

CLIP MANUAL - COMPLETE GUIDE FOR FIXING LONG STRIP ROOFS



INTRODUCTION

Sheet metal as cladding material on roofs and walls has a long tradition all over the world. The material gives opportunities for almost all types of designs. In principle sheet metal can be used on all types of buildings. In order to get a good result, the fastening technique is one of the most important questions. A number of functions shall be fulfilled.

STRUCTURAL PERFORMANCE

The strength values given in the technical information is only valid for products from Bjarnes system. The characteristic values are defined as the lower 5% fractile with a 75% confidence level. To obtain a design value the characteristic value is reduced by using predefined safety factors. The safety factors varies depending on the method of calculation, material, fastening and substrate.

The safety factors are determined according to valid EUROCODE standard.

RESERVATION

The information in this manual is intended for general guidance only and is given without engagement. Information and advice on specific applications is given at request. For this, we require a precise description of the actual application.

All information in this manual concerning installation of our products must be adapted to suit local conditions and actual materials in use. If no performance specifications is given, contact Bjarnes System for advice.

We cannot be responsible for wrong performance and we reserve the right to make technical and range modifications without notice. No liability is accepted for printing errors and omissions.

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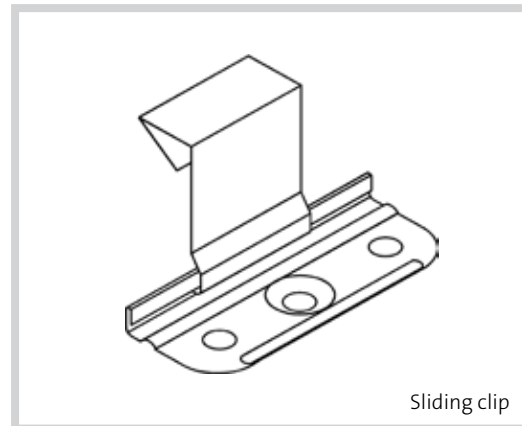
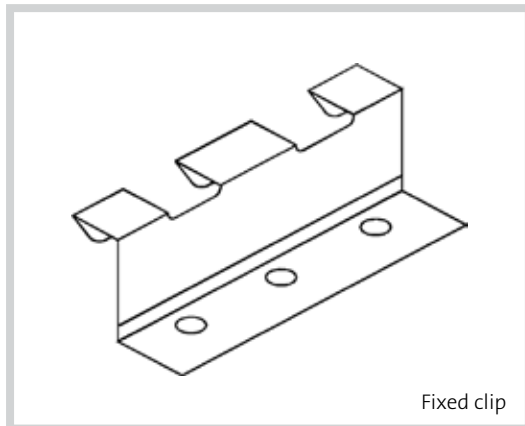


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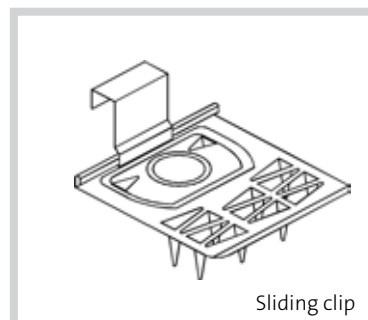
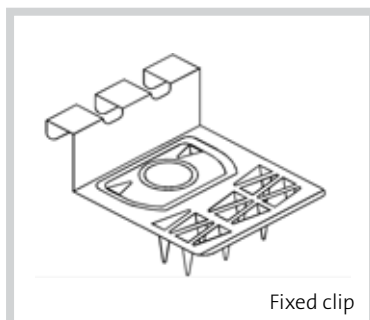
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CLIP FASTENING

Standing seam metal roofs are fixed to different kinds of substrates by using clips. Apart from the wind and snow influence the clips should also be designed to take care of thermal movements in the sheet metal. Resistance to corrosion is adapted to the current environment based on different corrosion classes. Refer to the chapter of durability.



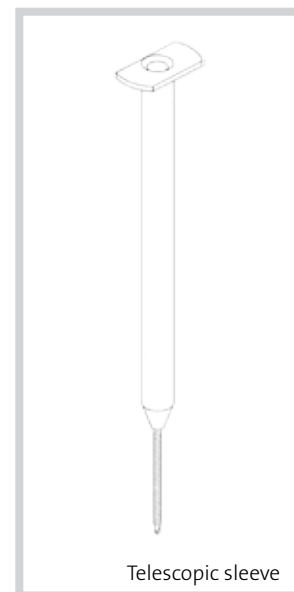
Clip types for installation directly to the substrate.



Clip types for insulated roofs in combination with telescopic sleeves.

SYSTEM KRABBAN

Snow and point loads can cause compression of the insulation. To avoid that the fastener damages the sheet metal, the telescopic effect is adjusted to the current compression. The telescopic effect shall be 10% of the insulation thickness but always at least 20mm.



The thermal conductivity is less in plastic sleeves than in metal. The thermal bridges are consequently considerably reduced compared with traditional metallic clips through the insulation.

All metals expand or contract when temperature is changing. In order to avoid damage in cladding and substrate it is very important to consider the movements that will occur due to variation in temperature.

Within the temperature interval $-20 - -30^{\circ}\text{C}$ to $+70 - 80^{\circ}\text{C}$, it is reasonable to assume that steel has an approximate movement of 1mm/meter and copper, aluminum and titan-zink about 2mm/meter. The movement is presumed to start from a fixed zone (MC), figure 1.

Within the fixed zone, fixed clips that does not allow any movements of the strips in the longitudinal direction are used. Fixing in other areas shall be done with sliding clips that allow movements in the strips in both directions.

All detail solutions connected to eave, ridge, ventilators etc has to be performed in a way that allows necessary movements in the sheet strips can be allowed.

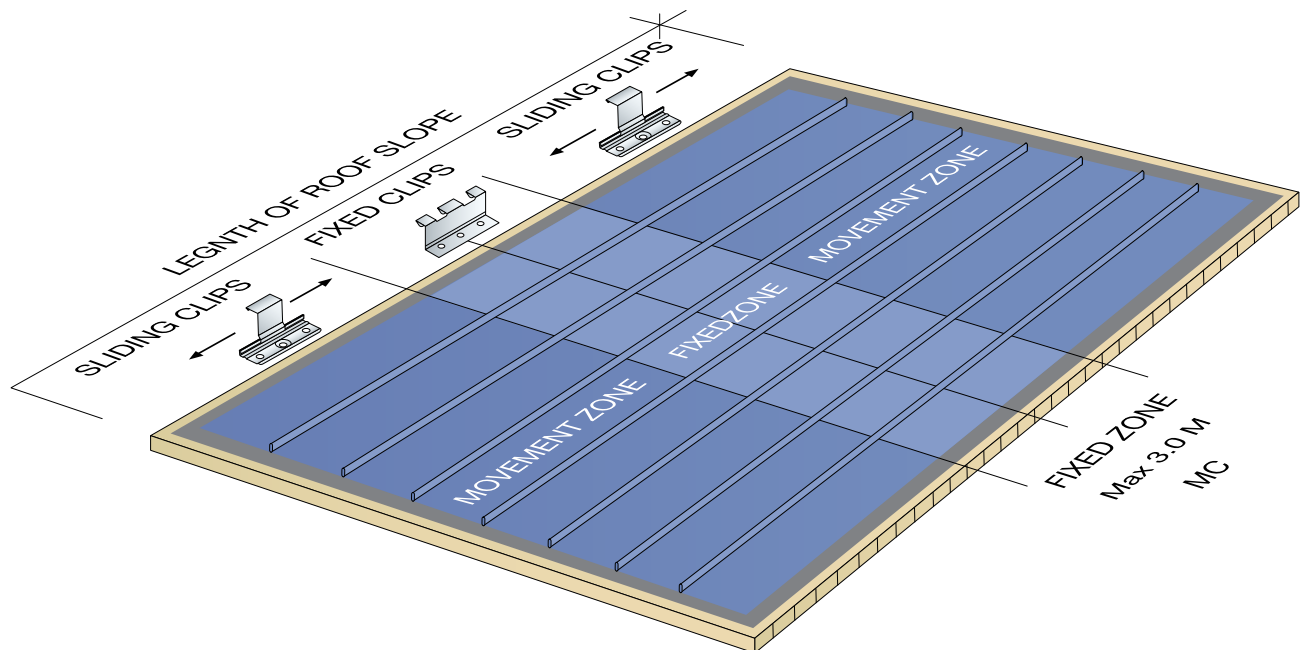


Figure 1. The thermal movement is assumed to start from a fixed zone (MC).

Material	Coefficient of thermal expansion °C-1
Steel sheet	$12 \cdot 10^{-6}$
Aluminum (Al)	$23 \cdot 10^{-6}$
Stainless (SS)	$17 \cdot 10^{-6}$
Copper (Cu)	$17 \cdot 10^{-6}$
Titanzink (Zn)	$22 \cdot 10^{-6}$

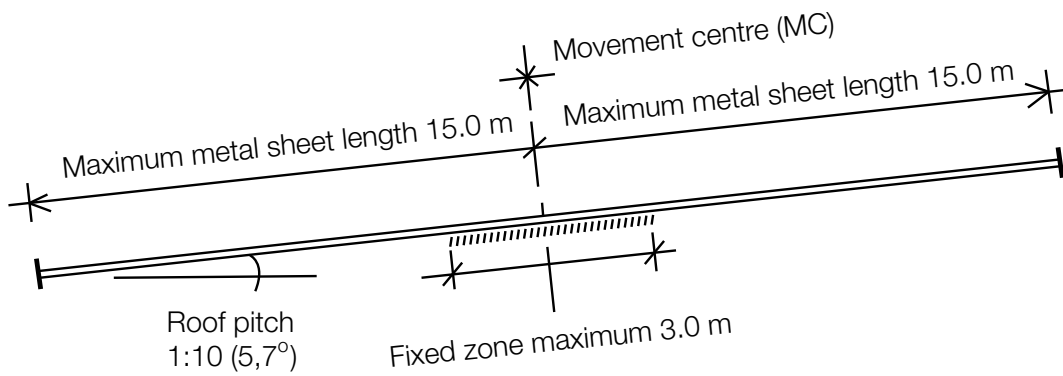
Coefficient of thermal expansion

Installation temperature	Summer - Max temperature +75°C					Winter - Min temperature -35°C				
	Steel 15m	Al 10m	SS 10m	Cu 10m	Zn 8m	Steel 15m	Al 10m	SS 10m	Cu 10m	Zn 8m
-10°C	+15mm	+20mm	+15mm	+15mm	+15mm	-5mm	-6mm	-5mm	-5mm	-5mm
0°C	+14mm	+17mm	+13mm	+13mm	+13mm	-6mm	-8mm	-6mm	-6mm	-6mm
+10°C	+12mm	+15mm	+11mm	+11mm	+12mm	-8mm	-10mm	-8mm	-8mm	-8mm
+20°C	+10mm	+13mm	+9mm	+9mm	+10mm	-10mm	-13mm	-9mm	-9mm	-10mm
+30°C	+8mm	+10mm	+8mm	+8mm	+8mm	-12mm	-15mm	-11mm	-11mm	-12mm

Maximum movement in standing seam strips starting from the fixed zone (RC). Length of the strips are based on industrial praxis.

Example 1

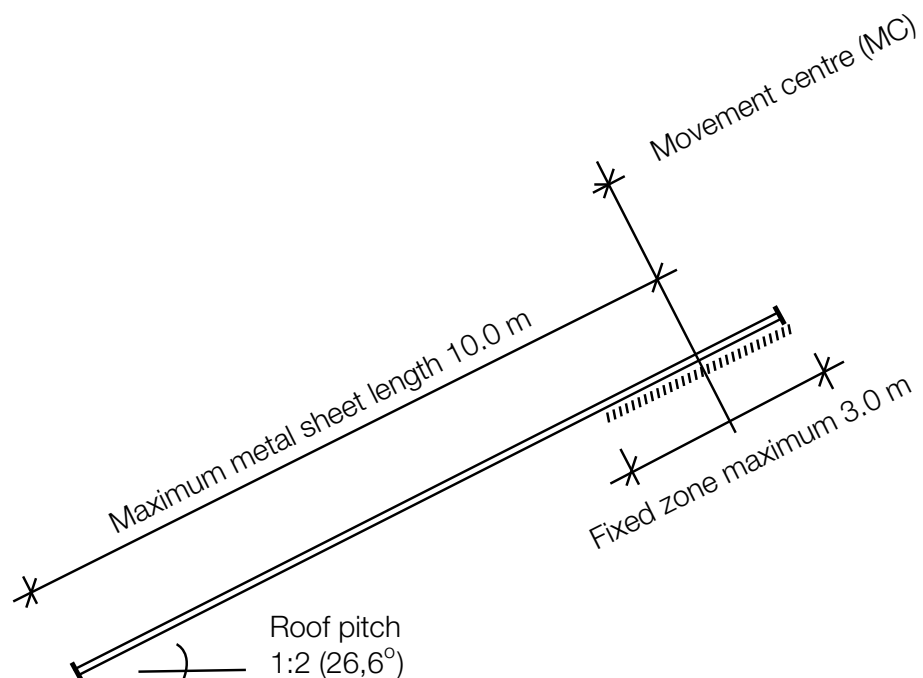
Standing seam roof, steel on wood substrate. Roof slope 1:10. Fixed zone in the middle of the roof (according to figure).



Maximum strip length with starting point from the centre of the fixed zone will be 15m. If installation temperature 10°C is assumed, the strip will be approximately 12mm longer during summer and contract 8mm in winter time with above given conditions.

Example 2

Standing seam roof, aluminum on wood substrate. Roof slope 1:2. Fixed zone in this case at the ridge of the roof (according to figure).



Maximal strip length with starting point at the centre of the fixed zone will be 11,5m. If installation temperature +30°C is assumed, the strip will be approximately 10mm longer during summer and contract about 15mm in winter time.

Fixed clips that doesn't allow movement along the seam can only be used in the fixed zone with a maximum length of 3 m. The fixed zone can be placed anywhere on the roof, suitable placing could be in connection to obstacles.

Sliding clips with a movement capacity adjusted to actual change of sheet length are to be used on all other surfaces. Connecting details shall be performed in a way that allows movements in the sheet strips.

Sliding clips movement capacity is shown in the technical specifications.

WINDLOAD

The roof cladding and the fixing to the substrate is mainly affected by suction forces caused by the wind. The design wind load is based on a number of different factors, such as:

- Geographical location
- Height, length and width of the building
- Terrain category
- Roof pitch

Roof areas in connection to eave, ridge and gables has considerably higher wind suction load than the inner areas, examples figure 2.

Respectively national code shows how to calculate the design wind load. A common code for the European countries, the Eurocode 1 (EN 1191 1-4) is valid in most European countries.

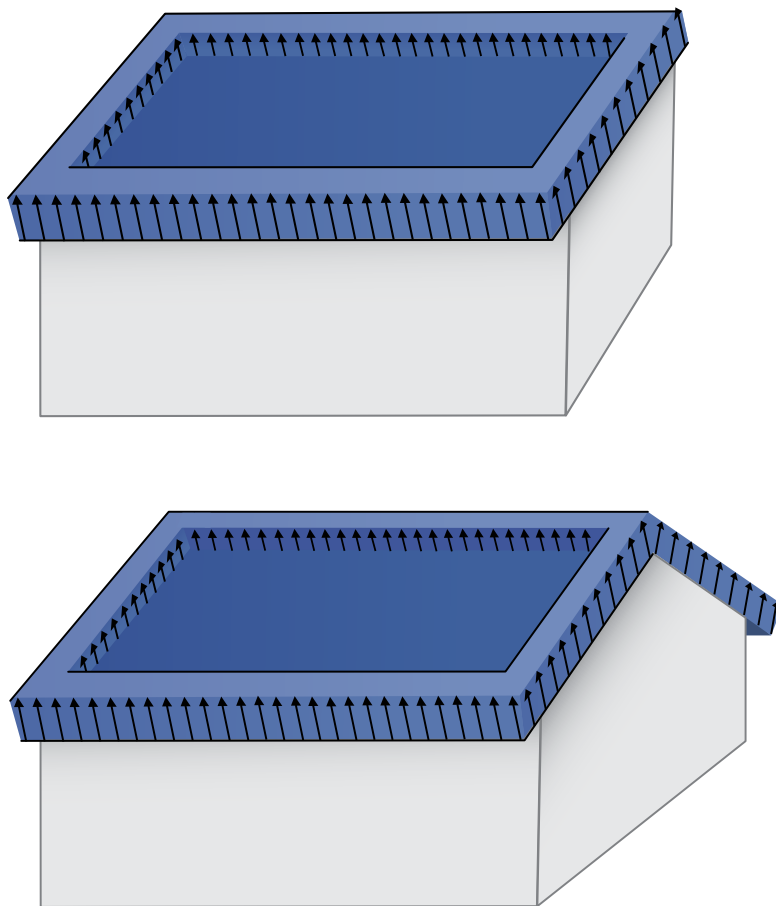


Figure 2. Examples on how different roof areas are influenced by the wind suction.

