baut®

BRICK FACADES

- SUSPENDED BRACKETS
- LINTELS
- ANCILLARY COMPONENTS FOR MASONRY

TABLE OF CONTENTS

Living house "Vingio apartamentai". Vilnius

BRICK VENEER FACADES

Shopping center Naugarduko Maxima. Vilnius

BRICK LINTELS

Office building "Software House",
Rakvere, Estonia

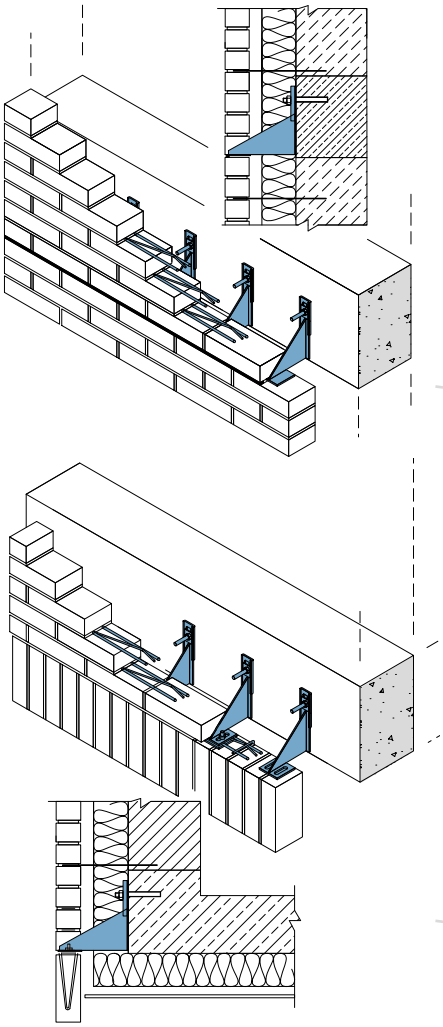
ANCILLARY COMPONENTS FOR MASONRY

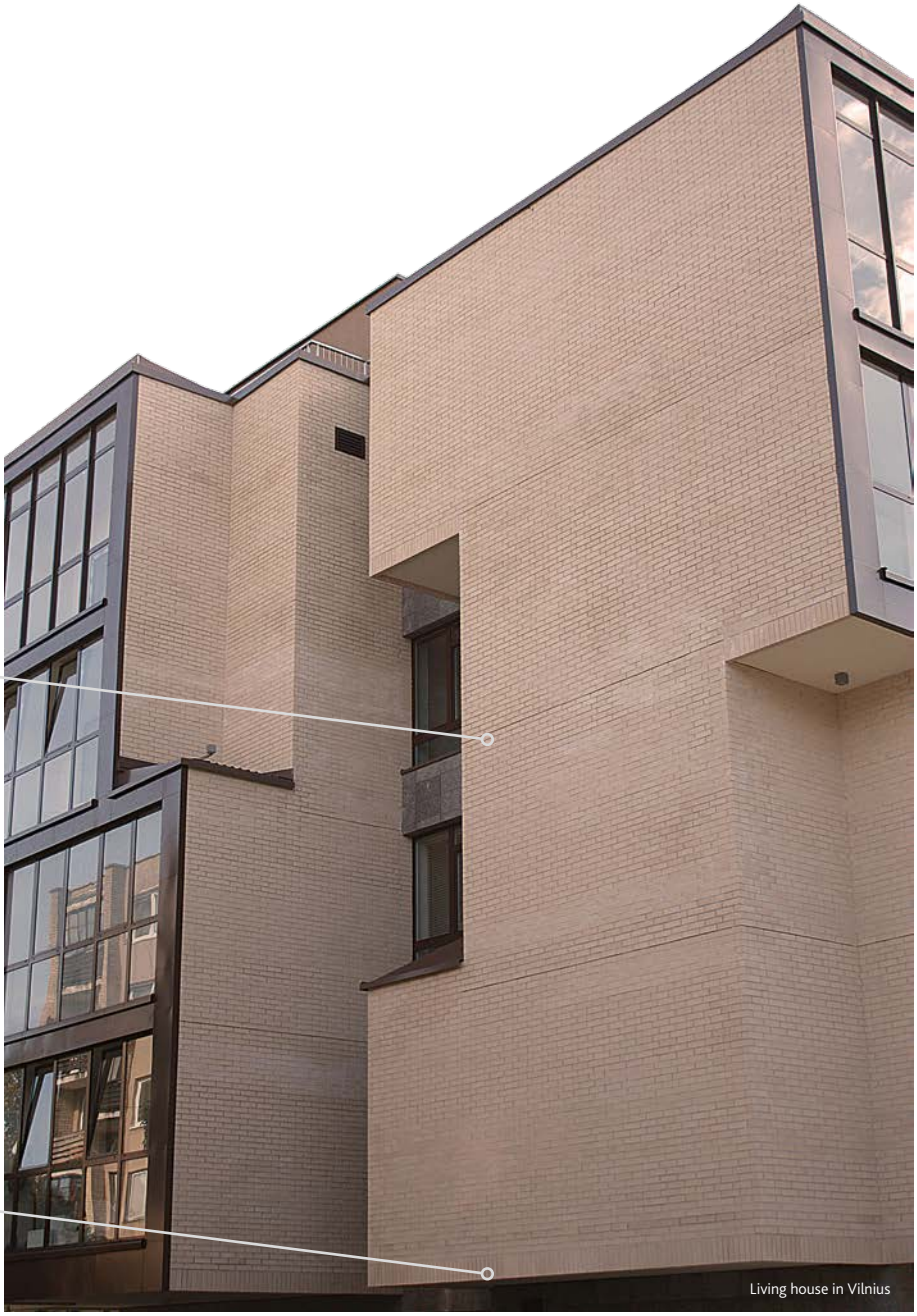
A complex of dwelling houses
"Skarnu apartaments". Riga, Latvia

TECHNICAL INFORMATION

On the cover of a booklet: "UAB Hoptrans" administration building. Kaunas.
Architect Donaldas Trainauskas.

BRICK VENEER FACADES





Living house in Vilnius

Suspending of brick veneer on the frame of a building is an optimal solution for the ventilated facade. When should it be used?

- When the height of brick veneer exceeds 12 meters
- When brick veneer starts not from the foundation but, for example, from the first floor
- When the floor slab cannot be loaded upon, for example, the slab between an underground parking and the ground floor
- In case of large openings
- When implementing complex architectural forms

ADVANTAGES OF BRICK VENEER FACADES

The primary advantage of brick veneer facades is enabling to increase floor areas on the ground level.

It is very relevant to large cities where ground floors are often used for shops or business offices with large glass openings while underground areas – for parking lots.

Brick veneer facades are self-supporting; therefore, fixing of advertising billboards or other structuress to them is not allowed.

ERECTION OF BRICK VENEER FACADES

When designing, the facade is divided into individual fragments separated by deformation joints in between.

The height of separate parts of the divided facade should not exceed the height of two floors, while the width of the fragments depends on the architecture and orientation of the building.

Every fragment is supported by a row of brackets KP.

The brackets are fixed to the framework of the building at a distance of, as a rule, one brick.

Then the first course of bricks is laid down on the brackets KP.

Reinforcements Murfor or BAUT are placed in the mortar layer laid on the top of the first row of bricks.

The next 2 courses of brickwork are also reinforced. In this way, a reinforced brick band is formed on the brackets and serves as a base for the abovelaying brickwork.

The brickwork is discontinued when its height reaches the height of two floors. Then a row of brackets KP is mounted, and the process of forming a reinforced brick band with subsequent brickwork is repeated.

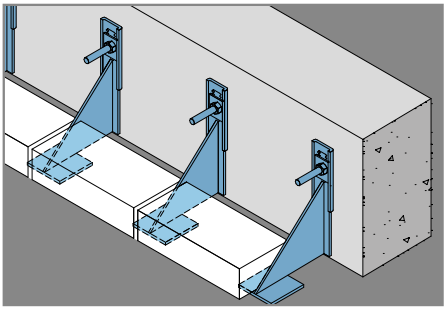
The bracket KP-M is another version of the bracket KP. Its supporting plate has holes, which allow suspending the lower course of bricks.

*all brackes are produced from stainless steel

BASIC TYPES OF BRACKETS

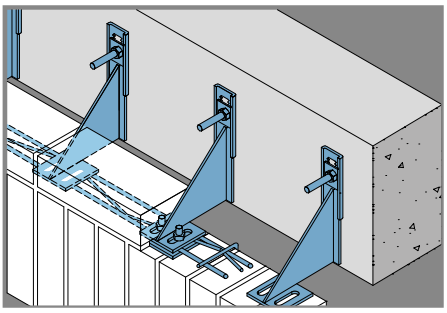
and their arrangement

BRACKET KP



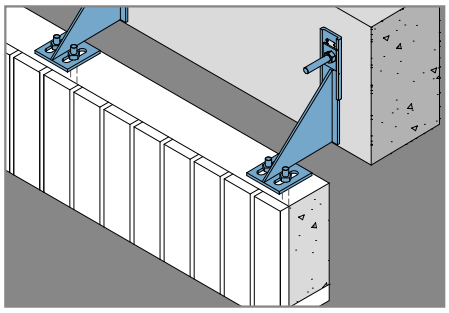
Ordinary bracket

BRACKET KP-M



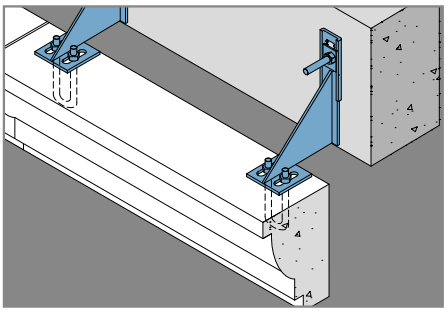
Another version of the ordinary bracket.
It can be alternated by using KPs at
the distance of one brick in between.

BRACKET KP-M



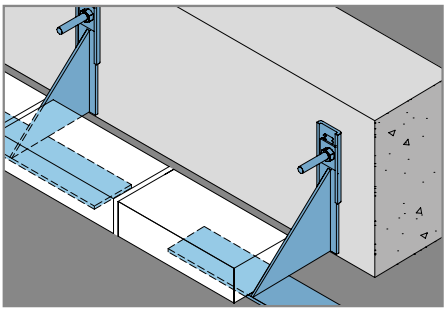
Example of application when using together
with factory made suspended brick lintels

BRACKET KP-M



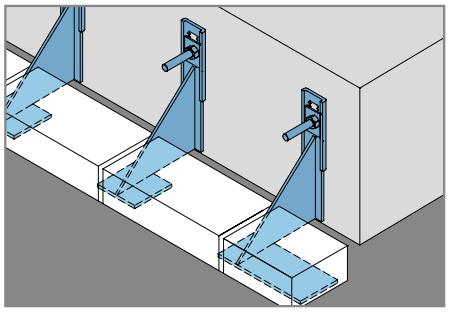
Example of application when using together
with factory made suspended elements

BRACKETS KP-P



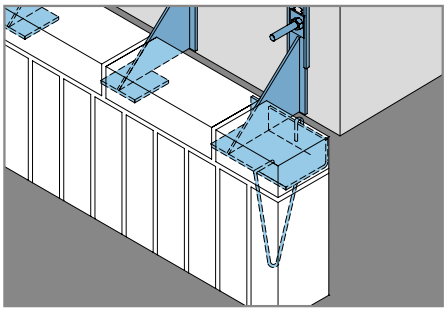
Ordinary bracket with prolonged ledge

BRACKETS KP-D, KP-K



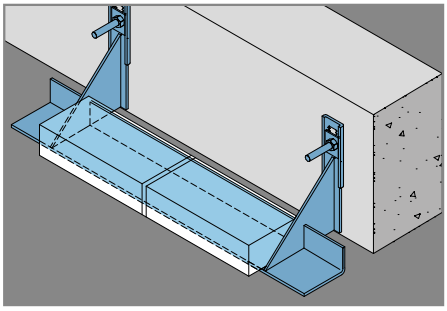
Right and left end brackets

BRACKETS KP-DM, KP-KM



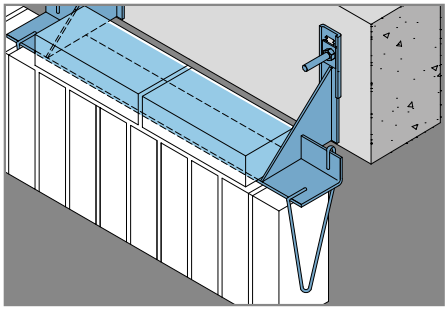
Right and left end brackets, which allow
suspending the lower couse of brickwork

BRACKET KP-2



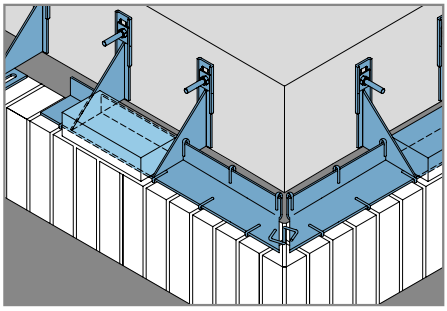
Ordinary double bracket

BRACKET KP-2



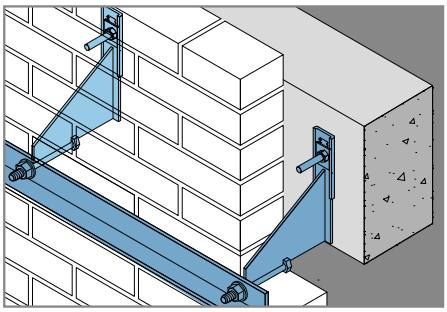
Ordinary double bracket with suspended lower row of brickwork

BRACKET KP-2D, KP-2K



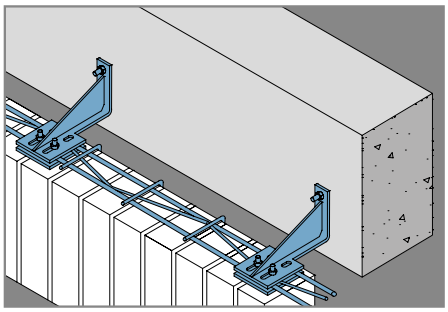
Right and left corner brackets

BRACKET KP-V



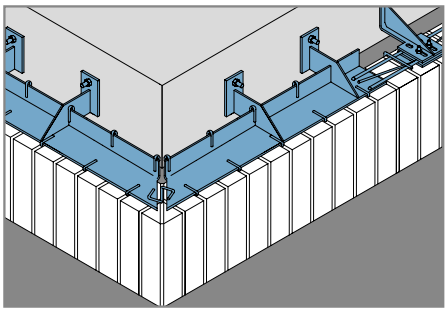
Bracket suspension for attaching of constructions

