When choosing the attachments, please also refer to the relevant approval certificate. JORDAHL® brickwork support brackets are dimensioned so that the permitted surface pressure at the pressure point is not exceeded for C ≥ 20/25. However, it should be taken into account that reinforcement is required close to the surface behind the pressure point.



Four brackets are available in the following load categories [LS]:

LS = 3.5	F_{Rd} = 4.7 kN
LS = 7.0	F_{Rd} = 9.5 kN
LS = 10.5	F_{Rd} = 14.2 kN

The present load per bracket back is calculated from:

d = 0.115 m	b = 0.50 m	a = 0.12 m
$\rho = 18.0\ kN/m^3$	H = 3.25 m	$\gamma_G = 1.35$

$$F_{Ed} = \rho \times d \times b \times H \times \gamma_G\ [kN]$$

$$F_{Ed} = 18.0\ kN/m^3 \times 0.115\ m \times 0.5\ m \times 3.25\ m \times 1.35$$

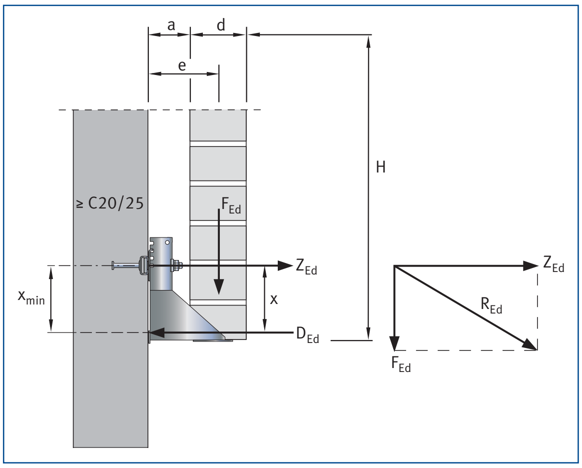
$$F_{Ed} = 4.54\ kN$$

Choice: JVA + 210 – N/3,5 with: $F_{Ed} = 4.7\ kN$

(see page 14)

Proof: $\frac{F_{Ed}}{F_{Rd}} \leq 1$ $\quad \frac{F_{Ed}}{F_{Rd}} = \frac{4.54\ kN}{4.7\ kN} = 0.97 \leq 1$

Designation		
Thickness of the facing masonry	d	[m]
Wall distance	a	[m]
Distance to load application point	e	[m]
Brickwork Height including any layers of upright bricks	H	[m]
Compensation for horizontal tolerances (± 0.01 m)	t	[m]
Apparent density of the bricks	ρ	[kN]
Partial safety factor	g_G	= 1.35
Design value for the action	F_{Ed}	[kN]
Design value for the action (tensile)	Z_{Ed}	[kN]
Design value for the action (compressive)	D_{Ed}	[kN]
Resulting design value for the action	R_{Ed}	[kN]
Design resistance of the bracket and/or anchor channel	F_{Rd}	[kN]
Installation dimension	x	[m]



Attachment to the Anchor Channel:

$$e = a + \frac{d}{2} + t\ [m]$$

$$e = 0.12\ m + \frac{0.115\ m}{2} + 0.01\ m = 0.19\ m$$

$$M_{Ed} = F_{Ed} \times e\ [kNm]$$

$$M_{Ed} = 4.54\ kN \times 0.19\ m = 0.863\ kNm$$

$$x_{min} = \text{Installation dimension } x - 0.03\ m = 0.12\ m$$

$$x_{min} = 0.15\ m - 0.03\ m = 0.12\ m$$

$$Z_{Ed} = D_{Ed} = \frac{M_{Ed}}{x_{min}}\ [kN]$$

$$Z_{Ed} = D_{Ed} = \frac{0.863\ kNm}{0.12\ m} = 7.19\ kN$$

$$R_{Ed} = \sqrt{F_{Ed}^2 + Z_{Ed}^2}\ [kN]$$

$$R_{Ed} = \sqrt{4.54^2\ kN^2 + 7.19^2\ kN^2} = 8.5\ kN$$

Selected: JTA - K38/17 - 200 with $F_{Rd} = 10.0\ kN$

(see page 44)

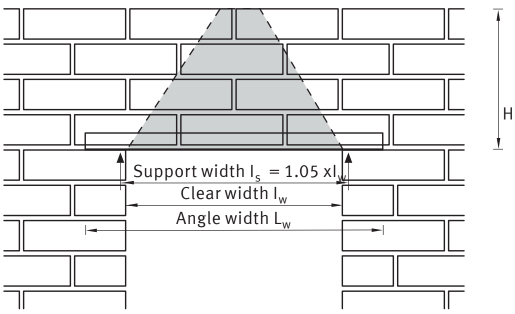
Proof: $\frac{R_{Ed}}{F_{Rd}} \leq 1$ $\quad \frac{8.5\ kN}{10.0\ kN} = 0.85 \leq 1$

Dimensioning of Supports above Wall Openings

Holding loadbearing members above wall openings can be designed for reduced wind loads, as a vault action is established above the support level. In this case the vault can be considered in a simplified manner as an equilateral triangle above the loadbearing member. The prerequisites for this approach are that the brickwork height H is sufficient (H ≥ h + 0.25 m), and that there are no openings to the side or above the loadbearing member. The structure to the side needs to be capable of absorbing the lateral thrust. Consequently, there must not be any expansion joints to the side of the opening. If the brickwork height is less than this then the full load must be used in the calculations.

The choice of the angle is made using tables or after static proof. Here, the bending moment M_{Ed} and compliance with the permitted deflection of l / 300 are decisive for the angle. The supporting force VEd is decisive for dimensioning of the point of support, i.e. brickwork support brackets. See pages 16 / 17 for a select-ion of suitable angles.

Calculations without Vault Action

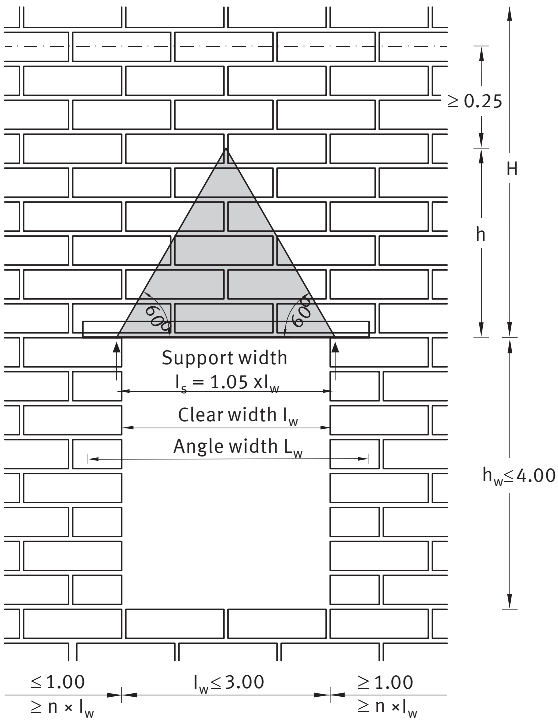


brickwork height / load height:	H [m]
load:	$q_{Ed} = \rho \times H \times d \times \gamma_G$ [kN/m]
max. moment:	$M_{Ed} = q_{Ed} \times l_S^2 / 8$ [kNm]
max. lateral force at support:	$V_{Ed} = q_{Ed} \times l_S / 2$ [kN]
angle length:	$L = l_w + 2 \times 0.095$ [m]

DIN 1053-1, November 1996, Masonry, contains the following relevant passages on the arrangement and execution of expansion joints:

8.5.3 Vault action above wall openings
In order for this section to be applicable, it must be possible for a vault action to become established above and adjacent to the loadbearing member and the load surface, so there must be no interfering openings in these areas and it must be possible for the tangential thrust of the vault to be absorbed there. In the case of lintels or loadbearing members under walls, only the load of the part of the walls which is enclosed by an equilateral triangle above the loadbearing member needs to be taken into ccount as the load. ...

Calculations with Vault Action



Prerequisite for Using the Vault Action Approach

h_w/l_w	0.85	1.2	1.6	2.0	2.5	3.0	3.6
n	0.4	0.5	0.6	0.7	0.8	0.9	1.0

brickwork height /	$H \geq h + 0.25$ [m]
load height:	$h = 0.866 \times l_S$ [m]
load:	$q_{Ed} = \rho \times h \times d \times \gamma_G$ [kN/m]
max. moment:	$M_{Ed} = q_{Ed} \times l_S^2 / 12$ [kN/m]
max. lateral force at support:	$V_{Ed} = q_{Ed} \times l_S / 4$ [kN]
angle length:	$L = l_w + 2 \times 0.095$ [m]

Corrosion Resistance

Why Stainless Steel?

Corrosion is a chemical reaction which takes place between a material and its surroundings. It produces measurable changes to the material and can prevent a component or system from performing properly. The best known form of corrosion is rusting, i.e. the oxidation of metals.

In order to ensure the stability of components throughout their entire service life, it is important that corresponding anti-corrosion protection measures are in place. 'Corrosion protection' is the term used to describe measures which help to avoid damage. This is based on the masonry standard DIN 1053-1 dated November 1996 and the general technical approval for stainless steels Z-30.3-6 dated 20.04.2009.

According to DIN 1053-1, section 8.4.3.1 (Types of construction and general rules on execution),

e)"The masonry shells shall be connected using wire anchors made of stainless steel with the material numbers 1.4401 or 1.4571 in accordance with DIN 17400."

g)"Supporting constructions which are no longer controllable after installation shall be permanently protected against corrosion."

Permanent protection against corrosion can only be achieved by using suitable stainless steels. The surface of these materials has a very solid and resistant passive layer.

The general technical approval Z-30.6-6 makes a distinction between material qualities according to various corrosion resistance classes (KWK I to KWK IV), whereby a material of the class KWK I offers the lowest resistance to corrosion and a material of the class KWK IV the highest. The corrosion resistance class for brickwork support brackets in residential areas results from the following five effects (see Z-30.3-6 attachment 1.1.) The effect which demands the highest corrosion resistance class is decisive in each case. An excerpt is provided in the table below. For brickwork support brackets this means that stainless steels in the corrosion resistance class III or higher must be used. JORDAHL® brickwork support brackets and all accessories like bolts, dowels, threaded loops, scaffold anchors, cavity wall ties etc. are manufactured from stainless steels with the material numbers 1.4401, 1.4404, 1.4571, 1.4362, 1.4462 or equivalent.

The use of stainless steels of a lower corrosion resistance class like A2 or zinc-plated material is not permitted in external areas, as these materials do not satisfy the requirements outlined above and would hence endanger the stability of the façade.

Action / Load	Exposure		Criteria and Examples	Corrosion Resistance Class		
				I	II	III
Moisture, annual mean moisture value U	SF1	moisture rarely present	$60\,\% \leq U < 80\,\%$	x		
	SF2	moisture frequently present	$80\,\% \leq U < 95\,\%$	x		
	SF3	moisture permanently present	$95\,\% < U$		x	
Level of chloride in the environment, distance M from the sea, distance S from busy roads where salt is spread in winter	SC0	low	Rural area, urban area $M > 10$ km, $S > 0.1$ km	x		
	SC1	medium	Industrial area $10 \text{ km} \geq M > 1$ km $0.1 \text{ km} \geq S > 0.01$ km		x	
	SC2	high	$M \leq 1$ km, $S \leq 0.01$ km			x
pH value at the surface	SH3	acidic (action of acids)	$pH \leq 3$			x
Location of the components	SL3	external, inaccessible, ambient air has access	Rear-ventilated façade			x

Excerpt from approval Z-30.3-6, attachment 1.1

Handling Stainless Steel

In order to preserve the surface quality and hence the level of anti-corrosion protection, contamination resulting from contact with standard steel must be avoided during all phases of production, transport, storage and assembly. Similarly, no contact with chemicals like acids or solutions containing acids, grease or oil must be permitted.

If the surface of a component made of stainless steel has been damaged then the passive layer of the stainless steel needs to be quickly restored. We recommend sending the components back to the manufacturer to have the anti-corrosion protection restored.

Notes

Transport

Belts and straps which do not damage the surface should be used during the transport of stainless steel components, e.g. ones made of plastic. Lifting equipment must be thoroughly cleaned prior to use. A suitable underliner must be inserted between stainless steel components and the wooden pallet. Stainless steel components and components made of standard steel must be transported and stored in such a way they are not in direct contact with each other.

Storage

Stainless steel components must be stored dry and preferably under a roof, particularly if the components are packed in cardboard boxes. Damp outer packaging can damage the surface of the stainless steel. Contact between components made of stain less steel and components made of normal steel must be avoided. In addition, stainless steel must also be protected with suitable measures against flash rust, such as by covering it with tarpaulin.

Assembly

Stainless steel components must be assembled using separate tool sets. If subsequent reworking (cutting, grinding etc.) becomes necessary on the construction site then this must only be done using tools which are suitable for stainless steel and which have not been used previously for work on standard steel. Angled brackets (refer to the assembly instructions) must only be supported with wooden beams which have not yet been in contact with standard steel. If standard steel profiles are used for support then a suitable underliner must be inserted.

Further information on handling stainless steel can be found in the information sheet 969 "Production and assembly of structures made of Stainless Steel – general information" supplied by the Stainless Steel information centre.

Single Bracket JVA+ N / NA / NU

Product Variants

The bracket types JVA+ N/NA/NU are used to support closed wall surfaces:

- Type JVA+ N is used only to provide same-height support: (support level same as bottom edge of bracket back)
- Type JVA+ NA is used only to provide support with a height offset: (support level same as bottom edge of bracket back minus offset A)
- Type JVA+ NU only with high-set support plate

They can be used as single brackets or with intermediate angled brackets.

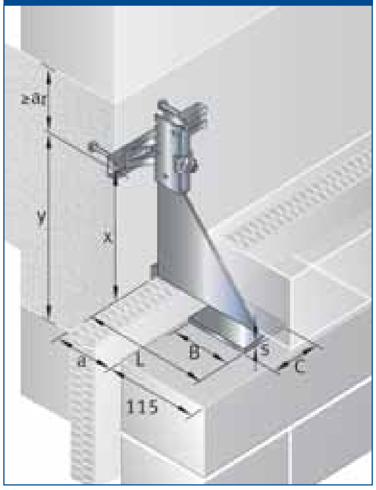
Installation Distances

The vertical web plate of the bracket engages in the transversal joints between the brickwork support brackets. The distance between the brackets is 25 cm (corresponding to one NF brick length) or a multiple thereof when using an intermediate angled bracket.

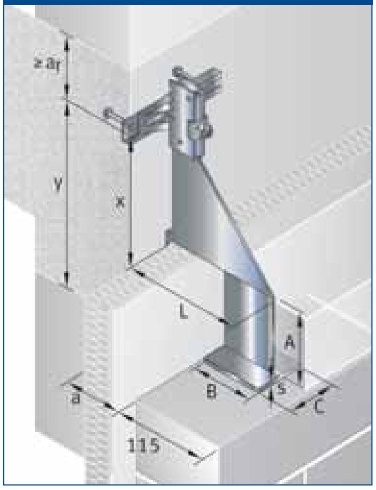
Accessories

Courses of bricks laid on edge (d = 11.5 cm) are executed using the suspension loop JRH 0/11.5 (see page 23)

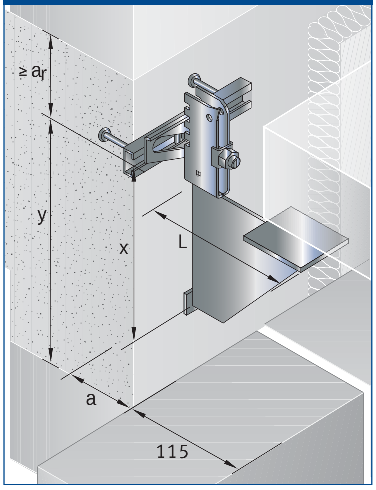
Single Bracket JVA+ N



Single Bracket JVA+ NA with Offset Support Level



Single Bracket JVA+ NU with Elevated Support Plate



Installation Dimensions and Permissible Loads for Type JVA+ N / NA / NU

Brackets JVA+ N JVA+ NA JVA+ NU	Gap between Walls a (± 10) [mm]	Cantilevered Length [1] L [mm]	Load Category 3.5 F_{Rd} = 4.7 kN Installation Dimensions		Load Category 7.0 F_{Rd} = 9.5 kN Installation Dimensions		Load Category 10.5 F_{Rd} = 14.2 kN Installation Dimensions	
			x [mm]	y [mm]	x [mm]	y [mm]	x [mm]	y [mm]
JVA+140-… ▾ JVA+210-…	50 ▾ 120	140 ▾ 210	150	200	200	250	250	300
JVA+220-… ▾ JVA+270-…	130 ▾ 180	220 ▾ 270	175	225	250	300	300	350
JVA+280-… ▾ JVA+330-…	190 ▾ 240	280 ▾ 330	200	250	300	350	350	400
Support plate C × B × s [mm] Recommended JORDAHL® anchor channel Corresponding JORDAHL® bolt			60 × 80 × 3 JTA K 38 / 17-200 Type JH, M 12 × 70 T (A4-50)		60 × 80 × 4 JTA K 50/30 Type JB, M 12 × 80 T (A4-70)		70 × 85 × 5 JTA K 53/34 Type JB, M 16 × 85 T (A4-50)	

[1] Required cantilevered length = gap between walls + 90 mm

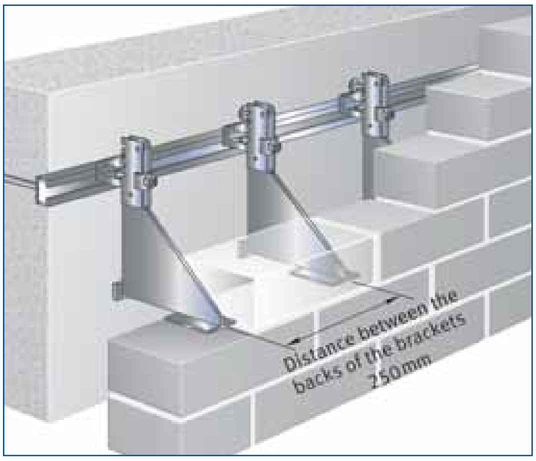
Brickwork Heights

The calculated permissible brickwork height results from the calculation approaches detailed on page 10 and the requirements of DIN 1053. For a standard format (d = 11.5 cm; ρ = 18 kN/m³) the load on the back of the bracket as a function of the brickwork height can be taken from the table below.