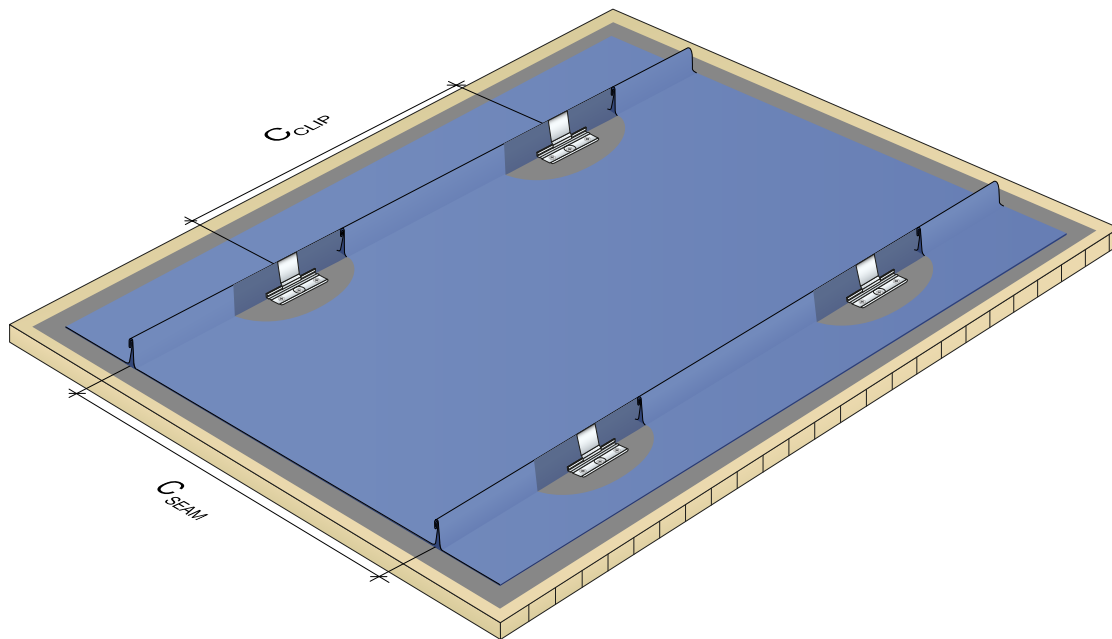
Based on the design wind load in respectively zone, the pull out force F_{cl} on the clip can be calculated.

$$F_{cl} = q_d \cdot c_{clip} \cdot c_{seam}$$

q_d = design wind load

c_{clip} = distance between clips

c_{seam} = distance between seams



Exemple:

$$c_{seam} = 600\text{mm}$$

$$c_{clip} = 450\text{mm}$$

$$q_d = 1,5 \text{ kN/m}^2$$

$$F_{cl} = 1,5 \cdot 0,6 \cdot 0,45 = 0,40 \text{ kN/clip}$$

Distance between clips

Clips fixed directly to the substrate is usually installed with a distance of 450-600mm. Maximum distance is normally 600mm. Determining factor regarding the total strength of the fixing is either the substrate or the clip itself. The design load for the weakest part is used for the wind load calculation. In corner and perimeter areas where the wind load is higher, the centre distance between the clips might be reduced. A fixing plan based on the wind load calculation should always be performed for each roof in order to obtain an optimal result. Fatigue risk in the sheet material can also result in reduced strip widths which also influences the load on the clip. Estimation of strip width is done by respectively sheet producer based on actual wind load.

Fixing of clips on insulated roofs with substrate of profile sheets, so called deck profiles, is normally done in the profile tops. Depending on producer, the distance has a variation between 200-300mm. In cases where the seam is parallel with the deck profiles, fixing in the bottom of the profile can be done.

Strength clips and fixings to substrate according to technical information.

LOADS IN ROOF PITCH DIRECTION

Snow load on a pitched roof in combination with the dead weight of the cladding, insulation and roof safety equipment causes a load component parallel with the roof pitch. In order to prevent sliding of the roof cladding these loads can be taken care of by the clips. (NOTE! Fixed clips)

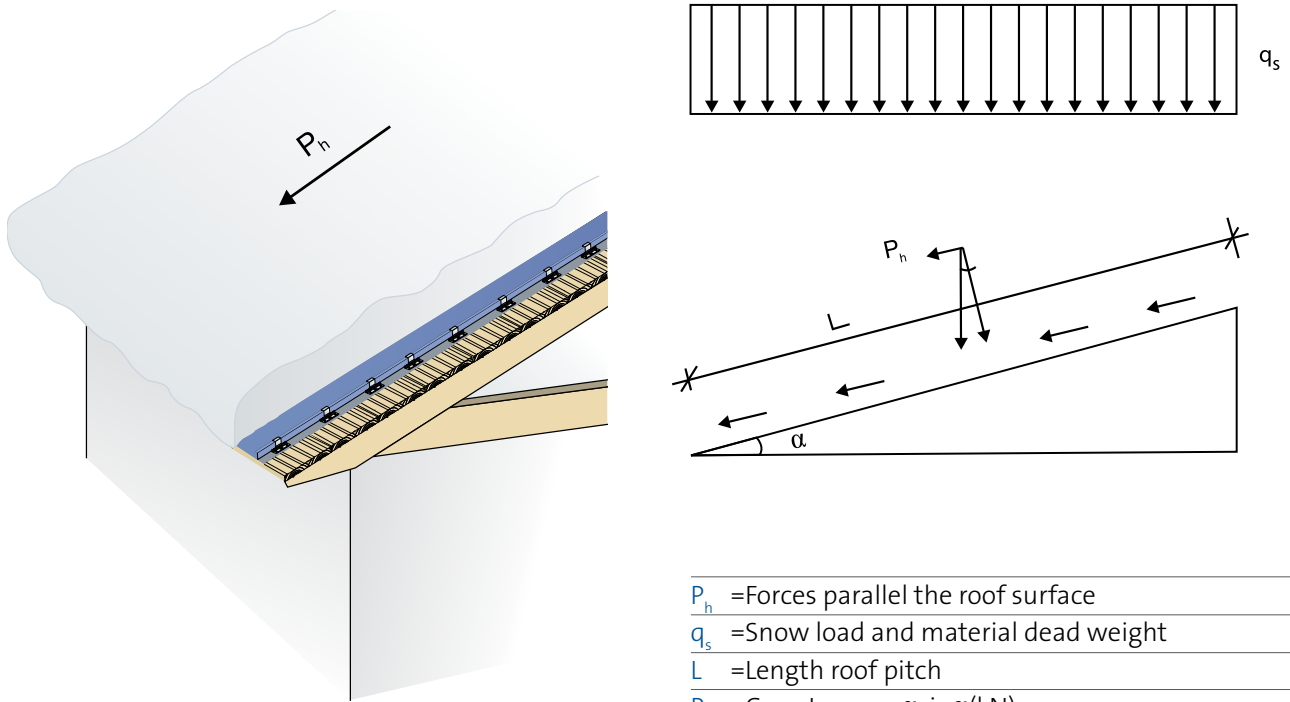


Figure 3. Snow load on roofs.

P_h = Forces parallel the roof surface

q_s = Snow load and material dead weight

L = Length roof pitch

$P_h = C_{seam} \cdot L \cdot q_s \cdot \cos\alpha \sin\alpha$ (kN)

C_{seam} = distance between seams

Pitch α		$\cos\alpha\sin\alpha$
1:16	3,6°	0,0625
1:10	5,7°	0,0988
1:4	14°	0,2346
1:2	26°	0,3939
1:1	45°	0,4998

Factor $\cos\alpha\sin\alpha$ at different roof pitches.

Exemple:

Roof pitch α = 1:10(5,7°)

Snow load and dead weight q_s = 1,5kN/m²

Seam distance C_{seam} = 600mm(0,6m)

Lenght roof pitch L = 12,0m

$$P_h = 0,6 \cdot 12,0 \cdot 1,5 \cdot 0,0988 = 1,06 \text{ kN}$$

The resulting force is calculated for each seam and the total length of the roof. This force is transferred by the fixed clips to the substrate, according to figure 4 and 5.

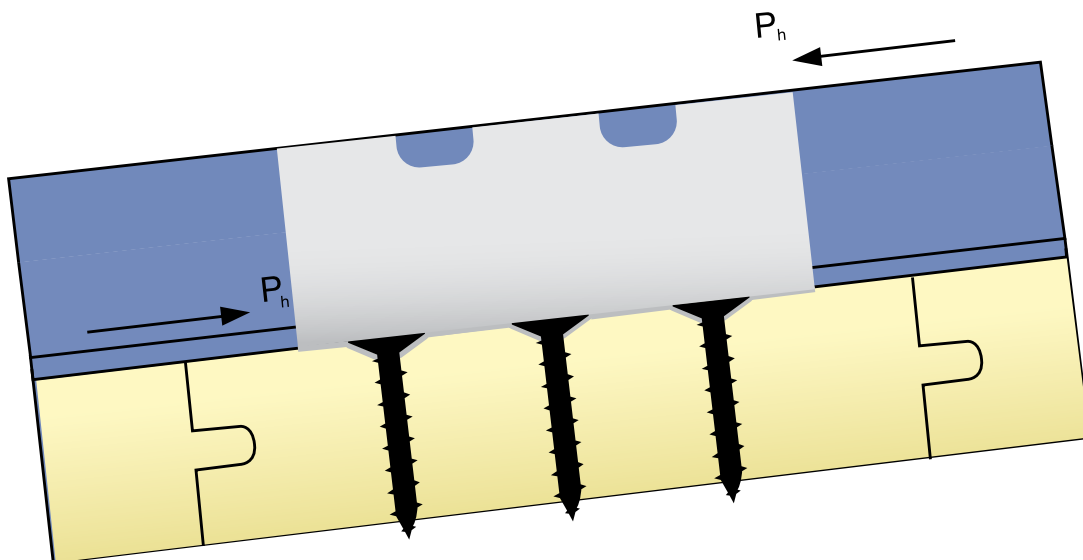


Figure 4. Force transferring through the fixed clip down to the substrate. Static values according to technical information.

Force transferring through fixed clips for insulated roof systems. Krabban system with telescope sleeves, according to figure 5.

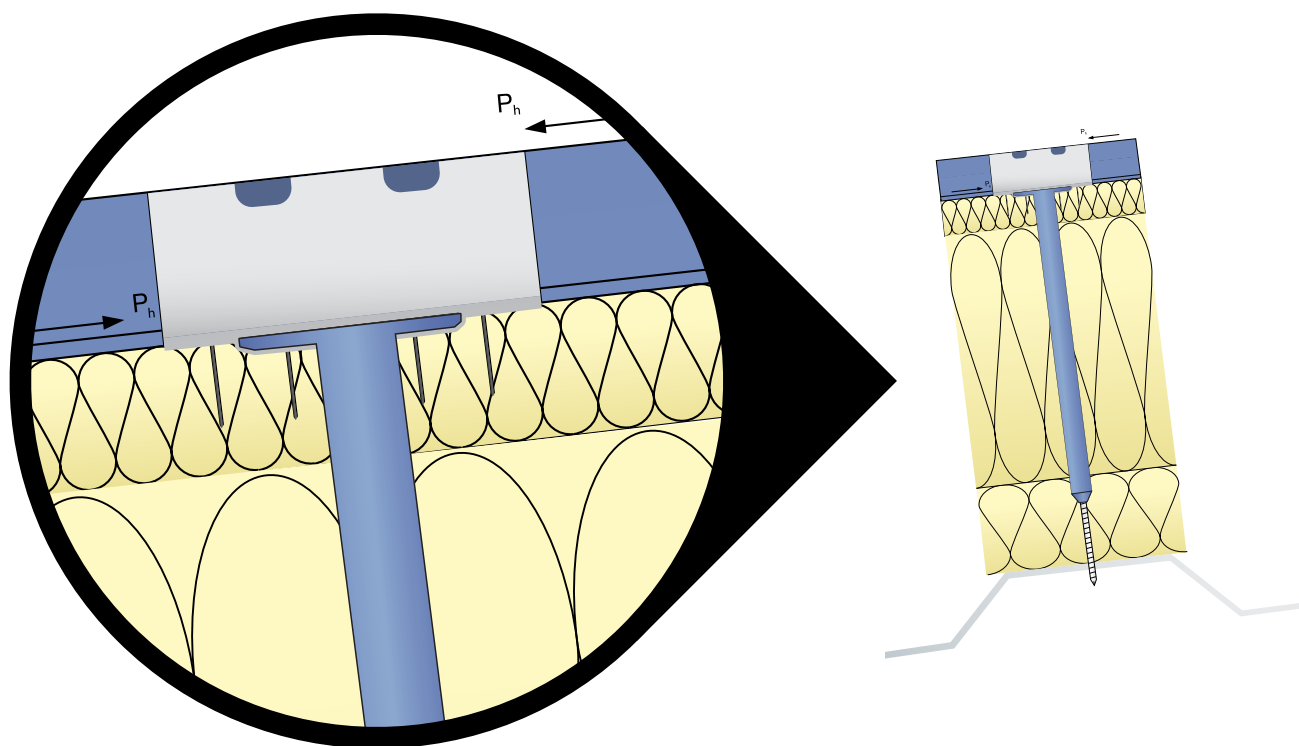


Figure 5. Krabban system with telescopic sleeves. Force transferring via fixed clips for insulated roof systems. The force is transferred through the “spikes” in the Krabban clip to the mineral wool board or the cellular plastic insulation. The insulation must be stabilized to avoid sliding in the roof pitch direction. Static values according to technical information.

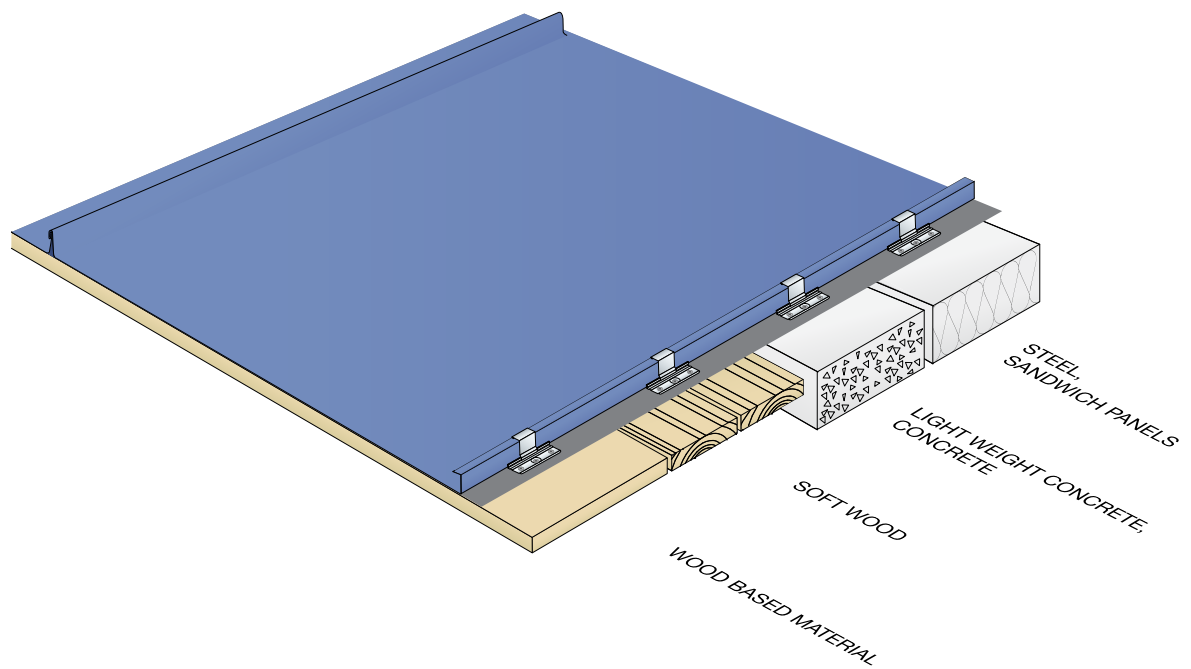
A roof is during its lifetime subjected to a wide range of different atmospheric conditions. In addition to wind, snow and thermal movements corrosion resistance might be a weak link.

Even in environments with moderate outdoor influence, the fastener can be exposed to moist inside the construction such as condensation water and leakages. Internal air over pressure in combination with high air humidity can also cause damages that are hard to detect.