BRACKET GSP



Bracket for lintels

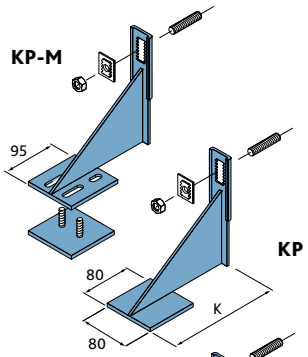
BRACKET GSP-2D, GSP-2K

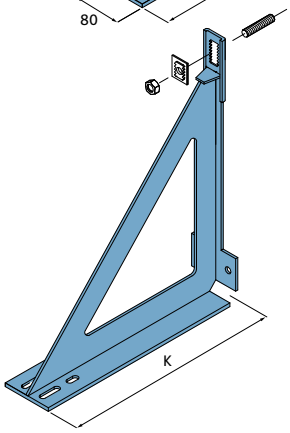


Right and left corner brackets

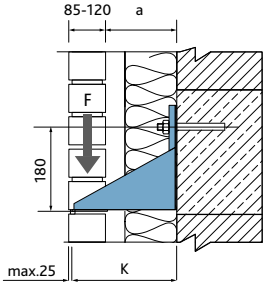
Other types of bracket can be made according to individual orders

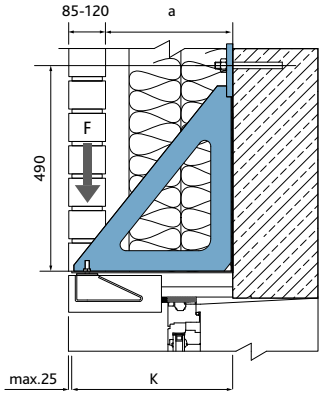
TECHNICAL SPECIFICATIONS OF BRACKETS



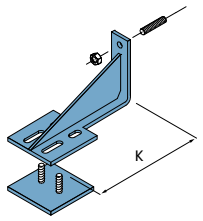


Standard configuration
with a bottom plate

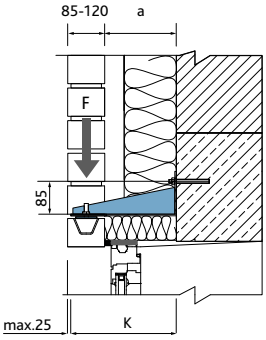




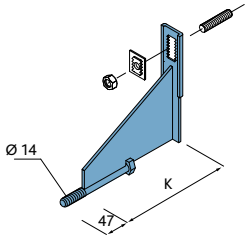
TYPE KP	TYPE KP-M	F kN	a mm	K mm
KP - 160	KP-M - 160	4.5	65 - 95	160
KP - 180	KP-M - 180	4.5	85 - 115	180
KP - 210	KP-M - 210	4.5	115 - 145	210
KP - 230	KP-M - 230	4.5	135 - 165	230
KP - 245	KP-M - 245	4.5	150 - 180	245
KP - 260	KP-M - 260	4.5	165 - 195	260
KP - 275	KP-M - 275	4.5	180 - 210	275
KP - 300	KP-M - 300	4.0	205 - 235	300
Bracket suspension with hollow stiffness edges				
KP - 400	KP-M - 400	3.0	305 - 355	400
KP - 450	KP-M - 450	3.0	355 - 385	450
KP - 470	KP-M - 470	3.0	375 - 405	470
KP - 500	KP-M - 500	3.0	405 - 435	500
Thickness of metal			4 mm	
Stainless steel in accordance with EN 10088-1			1.4301/1.4401	

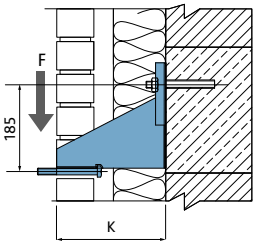


Standard configuration
with a bottom plate

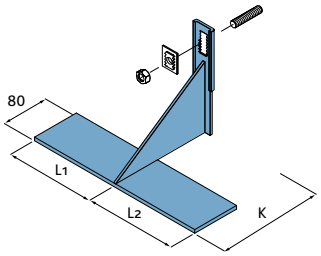


TYPE	F kN	a mm	K mm
GSP-110	1.5	20 - 55	119
GSP-180	1.5	90 - 125	189
GSP-210	1.5	120 - 155	219
GSP-230	1.5	140 - 175	239
GSP-245	1.5	155 - 190	254
GSP-260	1.5	170 - 205	269
GSP-275	1.5	185 - 220	284
GSP-300	1.0	210 - 245	309
Thickness of metal		4 mm	
Stainless steel in accordance with EN 10088-1		1.4301/1.4401	

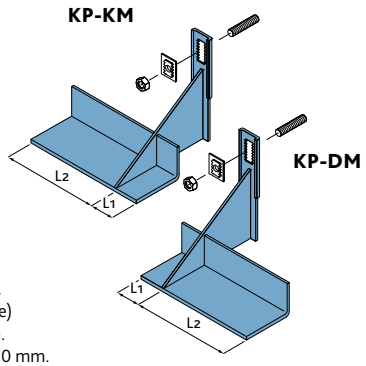




TYPE	F kN	K mm
KP - V-160-M14	4.5	160
KP - V-180-M14	4.5	180
KP - V-210-M14	4.5	210
KP - V-230-M14	4.5	230
KP - V-245-M14	4.5	245
KP - V-260-M14	4.5	260
Thickness of metal	4 mm	
Stainless steel in accordance with EN 10088-1	1.4301/1.4401	

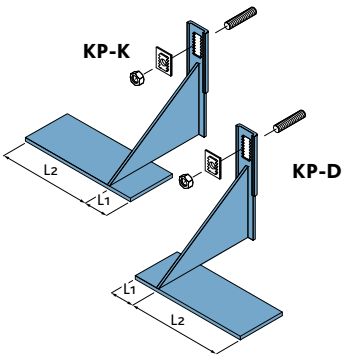


TYPE	Fv	L1	L2	a mm	K mm
KP-P-160	4.5	160	160	75	160
KP-P-180	4.5	160	160	95	180
KP-P-210	4.5	160	160	125	210
KP-P-230	4.5	160	160	145	230
KP-P-245	4.5	160	160	160	245
KP-P-260	4.5	160	160	175	260
KP-P-275	4.5	160	160	190	275
KP-P-300	4.0	160	160	215	300



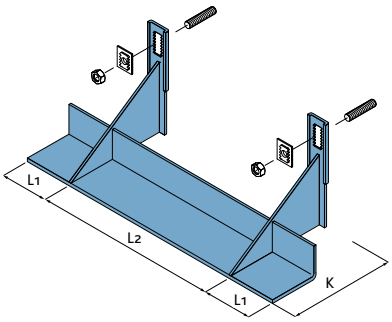
HERE AND FURTHER.
Unequal angle (L profile) dimensions 80x50 mm.
Based per order – 50x50 mm.

TYPE	Fv	L1	L2	a mm	K mm
KP-DM-160	4.5	40	140	75	160
KP-KM-160	4.5	40	140	75	160
KP-DM-180	4.5	40	140	95	180
KP-KM-180	4.5	40	140	95	180
KP-DM-210	4.5	40	140	125	210
KP-KM-210	4.5	40	140	125	210
KP-DM-230	4.5	40	140	145	230
KP-KM-230	4.5	40	140	145	230
KP-DM-245	4.5	40	140	160	245
KP-KM-245	4.5	40	140	160	245
KP-DM-260	4.5	40	140	175	260
KP-KM-260	4.5	40	140	175	260
KP-DM-275	4.5	40	140	190	275
KP-KM-275	4.5	40	140	190	275
KP-DM-300	4.0	40	140	215	300
KP-KM-300	4.0	40	140	215	300

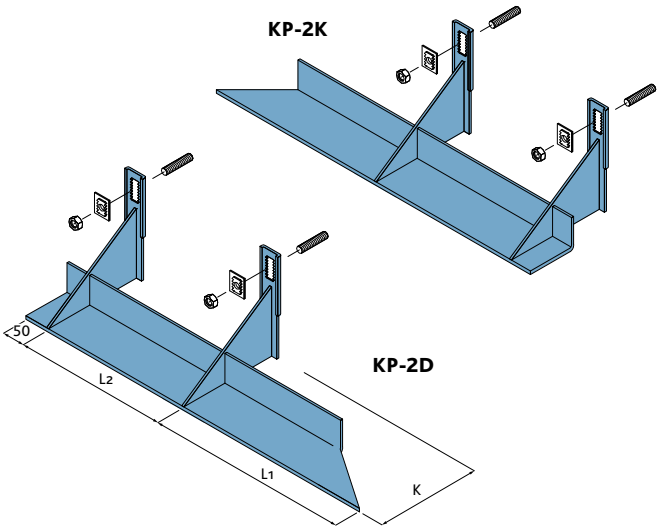


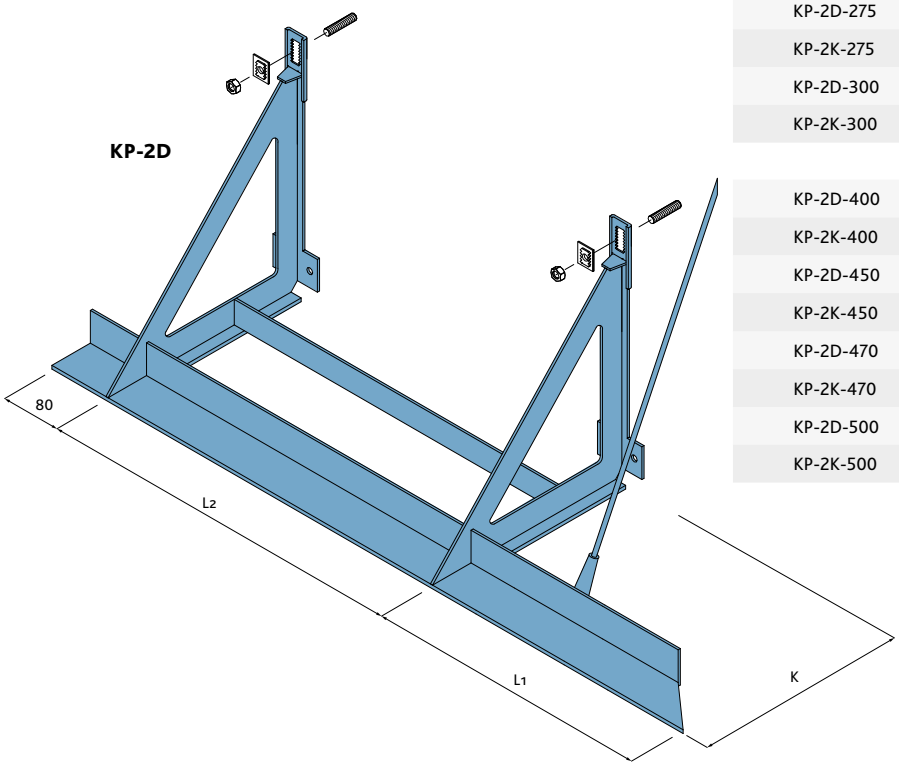
TYPE	Fv	L1	L2	a mm	K mm
KP-D-160	4.5	40	140	75	160
KP-K-160	4.5	40	140	75	160
KP-D-180	4.5	40	140	95	180
KP-K-180	4.5	40	140	95	180
KP-D-210	4.5	40	140	125	210
KP-K-210	4.5	40	140	125	210
KP-D-230	4.5	40	140	145	230
KP-K-230	4.5	40	140	145	230
KP-D-245	4.5	40	140	160	245
KP-K-245	4.5	40	140	160	245
KP-D-260	4.5	40	140	175	260
KP-K-260	4.5	40	140	175	260
KP-D-275	4.5	40	140	190	275
KP-K-275	4.5	40	140	190	275
KP-D-300	4.0	40	140	215	300
KP-K-300	4.0	40	140	215	300

MARKINGS:
D – the right protrusion,
K – the left protrusion



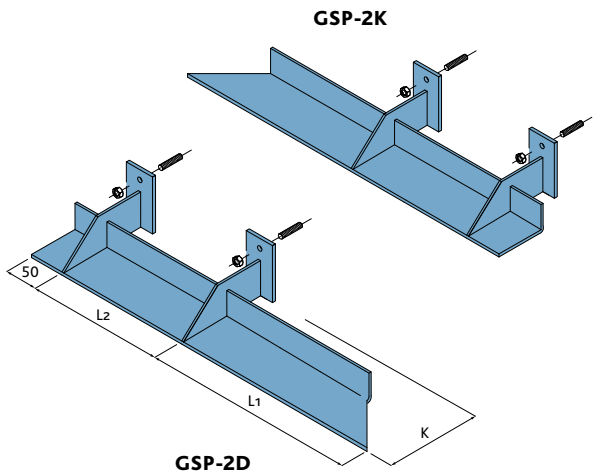
TYPE	Fv	L1	L2	a mm	K mm
KP-2-160-520	9.0	100	520	75	160
KP-2-160-780	9.0	100	780	75	160
KP-2-180-520	9.0	100	520	95	180
KP-2-180-780	9.0	100	780	95	180
KP-2-210-520	9.0	100	520	125	210
KP-2-210-780	9.0	100	780	125	210
KP-2-230-520	9.0	100	520	145	230
KP-2-230-780	9.0	100	780	145	230
KP-2-245-520	9.0	100	520	160	245
KP-2-260-520	9.0	100	520	175	260
KP-2-275-520	9.0	100	520	190	275
KP-2-300-520	8.0	100	520	215	300





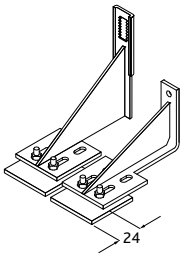
TYPE	Fv	L1	L2	a mm	K mm
KP-2D-160	9.0	270	260	75	160
KP-2K-160	9.0	270	260	75	160
KP-2D-180	9.0	290	260	95	180
KP-2K-180	9.0	290	260	95	180
KP-2D-210	9.0	320	260	125	210
KP-2K-210	9.0	320	260	125	210
KP-2D-230	9.0	340	260	145	230
KP-2K-230	9.0	340	260	145	230
KP-2D-245	9.0	355	260	160	245
KP-2K-245	9.0	355	260	160	245
KP-2D-260	9.0	370	260	175	260
KP-2K-260	9.0	370	260	175	260
KP-2D-275	9.0	385	260	190	275
KP-2K-275	9.0	385	260	190	275
KP-2D-300	8.0	410	260	215	300
KP-2K-300	8.0	410	260	215	300
KP-2D-400	6.0	500	520	320	400
KP-2K-400	6.0	500	520	320	400
KP-2D-450	6.0	550	520	370	450
KP-2K-450	6.0	550	520	370	450
KP-2D-470	6.0	570	520	390	470
KP-2K-470	6.0	570	520	390	470
KP-2D-500	6.0	600	520	420	500
KP-2K-500	6.0	600	520	420	500