Brackets JVA+ N/NA/NU: Design Value for the Action/Load per Bracket Back [1]

Brickwork Height H [m]	Load Category of the Bracket	F_{Rd} [kN]	F_{Ed} [kN] [2]
12	7.0	9.5	8.4
11			7.7
10			7.0
9			6.3
8			5.5
7			4.9
6	3.5	4.7	4.2
5			3.5
4			2.8
3			2.2
2			1.4
1			0.7

[1] Distance between the backs of the brackets b = 250 mm
[2] ρ = 18.0 kN/m³; d = 11.5 cm



JVA+ N as single brackets in normal wall areas

Calculation of the Maximum Brickwork Height

$$\max.\ H = \frac{F_{Rd}}{b \times d \times \rho \times \gamma_G} \quad [m]$$

$$\max.\ H = \frac{F_{Rd}}{b \times 2.8} \quad [m]$$

with $d = 0.115$ m
$\rho = 18.0$ kN/m³
$\gamma_G = 1.35$
b = distance between the bracket backs

JVA+ NA as single brackets in normal wall areas

Ordering Example

Konsole JVA+ NA

Type	Cantilevered Length		Type		Load Category	Offset
JVA+	150	–	NA	/	3.5	A =100

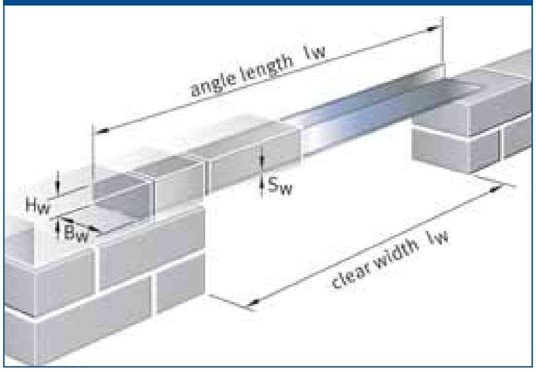
Intermediate sizes and special sizes are available on request.

JORDAHL® Brickwork Support Systems

Angled Bracket JW

Angled Bracket JW above Openings

Angled Bracket JW above Openings



JORDAHL® angled brackets JW can be used individually for support above openings by placing them on the brickwork either side of the opening. When used as an intermediate angled bracket for Single Facing Anchors JVA+ N or Grout-in Brackets JMK+ they are loosely placed on the support plate of the brickwork support bracket. The basis for calculations can be found on page 11.

Angle above Openings							
Clear width l_w of the opening [mm]	510	760	1010	1260	1510	1760	2010
Corresponding angle length L_w [mm]	700	950	1200	1450	1700	1950	2200
Brickwork height H [m]	Corresponding angle cross-section (H_w × B_w × s_w × length) [mm] 1) Maximum deflection l / 300						
≤ 0.50 Without vault action	25 × 90 × 2	30 × 90 × 3	40 × 90 × 3	50 × 90 × 3	60 × 90 × 3	60 × 90 × 4	70 × 90 × 4
≤ 0.75	25 × 90 × 2	40 × 90 × 3	50 × 90 × 3	60 × 90 × 3	60 × 90 × 4	70 × 90 × 4	80 × 90 × 4
≤ 1.00 With vault action	25 × 90 × 2	40 × 90 × 3	50 × 90 × 3	60 × 90 × 3	70 × 90 × 4	80 × 90 × 4	90 × 90 × 4
≤ 1.25	25 × 90 × 2	30 × 90 × 3	60 × 90 × 3	60 × 90 × 4	80 × 90 × 4	80 × 90 × 5	90 × 90 × 5
≤ 1.50	25 × 90 × 2	30 × 90 × 3	50 × 90 × 3	70 × 90 × 4	80 × 90 × 5	80 × 90 × 5	90 × 90 × 6
≤ 1.75	25 × 90 × 2	30 × 90 × 3	50 × 90 × 3	60 × 90 × 3	80 × 90 × 5	90 × 90 × 5	90 × 90 × 8
≤ 2.00	25 × 90 × 2	30 × 90 × 3	50 × 90 × 3	60 × 90 × 3	70 × 90 × 4	90 × 90 × 6	90 × 90 × 8
≤ 2.25	25 × 90 × 2	30 × 90 × 3	50 × 90 × 3	60 × 90 × 3	70 × 90 × 4	80 × 90 × 4	90 × 90 × 8
› 2.25	25 × 90 × 2	30 × 90 × 3	50 × 90 × 3	60 × 90 × 3	70 × 90 × 4	80 × 90 × 4	90 × 90 × 5
Minimum brickwork height H for vault action approach	0.71 m	0.94 m	1.17 m	1.40 m	1.63 m	1.85 m	2.08 m

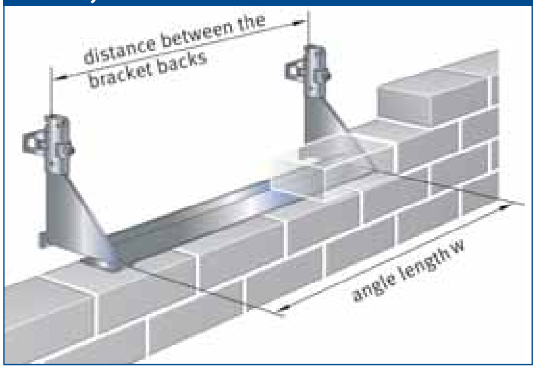
1) Valid for facing masonry with an apparent density of ρ = 18 kN/m³ and thickness d = 11.5 cm
2) The angle length B_W should be increased if more than two storeys are supported.

Ordering Example

Type	Length	Angled Bracket
JW	1200	L 50 × 90 × 3

Angled Bracket JW as Intermediate Angled Bracket

Single Bracket JVA+ N with Intermediate Angled Bracket JW

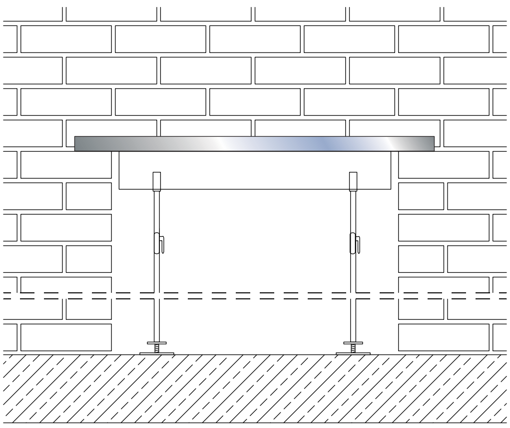


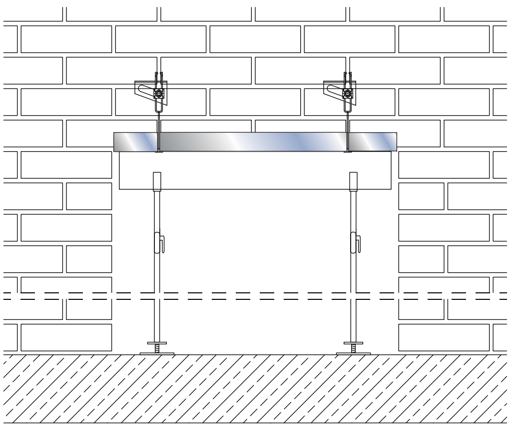
The values in the table apply to facing masonry with a density of 18 kN / m³ and a thickness of 11.5 cm. The angle length B_W should be increased if more than two storeys are supported. Single brackets with intermediate angled brackets are used on connected wall surfaces.

<table>
<tr><th colspan="6">Load on the Backs of the Brackets [kN]</th></tr>
<tr><th>Brickwork Height H [m]</th><th>Distance between the Brackets Backs 500 mm</th><th>Distance between the Brackets Backs 750 mm</th><th>Distance between the Brackets Backs 1000 mm</th><th colspan="2" rowspan="3">Corresponding Bracket Load Category</th></tr>
<tr><td rowspan="2"></td><td colspan="3">Corresponding Angle Cross-Section (H_W × B_W × s_W × Length) [mm]</td></tr>
<tr><td>L 25 × 90 × 2 – 480</td><td>L 30 × 90 × 3 – 730</td><td>L 50 × 90 × 3 – 980</td></tr>
<tr><td></td><td>F_{Ed} [kN]</td><td>F_{Ed} [kN]</td><td>F_{Ed} [kN]</td><td>Load Category</td><td>F_{Rd} [kN]</td></tr>
<tr><td>12</td><td rowspan="2"></td><td rowspan="6"></td><td rowspan="7"></td><td rowspan="9">10.5</td><td rowspan="9">14.2</td></tr>
<tr><td>11</td></tr>
<tr><td>10</td><td>14.0</td></tr>
<tr><td>9</td><td>12.6</td></tr>
<tr><td>8</td><td>11.2</td></tr>
<tr><td>7</td><td>9.7</td></tr>
<tr><td>6</td><td>8.4</td><td>12.6</td></tr>
<tr><td>5</td><td>7.0</td><td>10.5</td><td>14.0</td></tr>
<tr><td>4</td><td>5.5</td><td>8.4</td><td>11.2</td></tr>
<tr><td>3</td><td>4.2</td><td>6.3</td><td>8.4</td><td rowspan="2">7.0</td><td rowspan="2">9.5</td></tr>
<tr><td>2</td><td>2.8</td><td>4.2</td><td>5.5</td></tr>
<tr><td>1</td><td>1.4</td><td>2.2</td><td>2.8</td><td>3.5</td><td>4.7</td></tr>
</table>

Assembly Information

On all brackets with welded-on or loose angled brackets the angled bracket must be supported until the mortar has hardened.





JORDAHL® Brickwork Support Systems

Single Bracket JVA+ P / PAR

Product Variants

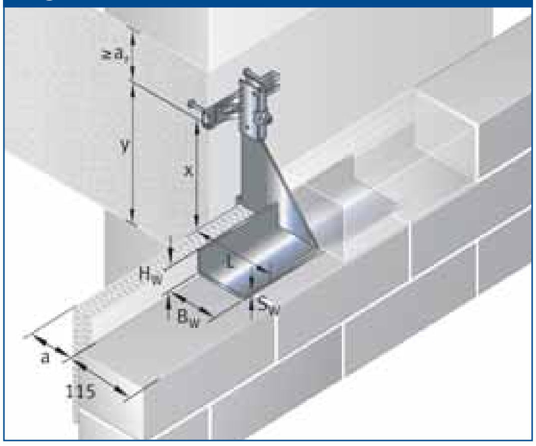
The bracket types JVA+ P / PAR are used preferably in normal wall areas or in edge situations, such as on inside corners or vertical joints.

- Type JVA+ P is used to provide same-height support (support level same as bottom edge of bracket back)
- Type JVA+ PAR is used to provide support with a height offset (support level same as bottom edge of bracket back minus offset A)

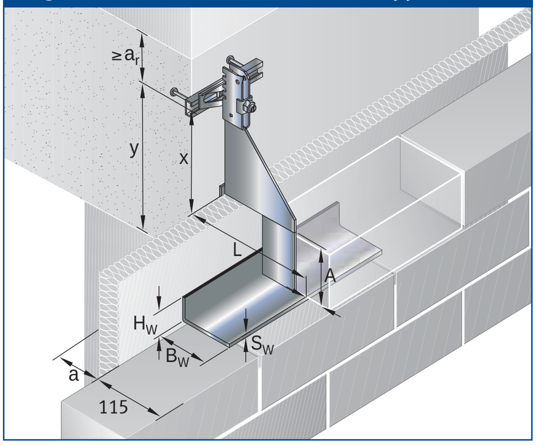
Installation Distances

The vertical web plate of the bracket engages in the gap between the facing bricks. The distance between brackets is 50 cm. This corresponds to two NF brick lengths.

Single Bracket JVA+ P in Standard Wall Areas



Single Bracket JVA+ PAR with Offset Support Level



Installation Dimensions and Permissible Loads for Type JVA+ P / PAR

Brackets JVA+ P JVA+ PAR	Gap between Walls a (± 10)	Cantilevered Length [1] L	Load Category 3.5 F_{Rd} = 4.7 kN Installation Dimensions		Load Category 7.0 F_{Rd} = 9.5 kN Installation Dimensions		Load Category 10.5 F_{Rd} = 14.2 kN Installation Dimensions	
	[mm]	[mm]	x [mm]	y [mm]	x [mm]	y [mm]	x [mm]	y [mm]
JVA+140-… ▾ JVA+210-…	50 ▾ 120	140 ▾ 210	150	200	200	250	250	300
JVA+220-… ▾ JVA+270-…	130 ▾ 180	220 ▾ 270	175	225	250	300	300	350
JVA+280-… ▾ JVA+330-…	190 ▾ 240	280 ▾ 330	200	250	300	350	350	400
Support angle $H_W \times B_W \times s_W$ [mm] [2] Recommended JORDAHL® anchor channel Corresponding JORDAHL® bolt			30×100×3 JTA K 38 / 17-200 Type JH, M 12×70 T (A4-50)		45×100×3 JTA K 50/30 Type JB, M 12×80 T (A4-70)		55×100×3 JTA K 53 / 34 Type JB, M 16×85 T (A4-50)	

[1] Required cantilevered length = gap between walls + 90 mm

[2] Angle length: L = 300 mm

Ordering Example

Bracket JVA+ PAR

Type	Cantilevered Length	Type	Load Category	Offset
JVA+	150	– PAR /	3.5	A = 100

Intermediate sizes and special sizes are available on request.

Single Bracket JVA+ E / EA

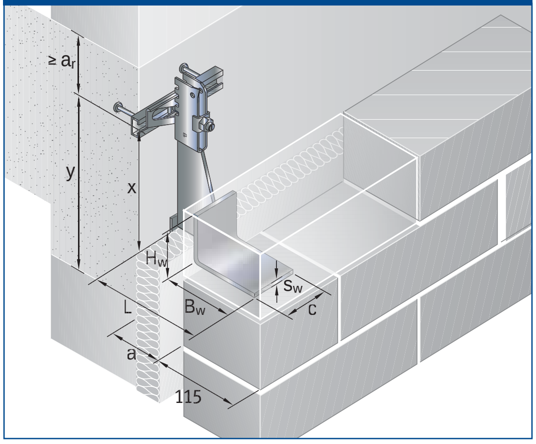
JORDAHL®
anchored in quality

Product Variants

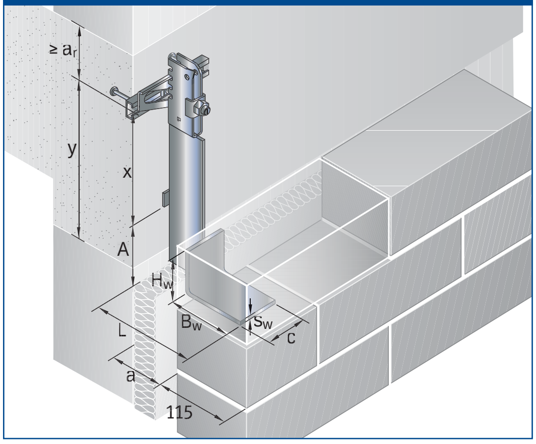
The bracket types JVA+ E / EA are used preferably in the end areas of facing masonry walls, such as on inside corners or vertical joints. The bracket is used in areas where it is not possible to reach into the transversal joint. It supports individual brickwork support brackets.