Choice of clip and fastening to different substrate is adapted to the corrosion class according to table.

Corrosion class	Corrosion in environment	Examples of typical environments	
		Outdoors	Indoors
C1	Very small	-	Heated buildings with clean atmosphere e.g. offices, shops, schools, hotels.
C2	Small	Atmospheres with low level of pollution. Mostly rural areas.	Unheated buildings where condensation may occur, e.g. depots, sports halls.
C3	Moderate	Urban and industrial atmospheres, moderate sulfur dioxide pollution. Coastal areas with low salinity.	Production rooms with high humidity and some air pollution, e.g. food-processing plants, laundries, breweries, dairies.
C4	Large	Industrial areas and coastal areas with moderate salinity.	Chemical plants, swimming pools, coastal ships- and boatyards.
C5	Very large (industrial)	Industrial areas with high humidity and aggressive atmosphere.	Buildings or areas with almost permanent condensation and with high pollution.
C5-M	Very large (Marine)	Coastal and offshore areas with high salinity.	Buildings or areas with almost permanent condensation and with high pollution.

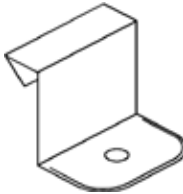
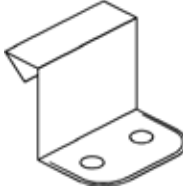
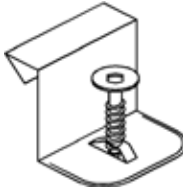
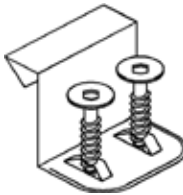
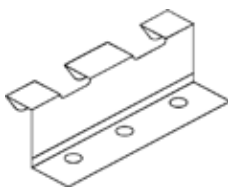
INSTALLATION DIRECTLY TO SUBSTRATE



Clip overview

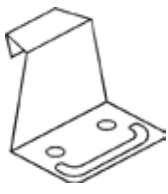
Clip type	Material	Reference
Fixed clips	Stainless steel	page 15
Sliding clips	Stainless steel	page 16
Fixed clips	Galvanized	page 18
Sliding clips	Galvanized	page 18
Fixed clips	Copper	page 15
Fastener	-	page 19-20

FIXED CLIPS STAINLESS

Clip type	Item	Height h (mm)	Remark	Technical info
	F02	26	One hole for fixing	F02-F0230:1
	F0230	32		F02-F0230:1
	F022	26	Two holes for fixing	F022-F02250:1
	F02230	32		F022-F02250:1
	F02238	40		F022-F02250:1
	F02250	52		F022-F02250:1
	F02S	26	One integrated screw for fixing in wood substrate	F02S-F0230S:1
	F0230S	32		F02S-F0230S:1
	F022S	26	Two integrated screws for fixing in wood substrate	F022S-F02250S:1
	F02230S	32		F022S-F02250S:1
	F02238S	40		F022S-F02250S:1
	F02250S	52		F022S-F02250S:1
	F02E	27	Three holes for fixing "extreme"	F02E:1

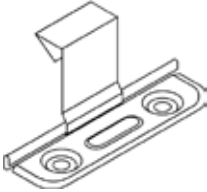
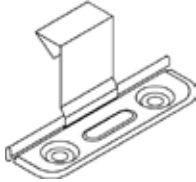
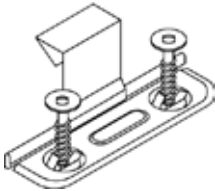
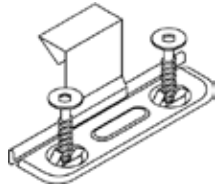
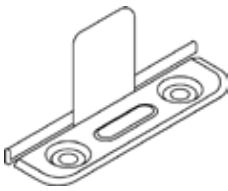
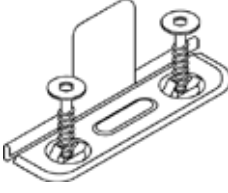
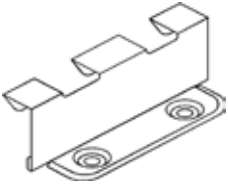
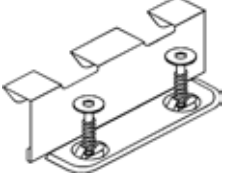
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FIXED CLIP CUPPER

Clip type	Item	Height h (mm)	Remark	Technical info
	F03	27	Two holes for fixing	F03:1

Technical information page 32.

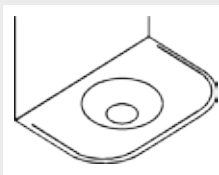
SLIDING CLIPS STAINLESS

Clip type	Item	Height h (mm)	Remark	Technical info
	G02	27	Two holes for fixing. Also used for seam welded stainless steel roofs with angle seam.	G02:1
	G0230	32	Two holes for fixing.	G0230-G0250:1
	G0238	40		G0230-G0250:1
	G0250	52		G0230-G0250:1
	G02S	27	Two integrated screws for fixing in wood substrate. Also used for seam welded stainless steel roofs with angle seam.	G02S:1
	G0230S	32	Two integrated screws for fixing in wood substrate.	G0230S-G0250S:1
	G0238S	40		G0230S-G0250S:1
	G0250S	52		G0230S-G0250S:1
	G02V	30	Two holes for fixing. Designed for seam welded stainless steel roofs.	G02V:1
	G02VS	30	Two integrated screws for fixing in wood substrate. Designed for seam welded stainless steel roofs.	G02VS:1
	G02E	26	Two holes for fixing "extreme". Also used for seam welded stainless steel roofs with angle seam.	G02E:1
	G02SE	26	Two integrated screws for fixing in wood substrate "extreme". Also used for seam welded stainless steel roofs with angle seam.	G02SE:1

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Clip type	Item	Height h (mm)	Remark	Technical info
	G021	27	Three holes for fixing.	G021:1
	G021S	27	One screw for fixing.	G021S:1
	G02130	32	Three holes for fixing.	G02130:1
	G02138	40		
	G02150	52		
	G02130S	32	One screw for fixing.	G02130S:1
	G02138S	40		
	G02150S	52		
	G021V	30	Three holes for fixing. Designed for welded long strip roofing.	G021V:1
	G021VS	30	One screw for fixing. Designed for welded long strip roofing.	G021VS:1

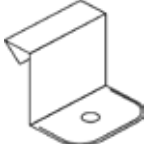
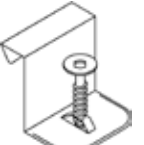
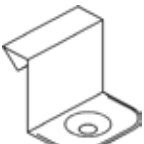
Technical information page 41-46.



Most of the clips can be supplied with a counter sunk hole to be used with light weight concrete screws.

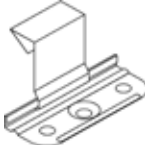
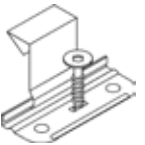
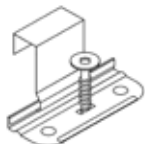
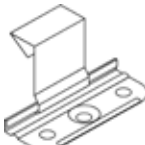
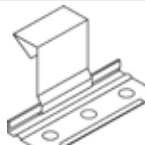
Item FÖR.

FIXED CLIPS GALVANIZED

Clip type	Item	Height h (mm)	Remark	Technical info
	F01	26	One hole for fixing.	F01:1
	F01S	26	One integrated screw for fixing in wood substrate.	F01S:1
	F01F	26	One counter-sunk hole for fixing. Hole adjusted for light weight concrete screw LBS.	F01F:1

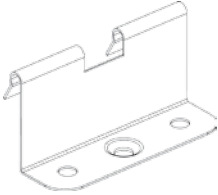
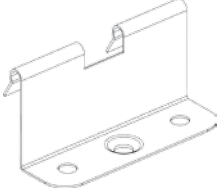
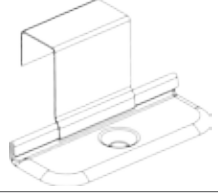

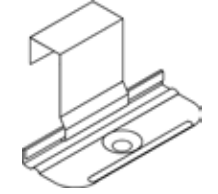
Technical information page 47-49.

SLIDING CLIPS GALVANIZED

Clip type	Item	Height h (mm)	Remark	Technical info
	G01	26	Three holes for fixing. Middle hole counter-sunk for screw KLRT.	G01:1
	G01S	26	One integrated screw for fixing in wood substrate.	G01S:1
	G01S90	26	One integrated screw for fixing in wood substrate (open).	G01S90:1
	G01F	26	Three holes for fixing. Middle hole adjusted for light weight concrete screw LBS.	G01F:1
	G01P	26	Three holes for fixing. Adjusted for flat substrates.	G01P:1



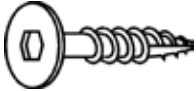
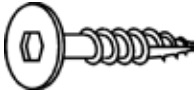
Technical information page 50-54.

MAGAZINISED CLIPS - CLIPDRIVER

Clip type	Item	Height h (mm)	Remark	Technical info
	SR25C	25	Magazinised stainless clip for "snap falz".	SR25C-SR38C:1
	SR38C	38		SR25C-SR38C:1
	SG25C	25	Magazinised galvanized clip for "snap falz".	SG25C-SG38C:1
	SG38C	38		SG25C-SG38C:1
	G021C	27	Magazinised stainless clip.	G021C:1
	G02130C	32		G02130C-G02138C:1
	G02138C	40		G02130C-G02138C:1
	G021VC	30	Magazinised stainless clip for welding.	G021VC:1
	G01C	26	Magazinised galvanized clip.	G01C:1

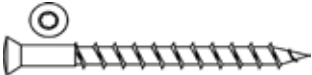
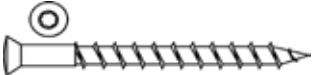
Technical information page 55-60.

FASTENERS - WOOD SUBSTRATE

Designation	Item	Material	Remark	Technical info
Clip screw 4.5x26 	KLRT	Stainless	Drive T20	KLRT:1
Clip screw 4.5x35 	KLRT35	Stainless	Drive T20	KLRT:1
Clip screw 4.5x20 	KLRT20C	Stainless	Drive T20 Cutter point	KLRTC:1
Clip screw 4.5x26 	KLRT26C	Stainless	Drive T20 Cutter point	KLRTC:1

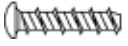
Technical information page 75-76 .

FASTENERS - LIGHT WEIGHT CONCRETE SUBSTRATE

Designation	Item	Material	Remark	Technical info
LWC screw 8.0xL 	LBS80 LBS130	Surface treated carbon steel	Drive T25 Predrilling not necessary	LBS:1
LWC screw 8.0xL 	LBSR80 LBSR120	Stainless	Drive T25	LBSR:1

Technical information page 83-84.

FASTENERS - CONCRETE SUBSTRATE

Designation	Item	Material	Remark	Technical info
Concrete screw 6.1xL 	BSC28	Surface treated carbon steel	Drive T25 Predrilling of concrete	BSC:1


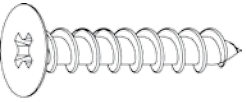
Technical information page 82.

FASTENERS - STEEL SUBSTRATE

Designation	Item	Material	Remark	Technical info
"Stavex" blind rivet 3.2x12.5 	BS11	Stainless steel	Predrilling \varnothing 3.3-3.4mm	BS11:1

Technical information page 79.

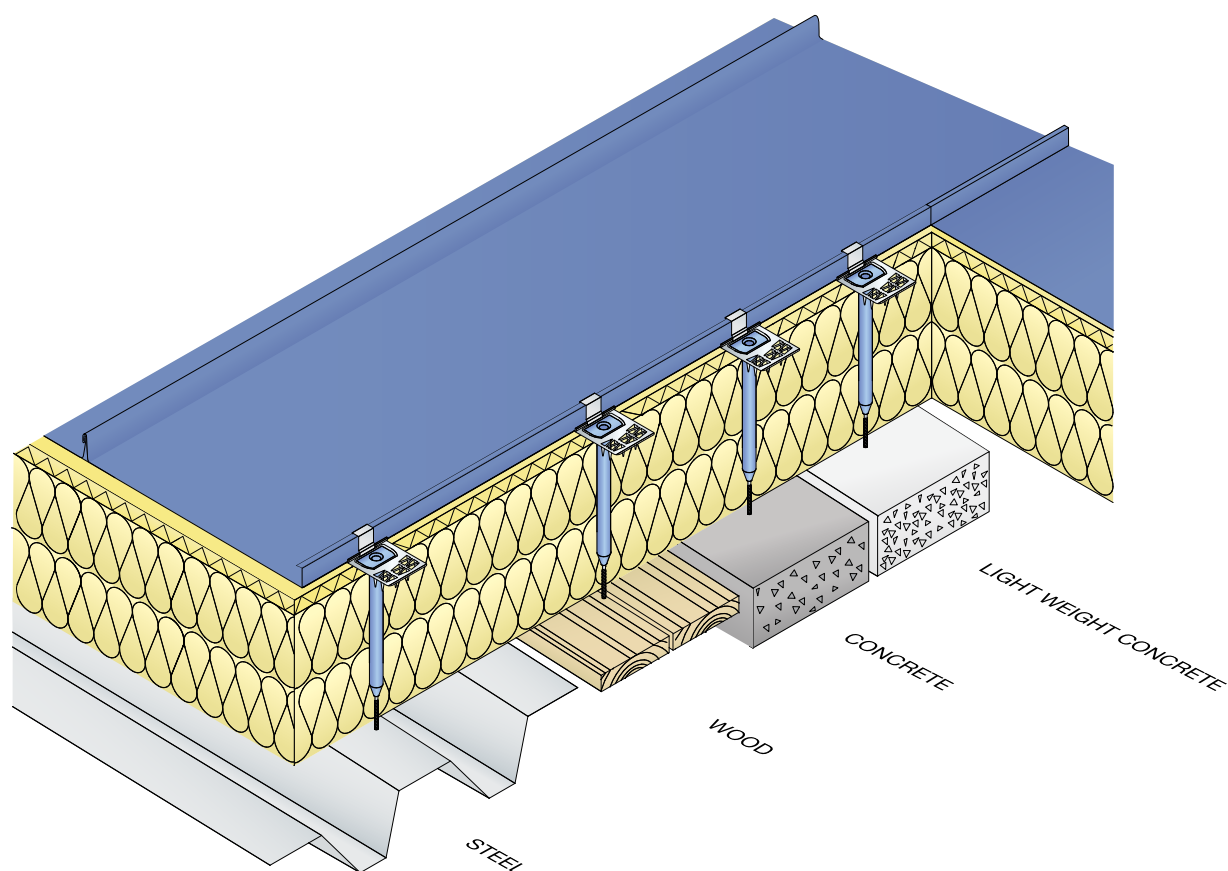
FASTENERS - CLIPDRIVER

Designation	Item	Material	Remark	Technical info
Clip screw 4.5x25 	KLGP25	Surface treated carbon steel	Drive PH2	KLGP25:1
Clip screw 4.5x25 	KLRP25	Stainless	Drive PH2	KLRP25:1

Technical information page 80-81.

INSTALLATION – INSULATED ROOFS

Overview Krabban clip system





Clip type	Material		Reference
	Clip	Telescopic sleeve*	
Fixed clip – telescopic sleeve	Stainless	Polypropylene	page 23
Sliding clip - telescopic sleeve	Stainless	Polypropylene	page 24
Fixed clip – telescopic sleeve	Galvanized	Polypropylene	page 25
Sliding clip - telescopic sleeve	Galvanized	Polypropylene	page 25
Fasteners	-	-	page 26

*For insulation thicknesses 20-30mm, counter sunk steel washers are used.

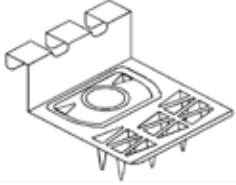
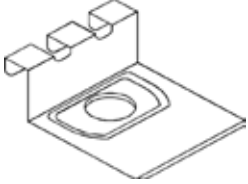
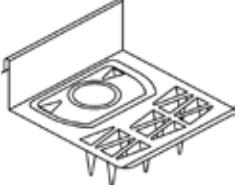
The Krabban system contains of specially designed clips combined with polypropylene telescopic sleeves. Can be used for insulation thicknesses up to 970mm depending on type of substrate. The telescope effect allow compression of the insulation without risking damage of the substrate. The insulation can be installed with overlapping joints since the installation is independent of the joints position in relation to the seam. Overlapping joints prevents air leakage.