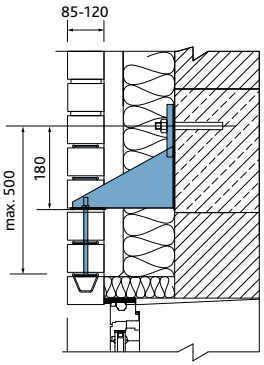
MARKINGS:
2 – double,
D – the right protrusion,
K – the left protrusion



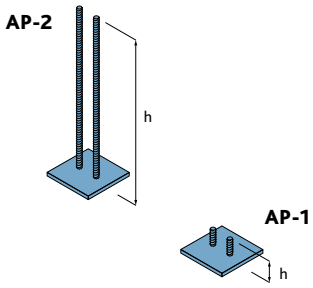
TYPE	Fv	L1	L2	a mm	K mm
GSP-2D-110	3.0	220	260	25	110
GSP-2K-110	3.0	220	260	25	110
GSP-2D-180	3.0	290	260	95	180
GSP-2K-180	3.0	290	260	95	180
GSP-2D-210	3.0	320	260	125	210
GSP-2K-210	3.0	320	260	125	210
GSP-2D-245	3.0	355	260	160	245
GSP-2K-245	3.0	355	260	160	245
GSP-2D-260	3.0	370	260	175	260
GSP-2K-260	3.0	370	260	175	260
GSP-2D-275	3.0	385	260	190	275
GSP-2K-275	3.0	385	260	190	275
GSP-2D-300	2.0	410	260	215	300
GSP-2K-300	2.0	410	260	215	300

ANCILLARY ELEMENTS

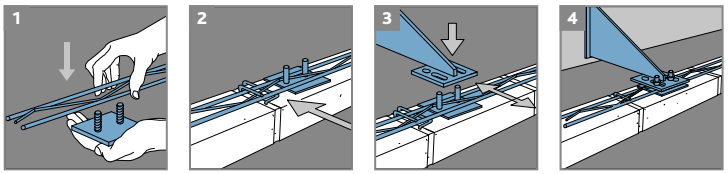




MAKE	Dimensions in mm	Material
BOTTOM PLATE		
AP-1	80x80x34 h	1.4301/1.4401
AP-2	80x80x350 h	1.4301/1.4401

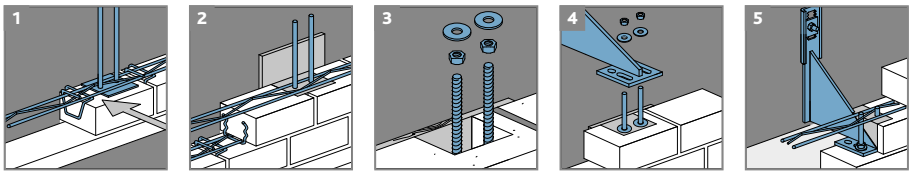


BRACKET KP-M (GSP) MOUNTING WITH A BOTTOM PLATE AP-1

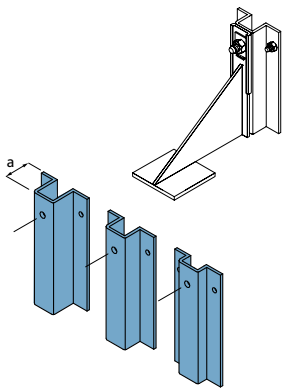


For details see page 18.

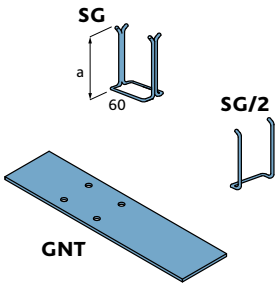
BRACKET KP-M (GSP) MOUNTING WITH A BOTTOM PLATE AP-2



Possible suspension up to 4 mansonry rows

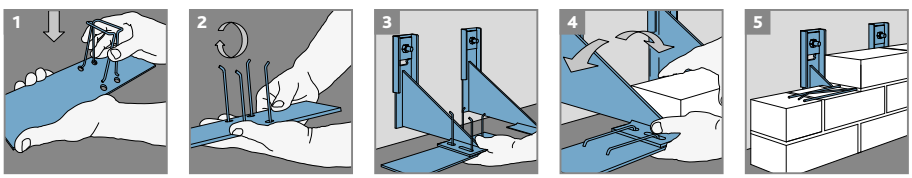


MAKE	Dimensions in mm	Thickness mm	Material
ATTACHING ELEMENT OMEGA			
Omega 30	a - 30	4	1.4301/1.4401
Omega 50	a - 50	4	1.4301/1.4401
Omega 70	a - 70	4	1.4301/1.4401

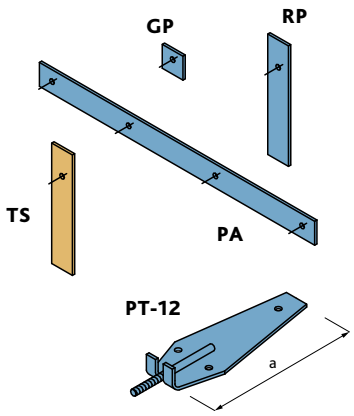


MAKE	Dimensions in mm	Thickness mm	Material
HOOKS			
SG double	a - 80	Ø3	1.4301
SG/2 single	a - 80	Ø3	1.4301
SUPPORTING PLATE			
GNT	320x90	4	1.4301/1.4401

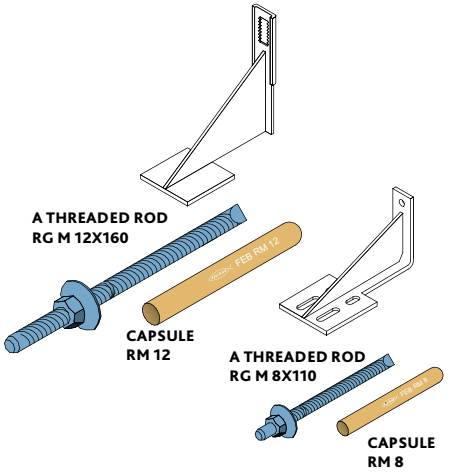
CORNER ORIFICES DECORATION MASONRY SUSPENSION USING SG HOOKS



ANCILLARY ELEMENTS AND BRACKETS FIXING



MAKE	Dimensions in mm	Thickness mm	Material
Levelling plate			
RP	230 x 65	4	1.4301/1.4401
Backing element			
GP	65 x 65	4	1.4301/1.4401
Supporting plate			
PA	1000 x 100	4	1.4301/1.4401
Thermal gasket			
TS	230 x 65	4	Glass fiber
Entablature anchor			
PT-12	a - 220	Ø 12	1.4301/1.4401

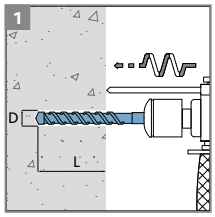


FIXING OF BRACKETS

MAKE	Dimensions in mm	Diameter in mm	Material
A threaded rod and glue capsule Fischer R (Eurobond)			
RG M 12x160	160	12	A4
RG M 8x110	110	8	A4
RM 12	90	Polimeric resin	
RM 8	80	Polimeric resin	

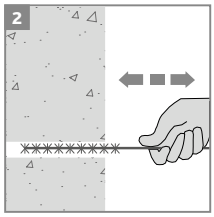
It is possible to use analogous items in compliance to the applicable requirements.

INSTALLATION OF CHEMICAL ANCHOR

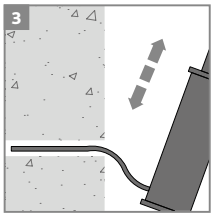


	L mm	D mm
RG M 12x160	110	14
RG M 8x110	80	10

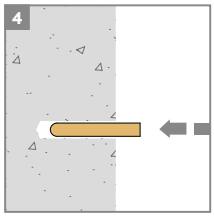
A hole for the chemical anchor in the concrete block should be drilled in accordance with the applicable technical requirements.



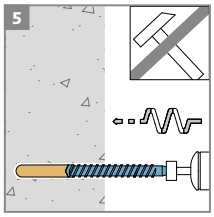
The hole should be carefully cleaned from dust manually, using a brush.



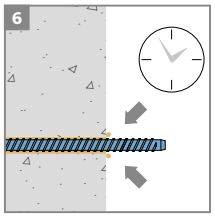
Hole cleaning is completed with a blow-down. Mechanic cleaning and blow-down is carried 2-3 times.



The capsule is inserted into the cleaned hole.

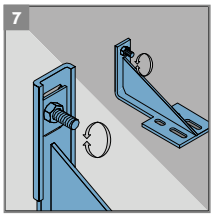


The threaded rod RG M inserted by a percussive-rotary method with a drill. The rotation speed should not exceed 750 RPM. Hammering the threaded rod into the capsule is strictly prohibited.



Ambient temperature, T °C	Hardening time T
> 20	10 min.
10 - 20	20 min.
0 - 9	45 min.
-5 - -1	1 h

The rod is threaded up to the mark on it, until a small amount of glue appears on the surface. Duration of hardening depends on the temperature of concrete, which is considered as the ambient temperature. After the specified time elapses, the bracket can be suspended.



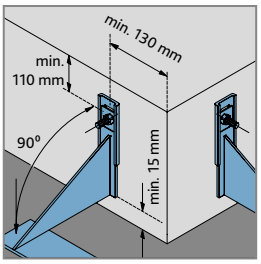
Diameter of the nut mm	Tightening torque Nm
8	10
12	40

ATTENTION!
Wear gloves while performing all tasks

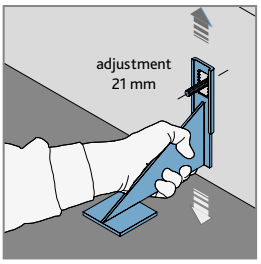
INSTALLATION OF SUSPENDED BRACKETS

The base, on which brackets are mounted, is a cast reinforced concrete or pre-cast reinforced concrete structure of Class C 20/25 (B 25 or higher). For maintaining a vertical position and ensuring the required allowances in respect of supporting of the decorative masonry on the brackets, it is necessary to make a shot of the reinforced concrete base. For insignificant adjustment, levelling plates RP should be used. In case of significant deviations, it is necessary to order brackets with larger (or smaller) shoulder overhang. The brackets should seat on the reinforced concrete structure with the entire surface of their supporting walls.

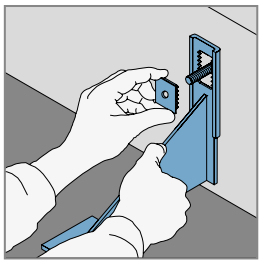
REQUIREMENTS AND PERMITS



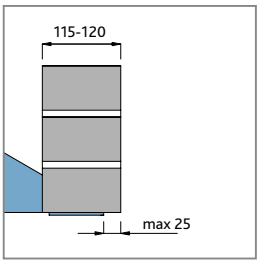
Minimal distances to the edges of reinforced concrete structures



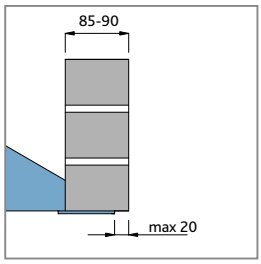
Height adjustment 21 mm



Brackets fixing

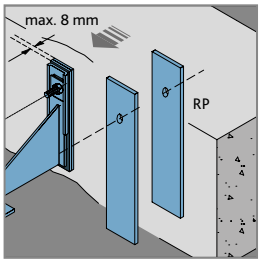


Permitted mansonry protrusion from the support limits

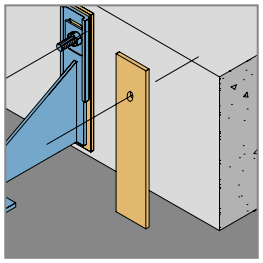


Permitted mansonry protrusion from the support limits

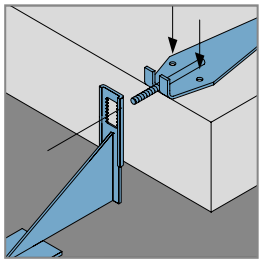
USE OF ANCILLLARY ELEMENTS



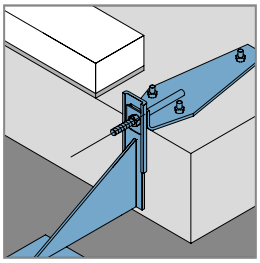
Use no more than 2 stripes of RP



For reducing heat losses between the bracket and reinforced concrete construction thermoinsulation shall be installed TS.

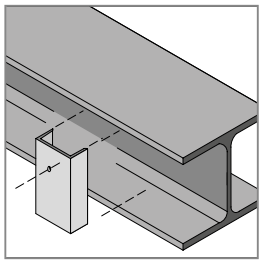


The bracket shall be fixed to the reinforced concrete slab by means of PT-12.

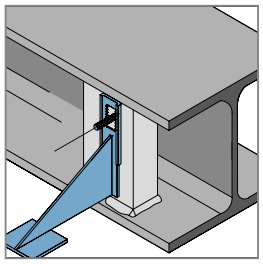


Later the anchor can be hidden in the wall construction.

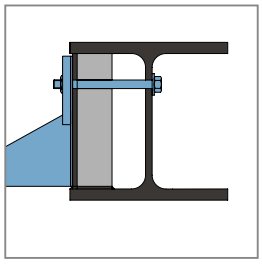
FIXING OF BRACKETS TO METAL



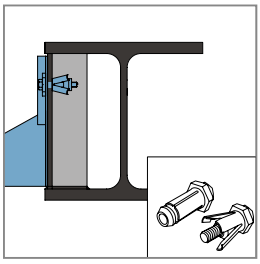
A UPN-type profile is inserted into the cavity of the HEB and welded there.



The bracket is fixed by a stainless steel bolt.