- Type JVA+ E is used to provide same-height support (support level same as lower edge of support bracket)
- Type JVA+ EA is used to provide support with a offset height (support level is the same as lower edge of support bracket minus offset A)

Single Bracket JVA+ E



Single Bracket JVA+ EA with Offset Support Level



Installation Dimensions and Permissible Loads for Type JVA+ E/EA

Brackets JVA+ E JVA+ EA	Gap between Walls a (± 10)	Cantilevered Length [1] L	Load Category 1.8 F_{Rd} = 2.4 kN Installation Dimensions		Load Category 3.5 F_{Rd} = 4.7 kN Installation Dimensions		Load Category 7.0 F_{Rd} = 9.5 kN Installation Dimensions	
	[mm]	[mm]	x [mm]	y [mm]	x [mm]	y [mm]	x [mm]	y [mm]
JVA+140-… ▾ JVA+210-…	50 ▾ 120	140 ▾ 210	150	200	150	200	200	250
JVA+220-… ▾ JVA+270-…	130 ▾ 180	220 ▾ 270	175	225	175	225	250	300
JVA+280-… ▾ JVA+330-…	190 ▾ 240	280 ▾ 330	200	250	200	250	300	350
Support plate $H_w \times B_w \times s_w$ [mm] Recommended JORDAHL® anchor channel Corresponding JORDAHL® bolt			55 × 110 × 6 JTA K 38 / 17-200 Type JH, M 12×70 T (A4-50)		70 × 110 × 8 JTA K 38 / 17-200 Type JH, M 12×70 T (A4-50)		70 × 110 × 10 JTA K 50 / 30 Type JB, M 12×80 T (A4-70)	

[1] Required cantilevered length = gap between walls + 90 mm

Ordering Example

Bracket JVA+ EA

Type	Cantilevered Length		Type		Load Category	Offset
JVA+	150	–	EA	/	3.5	A = 100

Intermediate sizes and special sizes are available on request.

JORDAHL® Brickwork Support Systems

Angled Bracket JVA+ F / FAR

Product Variants

The brackets in the JVA+ F / FAR product family are combined supporting brackets with a continuous supporting angle and two or more bracket backs. They are used to support visible or hidden opening in buildings or outside corners with or without vertical joints:

- Type JVA+ F is used to provide same-height support (support level same as bottom edge of bracket back)
- Type JVA+ FAR with web in the area of the facing shell is used to provide support with a height offset in front of blind boxes or projections

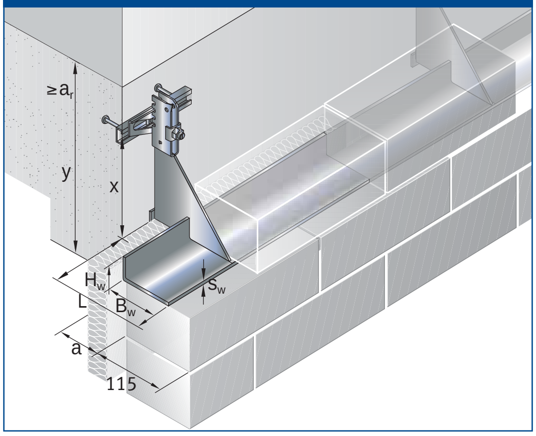
Available Lengths

A range of different system lengths based on multiples of 250 mm is available; other lengths and basic multiples can be manufactured on request.

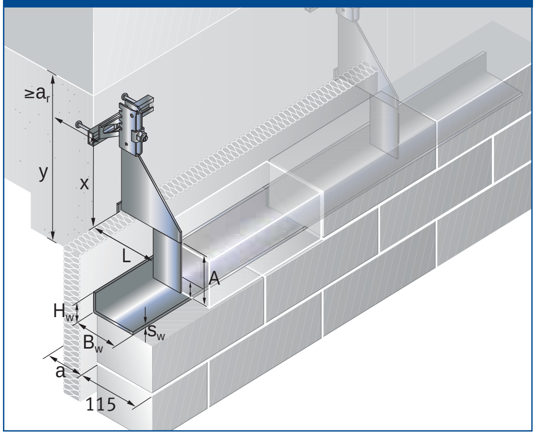
Assembly Information

While the bricks are being laid the support angles must be supported until the brickwork is sufficiently strong enough (see page 17).

Angled Bracket JVA+ F



Angled Brackets JVA+ FAR with Offset-Height Support Level



Installation Dimensions and Permissible Loads for Type JVA+ F / FAR

Brackets JVA+ F JVA+ FAR	Gap between Walls a (± 10)	Cantilevered Length[1] L	Load Category 3.5 F_{Rd} = 4.7 kN Installation Dimensions		Load Category 7.0 F_{Rd} = 9.5 kN Installation Dimensions		Load Category 10.5 F_{Rd} = 14.2 kN Installation Dimensions	
	[mm]	[mm]	x [mm]	y [mm]	x [mm]	y [mm]	x [mm]	y [mm]
JVA+140-… ▾ JVA+210-…	50 ▾ 120	140 ▾ 210	150	200	200	250	250	300
JVA+220-… ▾ JVA+270-…	130 ▾ 180	220 ▾ 270	175	225	250	300	300	350
JVA+280-… ▾ JVA+330-…	190 ▾ 240	280 ▾ 330	200	250	300	350	350	400
Recommended JORDAHL® anchor channel Corresponding JORDAHL® bolt			JTA K 38 / 17-200 Type JH, M 12 × 70 T (A4-50)		JTA K 50/30 Type JB, M 12 × 80 T (A4-70)		JTA K 53/34 Type JB, M 16 × 85 T (A4-50)	

[1] Required cantilevered length = gap between walls + 90 mm

Above Openings

Facing masonry above openings can be supported visibly with courses of stretchers or bricks laid on edge or upright using a visible support angle, or invisibly with a suspended course of bricks laid on edge or upright.

In the case where the support is hidden, the suspended facing bricks are secured with suspension loop and stainless steel wire (see page 23). With both variants support is possible either at the same height or with a height offset.

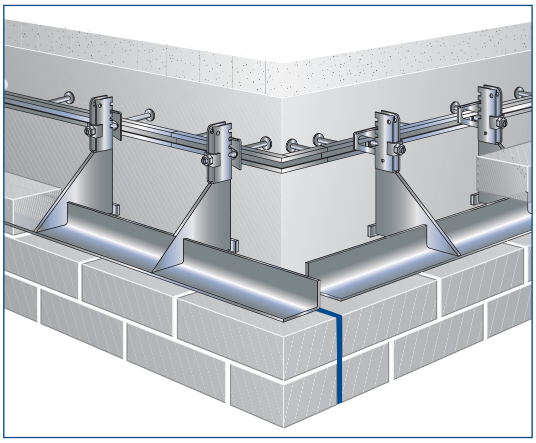
On Outside Corners

One or two Angled Brackets JVA+ F or JVA+ FAR are arranged with or without soffit corners on outside corners with a vertical expansion joint.

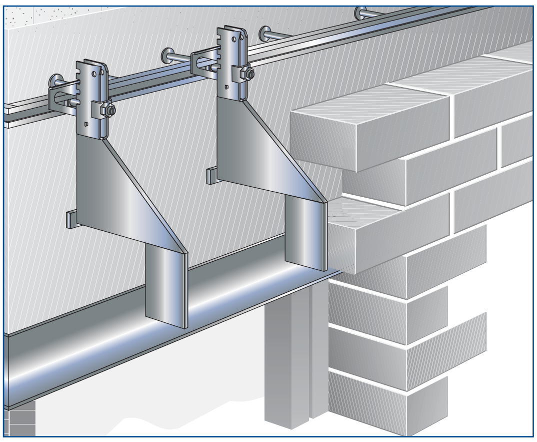
Two JVA+ F or JVA+ FAR brackets with diagonal cut are arranged on outside corners without a vertical expansion joint. On outside corners in areas which are hidden from view, brickwork support brackets without diagonal cut are used.

Note:
It must be ensured that the first bracket back is positioned far enough away from the corner of the building so that the edge distance requirements for attachment to anchor channels and/or dowels are satisfied. If this is not possible then special brackets, e.g. brackets with a tie strap (see page 26), are available.

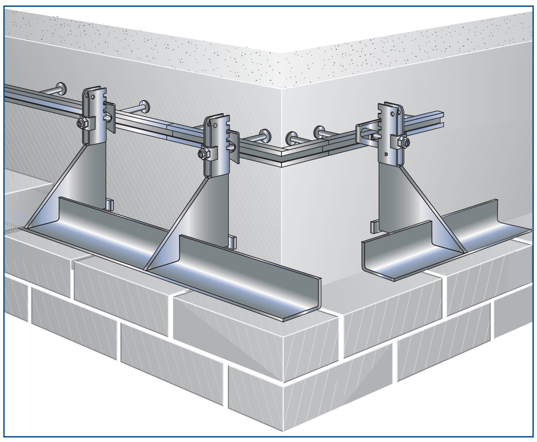
Hidden support over a window openings with JVA+ F and suspension loop



Execution of an outside corner with vertical expansion joint using JORDAHL® brickwork support brackets JVA+ F



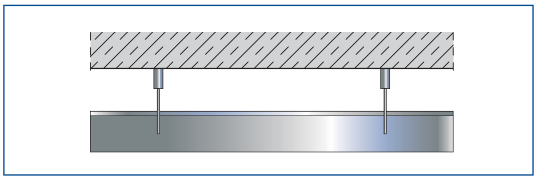
Visible support over a window opening with JVA+ FAR



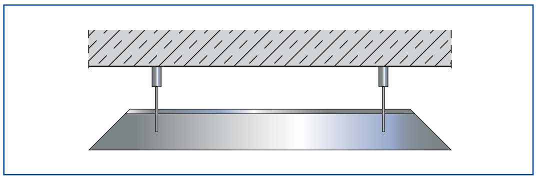
Execution of an outside corner without vertical expansion joint using JORDAHL® brickwork support brackets JVA+ F

Angle Bracket Designs for JVA+ F / FAR

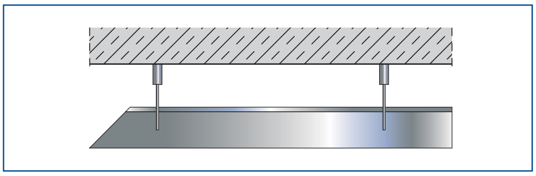
Many types of bracket are additionally manufactured in different angle versions for corner and support column areas; special designs and other angle designs are available on request.



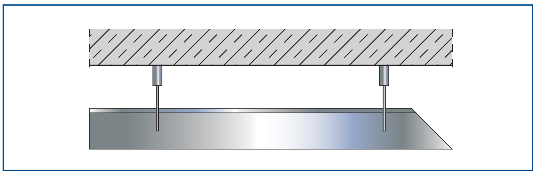
angle bracket design 101



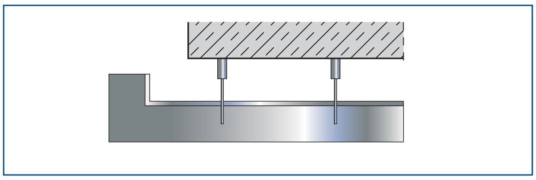
angle bracket design 111



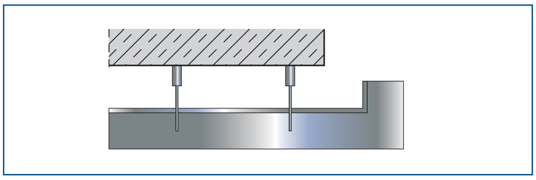
angle bracket design 112



angle bracket design 113



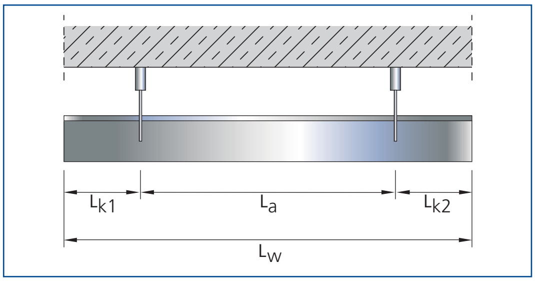
angle bracket design102



angle bracket design 103

Support Angle

The JORDAHL® Brackets JVA+ F / FAR come with different support angles to suit the requirements. The dimensions of the support angle above openings depend on the clear width of the opening and the required brickwork height. In the process, any courses of bricks laid upright or on edge must also be taken into account.



Angled Bracket JVA+ F/FAR with two console backs, lengths and dimensions

Angle Dimensions and Permissible Brickwork Heights

Brickwork Height H [m]	510	760	1010	1260	1510	1760	2010	2260	2510	2760	Corresponding Load Category (LS) of the Bracket	
	Bracket Length L_w [mm]; Bracket Dimensions L_{k1}/L_a /L_{k2} [mm]										LS	$F_{R,d}$ [kN]
	L_w =490 120/250/120	L_w =740 120/500/120	L_w =990 245/500/245	L_w =1240 245/750/245	L_w =1490 245/1000/245	L_w =1740 370/1000/370	L_w =1990 370/1250/370	L_w =2240 495/1250/495	L_w =2490 495/1500/495	L_w =2740 620/1500/620		
6,0	L30×100×3	L40×100×3	L50×100×3	L50×100×3	L80×100×3	–	–	–	–	–		
5,5	L30×100×3	L40×100×3	L50×100×3	L50×100×3	L80×100×3	L70×100×3	–	–	–	–		
5,0	L30×100×3	L40×100×3	L40×100×3	L50×100×3	L80×100×3	L60×100×3	L90×100×4	–	–	–		
4,5	L30×100×3	L40×100×3	L40×100×3	L40×100×3	L70×100×3	L60×100×3	L80×100×4	L80×100×3	–	–		
4,0	L30×100×3	L30×100×3	L40×100×3	L40×100×3	L70×100×3	L60×100×3	L80×100×4	L80×100×3	L90×100×4	–	10.5	14.2
3,5	L30×100×3	L30×100×3	L40×100×3	L40×100×3	L60×100×3	L50×100×3	L80×100×3	L70×100×3	L90×100×4	L90×100×3		
3,0	L30×100×3	L30×100×3	L30×100×3	L40×100×3	L60×100×3	L50×100×3	L80×100×3	L60×100×3	L90×100×3	L90×100×3		
2,5	L30×100×3	L30×100×3	L30×100×3	L30×100×3	L60×100×3	L50×100×3	L70×100×3	L60×100×3	L90×100×3	L80×100×3		
2,0	L30×100×3	L30×100×3	L30×100×3	L30×100×3	L60×100×3	L50×100×3	L70×100×3	L50×100×3	L80×100×3	L80×100×3	7.0	9.5
1,5	L30×100×3	L30×100×3	L30×100×3	L30×100×3	L50×100×3	L40×100×3	L60×100×3	L50×100×3	L70×100×3	L70×100×3		
1,0	L30×100×3	L30×100×3	L30×100×3	L30×100×3	L50×100×3	L40×100×3	L60×100×3	L50×100×3	L60×100×3	L60×100×3	3.5	4.7
0,5	L30×100×3	L30×100×3	L30×100×3	L30×100×3	L50×100×3	L40×100×3	L50×100×3	L50×100×3	L60×100×3	L60×100×3		

Accessories: Suspension Loop JRH

The following suspension loop and corresponding longitudinal reinforcement made of stainless steel wire can be used for hidden support above openings with a course of bricks laid upright or on edge:

- JRH 0 for a thickness of the edge course of 115 mm and JVA+ N bracket
- JRH 11 for a thickness of the edge course of 115 mm
- JRH 24 for a thickness of the edge course of 240 mm

Hidden Support over a Window Opening with JVA+ F and Suspension Loops and Stainless Steel Wire ESD