TELESCOPIC SLEEVE POLYPROPYLENE

Telescope type	Item	Length l (mm)	Remark	Technical info
	H30-H705	30-705	Sleeve for insulation thicknesses according to combination tables in Bjarnes Systems product catalogue. www.bjarnessystem.se	H30-H705:1
	H06-H09	-	Washer for insulation thicknesses according to combination tables in Bjarnes Systems product catalogue. www.bjarnessystem.se	

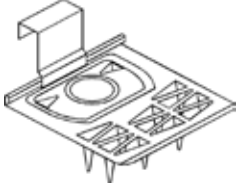

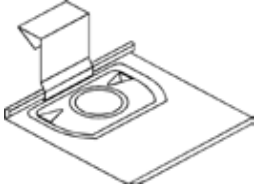
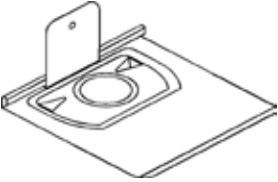
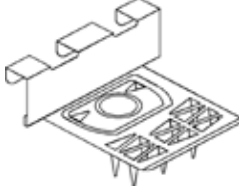
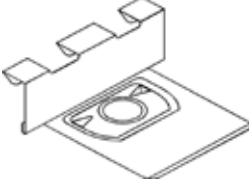
Technical information page 86.

FIXED CLIP STAINLESS STEEL

Clip type	Item	Height h (mm)	Remark	Technical info
	KRF	25	Designed for telescopic sleeve.	KRF:1
	KRFP	25	Designed for telescopic sleeve, lower part plane.	KRFP:1
	KR25	25	Designed for telescopic sleeve. Used for "snap falz" systems.	KR25-KR38:1
	KR38	38		

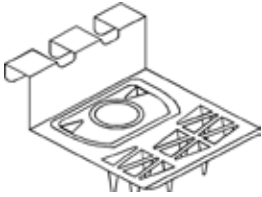
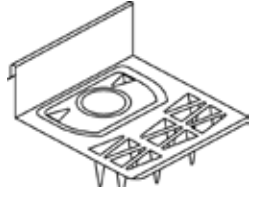
Technical information page 61-63.

SLIDING CLIP STAINLESS STEEL

Clip type	Item	Height h (mm)	Remark	Technical info
	KR	25	Designed for telescopic sleeve. Seam welded stainless steel roofs.	KR:1
	KR38H	38		KR38H-KR50H:1
	KR50H	50		KR38H-KR50H:1
	KRS	30	Designed for telescopic sleeve. Seam welded stainless steel roofs.	KRS:1
	KRP	25	Designed for telescopic sleeve smooth subsurface. Lower part plane.	KRP:1
	KRSP	30	Designed for telescopic sleeve. Lower part plane. Seam welded stainless steel roofs.	KRSP:1
	KRE	25	Designed for telescopic sleeve, extrem	KRE:1
	KRPE	25	Designed for telescopic sleeve Extreme. Lower part plane.	KRPE:1

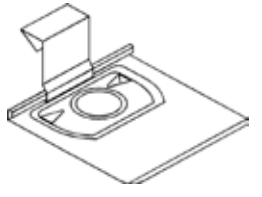
Technical information page 64-70.
 Telescopic sleeves and metal plates page 86.

FIXED CLIP GALVANIZED

Clip type	Item	Height h (mm)	Remark	Technical info
	KGF	25	Designed for telescopic sleeve	KGF:1
	KG25	25	Designed for telescopic sleeve. Used for “snap falz” systems.	KG25-KG38:1
	KG38	38		

Technical information page 71-72.



SLIDING CLIP GALVANIZED

Clip type	Item	Height h (mm)	Remark	Technical info
	KG	25	Designed for telescopic sleeve	KG:1
	KGP	25	Designed for telescopic sleeve. Lower part plane.	KGP:1

Technical information page 73-74.

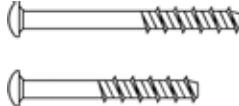
FASTENERS - STEEL AND WOOD SUBSTRATE

Overview fasteners Krabban clip system

Designation	Item	Material	Remark	Technical info
Roof screw with drill point 4.8xL 	LS50-LS300	Surface treated carbon steel	Drive T25 Drill capacity in steel 0.7-2x1.25mm	LS:1
Roof screw with drill point 4.8xL 	RS60-RS100	Stainless	Drive T25 Drill capacity in steel 0.7-2x1.0mm	RS:1

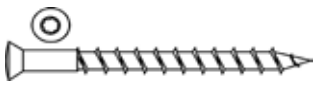
Technical information page 77-78.

FASTENERS - CONCRETE SUBSTRATE

Designation	Item	Material	Remark	Technical info
Concrete screw 6.1xL 	BSC28-BCS280	Surface treated carbon steel	Drive T25 Predrilling of concrete	BSC:1

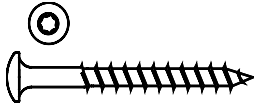
Technical information page 82.

FASTENERS - LIGHT WEIGHT CONCRETE SUBSTRATE

Designation	Item	Material	Remark	Technical info
LWC screw 8.0xL 	LBS80-LBS130	Surface treated carbon steel	Drive T25 No predrilling	LBS:1

Technical information page 83.

FASTENERS - WOOD SUBSTRATE

Designation	Item	Material	Remark	Technical info
Wood screw 5.0xL 	LST40-LST90	Surface treated carbon steel	Drive T25 To be used with telescopic sleeve	LST:1

Technical information page 85.

Technical information



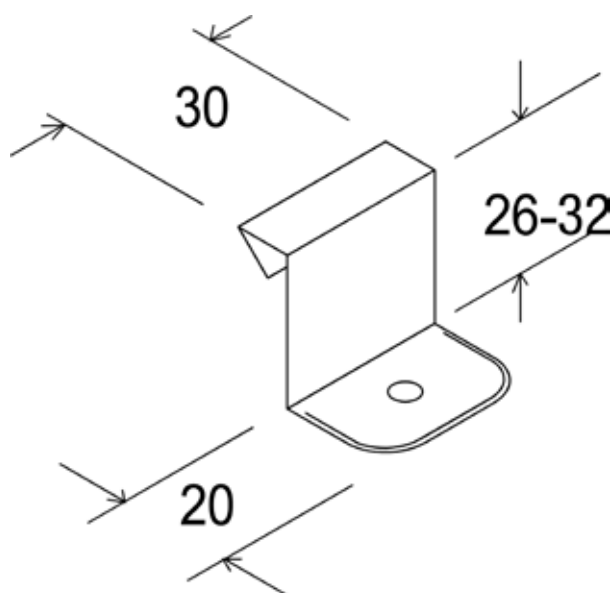
Item: F02,F0230

Description: Fixed stainless clip with one hole, height 26, 30

Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Quality	Thickness
EN 1.4301	0.4mm



■ Fixing to substrate

One hole \varnothing 4,0mm

■ Thermal movement

Fixed clip

STRENGTH

	Centric load	Shear load-roof slope
Ultimate tensile strength	1840N	-
Characteristic tensile strength	1400N	-

Clip strength valid in combination with one screw type KLRT.

Assumes that the fixing in the actual substrate is stronger than the clip.

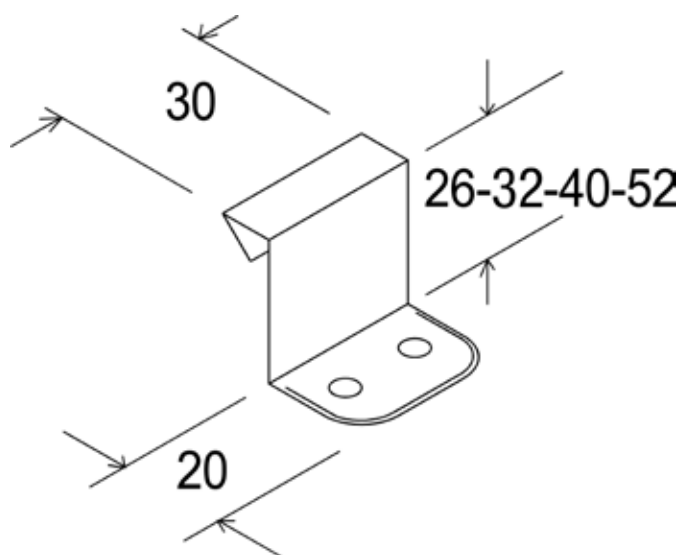
Date	Clip – drawing number	Revise	Date
2010-10-12	F02-F0230:1	-	-

Technical information

Item:	F022, F02230, F02238, F02250
Description:	Fixed stainless clip with two holes, height 26, 30, 38, 50
Material:	Stainless austenitic steel

MATERIAL DESCRIPTION

Quality	Thickness
EN 1.4301	0.4mm



■ Fixing to substrate

Two holes \varnothing 4,0mm

■ Thermal movement

Fixed clip

STRENGTH

	Centric load	Shear load-roof slope
Ultimate tensile strength	2655N	-
Characteristic tensile strength	2347N	-

Clip strength valid in combination with two screw type KLRT.
Assumes that the fixing in the actual substrate is stronger than the clip.

Date	Clip – drawing number	Revise	Date
2010-11-09	F022-F02250:1	-	-

Technical information

Item: F02S, F0230S

Description: Fixed stainless clip with one screw, height 26, 30

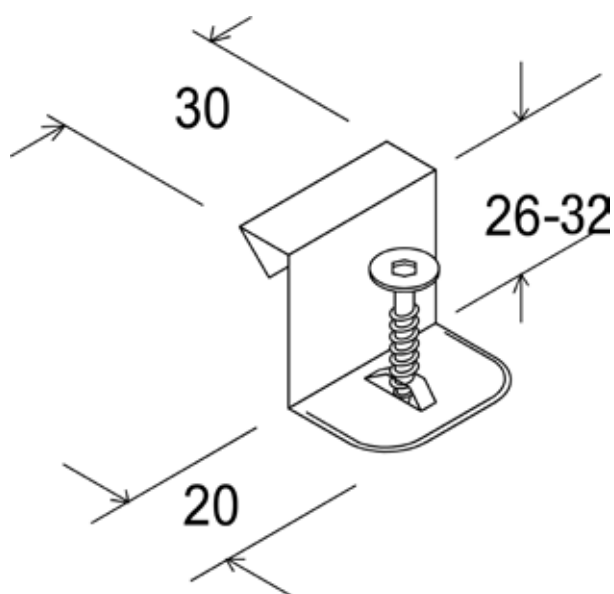
Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Quality	Thickness
EN 1.4301	0.4mm

SCREW

Demension	Quality	Drive
4.5x26	EN 1.4301	Torx T20



■ Fixing to substrate

One screw, KLRT, integrated in clip for fixing in wood substrate.

■ Thermal movement

Fixed clip

STRENGTH

	Centric load	Shear load-roof slope
Ultimate tensile strength	1470N	-
Characteristic tensile strength	785N	-

Clip strength valid with one integrated screw type KLRT.

Assumes that the fixing in the actual substrate is stronger than the clip.

Date
2010-10-12

Clip – drawing number
F02S-F0230S:1

Revise
-

Date
-

Technical information

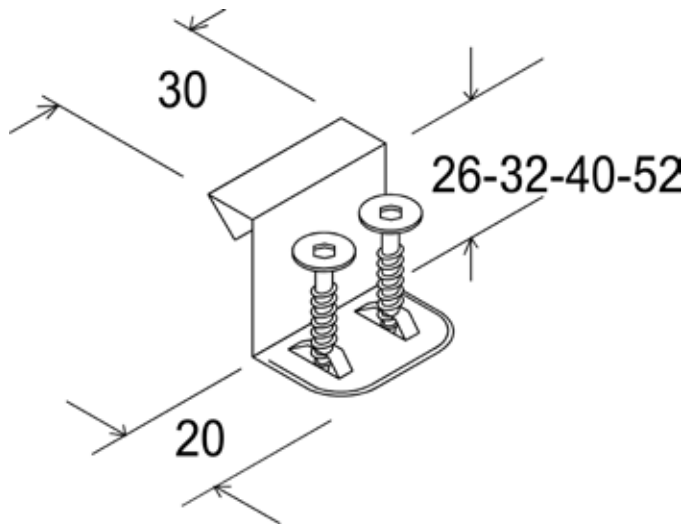
Item:	F022S, F02230S, F02238S, F02250S
Description:	Fixed stainless clip with two screws, height 26, 30, 38, 50
Material:	Stainless austenitic steel

MATERIAL DESCRIPTION

Quality	Thickness
EN 1.4301	0.4mm

SCREW

Demension	Quality	Drive
4.5x26	EN 1.4301	Torx T20



■ Fixing to substrate

Two screws, KLRT, integrated in the clip for fixing in wood.

■ Thermal movement

Fixed clip

STRENGTH

	Centric load	Shear load-roof slope
Ultimate tensile strength	2260N	-
Characteristic tensile strength	1700N	-

Clip strength valid in combination with two integrated screws type KLRT. Assumes that the fixing in the actual substrate is stronger than the clip.

Date	Clip – drawing number	Revise	Date
2010-11-09	F022S-F02250S:1	-	-

Technical information

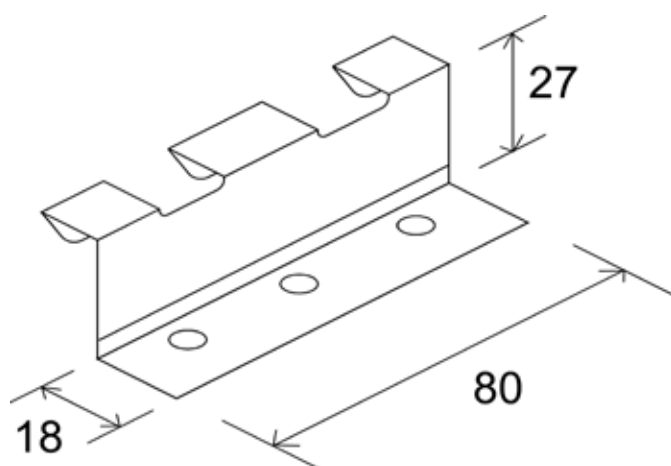
Item: F02E

Description: Fixed stainless clip with three holes, "Extrem"

Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Quality	Thickness
EN 1.4310	0.15mm



■ Fixing to substrate

Three holes \varnothing 4,0mm

■ Thermal movement

Fixed clip

STRENGTH

	Centric load	Shear load-roof slope
Ultimate tensile strength	1380N	2600N
Characteristic tensile strength	1150N	2230N

Clip strength valid in combination with three screws type KLRT.

Assumes that the fixing in the actual substrate is stronger than the clip.

Date
2010-11-09

Clip – drawing number
F02E:1

Revise
-

Date
-

Technical information

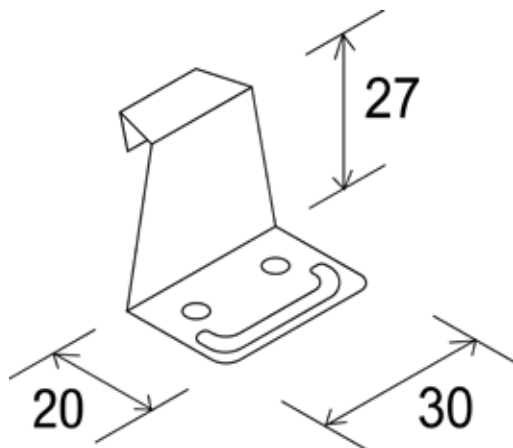
Item: F03

Description: Fixed copper clip with two holes

Material: Copper

MATERIAL DESCRIPTION

Quality	Thickness
EN-CU-DHP	0.8mm



■ Fixing to substrate

Two holes \varnothing 3.0mm

■ Thermal movement

Fixed clip

STRENGTH

	Centric load	Shear load-roof slope
Ultimate tensile strength	1640N	-
Characteristic tensile strength	800N	-

Clip strength valid in combination with two screw type KLRT.

Assumes that the fixing in the actual substrate is stronger than the clip.

Date	Clip – drawing number	Revise	Date
2010-11-09	F03:1	-	-

Technical information

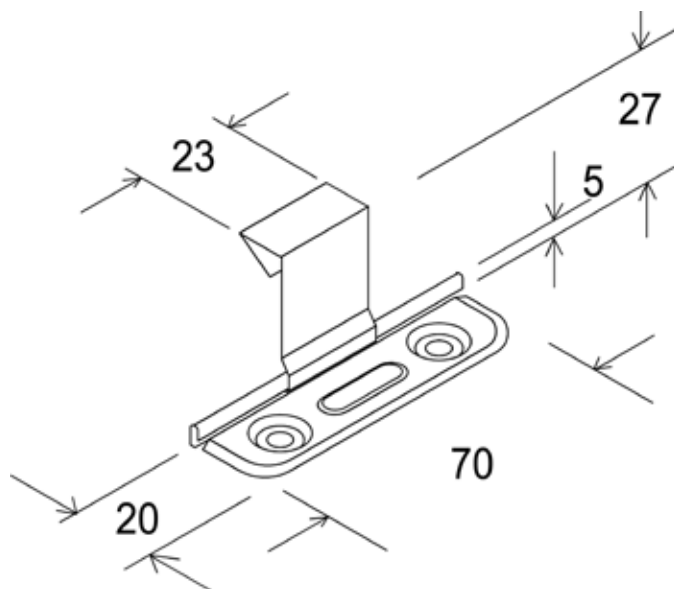
Item: G02

Description: Stainless sliding clip

Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 1.4310	0,15mm
Lower part	EN 1.4301	0,6mm



■ Fixing to substrate

Two counter-sunk hole \varnothing 5,0mm
adjusted to screw type KLRT

■ Thermal movement

\pm 20mm

STRENGTH

Centric load

Ultimate tensile strength	1080N
Characteristic tensile strength	916N

Clip strength valid in combination with tow screws type KLRT.