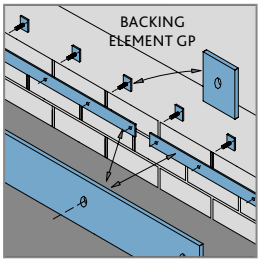
Fixing of brackets

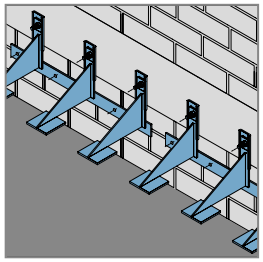


It is also allowed to use certified bolts of the type BoxBolt, intended for fixing metal elements.

NOTE:
Here one of more difficult cases was analysed when the bracked is fixed to HEB type metal beam.

SUPPORTING OF BRACKETS ON THE WALL STRUCTURE

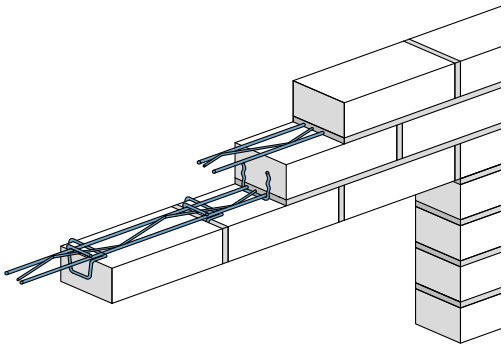




If it is impossible to fix and support brackets on a single reinforced concrete structure, it is allowed to support brackets on the wall structure, the density of which is at least 1,500 kg/m³. In order to reduce the load upon the wall structure and to distribute it, the supporting plate PA should be fixed on the wall providing a support for the brackets. An important condition is a reliable fixation of the supporting wall, including clamping it by the overlying reinforced concrete structure.

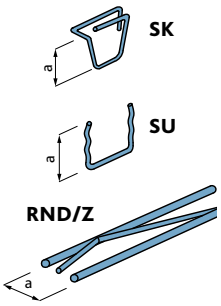
BRICK LINTELS

STRETCHER COURSE BRICKWORK



Lintel consist of at least three courses of bricks bonded with mortar. The first course of bricks, each vertical joint, has anchors inserted. Between the first and the second horizontal seams, and betyween the second and the third courses of bricks there is a longitudinal rebar reinforcement Murfor RND/Z-50. The longitudinal rebar at horizontal joints shall go outside the edges of the opening at 250 mm and 500 mm at the corners of the building.

In this way lintels up to 2,00 m are mouinted. If bigger apertures need to be made the same way, bracket suspensions GSP or KP-M are used.



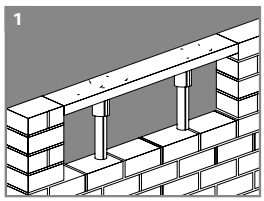
MAKE	Ø, mm	a, mm	Material
SK 50 - 40 - 1	3.0	40	zinc coating
SK 50 - 40 - 2	3.0	40	1.4301
SK 50 - 75 - 1	3.0	75	zinc coating
SK 50 - 75 - 2	3.0	75	1.4301
SU 50 - 45 - 1	3.0	45	zinc coating
SU 50 - 45 - 2	3.0	45	1.4301
RND/Z-50*	4.0	50	zinc coating

* here and further the reinforced truss MURFOR® manufacturer NV Bekaert SA

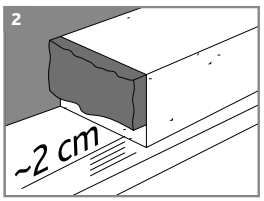
LINTEL KIT IN BOXES

MAKE	opening, m	Set, pcs.	Material
BL-H-1,0	1.0	SK 50-40 x 4 SU 50-45 x 3	zinc coating / 1.4301
BL-H-1.5	1.5	SK 50-40 x 6 SU 50-45 x 4	zinc coating / 1.4301

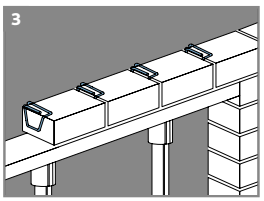
MOUNTING OF LINTELS UP TO 2 M



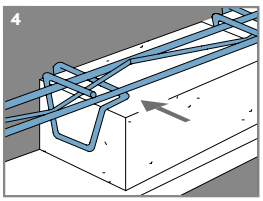
Construction of formwork



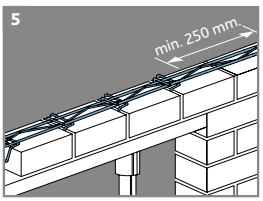
Mortar doesnot reach the bottom of the brick about 2 cm. After lintel mounting and formwork disassembly the joints shall be fixed



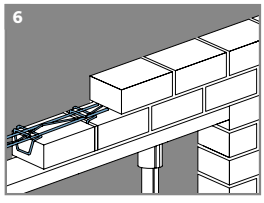
Lintel hooks SK 50-40 in every vertical joint of the first course



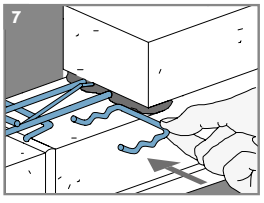
Reinforcement Murfor RND/Z-50 is inserted through grooves of lintel hooks



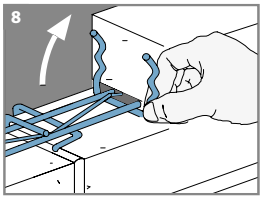
Reinforcement rods extend beyond the opening edges by at least 250 mm in both sides



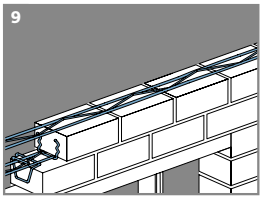
Second course of brickwork



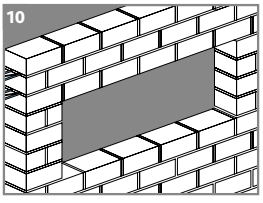
Mounting of lintel hooks SU 50-45



Lintel hooks SU 50-45 in every second vertical joint of the second couse

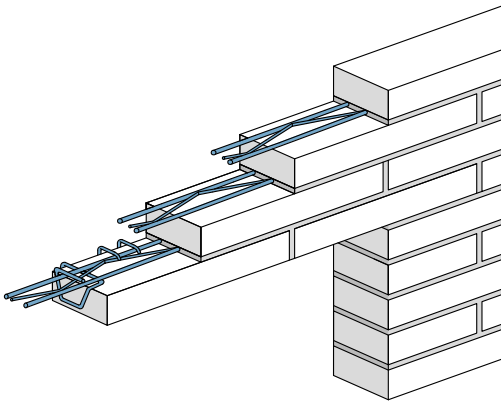


Reinforcement Murfor RND/Z-50 in the second course of brickwork. Further throughout the height, 1 reinforcement rod at every 300...500 mm

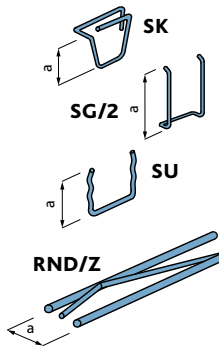


Formwork should be dismantled after 2 weeks.

ATTENTION! The bricks of the first course should be full.
HERE AND FURTHER. Seeking to reach the nominal strength making lintels during hot season, it is recommended to moistened them for 2 weeks.
Mortar marking should be at least 100



LINTEL FROM LONG BRICK

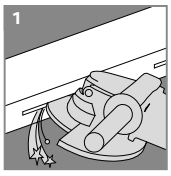


MAKE	Ø, mm	a, mm	material
SK 50 - 40 - 1	3.0	40	zinc coating
SK 50 - 40 - 2	3.0	40	1.4301
SU 50 - 45 - 1	3.0	45	zinc coating
SU 50 - 45 - 2	3.0	45	1.4301
SG/2 single	3.0	80	1.4301
RND/Z-50	4.0	30	zinc coating

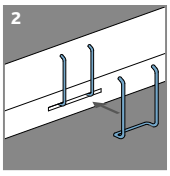
Lintel mounting from long brick is analogous to the lintel mounting from standart brick with the addition of connections SG/2, estimating 1-2 connections for the brick at the first row.

ATTENTION! Before laying bricks the first row, the ends of the bricks shall be processed with primer (quarz based). It is necessary for a better mortar, brick and metal adhesion.

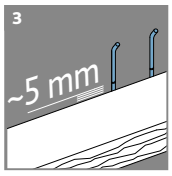
ATTACHING SG/2 CONNECTIONS ON LONG BRICKS



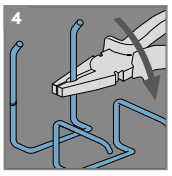
At the back wall grooves are made (~5 mm wide, ~150 mm long, and ~15 mm depth)



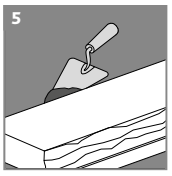
SG/2 connections introduced



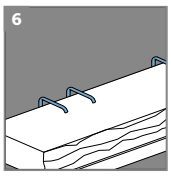
The connections are marked ~5 mm above brick surface



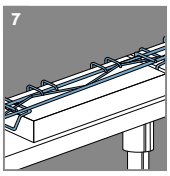
The connections are folded



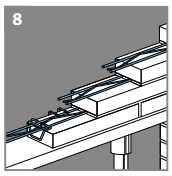
The grooves are filled with mortar



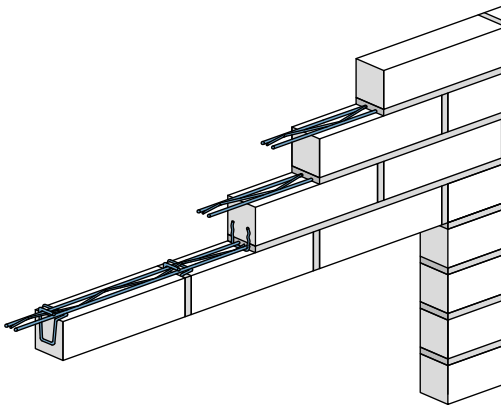
SG/2 connections are introduced into the mortar



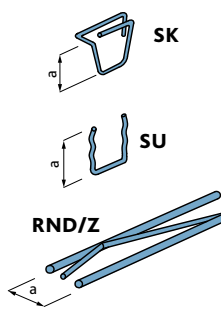
Lintel hooks SK 50-40 in every vertical joint of the first course



3 masonry rows are reinforced



THIN-LAYER DECORATION MASONRY LINTEL



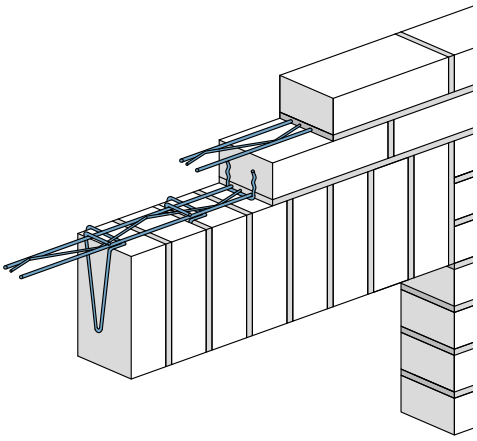
MAKE	Ø, mm	a, mm	material
SK 30 - 40 - 2	3.0	40	1.4301
SU 30 - 45 - 2	3.0	45	1.4301
RND/Z-50	4.0	30	zinc coating

Mounting of narrow brick lintel is analogous to the mounting of lintel from standard brick by additionally reinforcing one masonry row. The number of reinforced lintel rows – at least 3 rows.

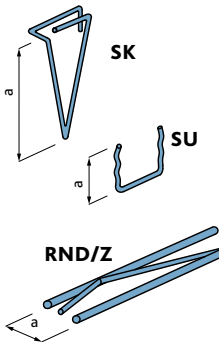
ATTENTION! Decorative masonry layer from bricks 50-65 mm is allowed at low-height construction, up to 2 floors.

BRICK LINTELS

SOLDIER COURSE BRICKWORK



The most common type of laying brick lintels is soldier course brickwork. In this case the bricks can be both solid and hollow. Sometimes, to achieve a better effect, 2 first courses of brick laying above the opening are soldier courses.

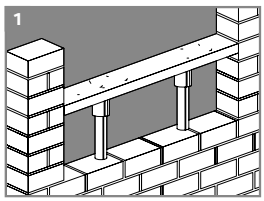


MAKE	Ø, mm	a, mm	Material
SK 50 - 170 - 1	3.0	170	zinc coating
SK 50 - 170 - 2	3.0	170	1.4301
SU 50 - 45 - 1	3.0	45	zinc coating
SU 50 - 45 - 2	3.0	45	1.4301
RND/Z-50	4.0	50	zinc coating

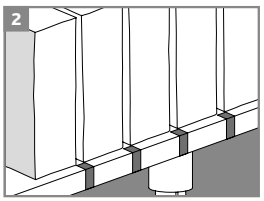
LINTEL KIT IN BOXES

MAKE	opening, m	Set, pcs.	Material
BL-V-1.0	1.0	SK 50-170 x 7 SU 50-45 x 4	zinc coating / 1.4301
BL-V-1.5	1.5	SK 50-170 x10 SU 50-45 x 5	zinc coating / 1.4301

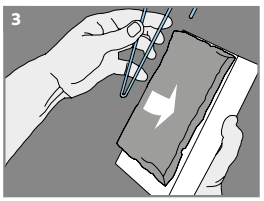
MOUNTING OF LINTELS UP TO 2 M



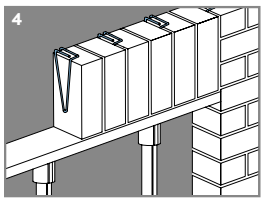
Construction of formwork



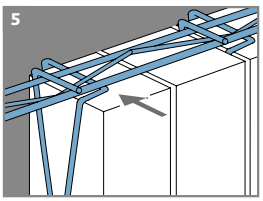
Bricks are placed on the framework. Placement of bricks is marked on the formwork.



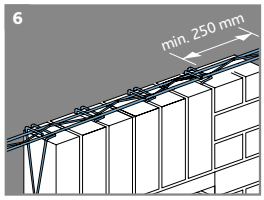
Mortar should not reach the bottom of the brick by approximately 2 cm. Upon mounting of the lintel and dismantling of the formwork, joints should be filled in.