Material and Design

- Corrosion resistance class III

Ordering Example

Brickwork Support

Bracket JVA+ F

Type	Canti-levered length L	Angle length L_w	Type	Load Cate-gory	Angle Dimen-sions
JVA+	190 –	1490 –	F /	7.0	(L70 × 100 × 3)

In addition, the bracket back recesses Lk1 / La / Lk2 should be specified, e.g.:

L_{k1}	L_a	L_{k2}
245	750	245

Suspension Loop

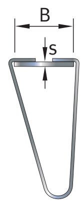
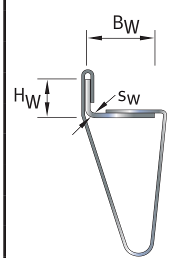
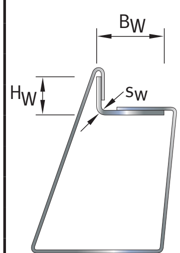
for L70 × 100 × 3, thickness of edge course of 115 mm

Type and Design		Thickness of the Course of Bricks Laid on Edge
JHR 5	/	11.5

Special shapes available on request

Stainless Steel Wire

Type	∅	Length
ESD	4	3000

Suspension Loop Form	Suspension Loop Type	Edge Course Thickness [mm]	∅ [mm]	Suitable for Angled Bracket with H_w [mm]	B_w [mm]	S_w [mm]
	JRH 0 / 11.5	115	4	Bracket type JVA+ N, support plate		
	JRH 1 / 11.5	115	4	30	80–100	3–8
			4	35		
	JRH 2 / 11.5		4	40		
			4	45		
	JRH 3 / 11.5		4	50		
			4	55		
	JRH 4 / 11.5		4	60		
			4	65		
	JRH 5 / 11.5		4	70		
			4	75		
	JRH 6 / 11.5		4	80		
			4	85		
	JRH 7 / 11.5		4	90		
			4	95		
	JHR 11 / 24.0	240	4	30	80–100	3–8
			4	35		
	JHR 12 / 24.0		4	40		
			4	45		
	JHR 13 / 24.0		4	50		
			4	55		
	JHR 14 / 24.0		4	60		
			4	65		
	JHR 15 / 24.0		4	70		
			4	75		
	JHR 16 / 24.0		4	80		
			4	85		
	JHR 17 / 24.0		4	90		
			4	95		
	ESD	/	4	In lengths up to 3000 mm		

Single Bracket JVA+ NFT / NAFT

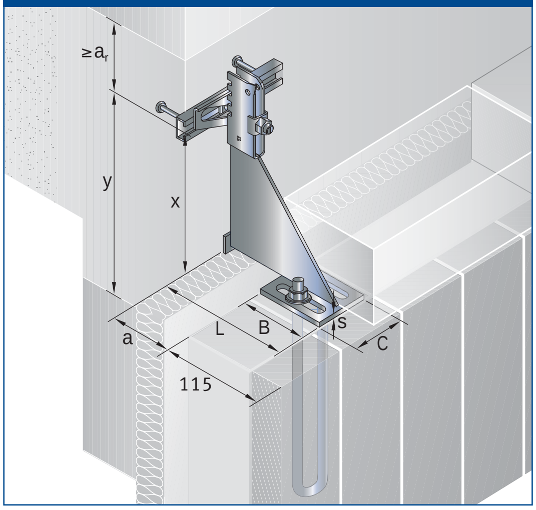
The JORDAHL® Brackets JVA+ NFT/NAFT can be used in the area of openings which are supported with prefabricated lintels and which do not have a side support.

- Type JVA+ NFT
- Type JVA+ NAFT is the version for support scenarios with an offset height

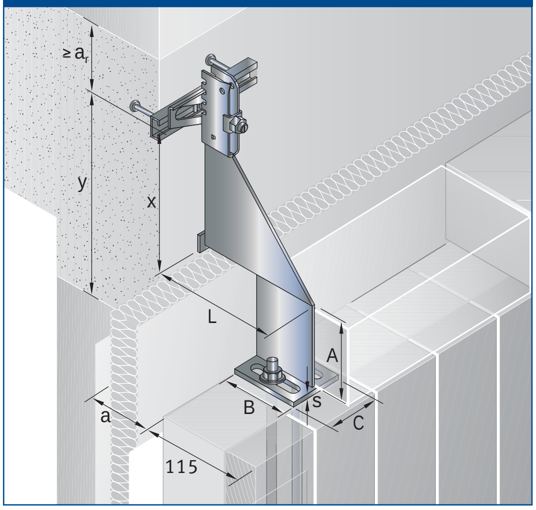
Calculation

When calculating the present loads, the own weight of the supported facing masonry, the weight of the suspended prefabricated lintel need to be taken into account as well as the definitions contained in DIN 1053-1 and the characteristics of the particular design and structure.

Bracket NFT for the Suspension of Prefabricated Lintels



Bracket NAFT for Suspension with a Height-Offset above Prefabricated Lintels



Installation Dimensions and Permissible Loads for Type JVA+ NFT / NAFT

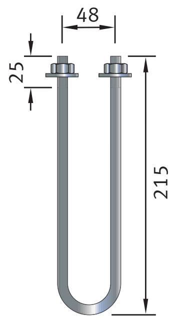
Brackets JVA+ NFT JVA+ NAFT	Gap between Walls a (± 10)	Cantilevered Length[1]) L	Load Category 3.5 F_{Rd} = 4.7 kN Installation Dimensions		Load Category 7.0 F_{Rd} = 9.5 kN Installation Dimensions		Load Category 10.5 F_{Rd} = 14.2 kN Installation Dimensions	
	[mm]	[mm]	x [mm]	y [mm]	x [mm]	y [mm]	x [mm]	y [mm]
JVA+140-... ▾ JVA+210-...	50 ▾ 120	140 ▾ 210	150	200	200	250	250	300
JVA+220-... ▾ JVA+270-...	130 ▾ 180	220 ▾ 270	175	225	250	300	300	350
JVA+280-... ▾ JVA+330-...	190 ▾ 240	280 ▾ 330	200	250	300	350	350	400
Support plate C × B × s [mm] Recommended JORDAHL® anchor channel Corresponding JORDAHL® bolt			80 × 80 × 4 JTA K 38 / 17-200 Type JH, M 12×70 T (A4-50)		80 × 80 × 5 JTA K 50/30 Type JB, M 12×80 T (A4-70)		JT 80 × 85 × 6 JTA K 53 / 34 Type JB, M 16×85 T (A4-50)	

[1]) Required cantilevered length = gap between walls + 90 mm

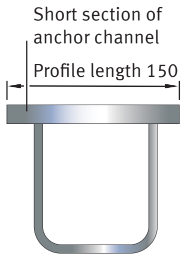
Accessories: Suspension Systems JGS and JFT

Suspension of Prefabricated Lintels
The prefabricated lintels are preferably fitted with prefabricated holders or threaded loops which are cast in-situ and suspended from the brackets by these. The structural engineer or prefabricated component manufacturer has the responsibility of providing static proof of the prefabricated lintel.

Bracket JVA+ NFT for the Suspension of Prefabricated Lintels



Threaded Loops JGS



JORDAHL® Prefabricated Part Holder JFT

Fastening Equipment for Prefabricated Lintels			
Load Category	F_{Rd} [kN]	Threaded Loops JGS [mm], with Fastening Equipment	JORDAHL® Anchor Channel JFT (Short Section) with Fastening Equipment
3.5	4.7	**JGS M8** 2× U-washer 8.4 EN ISO 7093-1 A4 2× nut M8 DIN 934	**JFT-K 28/15** 2 × JORDAHL® bolt Type JD M 10 × 30 (A4-50) 2 × U-washer 10.5 EN ISO 7093-1 A4 2 × nut M 10 DIN 934
7.0	9.5	**JGS M8** 2× U-washer 8.4 EN ISO 7093-1 A4 2× nut M8 DIN 934	**JFT-K 38/17** 2 × JORDAHL® bolt Type JH M 10 × 30 (A4-50) 2 × U-washer 10.5 EN ISO 7093-1 A4 2 × nut M 10 DIN 934
10.5	14.2	**JGS M10** 2× U-washer 10.5 EN ISO 7093-1 A4 2× nut M10 DIN 934	**JFT-K 50/30** 2 × JORDAHL® bolt Type JB M 12×40 (A4-50) 2 × U-washer 13 EN ISO 7093-1 A4 2 × nut M 12 DIN 934

Ordering Example
Bracket JVA / NAFT

Type	Cantilevered Length L	Type	Load Category	Offset
JVA+	190	– NAFT /	3.5	A = 100

Threaded Loop JGS for load category 7.0

Type	∅
JGS M	8

JORDAHL® Prefabricated Part Holder JFT for load category 3.5

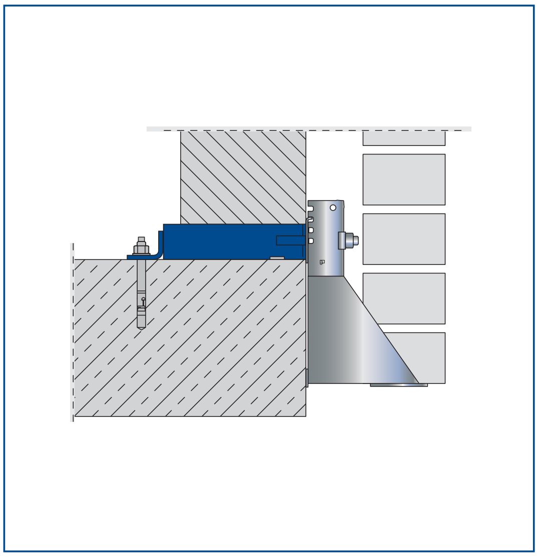
Type		Profile Type
JFT	–	K 28/15

Special shapes available on request

Individually Tailored Brackets

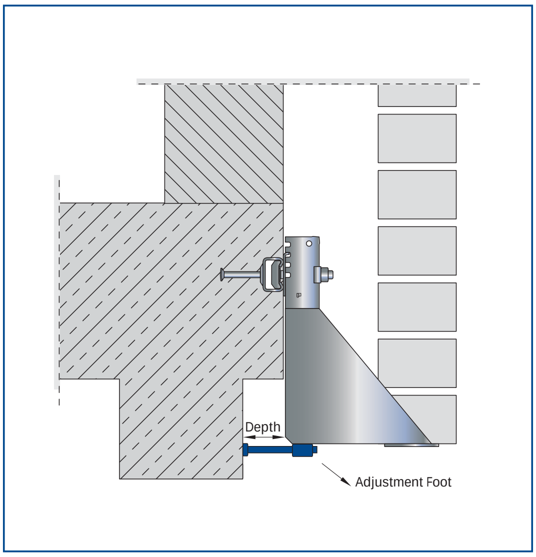
The special versions shown here only represent a small snapshot of what we can do. We can offer individually tailored brackets for any scenario. Please contact us – we would be happy to offer our advice and support.

Mounting on Thin Floors



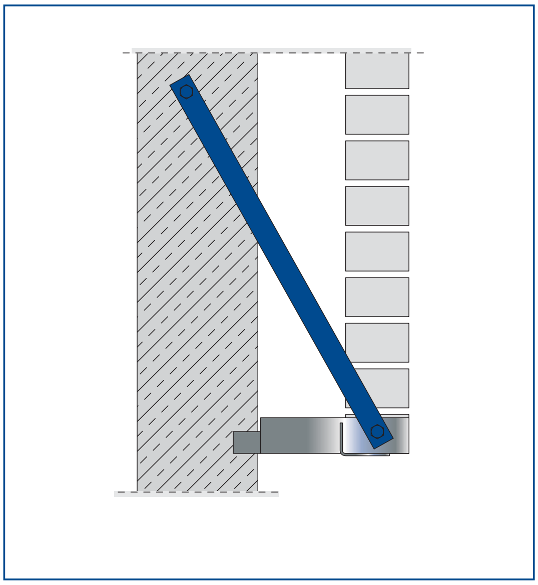
Standard bracket with additional component type JVA+ ZB, for mounting on thin floors

Adjustment Foot



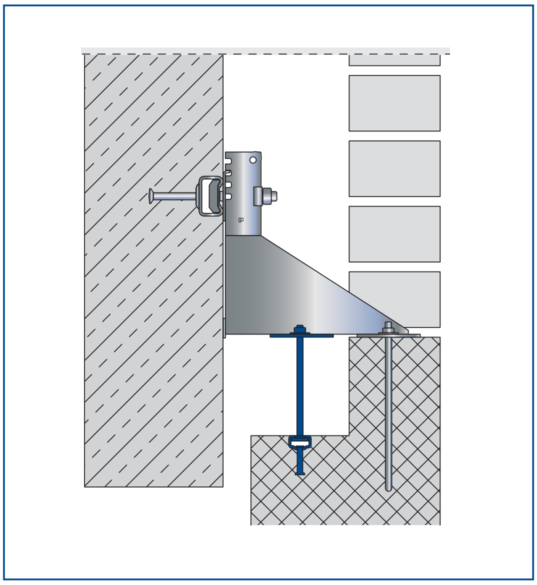
Special bracket with adjusting screw for depth adjustment

Attachment Close to Edges



Special bracket with tie strap

Fastening of L-Lintels



Special bracket with additional support plate for securing the position to the back

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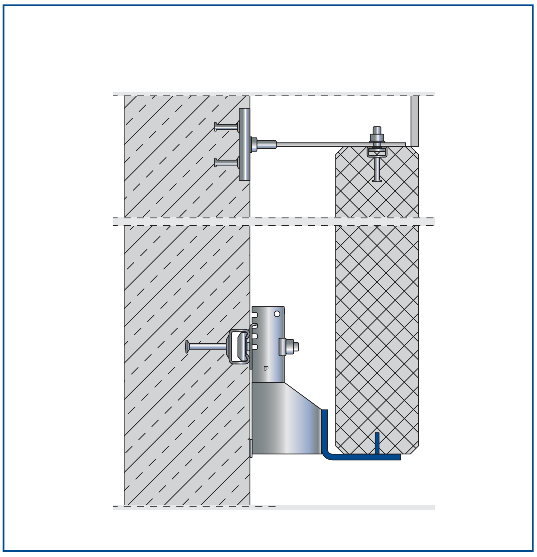
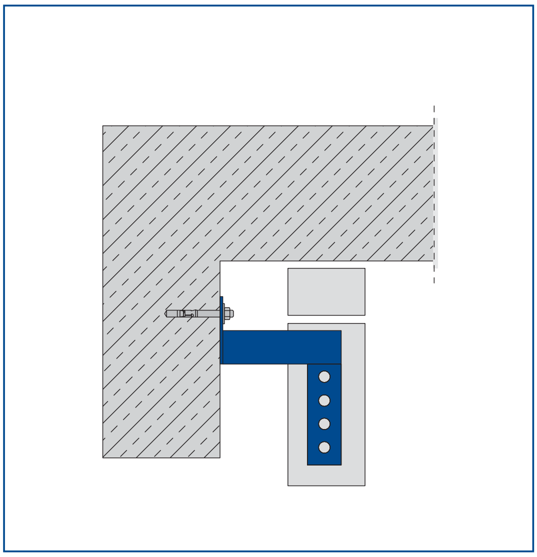
anchored in quality

Mounting of Visible Concrete Elements



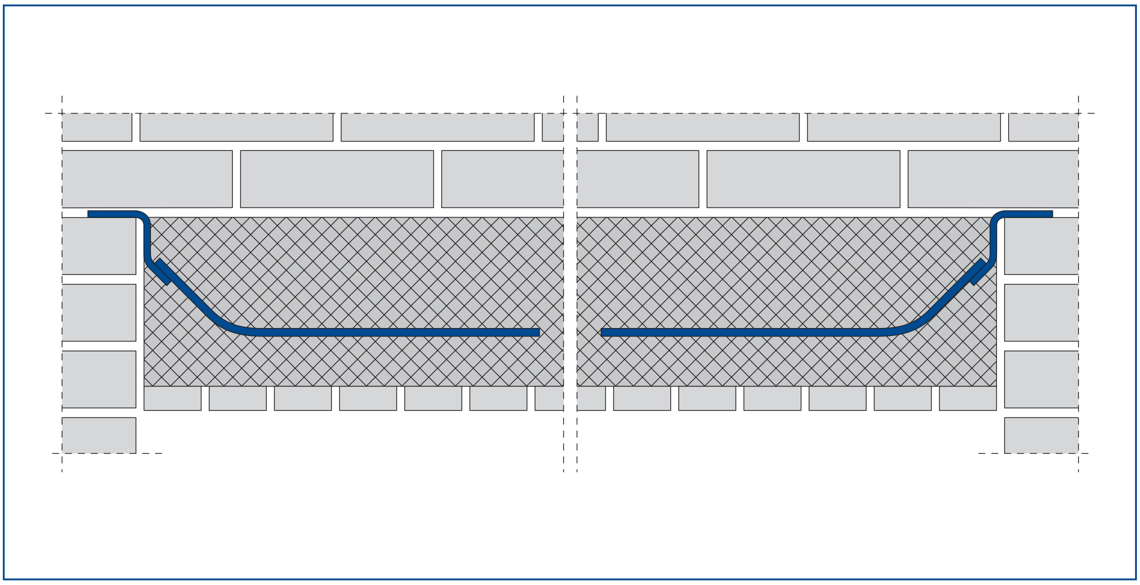
Special bracket for prefabricated elements and tilting holder

Attachment for Low Brickwork Heights



Special bracket for lintels for courses of bricks laid on edge or upright

Pre-cast Support Bracket



Special bracket for prefabricated lintels, type JAW

JORDAHL® Brickwork Support Systems

Angled Brackets L-F+, L-DF+, L-DN+

The Angled Brackets L-DF+, L-DN+ and L-F+ are simple, efficient supporting systems without vertical adjustment options. They are used if the support is visible and the air layer and insulation need to be fully covered.