Assumes that the fixing in the actual substrate is stronger than the clip.

Date
2010-10-12

Clip – drawing number
G02:1

Revise
-

Date
-

Technical information

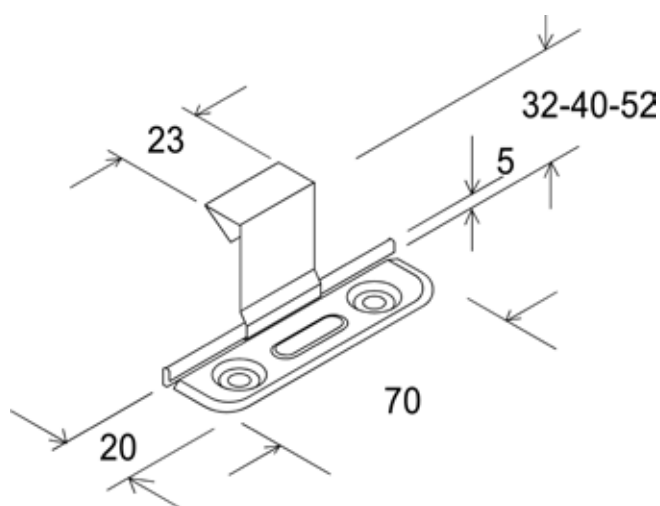
Item: G0230, G0238, G0250

Description: Stainless sliding clip, height 30, 38, 50

Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 1.4301	0,4mm
Lower part	EN 1.4301	0,6mm



■ Fixing to substrate

Two counter-sunk hole \varnothing 5,0mm
adjusted to screw type KLRT

■ Thermal movement

\pm 20mm

STRENGTH

Centric load

Ultimate tensile strength	1080N
Characteristic tensile strength	916N

Clip strength valid in combination with tow screws type KLRT.

Assumes that the fixing in the actual substrate is stronger than the clip.

Date
2010-10-12

Clip – drawing number
G0230-G0250:1

Revise
-

Date
-

Technical information

Item: G02S

Description: Stainless sliding clip with two screws

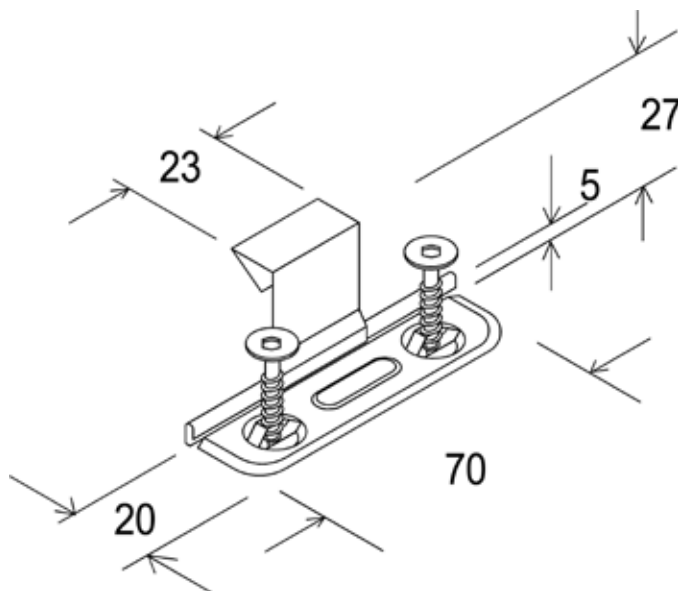
Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 1.4310	0,15mm
Lower part	EN 1.4301	0,6mm

SCREW

Demension	Quality	Drive
4.5x26	EN 1.4301	Torx T20



■ Fixing to substrate

Two screws KLRT integrated in the clip for fixing in wood substrate.

■ Thermal movement

±20mm

STRENGTH

Centric load	
Ultimate tensile strength	1060N
Characteristic tensile strength	974N

Clip strength valid in combination with two integrated screws type KLRT. Assumes that the fixing in the actual substrate is stronger than the clip.

Date
2010-10-12

Clip – drawing number
G02S:1

Revise
-

Date
-

Technical information

Item: G0230S, G0238S, G0250S

Description: Stainless sliding clip with two screws, height 30, 38, 50

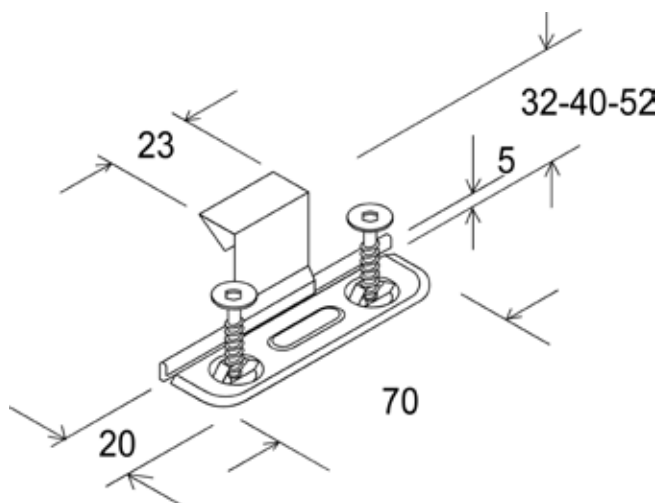
Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 1.4301	0,4mm
Lower part	EN 1.4301	0,6mm

SCREW

Demension	Quality	Drive
4.5x26	EN 1.4301	Torx T20



■ Fixing to substrate

Two screws KLRT integrated in the clip for fixing in wood substrate.

■ Thermal movement

±20mm

STRENGTH

Centric load	
Ultimate tensile strength	1060N
Characteristic tensile strength	974N

Clip strength valid in combination with two integrated screws type KLRT. Assumes that the fixing in the actual substrate is stronger than the clip.

Date
2010-10-12

Clip – drawing number
G0230S-G0250S:1

Revise
-

Date
-

Technical information

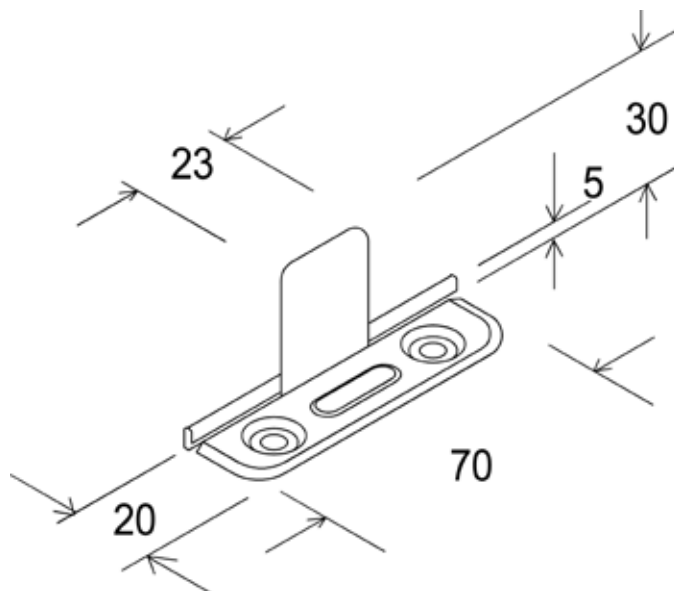
Item: G02V

Description: Stainless sliding clip weld

Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 1.4310	0,15mm
Lower part	EN 1.4301	0,6mm



■ Fixing to substrate

Two counter-sunk hole \varnothing 5,0mm
adjusted to screw type KLRT

■ Thermal movement

\pm 20mm

STRENGTH

Centric load

Ultimate tensile strength	903N
Characteristic tensile strength	765N

Clip strength valid in combination with tow screws type KLRT.

Assumes that the fixing in the actual substrate is stronger than the clip.

Date
2011-01-24

Clip – drawing number
G02V:1

Revise
-

Date
-

Technical information

Item: G02VS

Description: Stainless sliding clip weld with two screws

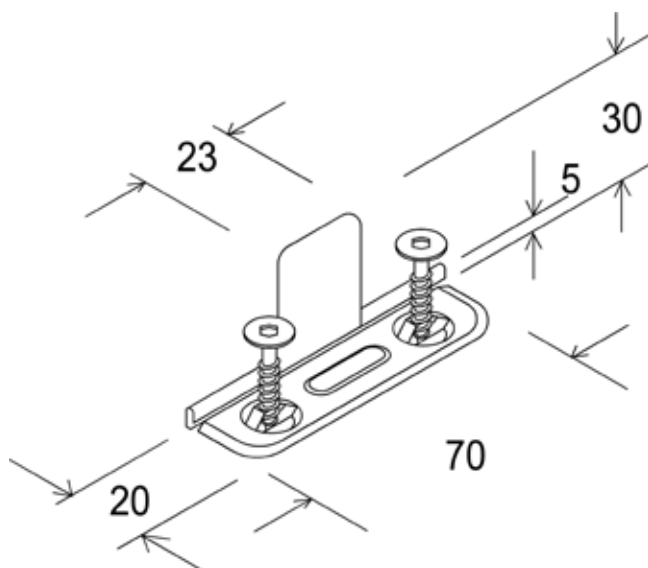
Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 1.4310	0,15mm
Lower part	EN 1.4301	0,6mm

SCREW

Demension	Quality	Drive
4.5x26	EN 1.4301	Torx T20



■ Fixing to substrate

Two screws KLRT integrated in the clip for fixing in wood substrate.

■ Thermal movement

±20mm

STRENGTH

Centric load	
Ultimate tensile strength	903N
Characteristic tensile strength	765N

Clip strength valid in combination with two integrated screws type KLRT. Assumes that the fixing in the actual substrate is stronger than the clip.

Date
2011-01-24

Clip – drawing number
G02VS:1

Revise
-

Date
-

Technical information

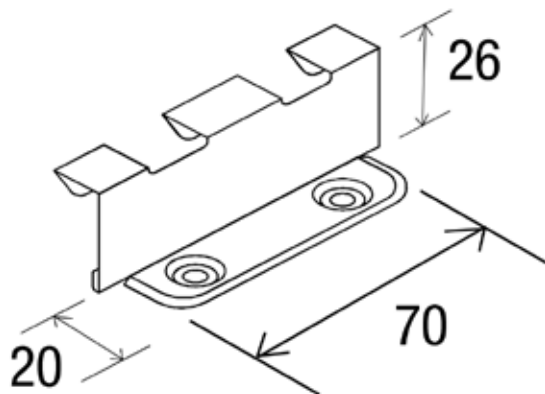
Item: G02E

Description: Stainless sliding clip "Extrem"

Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 1.4310	0,15mm
Lower part	EN 1.4301	0,6mm



■ Fixing to substrate

Two counter-sunk hole \varnothing 5,0mm
adjusted to screw type KLRT

■ Thermal movement

\pm 40mm

STRENGTH

Centric load

Ultimate tensile strength	1517N (<i>one test performed</i>)
Characteristic tensile strength	-

Clip strength valid in combination with two integrated screws type KLRT.
Assumes that the fixing in the actual substrate is stronger than the clip.

Date
2011-01-24

Clip – drawing number
G02E:1

Revise
-

Date
-

Technical information

Item: G02SE

Description: Stainless sliding clip with two screws "Extrem"

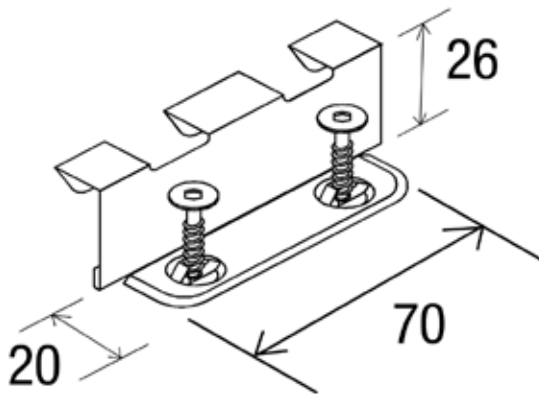
Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 1.4310	0,15mm
Lower part	EN 1.4301	0,6mm

SCREW

Demension	Quality	Drive
4.5x26	EN 1.4301	Torx T20



■ Fixing to substrate

Two screws KLRT integrated in the clip for fixing in wood substrate.

■ Thermal movement

±40mm

STRENGTH

Centric load

Ultimate tensile strength	1517N (<i>one test performed</i>)
Characteristic tensile strength	-

Clip strength valid in combination with two integrated screws type KLRT.
Assumes that the fixing in the actual substrate is stronger than the clip.

Date
2011-02-09

Clip – drawing number
G02SE:1

Revise
-

Date
-

Technical information

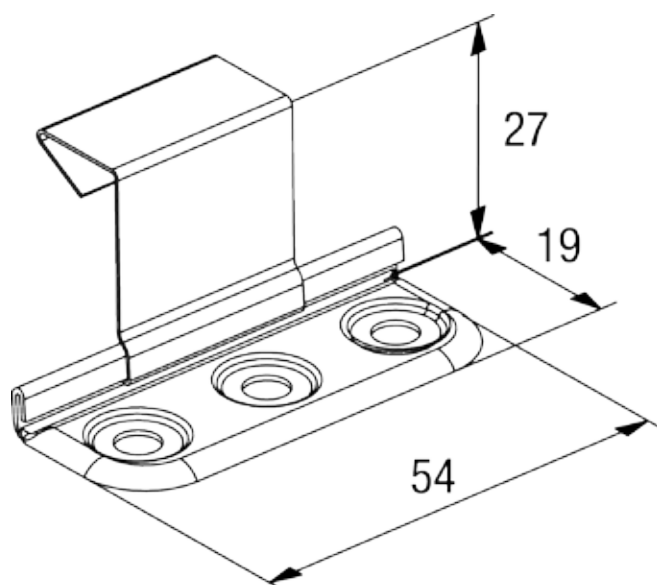
Item: G021

Description: Stainless sliding clip

Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 1.4310	0,15mm
Lower part	EN 1.4301	0,6mm



■ Fixing to substrate

Three counter-sunk hole \varnothing 5,0mm
adjusted to screw type KLRT

■ Thermal movement

\pm 12mm

STRENGTH

Centric load

Ultimate tensile strength	937N
Characteristic tensile strength	740N

Date
2011-10-24

Clip – drawing number
G021:1

Revise
-

Date
-

Technical information

Item: G021S

Description: Stainless sliding clip with one screw

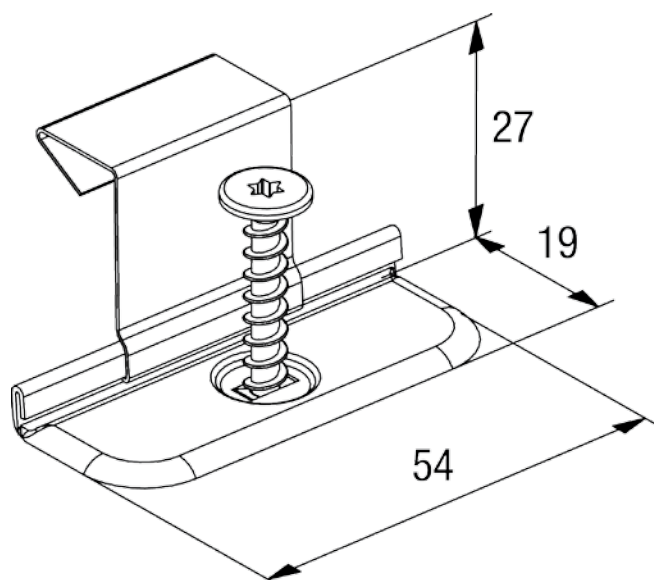
Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 1.4310	0,15mm
Lower part	EN 1.4301	0,6mm

SCREW

Demension	Quality	Drive
4.5x26	EN 1.4301	Torx T20



■ Fixing to substrate

One screw KLRT integrated in the clip for fixing in wood substrate.