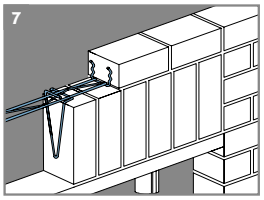
Lintel hooks SK 50-170 should be placed into the mortar, in every second vertical joint of the first row of brickwork



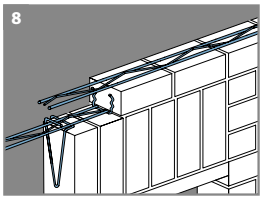
Reinforcement Murfor RND/Z-50 should be inserted through grooves of lintel hook



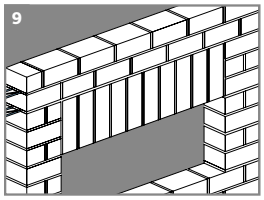
Reinforcement rods extend beyond the opening edges by at least 250 mm in both sides



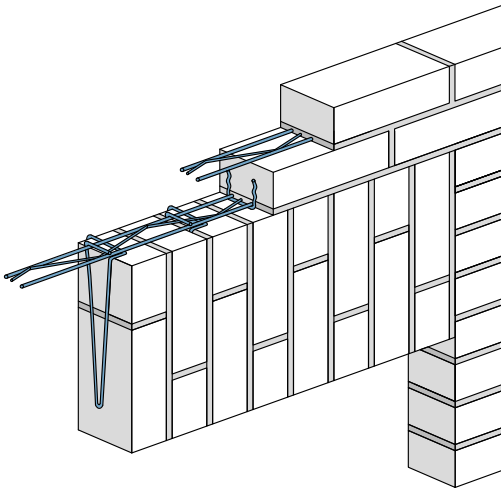
Lintel hooks SU 50-45 should be installed in every second vertical joint of the second row



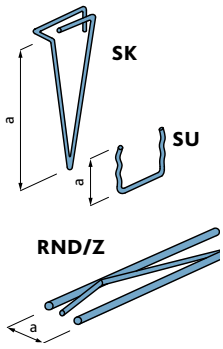
Reinforcement Murfor RND/Z-50 in the second row of brickwork. Further throughout the height, 1 reinforcement rod in every 300...500 mm



Formwork should be dismantled in 2 weeks

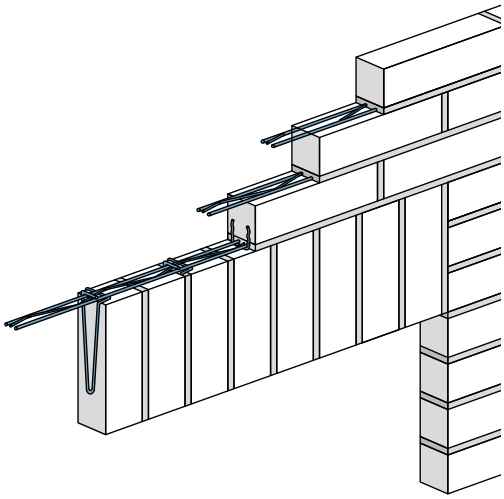


SOLDIER COURSE BRICKWORK WITH ONE AND A HALF BRICK

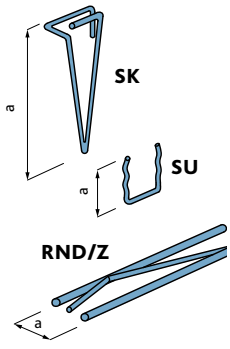


MAKE	Ø, mm	a, mm	Material
SK 50 - 270 - 1	3.0	270	zinc coating
SK 50 - 270 - 2	3.0	270	1.4301
SK 50 - 340 - 1	3.0	340	zinc coating
SK 50 - 340 - 2	3.0	340	1.4301
SU 50 - 45 - 1	3.0	45	zinc coating
SU 50 - 45 - 2	3.0	45	1.4301
RND/Z-50	4.0	50	zinc coating

Lintel mounting at one and a half brick is analogous to the mounting from full bricks.



THIN-LAYER DECORATION MASONRY LINTEL



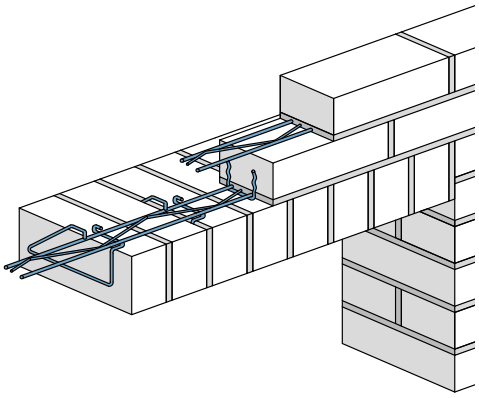
MAKE	Ø, mm	a, mm	Material
SK 30 - 170 - 2	3.0	170	1.4301
SU 30 - 45 - 2	3.0	45	1.4301
RND/Z-30	4.0	30	zinc coating

Lintel mounting from thin bricks is analogous to lintelmounting from standard bricks with additional reinforcement of one brick row. The number of reinforced masonry rows of the lintel shall be at least 3 rows.

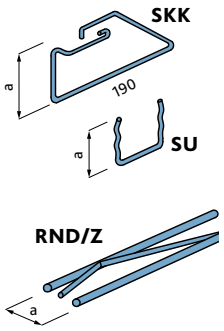
ATTENTION! Decorative masonry layer from bricks 50-65 mm is allowed at low-height construction, up to 2 floors.

BRICK LINTELS

ROWLOCK COURSE BRICKWORK



Rowlock course brickwork is performed at a 90° angle to the façade because doing this it is possible to hide the heat insulation layer behind the decorative brickwork. Depending on the thicknes of this layer the bottom row of bricks can protrude from the façade plane – this way the lintel will be emphasized not only by pattern, but by relief too.

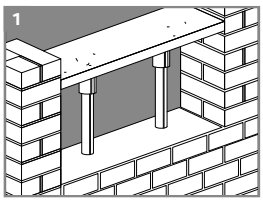


MAKE	Ø, mm	a, mm	Material
SKK 50 - 65 - 1	3.0	65	zinc coating
SKK 50 - 65 - 2	3.0	65	1.4301
SU 50 - 45 - 1	3.0	45	zinc coating
SU 50 - 45 - 2	3.0	45	1.4301
RND/Z-50	4.0	50	zinc coating

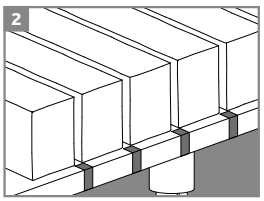
LINTEL KIT IN BOXES

MAKE	opening, m	Set, pcs.	Material
BL-S-1.0	1.0	SKK 50-65 x 7 SU 50-45 x 4	zinc coating / 1.4301
BL-S-1.5	1.5	SKK 50-65 x10 SU 50-45 x 5	zinc coating / 1.4301

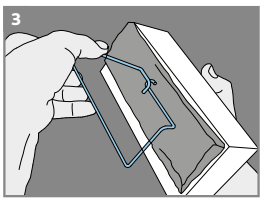
MOUNTING OF LINTELS UP TO 2 M



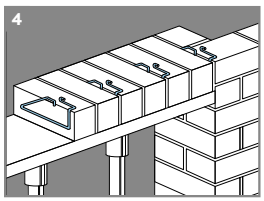
Construction of formwork



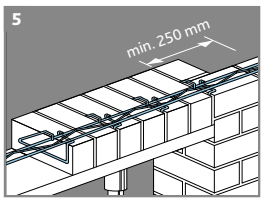
Bricks are placed on the framework. Placement of bricks is marked on the formwork.



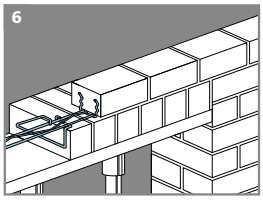
Mortar should not reach the bottom of the brick by approximately 2 cm. Upon mounting of the lintel and dismantling of the formwork, joints should be filled in.



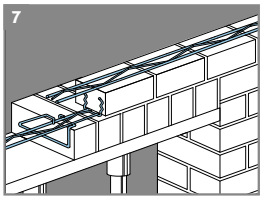
Lintel hooks SKK 50-65 should be placed into the mortar, in every second vertical joint of the first row of brickwork



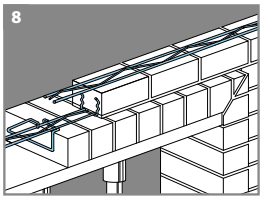
Reinforcement Murfor RND/Z-50 should be inserted through grooves and shall protrude from the opening for no less than 250 mm into both sides



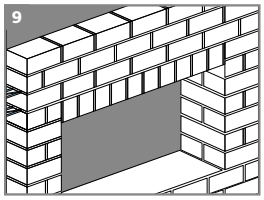
Lintel hooks SU 50-45 should be installed in every second vertical joint of the second row



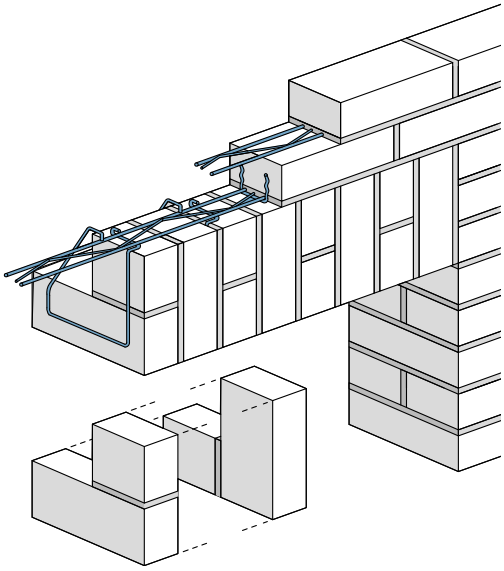
Reinforcement Murfor RND/Z-50 in the second row of brickwork. Further throughout the height, 1 reinforcement rod in every 300...500 mm



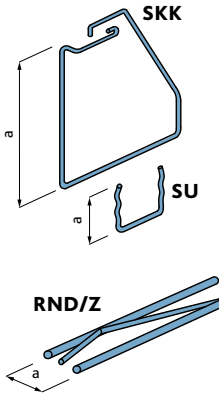
OPTION: Lintel with protrusion from the plane of the wall



Formwork should be dismantled in 2 weeks.

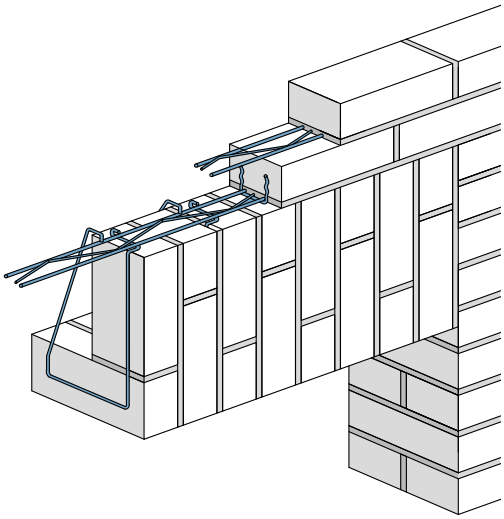


COMBINED BRICKWORK

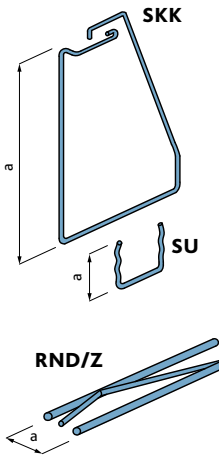


MAKE	Ø, mm	a, mm	Material
SKK 50 - 170 - 2	3.0	170	1.4301
SKK 50 - 220 - 2	3.0	220	1.4301
SU 50 - 45 - 1	3.0	45	zinc coating
SU 50 - 45 - 2	3.0	45	1.4301
RND/Z-50	4.0	50	zinc coating

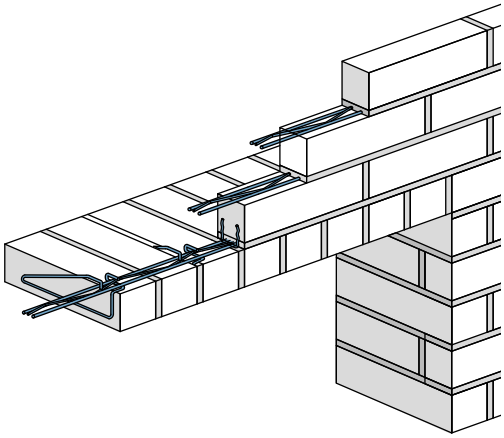
A classical type of brick lintels by altering a full brick and two identical halves. The only important condition when selecting combined brickwork is dimensions of the bricks. Their ratio shall be 2:1, e.g. 250x120x65h. The lintel should start and finish with soldier course brickwork. The layout of the lintel is identical to the lintel made in the vertical way.



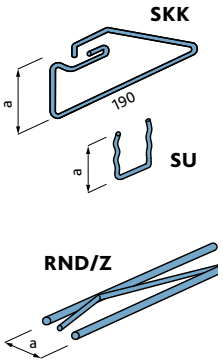
COMBINED BRICKWORK WITH ONE AND A HALF BRICK



MAKE	Ø, mm	a, mm	Material
SKK 50 - 320 - 2	3.0	320	1.4301
SU 50 - 45 - 1	3.0	45	zinc coating
SU 50 - 45 - 2	3.0	45	1.4301
RND/Z-50	4.0	50	zinc coating



THIN DECORATION MASONRY LINTEL



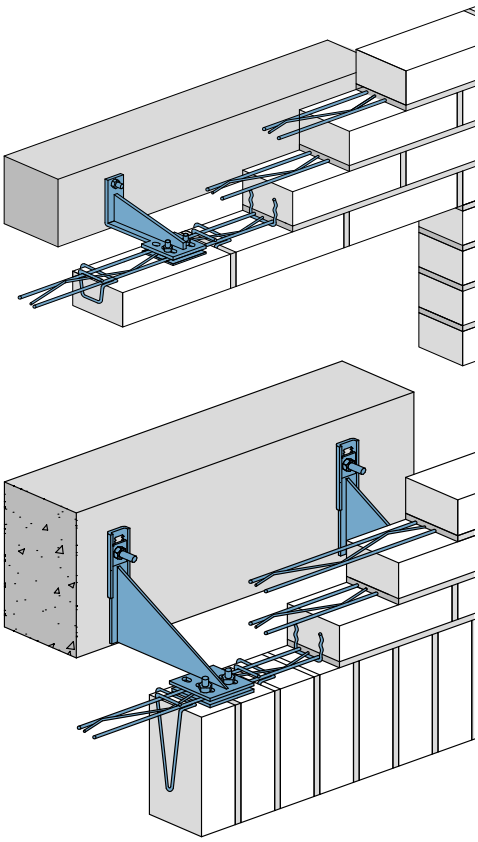
MAKE	Ø, mm	a, mm	Material
SKK 30 - 40 - 2	3.0	40	1.4301
SU 30 - 45 - 2	3.0	45	1.4301
RND/Z-30	4.0	30	zinc coating

Lintel mounting from thin bricks is analogous to lintel mounting from standard bricks with additional reinforcement of one brick row. The number of reinforced masonry rows of the lintel shall be at least 3 rows.