- Type L-DF+: angled bracket with diagonal reinforcement strut for visible support with fully covered reinforcement insulation and air gap
- Type L-F+: angled bracket without diagonal strut for small gap between walls a; enables variable distribution of the facing bricks on the bracket with fully covered insulation and air gap
- Type L-DN+: single bracket with diagonal reinforcement

Angled brackets are attached via continuous anchor channels or dowels. Horizontal alignment is made possible on the L-DF+ and L-F+ angled brackets by means of the slots LL11 × 30 (spacing of 25 cm).

Available Lengths

The brackets L-DF+ and L-F+ are available in lengths from 490 to 2000 mm. Other lengths are available on request.

Angled Bracket L-F+ without Diagonal Reinforcement Strut

Installation Dimensions and Permissible Loads for Type L-F+						
Brackets L-F+	Gap between Walls a (± 10)	Load Category	F_{Rd}	Angled Bracket Dimensions $H_W \times B_W \times s_W$	Installation Dimensions	
	[mm]		[kN]	[mm]	x [mm]	y [mm]
L-F+110-…/…	0–20	1.2	1.6	110 × 110 × 4	84	y > x + 25 mm
		2.1	2.8	110 × 110 × 5	83	
		3.2	4.3	110 × 110 × 6	82	
L-F+130-…/…	20–40	1.2	1.6	130 × 130 × 4	104	
		2.1	2.8	130 × 130 × 5	103	
		3.2	4.3	130 × 130 × 6	102	

Ordering Example

Bracket L-F+

Type	Cantilevered Length L		Angle Length L_W		Load Category
L-F+	110	–	1000	/	2.1

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Angled Bracket L-DF+ with Diagonal Reinforcement Strut

Single Bracket L-DN+ with Diagonal Reinforcement Strut

Installation Dimensions and Permissible Loads for Types L-DF+ and L-DN+

Brackets L-DF+ LDN+	Gap between Walls a (± 10)	Load Category	F_{Rd}	Angled Bracket Dimensions $H_W \times B_W \times s_W$	Installation Dimensions	
	[mm]		[kN]	[mm]	x [mm]	y [mm]
L-DF/DN+130 -…	40	1.5	2.0	130 × 130 × 3	105	y > x + 25 mm
		3.2	4.3	130 × 130 × 5	103	
L-DF/DN+150 -…	60	1.5	2.0	150 × 150 × 3	125	
		3.2	4.3	150 × 150 × 5	123	
L-DF/DN+170 -…	80	1.5	2.0	170 × 170 × 3	145	
		3.2	4.3	170 × 170 × 5	143	
L-DF/DN+190 -…	100	1.5	2.0	190 × 190 × 3	165	
		3.2	4.3	190 × 190 × 5	163	
L-DF/DN+210 -…	120	1.5	2.0	210 × 210 × 3	185	
		3.2	4.3	210 × 210 × 5	183	
L-DF/DN+230 -…	140	1.5	2.0	230 × 230 × 3	205	
		3.2	4.3	230 × 230 × 5	203	
L-DF/DN+250 -…	160	1.5	2.0	250 × 250 × 3	225	
		3.2	4.3	250 × 250 × 5	223	
L-DF/DN+270 -…	180	1.5	2.0	270 × 270 × 3	245	
		3.2	4.3	270 × 270 × 5	243	
L-DF/DN+290 -…	200	1.5	2.0	290 × 290 × 3	265	
		3.2	4.3	290 × 290 × 5	263	
L-DF/DN+310 -…	220	1.5	2.0	310 × 310 × 3	285	
		3.2	4.3	310 × 310 × 5	283	
L-DF/DN+330 -…	240	1.5	2.0	330 × 330 × 3	305	
		3.2	4.3	330 × 330 × 5	303	

Ordering Example

Bracket L-DF+

Type	Cantilevered Length L		Angle Length L_w		Load Category
L-DF+	190	–	990	/	3.2

Ordering Example

Bracket L-DN+

Type	Cantilevered Length L		Load Category
L-DN+	190	/	3.2

Grout-in Brackets JMK+

Area of Application
Grout-in brackets can be used when existing buildings are to be retrofitted with a brickwork support. For this purpose sufficiently deep support pockets are grilled into the supporting masonary and the brackets can be mortised using Group III cement mortar (expansion concrete). Alternatively the holes can be grouted. Grout-in brackets can absorb forces of $F_{Rd} = 4.7$ kN or $F_{Rd} = 9.5$ kN:

- Grout-in brackets JMK+ N / JMK+ NA / JMK+ NU
- Grout-in brackets JMK+ P / JMK+ PAR
- Grout-in brackets JMK+ F / JMK+ FAR
- Grout-in brackets JMK+ NFT / JMK+ NAFT
- Grout-in brackets JMK+ E / JMK+ EA (for exterior corners of buildings)

Brickwork Height
The maximum brickwork height per support level for an element separation of 50 cm and assuming standard format bricks and a density of 18 kN/m³, is H = 6.75 m maximum.

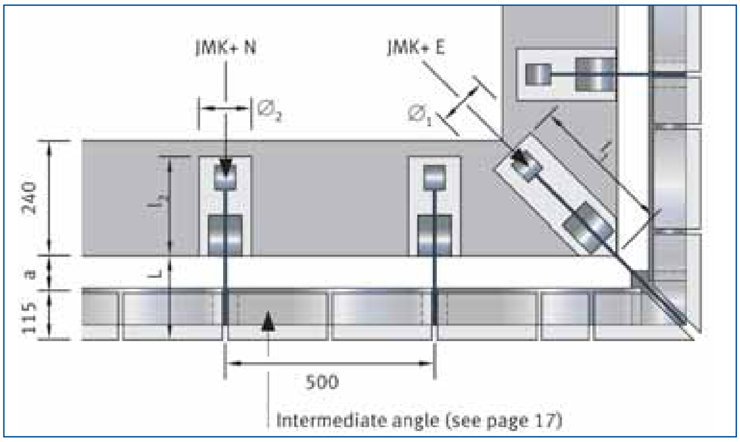
Prerequisites
The static prerequisites must be checked beforehand. The compressive strength of the existing masonary (thickness d ≥ 24 cm) must be at least $f_d = 2.1$ N/mm². In the case of lower compressive strength or thinner masonary wall thickness a special solution is required. The load transferred into the masonary must be taken into account structurally. Masonary or foundations must be capable of reliably absorbing the additional loads at brickwork.

Accessories
- Intermediate angle brackets JW (see page 17) for grout-in brackets of type JMK+ N / JMK+ NA / JMK+ E / JMK+ EA
- Edge-course support JRH (see page 23)
- Threaded hoops JGS and pre-cast brackets JFT (see page 25) for grout-in brackets JMK+ NFT / JMK+ NAFT

JMK+ P bracket assembly

JMK+ P bracket installation

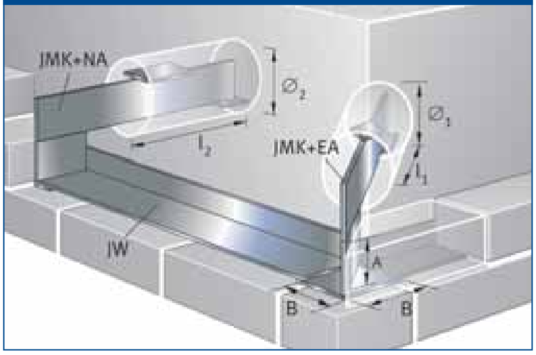
Corner Brackets JMK+ E/-EA



Plan view of the arrangement of the grout-in brackets JMK+ N und JMK+ E

Grout-in Brackets JMK+ and Corner Grout-in Brackets JMK+ E

Grout-in Brackets JMK+ NA and Corner Grout-in Brackets JMK+ EA



Installation Dimensions and Permissible Loads JMK+ E

Type	Gap between Walls a [mm]	Cantilevered Length [1)] L [mm]	Load Category	F_{Rd} [kN]	Core Bore $\varnothing_1$ [mm]	Core Bore Length l_1 [mm]
JMK+110-E ▼ JMK+160-E	20 ▼ 70	110 ▼ 160	3.5	4.7	140	250
JMK+170-E ▼ JMK+210-E	80 ▼ 120	170 ▼ 210			150	
JMK+220-E	130	220			160	
JMK+230-E ▼ JMK+290-E	140 ▼ 200	230 ▼ 290			170	
JMK+300-E ▼ JMK+310-E	210 ▼ 220	300 ▼ 310			180	
JMK+320-E ▼ JMK+330-E	230 ▼ 240	320 ▼ 330			190	

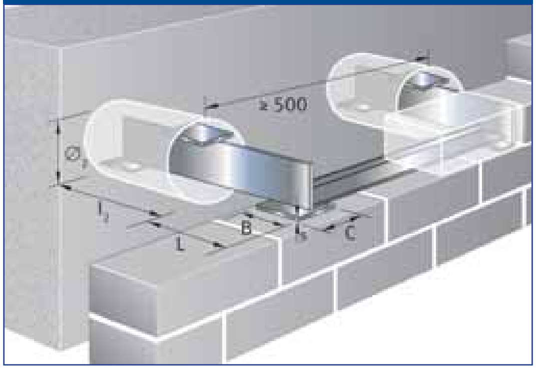
Installation Dimensions and Permissible Loads Type JMK+ EA

Type	Gap between Walls a [mm]	Cantilevered Length [1)] L [mm]	Load Category	F_{Rd} [kN]	Core Bore $\varnothing_1$ [mm]	Core Bore Length l_1 [mm]
JMK+110-EA ▼ JMK+170-EA	20 ▼ 80	110 ▼ 170	7.0	9.5	170	280
JMK+180-EA ▼ JMK+210-EA	90 ▼ 120	180 ▼ 210			180	
JMK+220-EA	130	220			190	
JMK+230-EA ▼ JMK+280-EA	140 ▼ 190	230 ▼ 280			200	
JMK+290-EA ▼ JMK+320-EA	200 ▼ 230	290 ▼ 320			210	
JMK+330-EA	240	330			220	

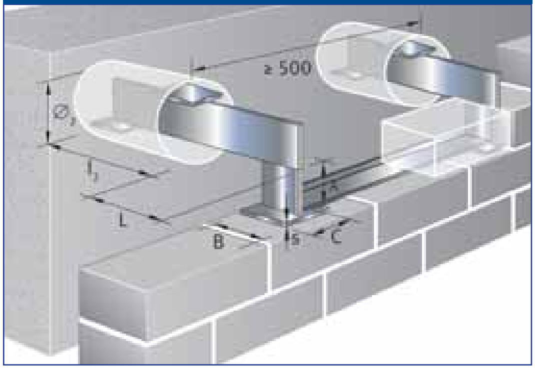
[1)] Required cantilever length = gap between walls + 90mm

Standard Brackets JMK+ N/ -NA/ -NU/ -NFT/ -NAFT/ -P/ -PAR/ -F/ -FAR

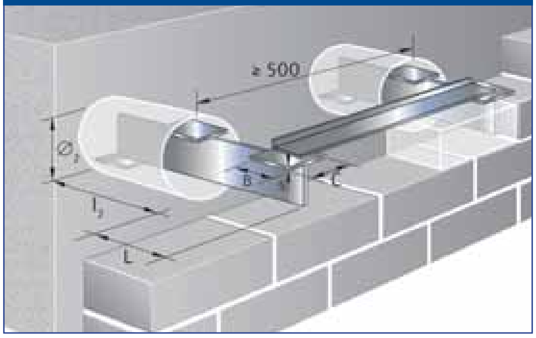
Grout-in Bracket JMK+ N



Grout-in Bracket JMK+ NA



Grout-in Bracket JMK+ NU



Grout-in Bracket JMK+ P

Grout-in Bracket JMK+ PAR

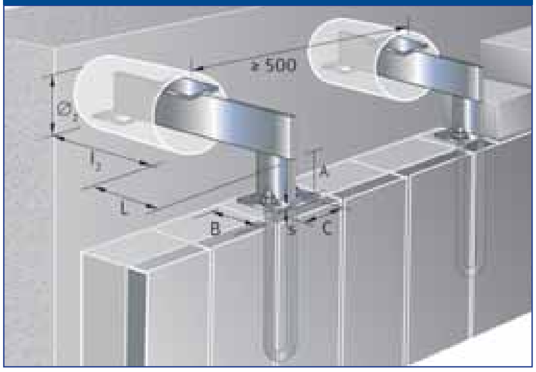
Installation Dimensions and Permissible Loads Type JMK+ N / -NA / -NU / -NFT / -NAFT / - P / -PAR / -F / -FAR

JMK+ N / -NA / -NU / -NFT / -NAFT - P / -PAR / -F / -FAR	Gap between Walls a [mm]	Cantilevered Length [1] L [mm]	Load Category	F_{Rd} [kN]	Core Bore $\varnothing_2$ [mm]	Core Bore Length l_2 [mm]
JMK+110-... ▼ JMK+160-...	20 ▼ 70	110 ▼ 160	3.5	4.7	90	205
JMK+170-... ▼ JMK+190-...	90 ▼ 100	170 ▼ 190			100	
JMK+200-... ▼ JMK+290-...	110 ▼ 200	200 ▼ 290			110	
JMK+300-... ▼ JMK+330-...	210 ▼ 240	300 ▼ 330			120	

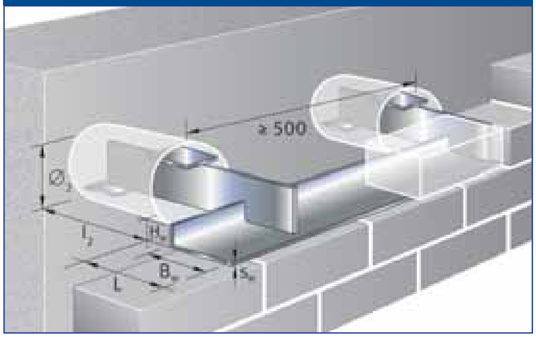
[1] Required cantilever length = gap between walls + 90mm

Grout-in Bracket JMK+ NFT

Grout-in Bracket JMK+ NAFT



Grout-in Bracket JMK+ F



Grout-in Bracket JMK+ FAR

Installation Dimensions and Permissible Loads Type JMK+ N / -NA / -NU / -NFT / -NAFT / - P / -PAR / -F / -FAR

JMK+ N / -NA / -NU / -NFT / -NAFT - P / -PAR / -F / -FAR	Gap between Walls a [mm]	Cantilevered Length [1] L [mm]	Load Category	F_{Rd} [kN]	Core Bore $\varnothing_2$ [mm]	Core Bore Length l_2 [mm]
JMK+110-... ▾ JMK+140-...	20 ▾ 50	110 ▾ 140	7.0	9.5	130	205
JMK+150-... ▾ JMK+180-...	60 ▾ 90	150 ▾ 180	7.0	9.5	140	205
JMK+190-... ▾ JMK+240-...	100 ▾ 150	190 ▾ 240	7.0	9.5	150	205
JMK+250-... ▾ JMK+330-...	160 ▾ 240	250 ▾ 330	7.0	9.5	160	205

[1] Required cantilever length = gap between walls + 90mm

Ordering Example

Type	Cantilevered length L		Type		Load Category
JMK+	190	–	N	/	3.5

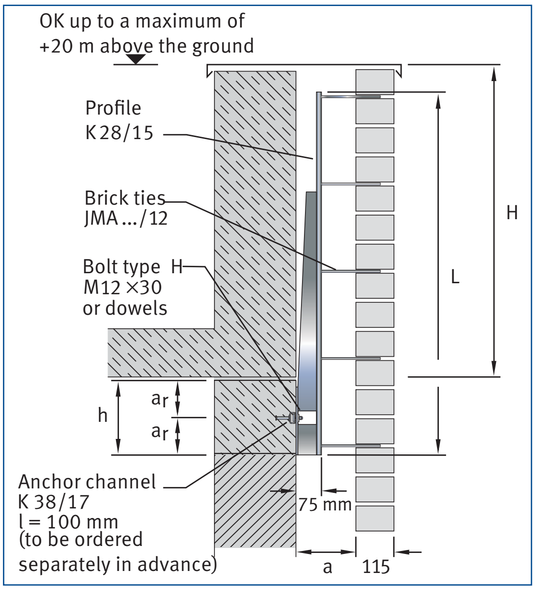
Attic Brick Anchors JAV

Flat reinforced concrete roofs can become deformed under the effects of temperature loads and mechanical loads. As a result, flat roofs made of reinforced concrete are usually supported on sliding bearings on the lower walls. The facing masonry is not capable of absorbing the deformations of the attic area without sustaining damage. Facing masonry which extends right up to the upper edge of the roof must therefore not be anchored in the area of the attic area. Attic brick anchors JAV are anchored in the ring beam of the lower wall in order to freely secure the facing shell up to the upper edge of the attic area.