■ Thermal movement

±12mm

STRENGTH

Centric load	
Ultimate tensile strength	937N
Characteristic tensile strength	740N

Date
2011-10-24

Clip – drawing number
G021S:1

Revise
-

Date
-

Technical information

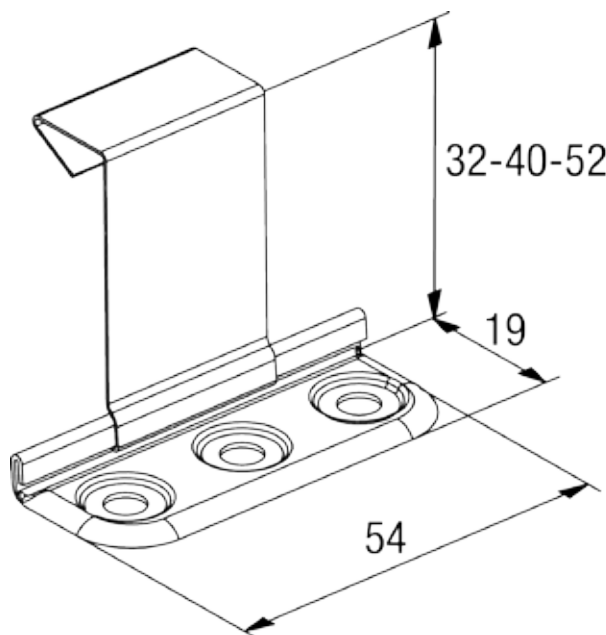
Item: G02130, G02138, G02150

Description: Stainless sliding clip, height 32, 40, 52

Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 1.4301	0,4mm
Lower part	EN 1.4301	0,6mm



■ Fixing to substrate

Three counter-sunk hole \varnothing 5,0mm
adjusted to screw type KLRT

■ Thermal movement

\pm 12mm

STRENGTH

Centric load

Ultimate tensile strength	937N
Characteristic tensile strength	740N

Date
2011-10-24

Clip – drawing number
G02130-G02150:1

Revise
-

Date
-

Technical information

Item: G02130S, G02138S, G02150S,

Description: Stainless sliding clip with one screw, height 32,40,52

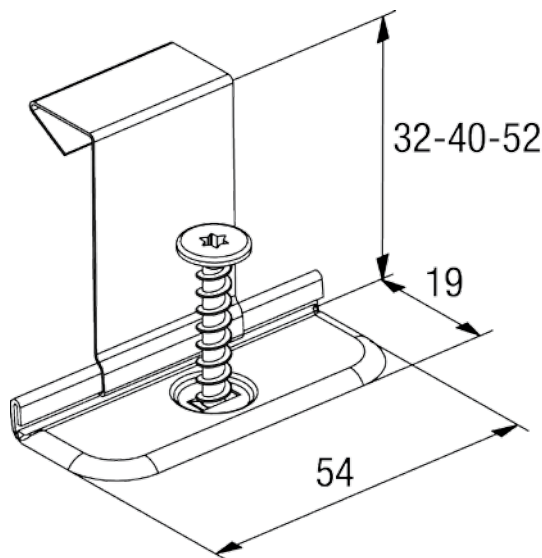
Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 1.4301	0,4mm
Lower part	EN 1.4301	0,6mm

SCREW

Demension	Quality	Drive
4.5x26	EN 1.4301	Torx T20



■ Fixing to substrate

One screw KLRT integrated in the clip for fixing in wood substrate.

■ Thermal movement

±12mm

STRENGTH

Centric load	
Ultimate tensile strength	937N
Characteristic tensile strength	740N

Date
2011-10-24

Clip – drawing number
G02130S-G02150S:1

Revise
-

Date
-

Technical information

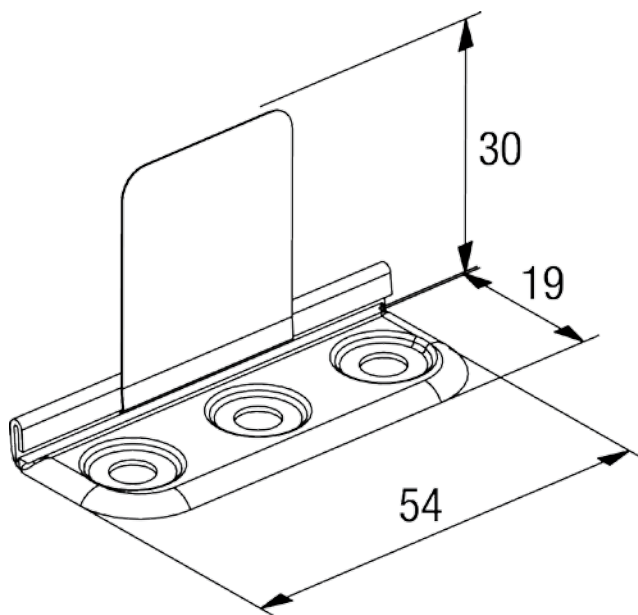
Item: G021V

Description: Stainless sliding clip weld

Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 1.4310	0,15mm
Lower part	EN 1.4301	0,6mm



■ Fixing to substrate

Three counter-sunk hole \varnothing 5,0mm
adjusted to screw type KLRT

■ Thermal movement

\pm 12mm

STRENGTH

Centric load

Ultimate tensile strength	937N
Characteristic tensile strength	740N

Date
2011-10-24

Clip – drawing number
G021V:1

Revise
-

Date
-

Technical information

Item: G021VS

Description: Stainless sliding clip weld with one screw

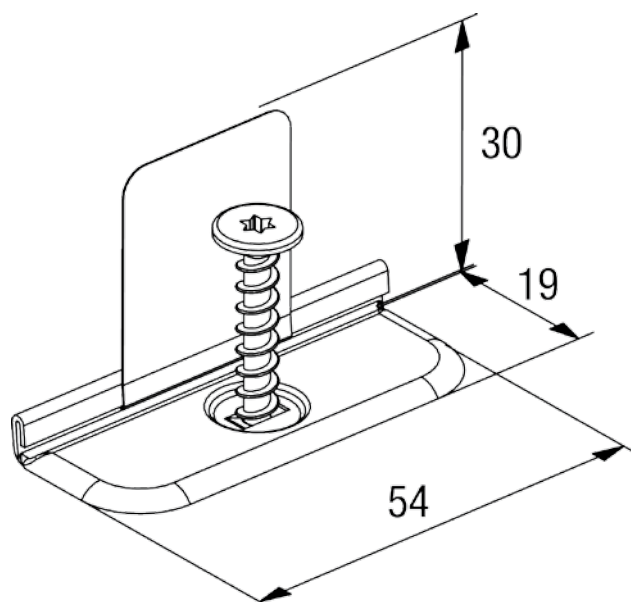
Material: Rostfritt austenitiskt stål

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 1.4310	0,15mm
Lower part	EN 1.4301	0,6mm

SCREW

Demension	Quality	Drive
4.5x26	EN 1.4301	Torx T20



■ Fixing to substrate

One screw KLRT integrated in the clip for fixing in wood substrate.

■ Thermal movement

±12mm

STRENGTH

Centric load	
Ultimate tensile strength	937N
Characteristic tensile strength	740N

Date
2011-10-24

Clip – drawing number
G021VS:1

Revise
-

Date
-

Technical information

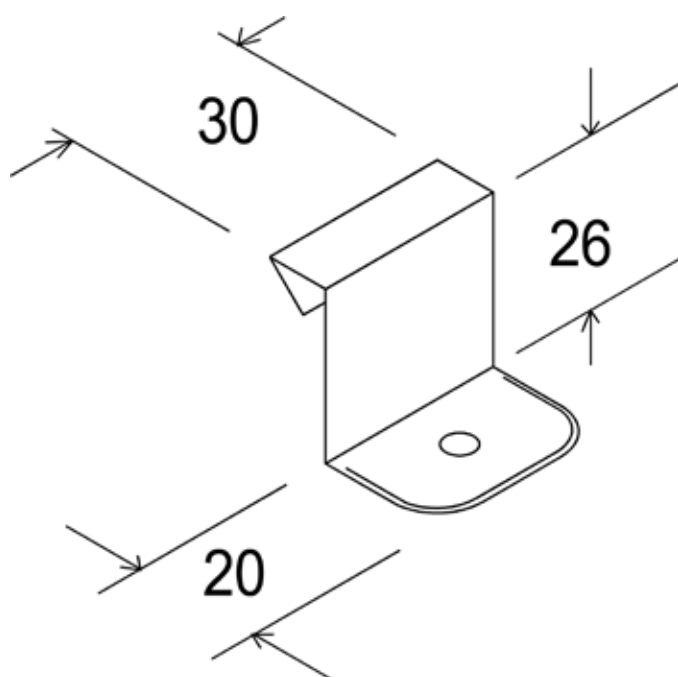
Item: F01

Description: Fixed galvanized clip with one hole

Material: Hot-dip galvanized steel

MATERIAL DESCRIPTION

Quality	Thickness	Ytbehandling
EN 10142	0.4mm	Hot-dip galvanized 275g/m ²



■ Fixing to substrate

One hole \varnothing 4.0mm

■ Thermal movement

Fixed clip

STRENGTH

	Centric load	Shear load-roof slope
Ultimate tensile strength	1280N	-
Characteristic tensile strength	1030N	-

Clip strength valid in combination with one screw type KLRT.

Assumes that the fixing in the actual substrate is stronger than the clip.

Date
2010-10-07

Clip – drawing number
F01:1

Revise
-

Date
-

Technical information

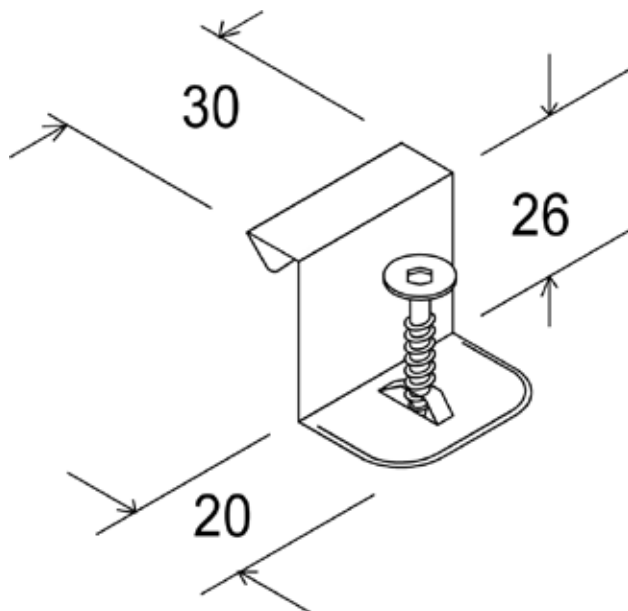
Item:	F01S
Description:	Fixed galvanized clip with one screw
Material:	Hot-dip galvanized steel

MATERIAL DESCRIPTION

Quality	Thickness	Ytbehandling
EN 10142	0.4mm	Hot-dip galvanized 275g/m ²

SCREW

Demension	Quality	Drive
4.5x26	EN 1.4301	Torx T20



■ Fixing to substrate

One screw, KLRT, integrated in clip for fixing in wood substrate.

■ Thermal movement

Fixed clip

STRENGTH

	Centric load	Shear load-roof slope
Ultimate tensile strength	912N	-
Characteristic tensile strength	780N	-

Clip strength valid with one integrated screw type KLRT.
Assumes that the fixing in the actual substrate is stronger than the clip.

Date	Clip – drawing number	Revise	Date
2010-11-10	F01S:1	-	-

Technical information

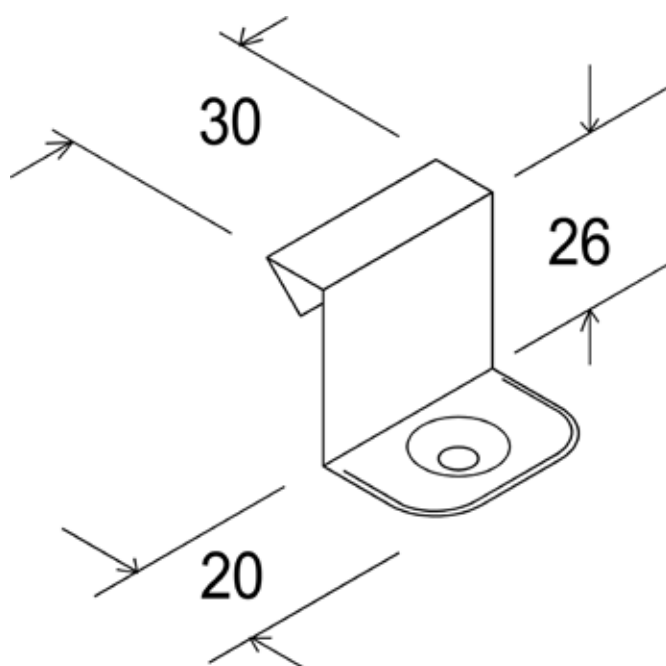
Item: F01F

Description: Fixed galvanized clip with one counter-sunk hole

Material: Hot-dip galvanized steel

MATERIAL DESCRIPTION

Quality	Thickness	Ytbehandling
EN 10142	0.4mm	Hot-dip galvanized 275g/m ²



■ Fixing to substrate

One counter-sunk hole $\varnothing 6,0\text{mm}$ adjusted for screw LBS for fixing to light weight concrete. Pull out tests are always recommended in light weight concrete

■ Thermal movement

Fixed clip

STRENGTH

	Centric load	Shear load-roof slope
Ultimate tensile strength	1280N	-
Characteristic tensile strength	1030N	-

Clip strength valid in combination with one screw type LBS. Assumes that the fixing in actual substrate is stronger than the clip.

Date
2010-11-10

Clip – drawing number
F01F:1

Revise
-

Date
-

Technical information

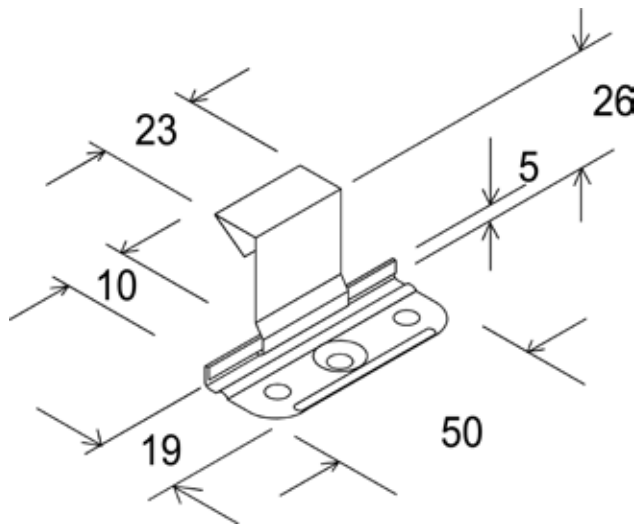
Item: G01

Description: Sliding clip galvanized

Material: Hot-dip galvanized steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 10142	0,4mm
Lower part	EN 10142	0,8mm



■ Fixing to substrate

Two holes \varnothing 4,0mm and one counter-sunk hole \varnothing 5,0mm adjusted to screw type KLRT

■ Thermal movement

\pm 10mm

STRENGTH

Centric load

Ultimate tensile strength	1230N
Characteristic tensile strength	1160N

Clip strength valid in combination with one screw type KLRT.

Assumes that the fixing in the actual substrate is stronger than the clip.

Date
2010-11-09

Clip – drawing number
G01:1

Revise
-

Date
-

Technical information

Item: G01S

Description: Sliding clip galvanized with one screw

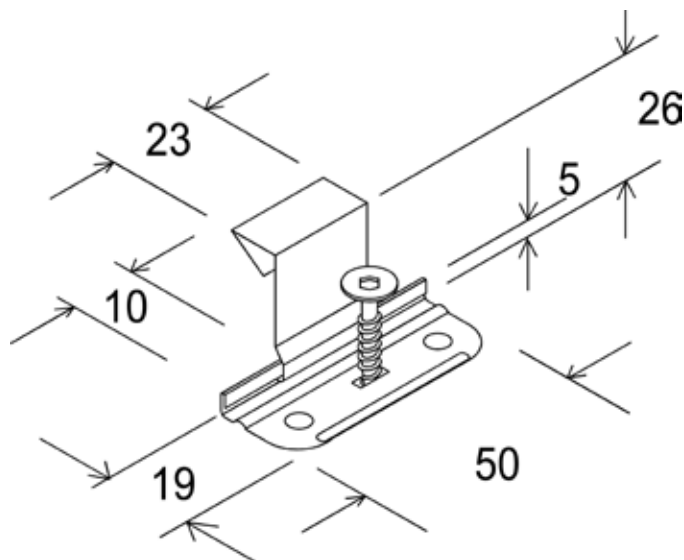
Material: Hot-dip galvanized steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 10142	0,4mm
Lower part	EN 10142	0,8mm

SCREW

Demension	Quality	Drive
4.5x26	EN 1.4301	Torx T20



■ Fixing to substrate

Two holes \varnothing 4,0mm and one integrated screw, KLRT

■ Thermal movement

\pm 10mm

STRENGTH

Centric load	
Ultimate tensile strength	1230N
Characteristic tensile strength	1160N

Clip strength valid in combination with one screw type KLRT.