ATTENTION! Decorative masonry layer from bricks 50-65 mm is allowed at low-height construction, up to 2 floors.

BRICK LINTELS ON BRACKETS

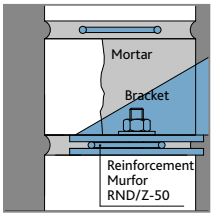
MASONRY ON THE BRACKETS REINFORCED BY MURFOR



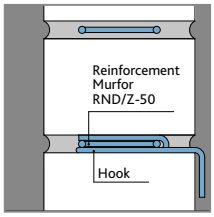
In case of large openings (>2 m), there is a risk of deflection as well as destruction of the lintel. In order to avoid this, suspended brackets GSP should be used. They are fixed to the carrying wall of the reinforced concrete lintel while the free end is inserted into the horizontal joint between the first and the second rows of brickwork. In this case, the load is transferred from decorative brickwork to the load-bearing structure through the brackets.

Quantity of suspended brackets and their arrangement above openings are calculated separately in every individual case.

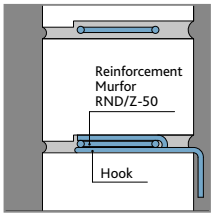
THICKNESS OF THE HORIZONTAL JOINT



Seam with brackets
12 – 15 mm



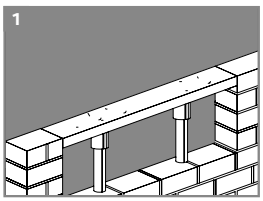
Seam with rebar and
connections 10 – 12 mm



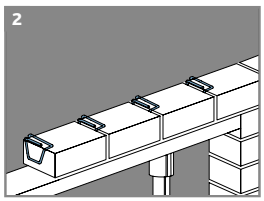
Thickness of a lowered joint
with reinforcement and lintel
hooks is 8 to 9 mm.

Upon mounting of the reinforcement in the horizontal joint, its thickness should not exceed 10 mm and in case of using brackets it should not exceed 12 mm. When placing reinforcement, there should be no obvious changes in the thickness of the joint, and its application should not have any influence on the general appearance of the brickwork.

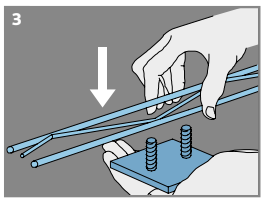
MOUNTING OF BRICK LINTELS OF OVER 2 M BY USING SUSPENDED BRACKETS GSP



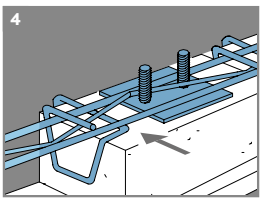
Construction of formwork



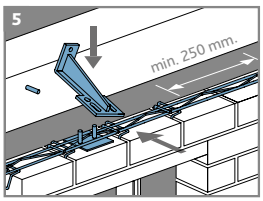
Lintel hooks SK 50-40 in every
vertical joint of the first row



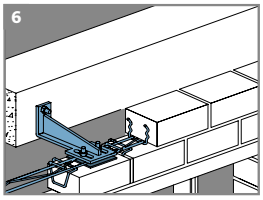
Connection of truss Murfor
RND/Z-50 with the bottom
plate AP-1



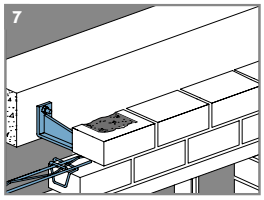
Reinforcement Murfor RND/Z-50
together with the plate AP-1 should
be inserted through grooves of
lintel hooks



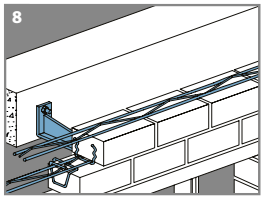
Fixation of suspended bracket



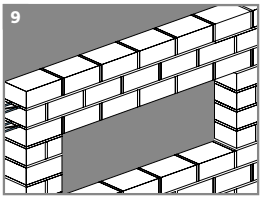
Second row of brickwork



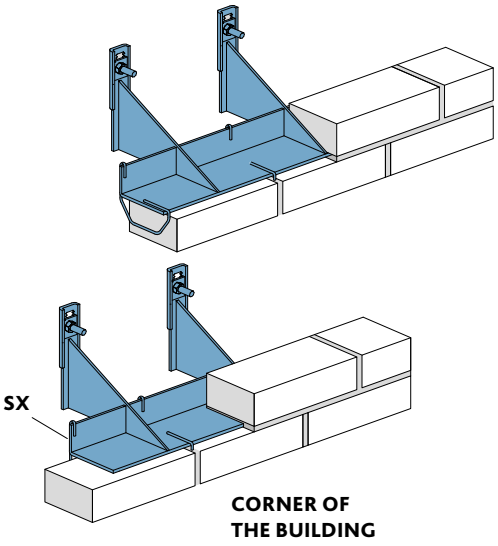
A cavity should be cut in
the brick above the bracket
and upon fixation should be
filled with mortar.



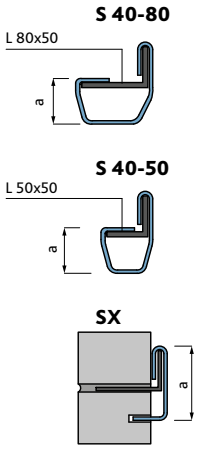
Reinforcement Murfor RND/Z-50
in the second and the third rows of
brickwork. Further throughout the
height, 1 reinforcement rod in every
300...500 mm



Formwork should be dismantled
in 2 weeks.

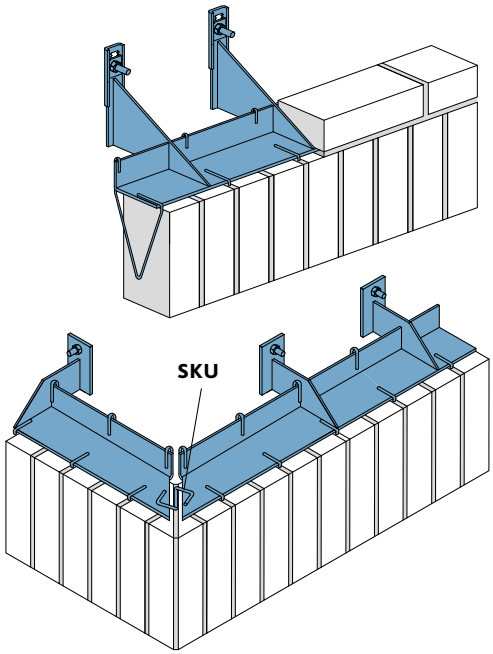


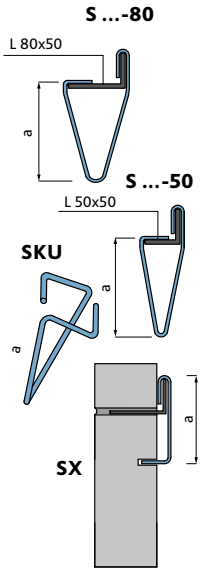
BRICKWORK SUSPENDED ON BRACKETS



Make	Ø, mm	a, mm	Material
S 40 - 80	3.0	40	1.4301
S 40 - 50	3.0	40	1.4301
SX - 80	3.0	80	1.4301

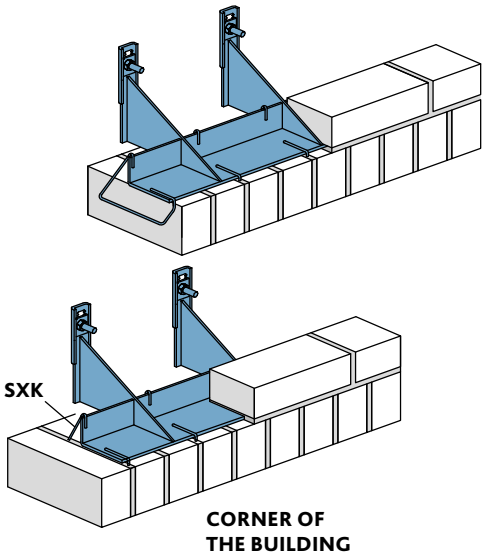
IMPORTANT! Connections at each vertical seam.
Holes in the brick are made at place.

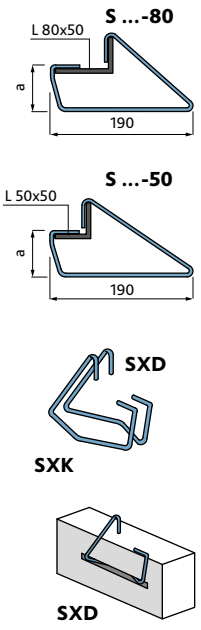




Make	Ø, mm	a, mm	Material
S 85 - 80	3.0	85	1.4301
S 165 - 80	3.0	85	1.4301
S 165 - 50	3.0	165	1.4301
S 270 - 80	3.0	270	1.4301
S 340 - 80	3.0	340	1.4301
SX - 145	3.0	145	1.4301
SKU - 165	3.0	165	1.4301

IMPORTANT! Connections at each second vertical seam.
Holes in the brick are made at place.



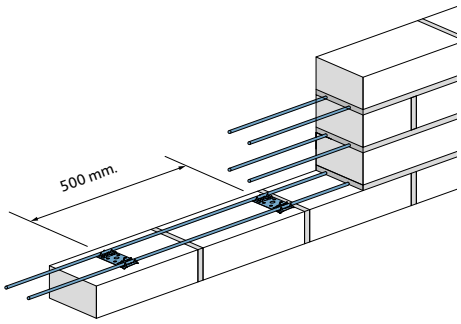


MAKE	Ø, mm	a, mm	Material
S 40/190 - 80	3.0	40	1.4301
S 40/190 - 50	3.0	40	1.4301
S 85/190 - 80	3.0	85	1.4301
S 170/190 - 80	3.0	170	1.4301
S 340/190 - 80	3.0	340	1.4301
SXD - 40	3.0	40	1.4301
SXK - 40	3.0	40	1.4301

IMPORTANT! Connections at each second vertical seam.
Holes in the brick are made at place

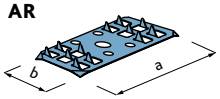
It is also possible to produce non-standard hooks
for any variant of decorative masonry laying.

MASONRY REINFORCEMENT

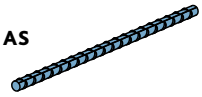


REINFORCEMENT SYSTEM BAUT®

AR



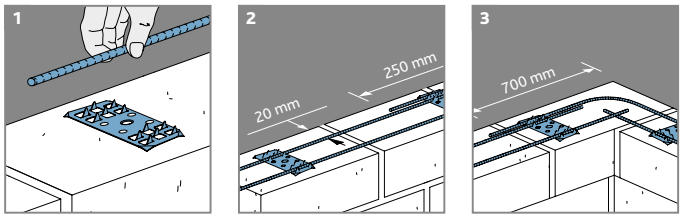
AS



MAKE	Thickness in mm	Dimensions mm	Material
AR - 01 - 1	1.0	72 x 30	zinc coating
AR - 01 - 2	1.0	72 x 30	1.4301

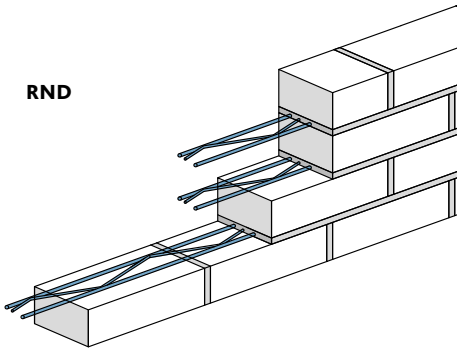
MAKE	Ø mm	Length in mm	Material
AS - 2,7	4.0	2700	zinc coating

REINFORCEMENT SYSTEM MOUNTING

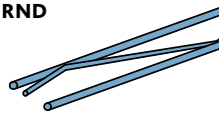


REINFORCEMENT MURFOR®
MADE BY NV BEKAERT SA

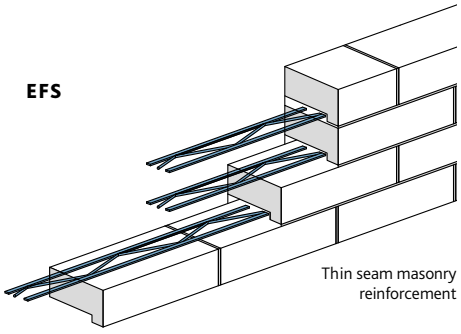
RND



RND

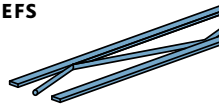


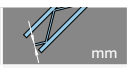
EFS



Thin seam masonry reinforcement

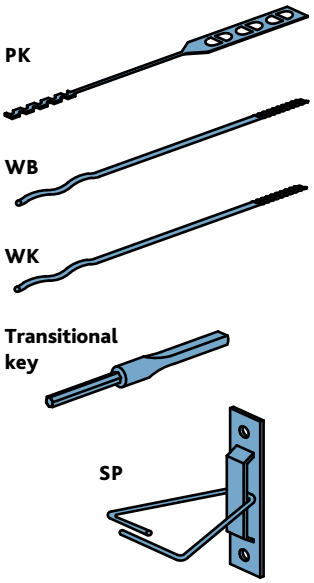
EFS



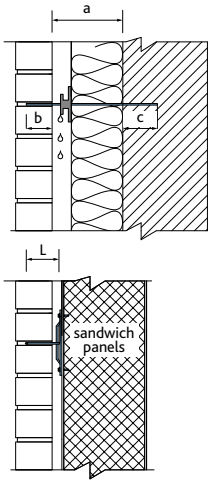
MAKE	Length in mm	 mm	 mm	 mm
RND/Z - 30	3.05	30	4	3.75
RND/S - 30	3.05	30	4	3.75
RND/Z - 50	3.05	50	4	3.75
RND/S - 50	3.05	50	4	3.75
RND/Z - 100	3.05	100	4	3.75
RND/S - 100	3.05	100	4	3.75
RND/Z - 150	3.05	150	4	3.75
RND/S - 150	3.05	150	4	3.75
RND/Z - 200	3.05	200	5	3.75
RND/S - 200	3.05	200	5	3.75
EFS/Z - 40	3.05	40	8 x 1.5	1.5
EFS/Z - 90	3.05	90	8 x 1.5	1.5
EFS/Z - 140	3.05	140	8 x 1.5	1.5
EFS/Z - 190	3.05	190	8 x 1.5	1.5