Accessories
Brick ties, type JMA (see page 37)

Installation Distances
Attic brick anchors are installed at a maximum distance of 75 cm to each other and 37.5 cm to the edge or to the corner:
Wall area ≤ 75 cm
Edge area ≤ 37.5 cm

Attic Brick Anchors JAV



Installation Dimensions and Permissible Loads for Type JAV					
Attic brick Anchors	Length L [mm]	Useful Height [1)] H [mm]	Required Number of Brick Ties	Wall Distance a [mm]	Brick Tie Type
JAV / 75 / 600	600	400–550	3	80–110	JMA 85/12
				90–145	JMA 120/12
				145–200	JMA 180/12
JAV / 75 / 850	850	650–800	4	80–110	JMA 85/12
				90–145	JMA 120/12
				145–200	JMA 180/12
JAV / 75 / 1100	1100	900–1000	5	80–110	JMA 85/12
				90–145	JMA 120/12
				145–200	JMA 180/12

[1)] Greater wall distances available on request

Ordering Example

Type	Construction Depth	Length L [mm]
JAV	75	600

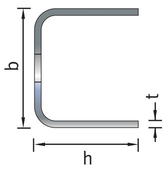
Wind Posts JWP

JORDAHL® wind posts and the associated JORDAHL® brick ties JMA are used to stiffen facing masonry and absorb wind loads (wind pressure and wind suction) on reinforced concrete structures. They are fastened to the horizontal member / ceiling made of reinforced concrete and thus bridge the thermal insulation area and / or the lightweight walls.

The design load is 0.75 kN/m. The distance of the JORDAHL® wind posts e [m] thus results from the quotient of $q_{R,d}$ [kN/m] and the existing wind load $w_{E,d}$ [kN/m²] in accordance with DIN 1055-4:2005-03. Different dimensions, loads and types of attachment are possible.

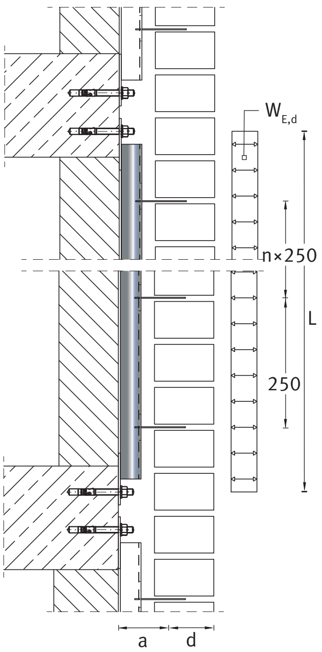
Please contact us for more information. JORDAHL® wind posts, brick ties and the associated fastening materials are made of stainless steel which satisfies the requirements for corrosion resistance class III.

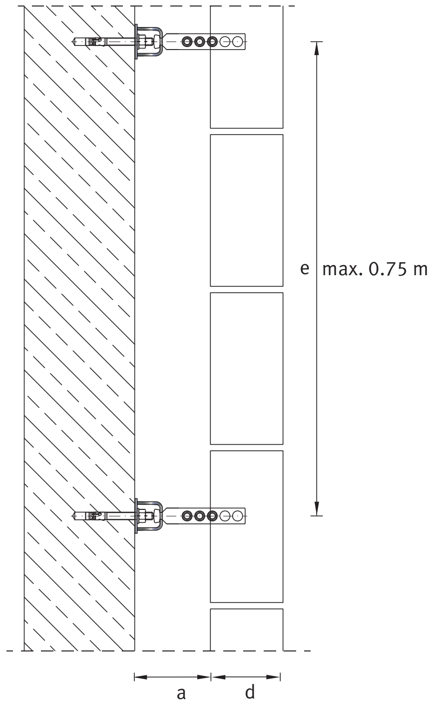
Wind Post JWP



L [m]	Profile Dimensions [1] w × h × d [mm]	$q_{R,d}$ [2] [kN/m]	Wall Distance a [cm]	Brick Ties Type
2.50	70 × 60 × 3	0.75	70 – 95 95 – 130 135 – 190	JMA 85/12 JMA 120/12 JMA 180/12
2.75	75 × 65 × 3			
3.00	75 × 65 × 4			
3.25	80 × 70 × 4			
3.50	85 × 75 × 4		85–110 115 – 145 150 – 205	JMA 85/12 JMA 120/12 JMA 180/12
3.75	90 × 80 × 4			
4.00	95 × 85 × 4			

[1] Profile type and profile dimensions according to the static requirements
[2] $q_{R,d}$ = wind resistance of the structure (max. wind load) per metre





Ordering Example for Wind Posts JWP

Type	Dimensions		Length L [mm]
JWP	75 × 65 × 4	–	3000

Ordering Example for Brick Ties JMA

Type	Dimensions		Length L [mm]
JMA	120	/	12

JORDAHL® Brickwork Support Systems

Brick Tie Channels

Brick tie channels and the corresponding brick ties ensure the durable and reliable connection of brickwork to adjacent components. The brick tie channels with rear-facing anchors are cast into reinforced concrete. Mounting channel and/or slotted back mounting channel are used for attachment to wood or steel components.

- Anchor Channels JTA
- Mounting Channel JM
- Kt 25 / 15-D with integrated punched anchors which can be bent out for safe and reliable anchoring even in components from which the formwork is stripped very early on

Brick tie channels are available in various cross-sections.

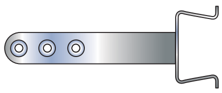
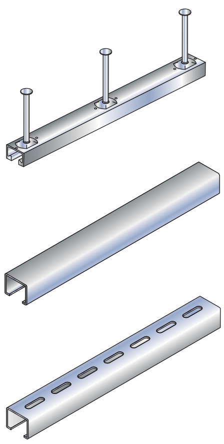
Material

The brick tie channels and brick ties are manufactured from stainless steel 1.4571 or 1.4401 (A4) for use in façade applications. Hot-dip galvanized products can be used for inner applications.

Static Information

All specified load-bearing capacities apply to anchoring in concrete ≥ C20 / 25.

Connection of Facing Shells to Reinforced Concrete Components with Brick Tie Channels Kt 28 / 15-D and Brick Ties

Brick Tie Channels				
Brick Tie Channels	Cross-section Groups	Design	Load-bearing Capacity of the Channels F_{Rd} [kN] at a Distance of 25 cm	Corresponding Brick Ties and Nail Anchors
	Kt 25/15-D with punched anchors	Hdg A4	1.7	**Series 12** JMA-L_2/12 JMA-$L_2 \times L_3$-Q/12 JMA-$L_2 \times L_3$-QE/12 JMA-L-D/12
	JTA K 28 /15 [1)] JM K 28 /15 JML K 28 /15	Hdg A2 A4	4.2	
	JTA K 38 /17 [1)] JM K 38 /17 JML K 38 /17	Hdg A2 A4	6.3	**Series 18** JMA-L_2/18 JMA-$L_2 \times L_3$-Q/18 JMA-$L_2 \times L_3$-QE/18

[1)] General technical approval no. Z-21.4-151.

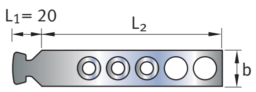
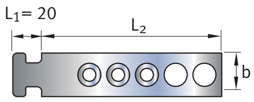
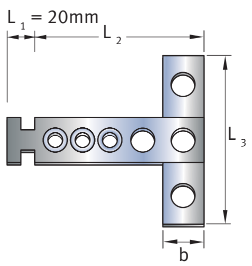
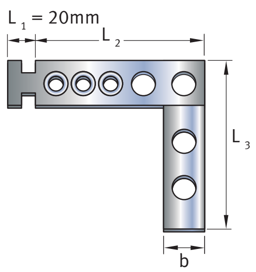
Brick Ties

JORDAHL®
anchored in quality

The brick ties are inserted in the brick tie channels and pressed into the bearing joint mortar of the brick work at the recommended distances.

- Straight design JMA-...
- T-shaped transverse tie, designation $JMA\text{-}L_2 \times L_3\text{-}Q$
- L-shaped transverse tie, designation $JMA\text{-}L_2 \times L_3\text{-}QE$
- Thin-bed brick tie for connection of large areas of brickwork, designation JMA-L-D

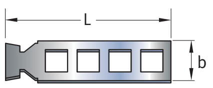
Brick Ties

Brick Ties fv, A4		Gap between Walls	Dimensions			
		a [mm]	b [mm]	t [mm]	L_2 [mm]	L_3 [mm]
	$JMA\text{-}L_2/12$ (Series 12) [1]	20 – 40 40 – 80 85 – 140	25	2	85 120 180	–
		140 – 160		3	300 [2]	
	$JMA\text{-}L_2/18$ (Series 18) [1]	20 – 40 40 – 80 85 – 140 140 – 160	25	3	85 120 180 300 [2]	–
	$JMA\text{-}L_2 \times L_3\text{-}Q/12$ (Series 12) [1]	20 – 40 40 – 80 85 – 140	25	2	85 120 180	120 180 300
		140 – 160		3	300 [2]	
	$JMA\text{-}L_2 \times L_3\text{-}Q/18$ (Series 18) [1]	20 – 40 40 – 80 85 – 140 140 – 160	25	3	85 120 180 300 [2]	
	$JMA\text{-}L_2 \times L_3\text{-}QE/12$ (Series 12) [1]	20 – 40 40 – 80 85 – 140	25	2	85 120 180	120 180 300
		140 – 160		3	300 [2]	
	$JMA\text{-}L_2 \times L_3\text{-}QE/18$ (Series 18) [1]	20 – 40 40 – 80 85 – 140 140 – 160	25	3	85 120 180 300 [2]	

[1] Refer to page 36 for the corresponding brick tie channels

[2] The required length L_2 should be determined taking the thickness of the facing masonry shell into account (minimum anchoring depth 5 cm).

Thin-Bed Brick Tie

Thin-bed Brick Tie JMA-L-D/12, Series 12 A2	Cross-Sections		Length
	b [mm]	t [mm]	L [mm]
	25	1	125
			185
			245

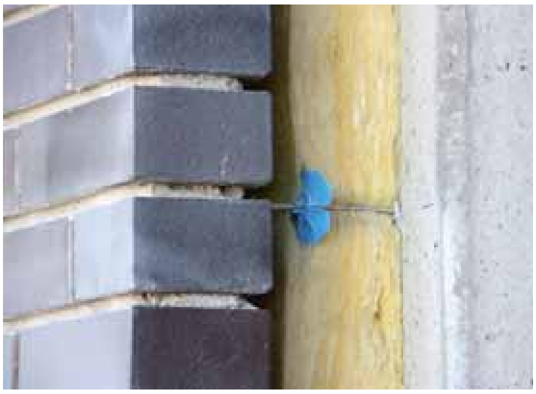
Ordering Example

Brick Tie JMA-QE

Type	Length $L_2 \times L_3$ [mm]	Design	Series
JMA –	85 × 120 –	QE /	12

JORDAHL® Brickwork Support Systems

Cavity Wall Ties LSA

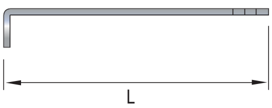
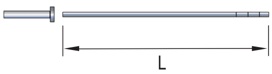


The facing masonry forms a thin shell. This needs to be protected against buckling, and the supporting structure also needs to be capable of deflecting even high wind loads into the load-bearing component. Depending on the material of the load-bearing inner wall, this role is fulfilled by cavity wall ties in accordance with DIN 1053-1 or brick ties made of flat steel.

Cavity Wall Tie
Cavity wall ties safely and reliably connect brickwork to walls and protect the walls against horizontal forces.

- Cavity wall ties LSA W-L: for two-lead brickwork with and without thermal insulation. The wavy form prevents bending
- Dowel anchors LSA D-ZV: pre-assembled cavity wall ties for retrofit facing of brickwork walls made of solid brick and / or concrete walls. The wavy form prevents bending.
  A hammering-in tool is included with every packaging unit.

Material
Stainless steel W1.4571 or 1.4401 (A4)

Type	Gap between Walls [1] [mm]	Designation	Area of Application: Internal Shell	Area of Application: External Shell
Cavity Wall Tie LSA W-L 	125	W-L-3 / 250	Brickwork in accordance with DIN 1053-1	Brickwork in accordance with DIN 1053-1
	175	W-L-3 / 300		
	100	W-L-4 / 225		
	125	W-L-4 / 250		
	150	W-L-4 / 275		
	175	W-L-4 / 300		
	215	W-L-4 / 340		
Dowel Anchors LSA D-ZV  Incl. tapping-in tool [2]	25	D-ZV-4 / 160	Concrete › B15 Brickwork ≥ Mz 12 ≥ KSV 12	Brickwork in accordance with DIN 1053-1
	45	D-ZV-4 / 180		
	75	D-ZV-4 / 210		
	115	D-ZV-4 / 250		
	140	D-ZV-4 / 275		
	165	D-ZV-4 / 300		
	185	D-ZV-4 / 320		
	200	D-ZV-4 / 350		

[1] Up to a gap between walls of 150 mm in accordance with DIN 1053-1; at a gap between walls above 150 mm but no more than 200 mm in accordance with the manufacturer's approval; anchors for gap between walls above 200 mm on request
[2] 1 tapping-in tool included with each packaging unit (250 pieces)

Excerpts from DIN 1053-1, section 8.4.3.1 DIN1053-1, November 1996, Brickwork, contains the following relevant passages relating to the anchoring of facing shells:

e) The brickwork shells are to be connected using wire anchors made of stainless steel with the material numbers 1.4401 or 1.4571 in accordance with DIN EN 10 088 (Table 11). In terms of form and dimensions, the wire anchors must correspond to Fig. 9. ...

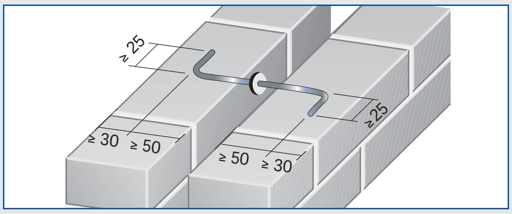


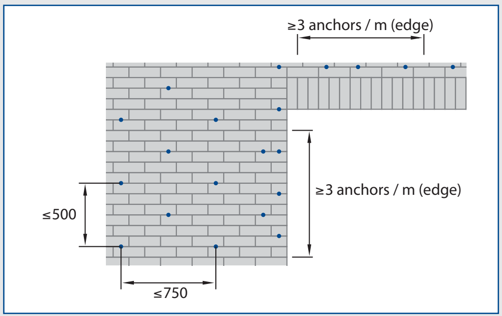
Fig. 9: Anchoring of facing shells with cavity wall ties to the masonry in accordance with DIN 1053-1

The vertical distance between wire anchors should not exceed 500 mm, the horizontal distance should be no more than 750 mm. ...