Assumes that the fixing in the actual substrate is stronger than the clip.

Date
2011-01-24

Clip – drawing number
G01S:1

Revise
-

Date
-

Technical information

Item: G01S90

Description: Sliding clip galvanized with one screw (Open)

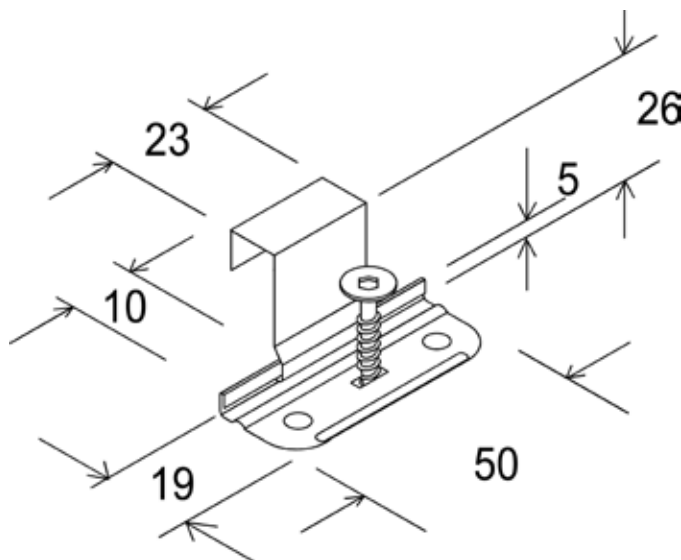
Material: Hot-dip galvanized steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 10142	0,4mm
Lower part	EN 10142	0,8mm

SCREW

Demension	Quality	Drive
4.5x26	EN 1.4301	Torx T20



■ Fixing to substrate

Two holes \varnothing 4,0mm and one integrated screw, KLRT

■ Thermal movement

\pm 10mm

STRENGTH

Centric load

Ultimate tensile strength	1230N
Characteristic tensile strength	1160N

Clip strength valid in combination with one screw type KLRT.

Assumes that the fixing in the actual substrate is stronger than the clip.

Date
2011-01-24

Clip – drawing number
G01S90:1

Revise
-

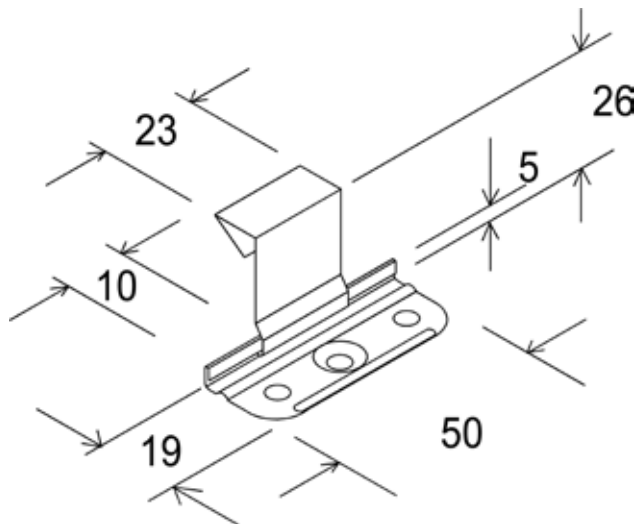
Date
-

Technical information

Item:	G01F
Description:	Sliding clip galvanized counter-sunk
Material:	Hot-dip galvanized steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 10142	0,4mm
Lower part	EN 10142	0,8mm



■ Fixing to substrate

Two holes \varnothing 4,0mm and one counter-sunk hole adjusted to light weight concrete screw LBS

■ Thermal movement

\pm 10mm

STRENGTH

Centric load

Ultimate tensile strength	1230N
Characteristic tensile strength	1160N

Clip strength valid in combination with one screw type KLRT.
Assumes that the fixing in the actual substrate is stronger than the clip.

Date	Clip – drawing number	Revise	Date
2011-01-24	G01F:1	-	-

Technical information

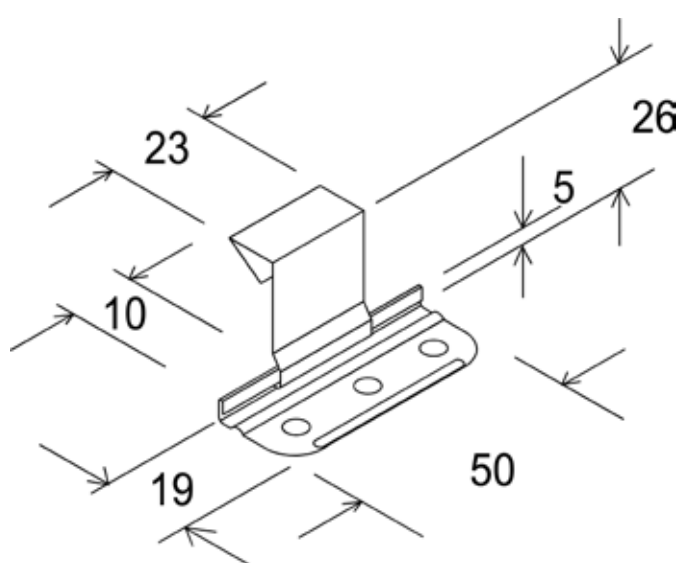
Item: G01P

Description: Sliding clip galvanized flat

Material: Hot-dip galvanized steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 10142	0,4mm
Lower part	EN 10142	0,8mm



■ Fixing to substrate

Three holes \varnothing 4.0mm.

■ Thermal movement

\pm 10mm

STRENGTH

Centric load

Ultimate tensile strength	1230N
Characteristic tensile strength	1160N

Clip strength valid in combination with one screw type KLRT.

Assumes that the fixing in the actual substrate is stronger than the clip.

Date
2011-01-24

Clip – drawing number
G01P:1

Revise
-

Date
-

Technical information

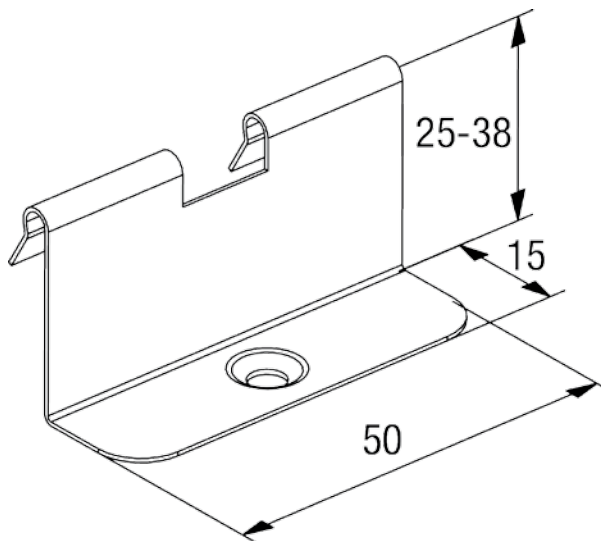
Item: SR25C, SR38C

Description: Magazinised stainless clip

Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Quality	Thickness
EN 1.4301	0.6mm



■ Fixing to substrate

Used for "snap falz" systems, magazinised with screw KLRP25

■ Thermal movement

Fixed clip

STRENGTH

Centric load	
Ultimate tensile strength	1662N
Characteristic tensile strength	1302N

Date
2011-02-09

Clip – drawing number
SR25C-SR38C:1

Revise
-

Date
-

Technical information

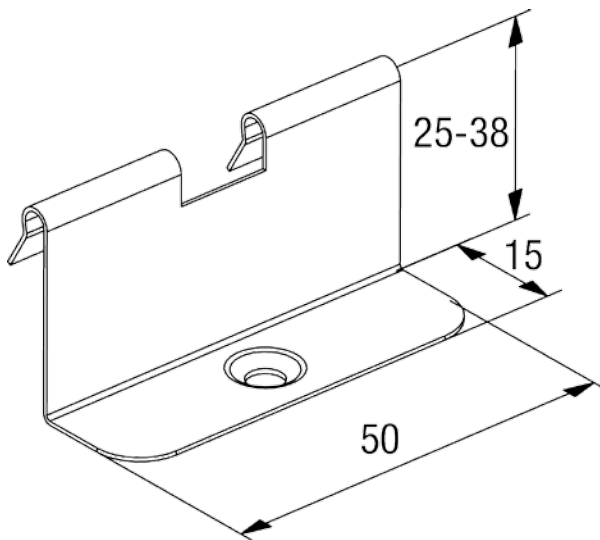
Item: SG25C, SG38C

Description: Magazinised galvanized clip

Material: Hot-dip galvanized steel

MATERIAL DESCRIPTION

Quality	Thickness
EN 1.4301	0.6mm



■ Fixing to substrate

Used for "snap falz" systems, magazinised with screw KLGP25

■ Thermal movement

Fixed clip

STRENGTH

Centric load	
Ultimate tensile strength	1662N
Characteristic tensile strength	1302N

Date
2011-02-09

Clip – drawing number
SG25C-SG38C:1

Revise
-

Date
-

Technical information

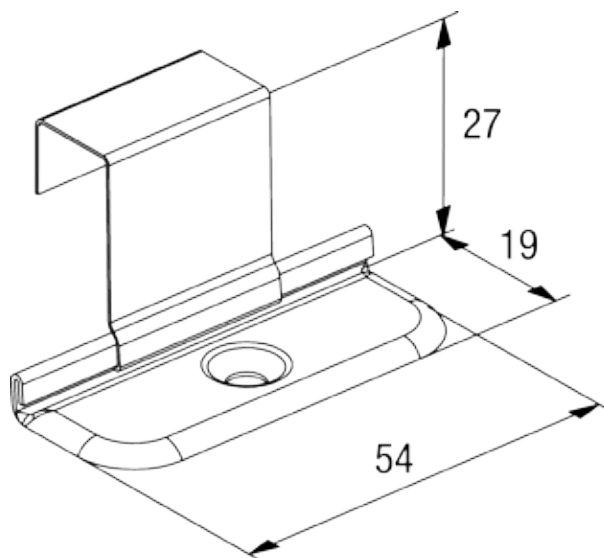
Item: G021C

Description: Magazinised stainless sliding clip with one hole

Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 1.4310	0,15mm
Lower part	EN 1.4301	0,6mm



■ Fixing to substrate

Magazinised with screw KLRP25

■ Thermal movement

±12mm

STRENGTH

Centric load

Ultimate tensile strength	937N
Characteristic tensile strength	740N

Date
2011-01-24

Clip – drawing number
G021C:1

Revise
-

Date
-

Technical information

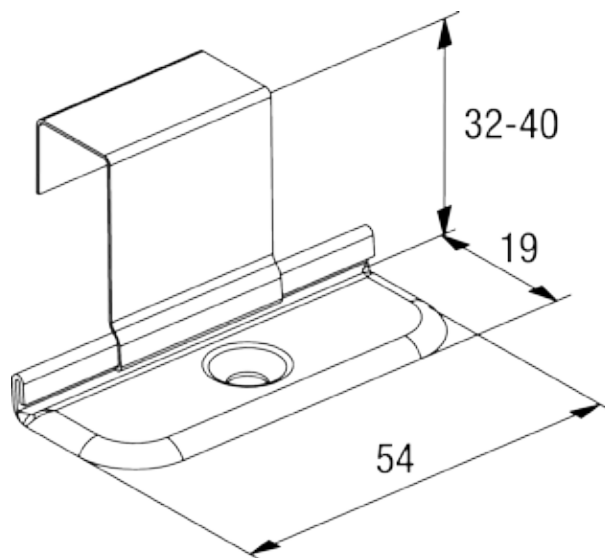
Item: G02130C, G02138C

Description: Magazinised stainless sliding clip with one hole, height 32, 40

Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 1.4301	0,4mm
Lower part	EN 1.4301	0,6mm



■ Fixing to substrate

Magazinised with screw KLRP25

■ Thermal movement

±12mm

STRENGTH

Centric load

Ultimate tensile strength	937N
Characteristic tensile strength	740N

Date
2011-01-24

Clip – drawing number
G02130C-G02138C:1

Revise
-

Date
-

Technical information

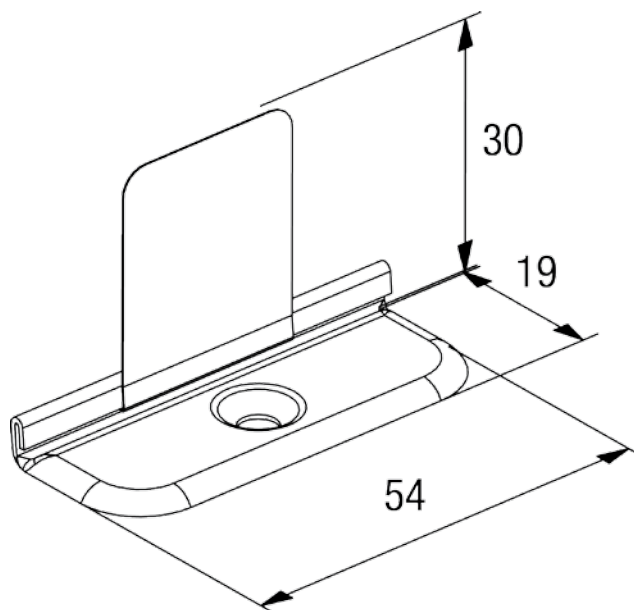
Item: G021VC

Description: Magazinised stainless sliding clip weld

Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 1.4310	0,15mm
Lower part	EN 1.4301	0,6mm



■ Fixing to substrate

Magazinised with screw KLRP25

■ Thermal movement

±12mm

STRENGTH

Centric load

Ultimate tensile strength	937N
Characteristic tensile strength	740N

Date
2011-01-24

Clip – drawing number
G021VC:1

Revise
-

Date
-

Technical information

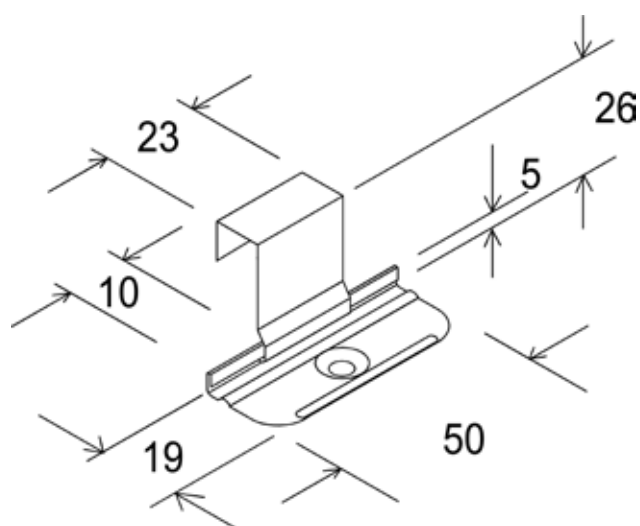
Item: G01C

Description: Magazinised galvanized sliding clip with one hole

Material: Hot-dip galvanized steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 10142	0,4mm
Lower part	EN 10142	0,6mm



■ Fixing to substrate

Magazinised with screw KLGP25

■ Thermal movement

±12mm

STRENGTH

Centric load

Ultimate tensile strength	1230N
Characteristic tensile strength	1160N

Date
2011-10-24

Clip – drawing number
G01C:1

Revise
-

Date
-

Technical information



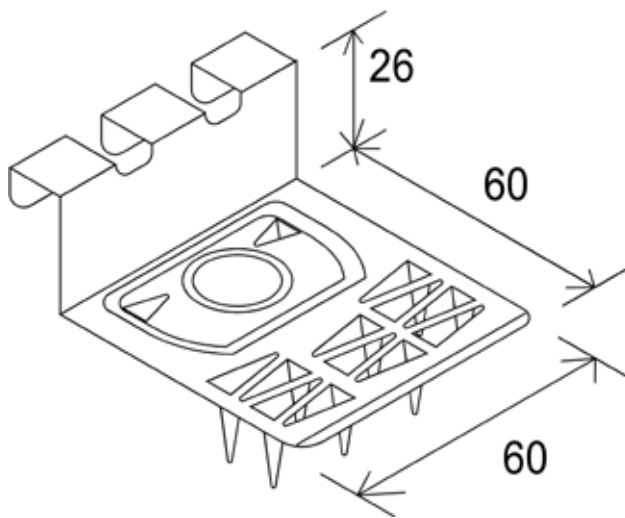
Item: KRF

Description: Krabban stainless fixed

Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Quality	Thickness
EN 1.4301	0.6mm



■ Fixing to substrate

The clip is installed in the substrate using a telescopic sleeve H30-H705. Where the insulation is thin steel washer H06-H09 is used. The fastener is adapted to the substrate.