NOTE:
.../Z – zinc coating,
.../S – stainless steel

ANCILLARY COMPONENTS FOR MASONRY



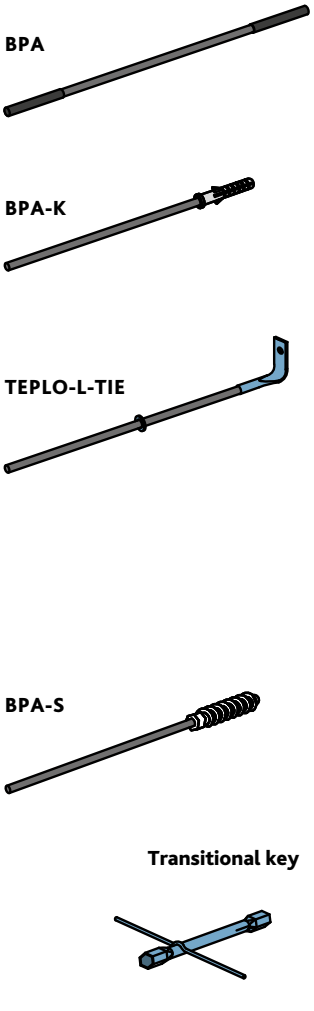
METAL ANCHORS



MAKE	Length L mm	Ø mm	a mm	b mm	c mm
PK 25	250	4	up to 100	70	110
PK 32	320	4	up to 170	70	110
WB 25	225	4	up to 105	60-70	50-70
WB 30	275	4	up to 155	60-70	50-70
WB 35	325	4	up to 205	60-70	50-70
WB 40	375	4	up to 255	60-70	50-70
WB 50	475	4	up to 355	70	50-70
WK 25	250	4	up to 130	70	50-70
WK 30	300	4	up to 180	70	50-70
SP-90	90*	4			

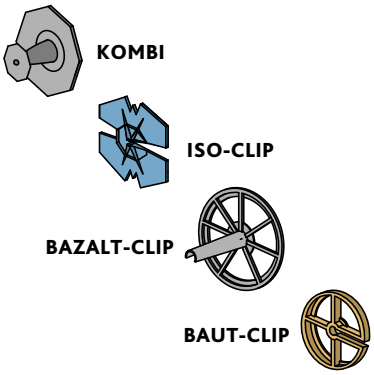
Material - stainless steel
*any length can be made by need
Material – stainless steel/zinc coated steel

BASALT FIBRE WALL TIES



Make	Length L mm	Ø mm	a mm	b mm	c mm
BPA-350	350	6	up to 180	80	80
BPA-400	400	6	up to 230	80	80
BPA-450	450	6	up to 280	80	80
BPA-500	500	6	up to 330	80	80
BPA-600	600	6	up to 380	80	80
BPA-650	650	6	up to 430	80	80
BPA-K-300	300	6	up to 130	80	50
BPA-K-320	320	6	up to 150	80	50
BPA-K-350	350	6	up to 180	80	50
BPA-K-400	400	6	up to 230	80	50
BPA-K-450	450	6	up to 280	80	50
Teplo-L-5-165	165	5	up to 100	60	-
Teplo-L-5-190	190	5	up to 125	60	-
Teplo-L-5-215	215	5	up to 150	60	-
Teplo-L-5-240	240	5	up to 175	60	-
Teplo-L-5-265	265	5	up to 200	70	-
Teplo-L-7-290	290	7	up to 225	70	-
Teplo-L-7-315	315	7	up to 250	70	-
Teplo-L-7-340	340	7	up to 275	70	-
Teplo-L-7-365	365	7	up to 300	70	-
BPA-S-200	200	6	up to 30	70	100
BPA-S-300	300	6	up to 130	70	100
BPA-S-350	350	6	up to 180	70	100
BPA-S-450	450	6	up to 280	70	100

ANCILLARY COMPONENTS FOR MASONRY

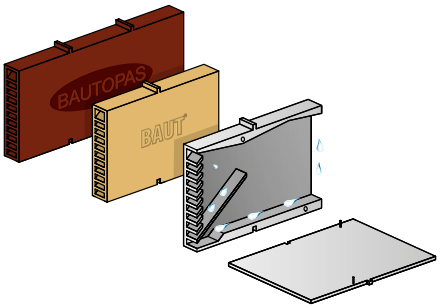


SPACERS

MAKE	Diameter of spacer mm	Diameter of anchor mm	Used with anchors
KOMBI	60	3,6-4,2	WB, WK
ISO-CLIP	65	3,6-4,2	PK, WB, WK
BAZALT-CLIP	80	6	BPA, BPA-K, BPA-S
BAUT-CLIP	45	5-7	BPA, BPA-K, BPA-S

EXPANSION PLUG

MAKE	Length mm	Drill diameter mm	Diameter of anchor mm
BV 6 x 50	50	6	4
ML 6 x 60	60	6	4
SX 8 x 65 L	65	8	4 - 6



VENTILATION BOXES

MAKE	Dimensions mm	Masonry thickness mm	Material
BAUTOPAS	115 x 60 x 12	115-120	Polystyrol PS
BAUT	80 x 60 x 12	85-90	Polystyrol PS

COLOR: White, Light gray, Dark gray, Sandy, Brown, Black

SELF-EXPANDING IMPREGNATED JOINT SEALING TAPE

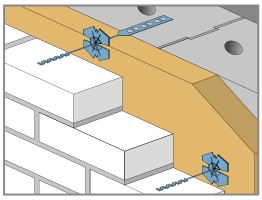
MAKE	Joint width mm	Roll length m	Material
illmod 600 15/8-15	8 - 15	3,3	Polyurethane PU

COLOR: Anthracite, Gray

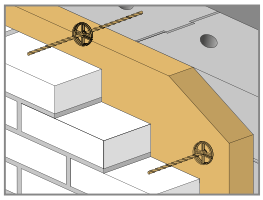
MASONRY COMPONENTS MOUNTING

Brick veneer should be reliably connected to a carrying wall structure. Brickwork is continuously exposed to weather elements, the essential of which are wind load and thermal expansion due to sunlight. Therefore, the anchors connecting the decorative and the load-bearing layers of the structure should meet the following essential requirements: resistance to compression and pulling, and a certain degree in elasticity allowing insignificant movement of the facing layer in respect of the load-bearing one. Stainless steel anchors and basalt fibre wall ties satisfy all these requirements.

USE OF ANCHORS AND TIES IN MASONRY WALL CONSTRUCTION PROCESS



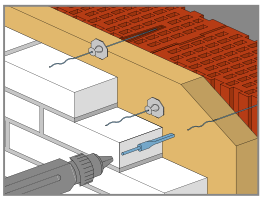
Installation of anchors PK



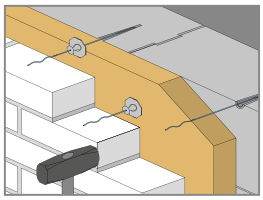
Basalt fibre ties BPA mounting

Used at the same time when building the supporting construction and decoration masonry

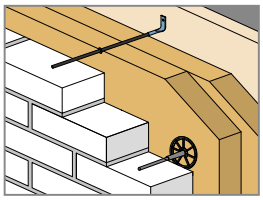
ATTACHING TO THE EXISTING WALL CONSTRUCTION



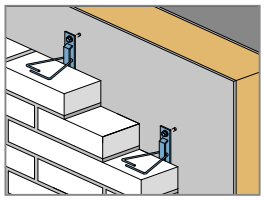
Installation of anchors WK



WB and BPA-K anchors mounting

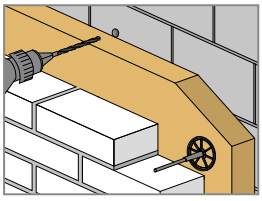


Teplo-L-Tie basalt fiber ties mounting

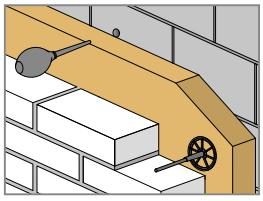


Ties SP attachement to the sandwich panel and metal constructions.

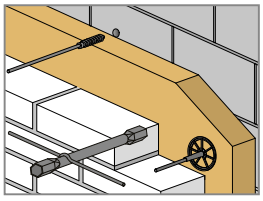
INSTALLATION OF BPA-S ANCHORS TO AERATED CONCRETE



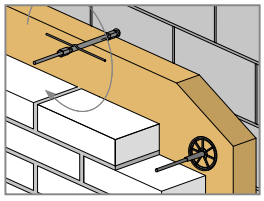
Drill the hole in the wall: diameter of drillbit - 10 mm; depth of the hall - 100 mm



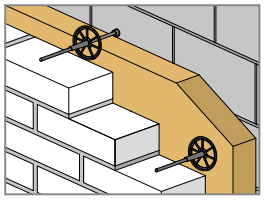
Clear the hole from dust



To set the anchor use a special key

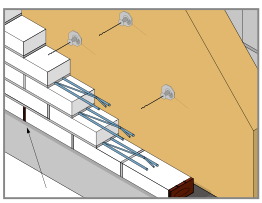


To twist the anchor all the way up to fully absconding in to the aerated blocks

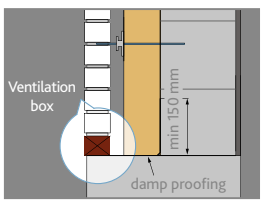


In case of insulation, anchors are used with spacers, which are closely pressing the insulation to the wall

INSTALLATION OF VENTILATION BOXES



ventilation boxes every 3 bricks



- 2 rows of boxes in the building of up to two floors (at the bottom – within the first row of brickwork and at the top – within the last one)
- 1 additional row of boxes per every second floor in multi-storey buildings
- Additional ventilation boxes should be installed above and under openings
- Boxes should be installed in vertical joints of brickwork as follows: 1 ventilation box per 2 to 3 bricks

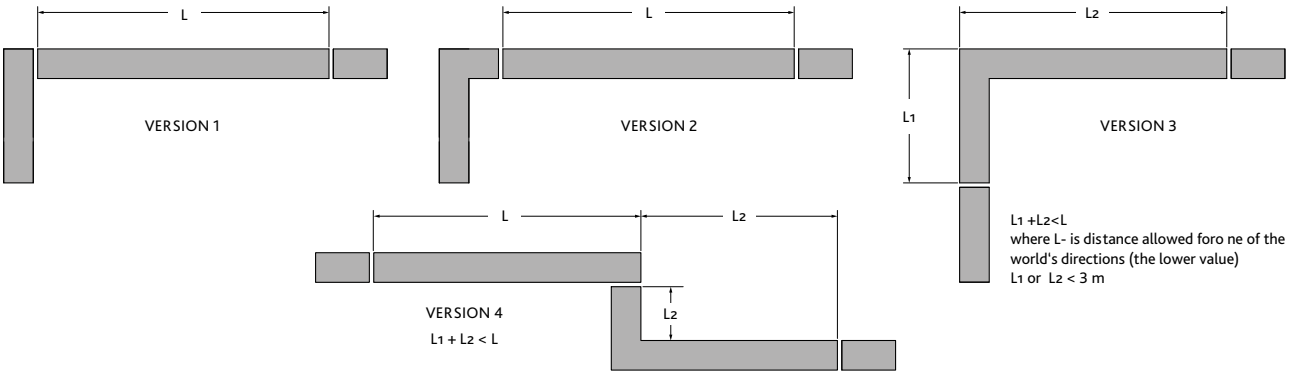
EXPANSION-DEFORMATION JOINTS

VERTICAL EXPANSION JOINTS ALONG THE LENGTH OF THE BUILDING

One of the key conditions of durability of decorative brickwork is dividing the facade into fragments by using deformation (expansion) joints. Sizes of fragments, first of all, depend on orientation of the facade according to the world's directions. The largest stresses in brickwork are in the corners of the building. In order to avoid cracks, it is recommended to locate vertical deformation joints in the corners of the building (version 1) or not far from the corners (version 2).

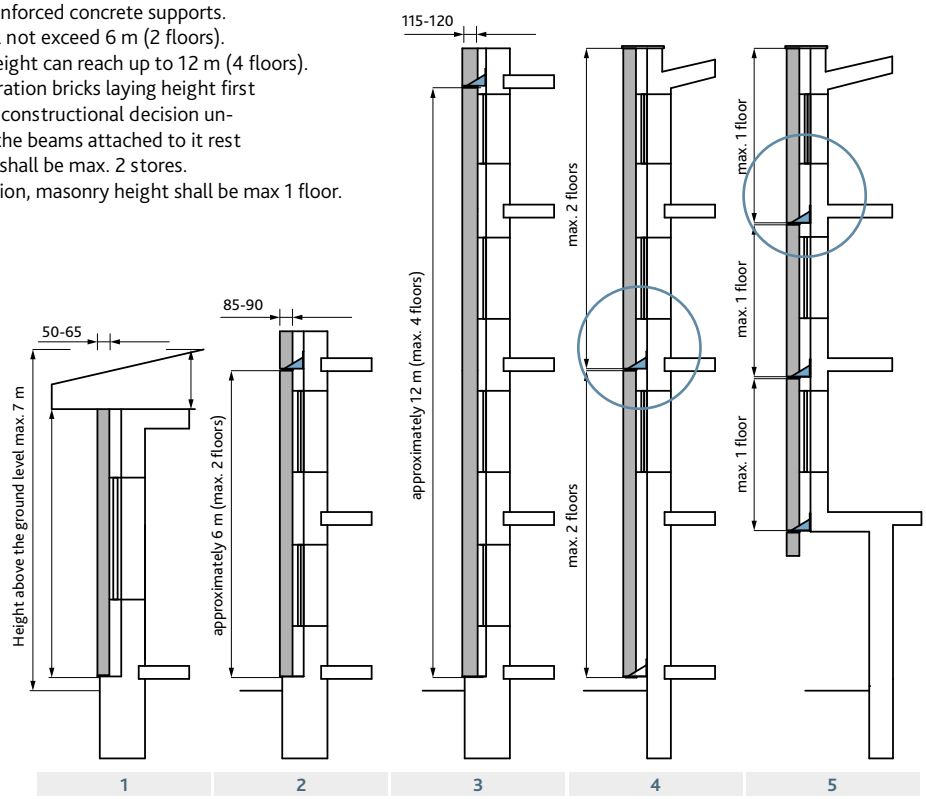
Orientation of the building	Maximal distance L in m
Northern facade	12 - 14
Eastern facade	10 - 12
Southern facade	8 - 9
Western facade	7 - 8

VERTICAL EXPANSION-DEROTMATION JOINTS ARRANGEMENT VERSIONS

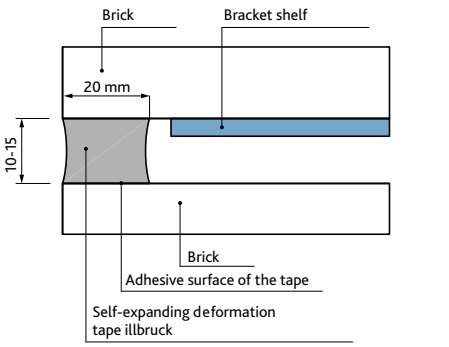


MASONRY HEIGHT. HORIZONTAL DEFORMATION JOINTS

1. Decoration wall height depends on the width of the masontry. When masonry thickness is 50-65 mm, wall height from the fundament shall not exceed 1 floor (around 3 meters). Masonry height above the ground level can be max. 7 m. Masonry above 3 m shall be suspended on beams or reinforced concrete supports.
2. When brick width is 85-90 mm, wall height shall not exceed 6 m (2 floors).
3. When the masonry width is 115-120 mm, wall height can reach up to 12 m (4 floors).
4. Height of the masonry placed on brackets. Decoration bricks laying height first of all depents on masonry weight, as well as the constructional decision undertaken. In case it is a supporting construction the beams attached to it rest upon the fundament, the height of the masonry shall be max. 2 stores.
5. If the beams are attached to the beam construction, masonry height shall be max 1 floor.