DIN 1053-1, Table 11: Minimum Number and Diameter [mm] of Wire Anchors per Square Metre of Wall Surface [1)]		
	Wire Anchors	
	Minimum Number	Diameter
1. Minimum number unless criteria 2 or 3 apply	5	3
2. Wall area higher than 12 m above ground or distance between masonry shells between 70 and 120 mm	5	4
3. Distance between masonry shells between 120 and 150 mm	7 5	4 5

[1)] Gap between walls between 150 mm and 200 mm according to manufacturer's approval, above 200 mm on request

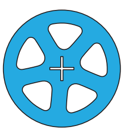
At all free edges (of openings, corners of buildings, along expansion joints and at the upper ends of the external shells), three wire anchors should be provided per metre of edge length in addition to the specifications in Table 11. Other anchoring types of wire anchors are permitted if it is demonstrated with a test certificate that the anchoring type can absorb a tensile force and a compressive force of at least 1 kN with slip of 1.0 mm per wire anchor. If one of these values is not attained then the number of wire anchors should be increased accordingly. Whilst making sure that the wire anchors should attain their structural properties, they should also be designed in such a way that they cannot conduct moisture from the external shell to the internal shell (e. g. by sliding on a plastic washer, Fig. 9). Other anchor forms (e.g. flat steel anchors) and dowels in the brickwork are permissible provided their usefulness has been verified in accordance with the relevant building regulations, e.g. through general building regulations approval. Without compromising their static efficacy, the wire anchors shall be executed in such a way that they cannot conduct any moisture from the external shell to the internal shell (e.g. by pushing on a plastic disc). Other anchor forms (e.g. flat steel anchors) and dowels in the brickwork are permissible provided their suitability is demonstrated in accordance with the technical building approval regulations, e.g. through a general technical approval.



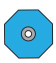
Arrangement of air anchors in the wall area, at joints and edges according to DIN 1053-1

Accessories

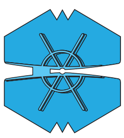
- Water barrier disc, suitable for all cavity wall ties ∅ 3 mm + 4 mm
- Insulation holder with drip nose made of plastic, ∅ 60 mm
- ISO-CLIP, combination of water barrier disc and Insulation Holder with drip nose



Insulation Holder with drip nose



Water barrier disc



ISO-CLIP

Ordering Example

Cavity wall tie L

Type		∅		Length L [mm]
W-L	–	4	/	250

Special shapes available on request

JORDAHL® Brickwork Support Systems

Scaffold Anchors JGA+ Q / Z

Scaffold anchors secure scaffolding and work equipment to the completed structure without damaging the facing shell. They are attached with dowels to the load-bearing structure and connected through the T-joint in the facing shell. They are used for:

- Attachment of scaffolding which would not be stable if left free-standing
- Attachment of advertising hoardings

In Germany, the anchoring of scaffolding is covered by two DIN standards. DIN 4420-3 contains rules for anchoring pipe coupling scaffolds and DIN 4426 the rules for anchoring scaffolding systems.

Product Variants

- Scaffold Anchors JGA+ Z dissipate forces acting perpendicularly on the external wall
- Scaffold Anchors JGA+ Q dissipate forces acting perpendicularly on and parallel to the external wall

Accessories

- Dowels for attachment to concrete (quality at least C 20/25 for the certified compression zone or tension zone)
- Grey plastic cap
- Scaffolding eyelet M 12 (eye diameter 23 mm; useful length 40 mm), zinc-plated (to be ordered separately)

Material

JORDAHL® scaffold anchors and dowels are made of stainless steel which meets the requirements for corrosion resistance class III.

Calculation

The load-bearing capacity of the JORDAHL® permanent scaffolding anchors has been calculated and dimensioned in accordance with the requirements of DIN 4426. This standard does not specify a particular grid, but the maximum vertical distance between anchor points must not exceed 4.0 m. A distinction between covered and uncovered scaffolds is not made in DIN 4426. The loads which are applied are $F_\perp$ = 2.25 kN/m and $F_{||}$ = 0.75 kN per metre of façade length. Taking the partial safety factor into account, this yields the following loads:

$$F_{Ed,\perp} = F_\perp \times \gamma_Q = 2.25 \text{ kN/m} \times 1.5 = 3.38 \text{ kN/m}$$

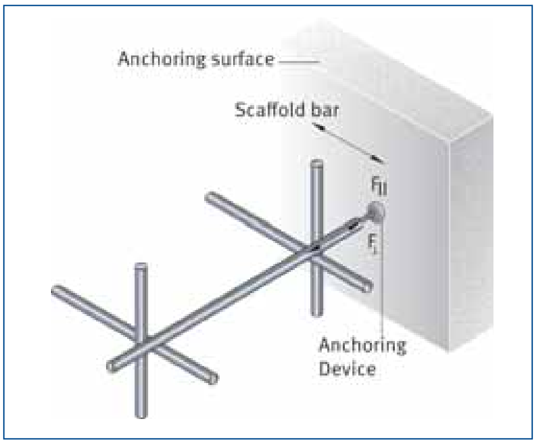
$$F_{Ed,||} = F_{||} \times \gamma_Q = 0.75 \text{ kN/m} \times 1.5 = 1.13 \text{ kN/m}$$

With a normal distance of 2.5 m between stands, this results in the following loads for the scaffold anchors:

$$F_{Ed,\perp} = 3.38 \text{ kN/m} \times 2.5 \text{ m} = 8.45 \text{ kN}$$

$$F_{Ed,||} = 1.12 \text{ kN/m} \times 2.5 \text{ m} = 2.81 \text{ kN}$$

In cases with different distances between anchors, the actions and loads on the scaffold anchors must be calculated and certified in accordance with the relevant DIN standard. Scaffolding which is erected in accordance with DIN 4420-3 can also be anchored with JORDAHL® permanent scaffolding anchors, as the loads which need to be anchored are lower (see DIN 4420-3, Table 3).



Anchoring forces during the connection of scaffolding

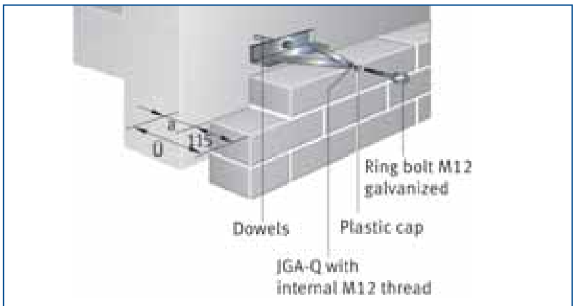
Scaffold Anchors JGA+ Q

JORDAHL® scaffold anchors JGA+ Q transmit tensile forces and compressive forces which are perpendicular to the façade and horizontal forces which are parallel to the façade onto the structure of the building. The anchoring is performed using the specified dowels in cracked or uncracked concrete ≥ C 20 / 25. Static proof for the dowels must always be provided according to the conditions of use.

Designation	Gap between Walls a [mm]	Brick Thick-ness d [mm]	Total Projection Ü [mm]	Matching Dowels
JGA+Q- 150	40 – 55		150	
JGA+Q- 170	60 – 75		170	
JGA+Q- 190	80 – 95		190	
JGA+Q- 210	100 – 115		210	
JGA+Q- 230	120 – 135		230	
JGA+Q- 250	140 – 155	115	250	M 12 [1)]
JGA+Q- 270	160 – 175		270	
JGA+Q- 290	180 – 195		290	
JGA+Q- 310	200 – 215		310	
JGA+Q- 330	220 – 235		330	
JGA+Q- 350	240 – 255		350	

Details for other projections, load categories and anchoring surfaces are available on request.

[1)] Dowels must always be checked and verified on the basis of the existing component geometry, the location of the dowel (tension zone or compression zone) and the existing loads.



Design resistance $F_{Rd,\perp} = \pm 8.6$ kN
$F_{Rd,II} = \pm 2.9$ kN

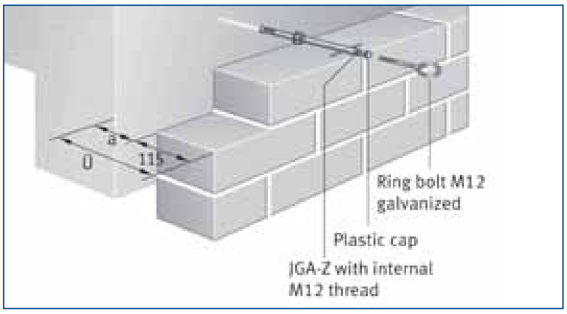
Scaffold Anchors JGA+ Z

JORDAHL® scaffold anchors JGA+ Z transmit tensile forces and compressive forces which act perpendicularly to the façade onto the structure of the building. The anchoring is performed using the specified dowels in cracked or uncracked concrete ≥ C 20 / 25. Provided a shearing check is performed on-site in the masonry, the scaffold anchors JGA+ Z can also be used to absorb loads which are parallel to the façade.

Designation	Gap between Walls a [mm]	Brick Thick-ness d [mm]	Total Projection Ü [mm]	Matching Dowels [3)]
JGA+Z- 110	0 – 15		110	M 12/10
JGA+Z- 130	20 – 35		130	M 12/30
JGA+Z- 150	40 – 55		150	M 12/10
JGA+Z- 170	60 – 75		170	M 12/30
JGA+Z- 190	80 – 95		190	M 12/10
JGA+Z- 210	100 – 115		210	M 12/30
JGA+Z- 230	120 – 135	115	230	M 12/10
JGA+Z- 250	140 – 155		250	M 12/30
JGA+Z- 270	160 – 175		270	M 12/10
JGA+Z- 290	180 – 195		290	M 12/30
JGA+Z- 310	200 – 215		310	M 12/10
JGA+Z- 330	220 – 235		330	M 12/30
JGA+Z- 350	240 – 255		350	M 12/10

Details for other projections,load categories and anchoring surfaces are available on request.

[3)] Dowels included



Design resistance $F_{Rd,\perp} = \pm 8.6$ kN
$F_{Rd,II} = \pm 2.9$ kN

Ordering Example

Scaffold Anchors JGA+ Q

Type		Total Projection
JGA+ Q	–	210

Dowels

Type	Thread	Clamping Thickness
AB	M 12	10

Scaffold Anchors JGA+ Z

Type		Total Projection
JGA+ Z	–	210

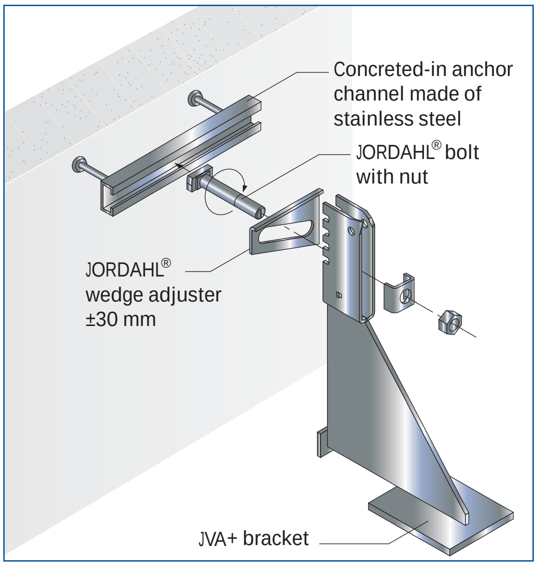
Scaffold Eyelet

Type	Thread	Material
FIG	M 12	gv

Attachment of Brickwork Support Brackets

To Anchor Channels

1. Concrete the JORDAHL® anchor channel professionally in place and remove the foam filling.
2. Pre-install the bracket with a JORDAHL® bolt and a JORDAHL® wedge adjuster: insert the JORDAHL® bolt horizontally into the anchor channel slot and rotate through 90°. The marker slot on the end of the shaft must be perpendicular to the longitudinal axis of the channel.
3. Adjust the height via the JORDAHL® wedge adjuster.
4. Tighten the nut with a torque wrench (M12 = 25 Nm and M16 = 60 Nm).
5. On all brackets with welded-on or loosely positioned angled brackets the angled bracket must be supported until the mortar has hardened.



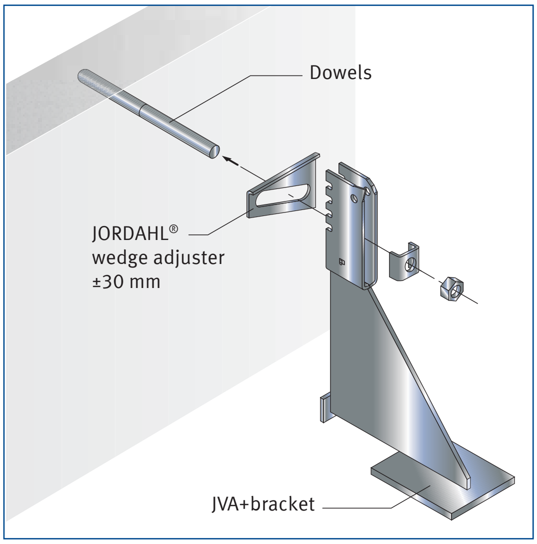
Assembly on anchor channels

To Install Dowels

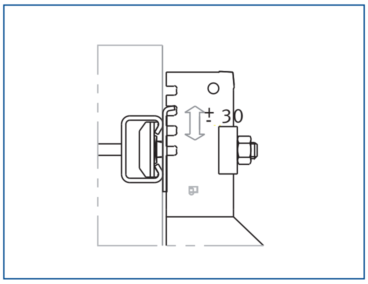
1. Install the dowel in accordance with the approval.
2. Position the bracket with the wedge adjuster on the dowel and tighten the nut by hand.
3. Adjust the height via the JORDAHL® adjustment plate with the angled slot.
4. Tighten the nut with a torque wrench. In the process follow the specifications of the dowel manufacturer's approval.
5. On all brackets with welded-on or loosely positioned angled brackets the angled bracket must be supported until the mortar has hardened.

Adjustment

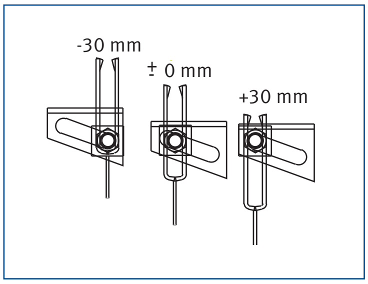
The brickwork support brackets can be vertically adjusted by ± 30 mm and perfectly aligned via the teeth provided in the bracket head and via the wedge adjuster. Horizontal adjustability is provided via the anchor channel.



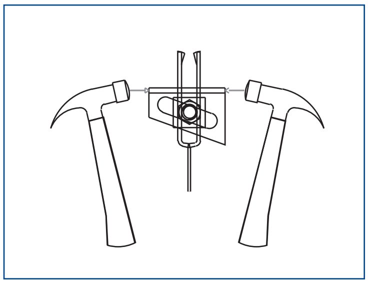
Assembly on dowels



Carefully ensure that the teeth on the head of the bracket are correctly placed on the short legs of the angle of the JORDAHL® wedge adjuster and that the upper edge of the slot is positioned directly over the JORDAHL® bolt and/or on the dowel.



Simple adjustment: adjustment is performed by moving the JORDAHL® wedge adjuster in the teeth of the head of the bracket.



Fine adjustment: fine adjustment is performed by moving the JORDAHL® wedge adjuster from side to side.

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Overview of Suitable Fixing Materials

Fixing Materials for JVA Brackets, Attic Brick Anchors and Angled Brackets							
JORDAHL® Product	Load Category	$F_{R.d}$ [kN]	JORDAHL® Anchor Channel	JORDAHL® Accessories	Suitable dowels [1]		
					Dowel Diameter	Clamping Thickness [mm]	JORDAHL® Accessories
Brickwork Support Brackets JVA+ N/NA/NU NFT/NAFT P/PAR F/FAR E/EA	3.5	4.7	K 38/17-200	JORDAHL® bolt JH M12×70 T (A4-50) Nut M12 DIN EN 24032 JORDAHL® wedge adjuster JORDAHL® clamping washer KS 13	M 12	50	JORDAHL® wedge adjuster JORDAHL® Clamping washer KS 13
	7.0	9.5	K 50/30	JORDAHL® bolt JB M12×80 T (FA-70) Nut M12 DIN EN 24032 JORDAHL® wedge adjuster JORDAHL® clamping washer KS 13	M 12	60	JORDAHL® wedge adjuster JORDAHL® Clamping washer KS 13
	10.5	14.2	K 53/34	JORDAHL® bolt JB M16×85 T (A4-50) Nut M16 DIN EN 24032 JORDAHL® wedge adjuster JORDAHL® clamping washer KS 17	M 16	60	JORDAHL® wedge adjuster JORDAHL® Clamping washer KS 17
Attic Brick anchor JAV	–	–	K 38/17 (short section, l = 100)	JORDAHL® bolt JH M12×30 (A4-50) Nut M12 DIN EN 24032 Washer 13 EN ISO 7089	M 12	10	–
Angled Brackets L-F+, L-DF+, L-DN+	1.2 1.5 2.1	1.6 2.0 2.8	K 28/15	JORDAHL® bolt JH M 10×30 (A4-50) Nut M10 DIN EN 24032 Washer 10.5 EN ISO 7089	M 10	10	–
	3.2	4.3	K 38/17	JORDAHL® bolt JH M 10×30 (A4-50) Nut M10 DIN EN 24032 Washer 10.5 EN ISO 7089	M 10	10	–

[1] Dowels must always be checked and verified on the basis of the existing component geometry, the location of the dowel (tension zone or compression zone) and the existing loads.