CONSTRUCTIVE SOLUTION OF THE DEFORMATION JOINT

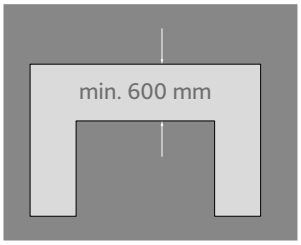


CALCULATION OF LOADS

When constructing openings in decorative brick walls, brick lintels consisting of brickwork beams and reinforcements should be installed.
In this case, the following should be ensured:

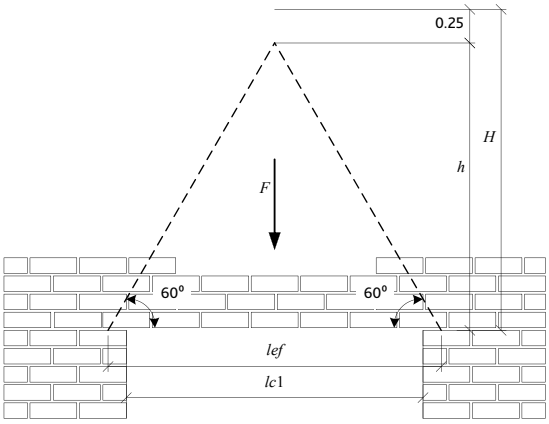
$$h/l_{ef} \geq 0,5$$

Where: h is the height of the wall above the opening;
l_{ef} is the effective span over the opening.



An important requirement, which should be followed when designing a lintel in order to ensure its normal functioning, is the minimal height of the reinforced wall above the opening.
In case if openings are less than 2 m in width and suspended brackets are not used, the height of reinforced wall above the opening should be at least 0.6 m.

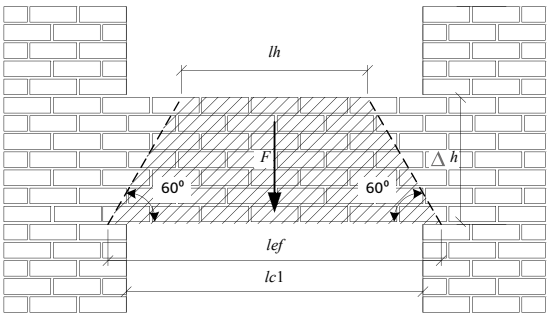
CALCULATION OF ACTIONS OF A BRICK BEAM



The value of action on a masonry beam is calculated in accordance with the following formula:

$$F = d_s \cdot S \cdot \gamma \cdot \gamma_G$$

$$(S = l_{ef} \cdot h/2;\ \ l_{ef} = 1{,}15 \cdot l_{c1};\ \ h = 0{,}866 \cdot l_{ef})$$



The value of action on a masonry beam when openings are located in every floor is calculated in accordance with the following formula:

$$F = d_s \cdot S \cdot \gamma \cdot \gamma_G$$

$$(S = \frac{l_{ef} + l_h}{2} \cdot \Delta h;\ l_{ef} = 1{,}15 \cdot l_{c1};$$

Where: S is the area of the force triangle (trapezium); d_s – is the thickness of decorative brickwork;
γ is the specific gravity of masonry; γ_G – is the safety factor.

CALCULATION OF ACTIONS OF A BRICK WALL

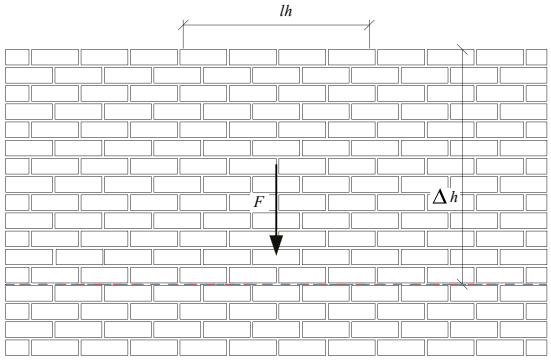
If it is necessary to "suspend" brickwork on the frame of the building, the facade shall be divided into separate fragments.

The value of action of every fragment should be calculated in accordance with the formula:

$$F = d_s \cdot S \cdot \gamma \cdot \gamma_G \ \ (S = l_h \cdot \Delta h)$$

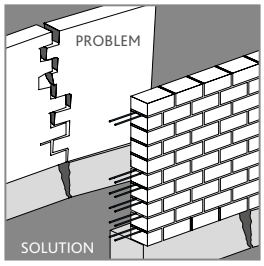
Where: S is the area of the fragment of the wall;
d_s is the thickness of decorative brickwork;
γ is the specific gravity of masonry;
γ_G is the safety factor.

When the value of action is calculated and the load-bearing capacity of suspended brackets is known, a quantity of brackets required for the given fragment of the facade can be calculated.

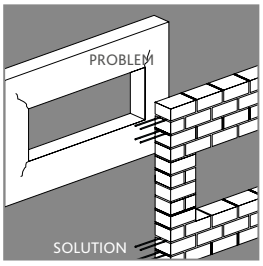


MASONRY REINFORCEMENT

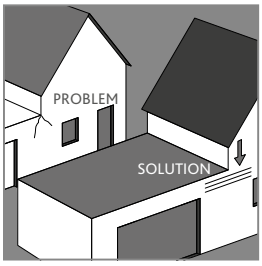
Longitudinal reinforcement by steel reinforcement (BAUT or Murfor) is applied in case of horizontal and vertical loads as well as structures, which are subject to earthquake loads. Reinforcement of stone structures significantly increases their load-bearing capacity and solidity, and ensures combined operation of separate parts of the building. This reinforcement is required for exterior layers of multi-layer wall structures as they are primarily exposed to weather elements, wind loads and temperature differences.Some of the masonry parts reinforcement recommendations are provided below



Above the foundation, 5 first rows should be reinforced with



Two rows shall be reinforced above the openings and under the openings



In case of places with different heights, 3 rows should be reinforced

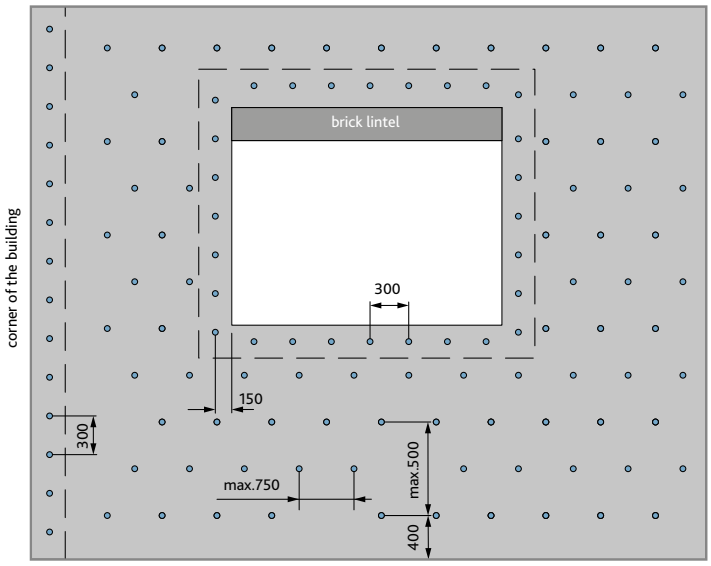
ANCHORING OF BRICK VENEER

The quantity of anchors per 1 sq. m. of a wall depends on many factors. However, in most cases it is required:

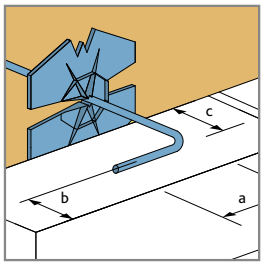
- 5 pcs. of anchors per 1 sq. m. of the wall in case of up to 5-storey buildings; masonry thinkness 85-120 mm;
- 7 pcs. of anchors per 1 sq. m. of the wall in case of 5-storey and higher buildings; masonry thinkness 85-120 mm;
- 9 pcs. of anchors per 1 sq. m. of the wall when masonry thickness is 50-65 mm.

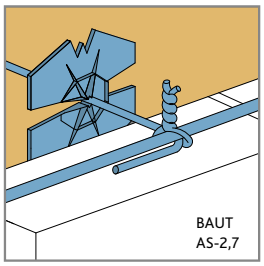
On all free edges of the building: along the perimeter of the openings, alongside the deformation joints and at the edge of the top of the masory additionaly 3 pcs of anchors needed for each linear meter.

INSTALLATION OF ANCHORS



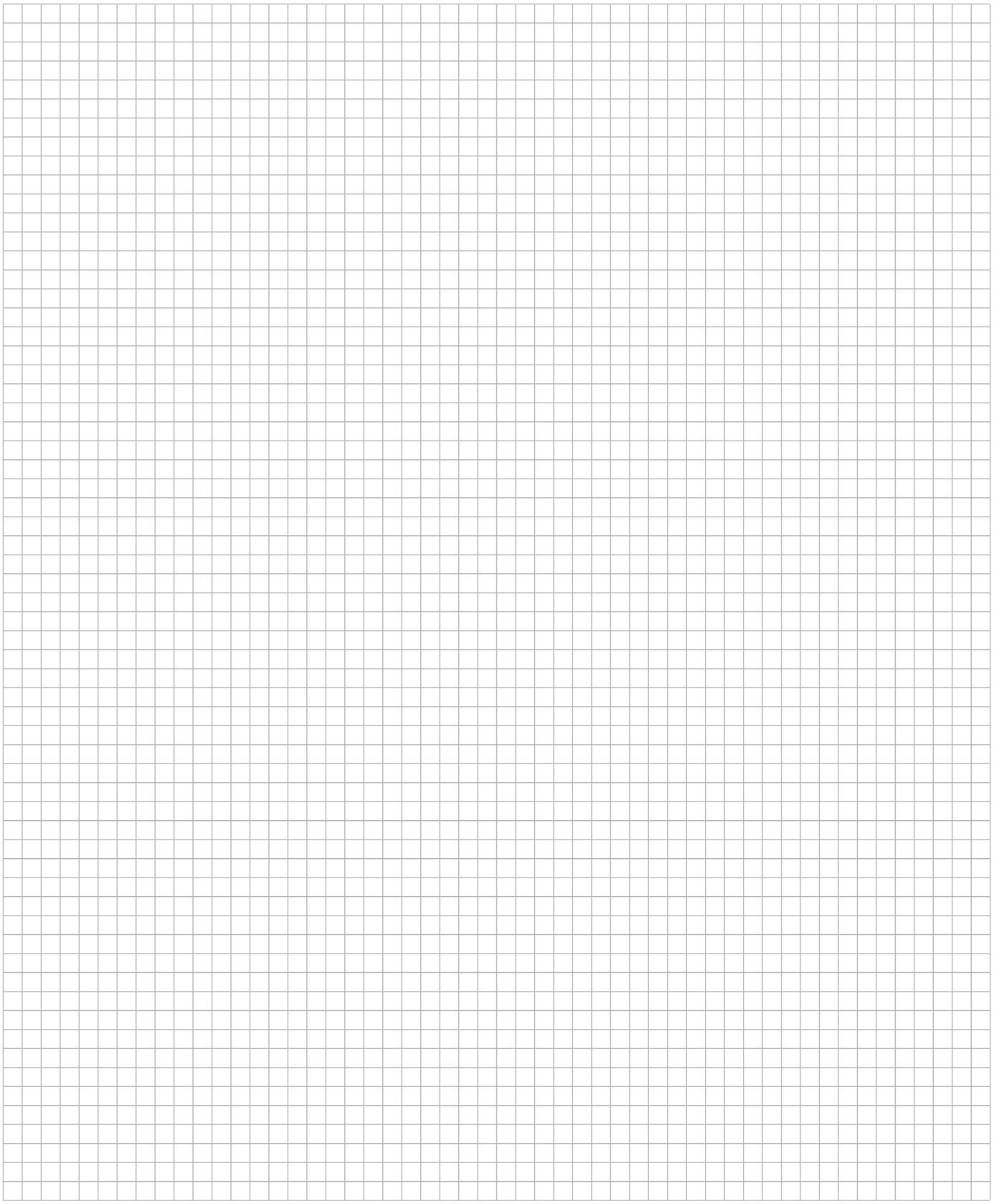
THIN-WALL MASONRY ANCHORING





When installing thin-wall masonry it very important to attach it safely to the supporting wall construction. A small amount of mortar at thin-wall masonry does not ensure complete attachement of the anchors to the masonry. That is why it is necessary to bend the anchors.
a - min. 50 mm
b - min. 20 mm
c - min. 25 mm
The rebars at the decorative masonry shall be fixed (bound) to the metal anchors using zink-plated wire.

NOTES



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