Dowels
Dowels which have been granted general technical approval must be used for the installation of JORDAHL® brickwork support brackets. Static proof for the dowels must always be provided according to the conditions of use. Suitable software is available from the dowel manufacturers for this purpose. All parts of the relevant approval must be complied with.

JORDAHL® Anchor Channel
See page 44.

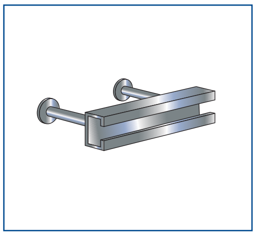

Attachment of a JVA+ N bracket with dowels


Attachment of a JVA+ N bracket with JORDAHL® anchor channels

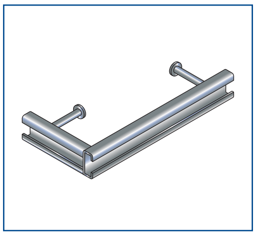
JORDAHL® Anchor Channels

Product Information

JORDAHL® anchor channels JTA are officially approved with national approval number Z-21.4-151. The European Technical Approval has also been granted: ETA 09 / 0338. Anchor channels are available in different sizes and designs. At this point we have only listed the anchor channels which are used for the installation of brickwork support brackets, angled brackets and attic brick anchors. The anchor channels and the corresponding fixing parts are made of stainless steel for use in façade areas.



JORDAHL® anchor channel



JORDAHL® anchor channels – corner section

Ordering Examples

Anchor Channel

Type	Profile	Length (mm)	Material
JTA	K 50/30	6000	A4

Anchor Channel Corner Section

Type	Profile	Element Lengths (mm)	Material
JTA	K 38/17	125 × 250	A4

Available Forms for Delivery

JORDAHL® anchor channels JTA are supplied either by the metre (lengths of 6.0 m are kept in stock), as short pieces and as corner pieces. In order to protect against the ingress of fresh concrete, all anchor channels have a filling.

According to the German national approval, the distance between anchors is 250 mm for channels sold by the metre. In the case of the anchor channel K 38 / 17-200 the distance between the anchors is 200 mm.

Technical Values

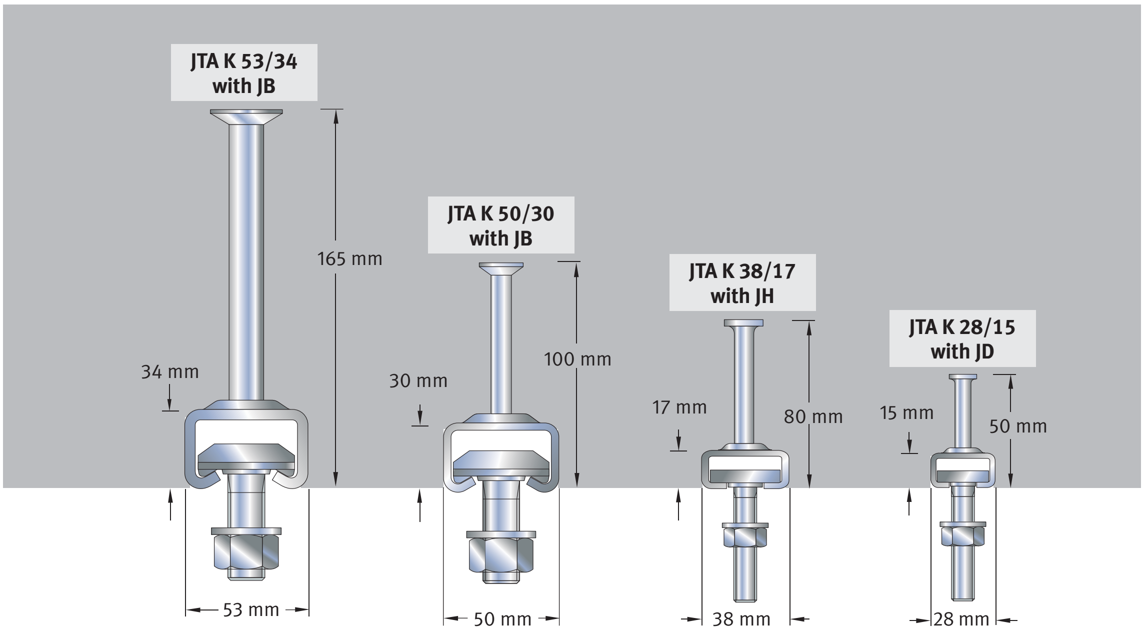
Prior to installation of the brickwork support brackets, check whether the required edge distances for the anchor channels are met.

Anchor Channel Corner Sections

Profile JTA	Element Lengths (mm)
K 38/17	125 × 250
	250 × 250
K 50/30	150 × 250
	250 × 250
K 53/34	250 × 250
K 38/17	125 × 250 (Standard; all others on request)

Detailed information can be found in the JORDAHL® catalogue "Channels and Accessories".

Recommended JORDAHL® Anchor Channels JTA with Bolts



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Design Resistances and Boundary Conditions for the Anchor Channels Taking the Load Category of the Brackets into Account

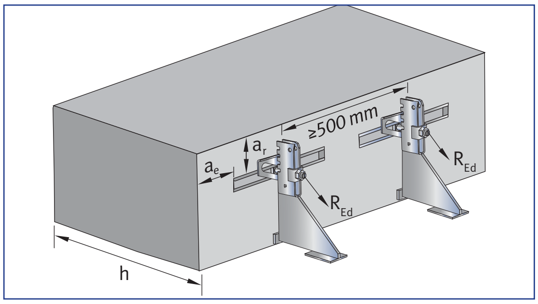
The following design resistances already take into account the latest acknowledgements according to the European technical approval ETA-09 / 0338.

The national approval no. Z-21.4-151 (valid until 31.01.2013) remains valid.

Individual proof is required in cases with different boundary conditions, concrete qualities or load categories.

Please contact us if you require more information!

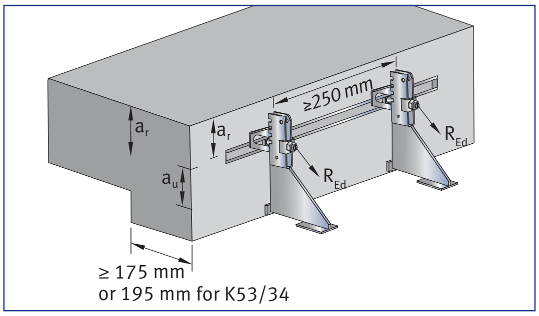
Short Sections and Stock Lengths with a Load Distance ≥ 500 mm

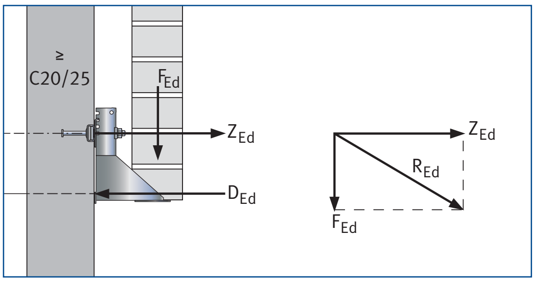


Load Cate-gory	Channel	Design Resistance R_{Rd} [1]	Edge Distances min a_r [2]	min a_e [3]			Component Thickness min. h
		[kN]	[mm]	C 20/25	C 30/37	C 40/50	[mm]
3.5	K 38/17	10	75	190	105	70	175
7.0	K 50/30	15	150	215	155	125	175
10.5	K 53/34	20	200	345	200	170	195

[1] Design resistance taking the load category of the relevant bracket type into account
[2] a_r = edge distance to the upper edge of the component. The lower edge results from the bracket dimensions y = x + 50 mm
[3] a_e = distance to the side edge for uncracked concrete or for situations with edge reinforcement and stirrups with a distance of a ≤ 100 mm

Stock Lengths with Regular Loads at a Distance ≥ 250 mm





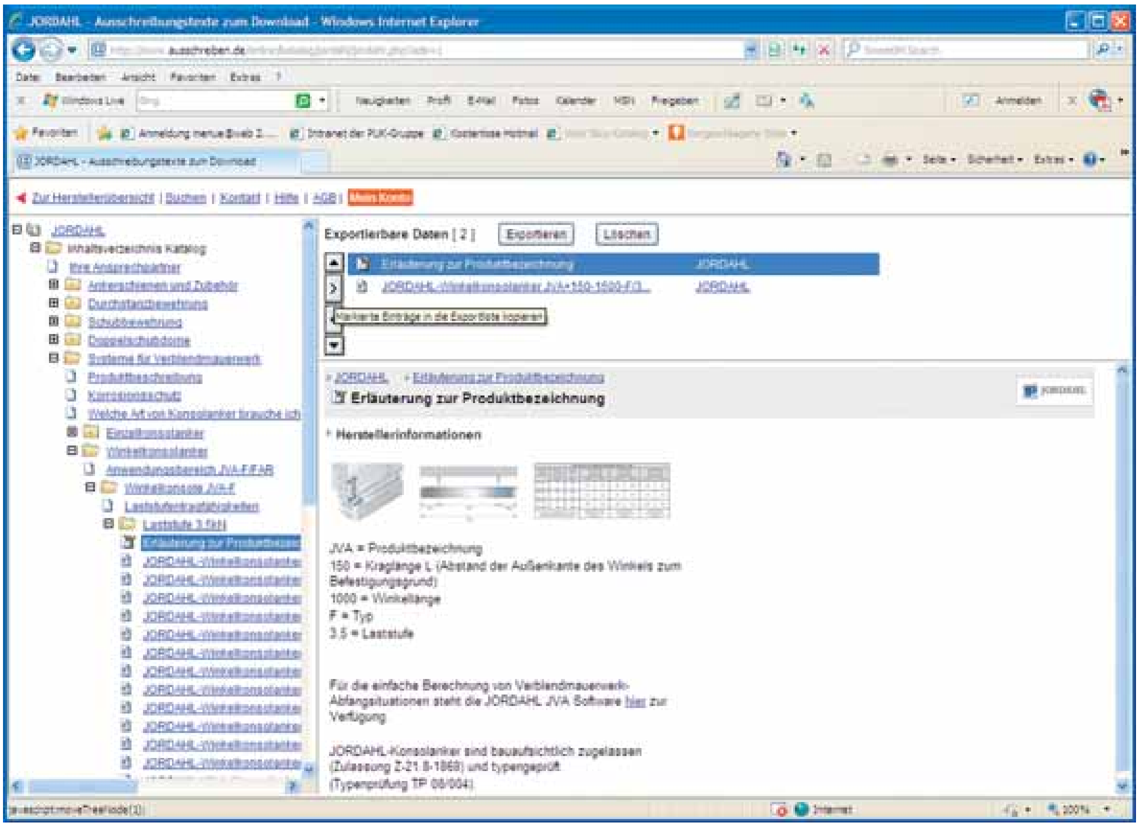
Proof: $\frac{R_{Ed}}{R_{Rd}} \leq 1$

Load Cate-gory	Channel	Design Resistance R_{Rd} [1]	Edge Distances min a_r [2]	min a_u		
		[kN]	[mm]	C 20/25	C 30/37	C 40/50
2.1	K 28/15	4	50	55	40	40
3.5	K 38/17	10	75	185 [3]	140 [4]	115
7.0	K 50/30	15	150	265 [5]	170	130
10.5	K 53/34	20	200	315	200	155

[1] Design resistance taking the load category of the relevant bracket type into account
[2] a_r = edge distance to the upper edge of the component, a_u = distance to the nearest lower edge in the rear area of the anchor. All values apply to uncracked concrete or reinforcement situations with edge reinforcement and stirrups with a distance of a ≤ 100 mm. The lower edge on the front results from the bracket dimensions y = x + 50 mm.
[3] for C 20/25 min a_r = 150 mm
[4] for C 30/37 min a_r = 100 mm
[5] for C 20/25 min a_r = 200 mm

JORDAHL® Brickwork Support Systems

Service



Invitation to Tender Form
All of the invitation to tender forms can be found in the invitation to tender software at **www.jordahl.de**.

Technical Advice
On request we can also offer the services of our structural calculation engineers and technical consultants.

Calculation Software
We can provide you with user-friendly calculation software in order to determine the optimum products for individual installation situations.

- Calculations in accordance with the general technical approval and type test
- Printout of the design with drawings as the basis for invitations to tender.

To place an order, call +49 30 68283-02 or send us an e-mail to info@jordahl.de.
Alternatively, you can also download the software from our website at **www.jordahl.de**

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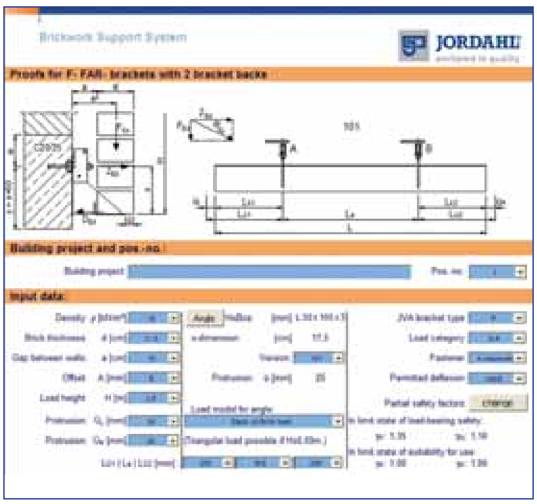

Subject Index

JORDAHL®
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A
Addresses **48**
Anchor Channels **44**
Anchor Channel Corner Section **44**
Openings
Angled Brackets
- Angled Bracket above Openings **16**
- Angled Bracket Designs **22**
- Angled Brackets L-DN+ / DF+ / F+ **28–29**
- Intermediate Angled Brackets **17**

Application Examples **6**
Approval **4**
Attachment of Brickwork Support Brackets **42**

B
Basis for Calculations **10**
Brick Ties JMA **37**
Brick Tie Channels JKt 25 / 15D, JM, JML **36**
Brickwork Height **5**

C
Calculation Approach **10–11**
Cavity Wall Ties **38-39**
Corrosion Resistance **12**
Courses of Bricks
- Laid on Edge Window Opening with Course of Bricks **21**
- Laid on Edge Suspension Loops **21**

D
DIN 1053-1 (theory) **5,9,11**
DIN 4420-3 (theory) **39**
Dowels **42–43**

E
Edge Distances for Anchor Channels **43**
Expansion Joints **8**
- Support next to Joints **19**
- Outside Corner with Joint **21**

F
Façade Design **8–9**
Brickwork Support Brackets
- JVA+ E / EA **19**
- JVA+ F / FAR **20–22**
- JVA+ N / NA / NU **14–15**
- JVA+ NFT / NAFT **24–25**
- JVA+ P / PAR **18**

Fixing Equipment/Fastening Materials **43**

G
General Technical Approval **4**
Grout-in Brackets JMK+ N/NA/NU, E/EA, P/PAR, F/FAR, NFT/NAFT **30-33**

J
Joints, Layout of **8**

L
L-Lintels **26**

M
Material **4**

O
Outside Corners
- with Expansion Joint **21**
- without Expansion Joint JRH **21**

P
Parapet Facing Anchors JAV **32**
Permanent Scaffolding Anchors J GA+ Q, JGA+ Z **40–41**
Prefabricated Lintel **24–25**
Prefabricated Part Holder JFT **25**
Prefabricated Supports **27**

S
Special Versions **26–27**
Support above Openings
- with JVA+ F / FAR **21**
- with JVA+ NFT / NAFT for **25**
  Pre-Fabricated Lintels **16**
- with Angled Brackets JW **10–11**

Stainless Steel **12–13**

T
Threaded Loops JGS **25**
Type Approval **4**

V
Vault Action **11**

W
Wind Posts JWP **35**

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