■ Thermal movement

Fixed clip

STRENGTH

	Centric load	Shear load-roof slope
Ultimate tensile strength	1273N	Dimensional value: 1.EPS-S80 200N/fastener 2.Mineral wool: 400N/fastener
Characteristic tensile strength	1260N	

Clip strength valid in combination with telescopic sleeve or steel washer H.

Assumes that the fixing in actual substrate is stronger than the clip.

1. EPS S80 Density 17kg/m³
2. Mineral wool 20mm roof board Density 180kg/m³

Date
2011-02-09

Clip – drawing number
KRF:1

Revise
-

Date
-

Technical information

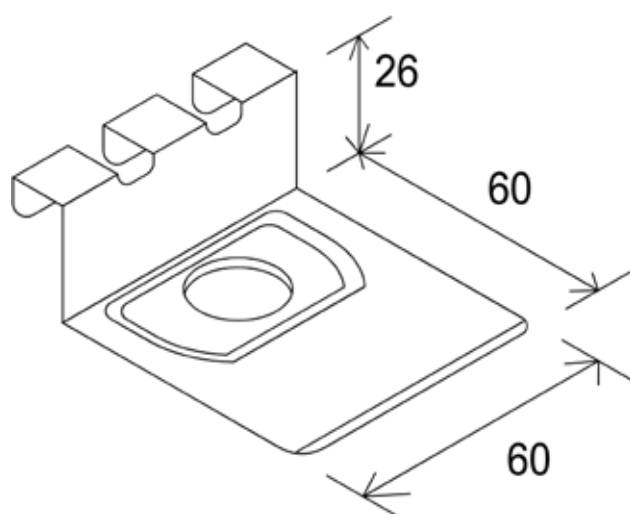
Item: KRFP

Description: Krabban stainless fixed flat

Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Quality	Thickness
EN 1.4301	0.6mm



■ Fixing to substrate

The clip is installed in the substrate using a telescopic sleeve H30-H705. Where the insulation is thin steel washer H06-H09 is used. The fastener is adapted to the substrate.

■ Thermal movement

Fixed clip

STRENGTH

Centric load	
Ultimate tensile strength	1273N
Characteristic tensile strength	1260N

Clip strength valid in combination with telescopic sleeve or steel washer H. Assumes that the fixing in actual substrate is stronger than the clip.

Date
2011-02-09

Clip – drawing number
KRFP:1

Revise
-

Date
-

Technical information

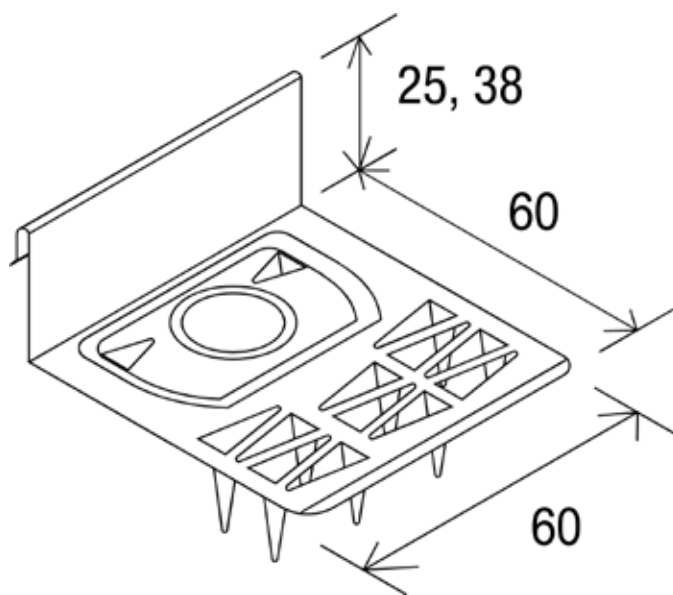
Item: KR25, KR38

Description: Krabban stainless 25, 38mm "snap falz"

Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Quality	Thickness
EN 1.4301	0.6mm



■ Fixing to substrate

The clip is installed in the substrate using a telescopic sleeve H30-H705. Where the insulation is thin steel washer H06-H09 is used. The fastener is adapted to the substrate.

■ Thermal movement

Fixed clip

STRENGTH

	Centric load	Shear load-roof slope
Ultimate tensile strength	1273N	Dimensional value: 1.EPS-S80 200N/fastener 2.Mineral wool: 400N/fastener
Characteristic tensile strength	1260N	

Clip strength valid in combination with telescopic sleeve or steel washer H.

Assumes that the fixing in actual substrate is stronger than the clip.

1. EPS S80 Density 17kg/m³
2. Mineral wool 20mm roof board Density 180kg/m³

Date	Clip – drawing number	Revise	Date
2011-02-09	KR25-KR38:1	-	-

Technical information

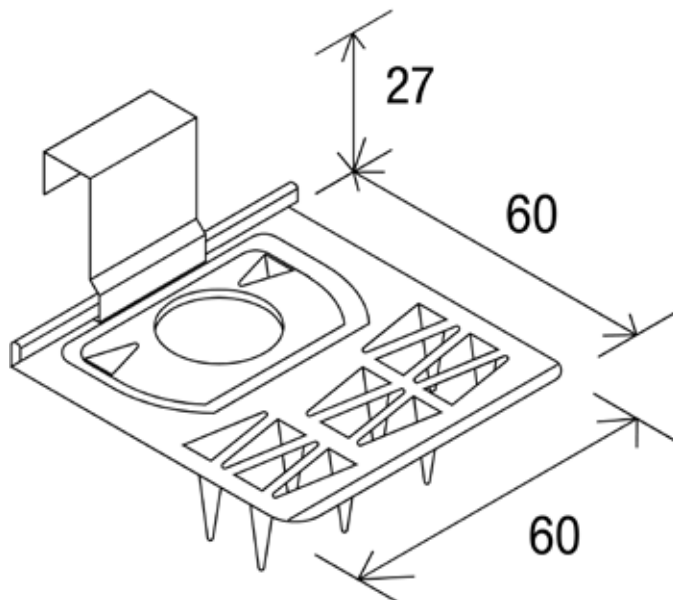
Item: KR

Description: Krabban stainless

Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 1.4310	0,15mm
Lower part	EN 1.4301	0,6mm



■ Fixing to substrate

The clip is installed in the substrate using a telescopic sleeve H30-H705. Where the insulation is thin steel washer H06-H09 is used. The fastener is adapted to the substrate.

■ Thermal movement

±15mm

STRENGTH

Centric load	
Ultimate tensile strength	1273N
Characteristic tensile strength	1260N

Clip strength valid in combination with telescopic sleeve or steel washer H. Assumes that the fixing in actual substrate is stronger than the clip.

Date
2011-02-09

Clip – drawing number
KR:1

Revise
-

Date
-

Technical information

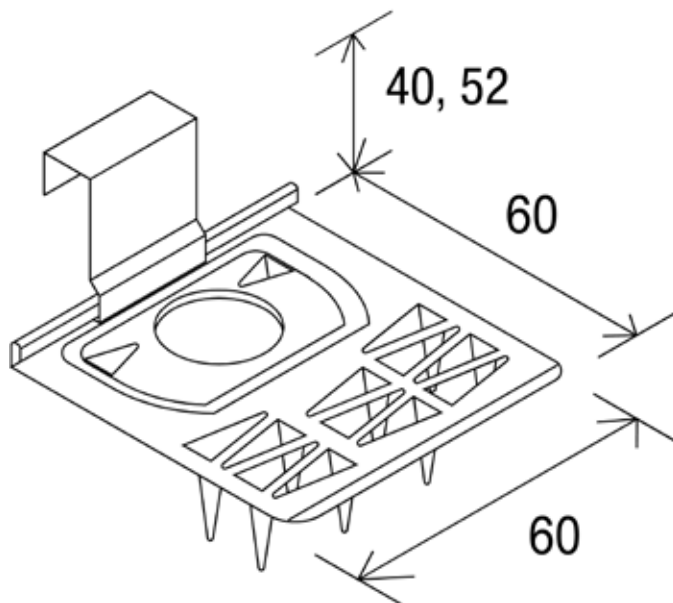
Item: KR38H, KR50H

Description: Krabban stainless 38, 50mm heigh

Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 1.4310	0,4mm
Lower part	EN 1.4301	0,6mm



■ Fixing to substrate

The clip is installed in the substrate using a telescopic sleeve H30-H705. Where the insulation is thin steel washer H06-H09 is used. The fastener is adapted to the substrate.

■ Thermal movement

±15mm

STRENGTH

Centric load	
Ultimate tensile strength	1273N
Characteristic tensile strength	1260N

Clip strength valid in combination with telescopic sleeve or steel washer H. Assumes that the fixing in actual substrate is stronger than the clip.

Date
2011-02-09

Clip – drawing number
KR38H-KR50H:1

Revise
-

Date
-

Technical information

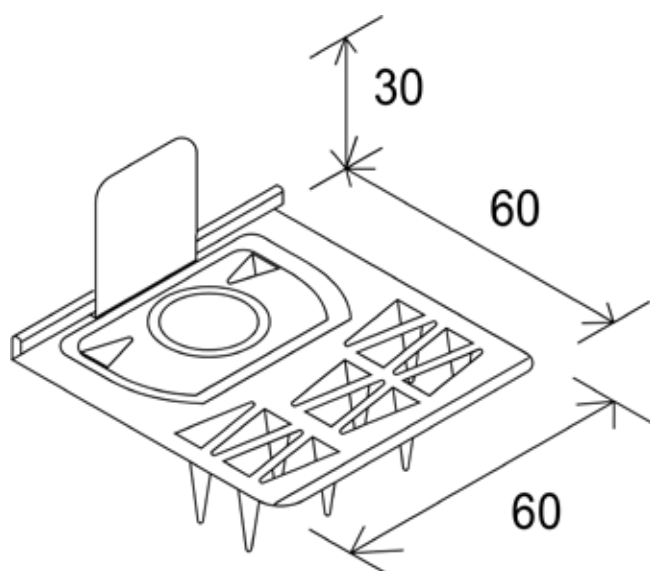
Item: KRS

Description: Krabban stainless weld

Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 1.4310	0,15mm
Lower part	EN 1.4301	0,6mm



■ Fixing to substrate

The clip is installed in the substrate using a telescopic sleeve H30-H705. Where the insulation is thin steel washer H06-H09 is used. The fastener is adapted to the substrate.

■ Thermal movement

±15mm

STRENGTH

Centric load

Ultimate tensile strength	1273N
Characteristic tensile strength	1260N

Clip strength valid in combination with telescopic sleeve or steel washer H. Assumes that the fixing in actual substrate is stronger than the clip.

Date
2011-02-09

Clip – drawing number
KRS:1

Revise
-

Date
-

Technical information

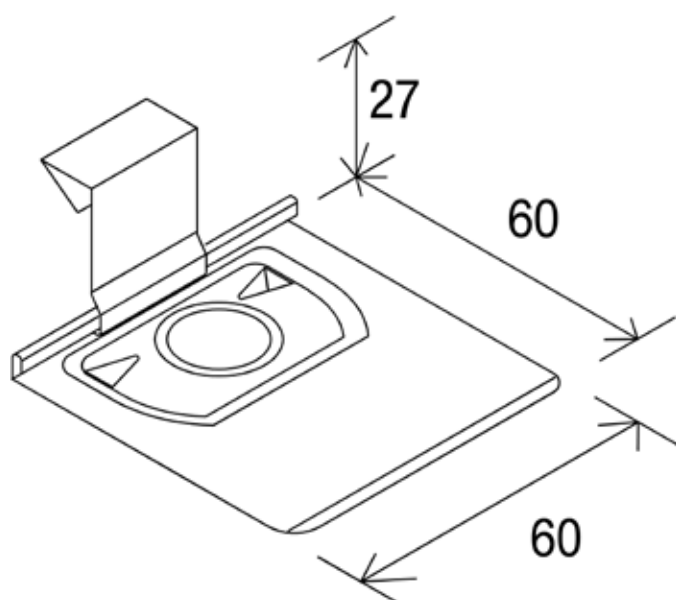
Item: KRP

Description: Krabban stainless flat

Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 1.4310	0,15mm
Lower part	EN 1.4301	0,6mm



■ Fixing to substrate

The clip is installed in the substrate using a telescopic sleeve H30-H705. Where the insulation is thin steel washer H06-H09 is used. The fastener is adapted to the substrate.

■ Thermal movement

±15mm

STRENGTH

Centric load

Ultimate tensile strength	1273N
Characteristic tensile strength	1260N

Clip strength valid in combination with telescopic sleeve or steel washer H. Assumes that the fixing in actual substrate is stronger than the clip.

Date
2011-02-09

Clip – drawing number
KRP:1

Revise
-

Date
-

Technical information

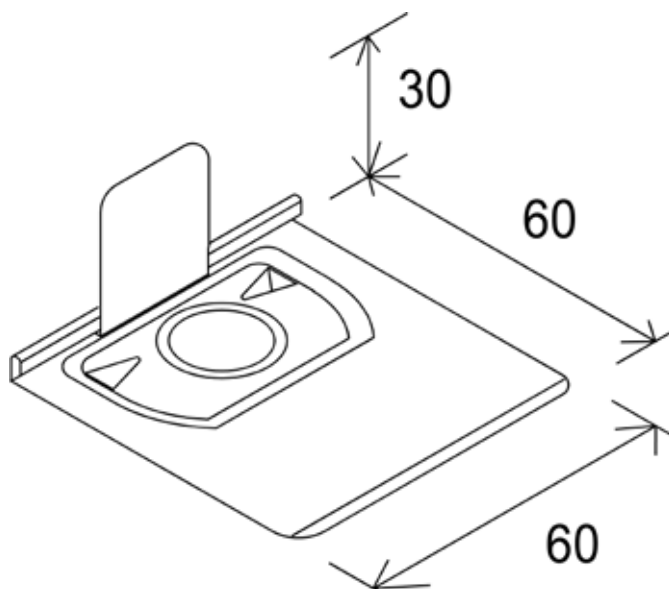
Item: KRSP

Description: Krabban stainless weld flat

Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 1.4310	0,15mm
Lower part	EN 1.4301	0,6mm



■ Fixing to substrate

The clip is installed in the substrate using a telescopic sleeve H30-H705. Where the insulation is thin steel washer H06-H09 is used. The fastener is adapted to the substrate.

■ Thermal movement

±15mm

STRENGTH

Centric load

Ultimate tensile strength	1273N
Characteristic tensile strength	1260N

Clip strength valid in combination with telescopic sleeve or steel washer H. Assumes that the fixing in actual substrate is stronger than the clip.

Date
2011-02-09

Clip – drawing number
KRSP:1

Revise
-

Date
-

Technical information

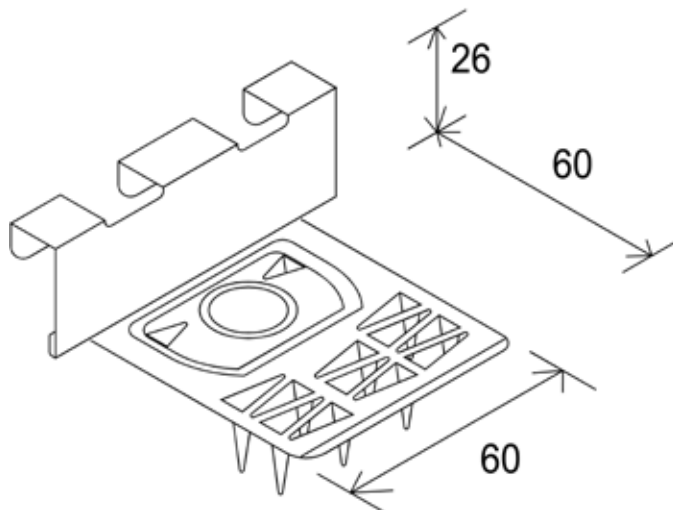
Item: KRE

Description: Krabban stainless Extrem

Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 1.4310	0,15mm
Lower part	EN 1.4301	0,6mm



■ Fixing to substrate

The clip is installed in the substrate using a telescopic sleeve H30-H705. Where the insulation is thin steel washer H06-H09 is used. The fastener is adapted to the substrate.

■ Thermal movement

±40mm

STRENGTH

Centric load

Ultimate tensile strength	1273N
Characteristic tensile strength	1260N

Clip strength valid in combination with telescopic sleeve or steel washer H. Assumes that the fixing in actual substrate is stronger than the clip.

Date
2011-02-09

Clip – drawing number
KRE:1

Revise
-

Date
-

Technical information

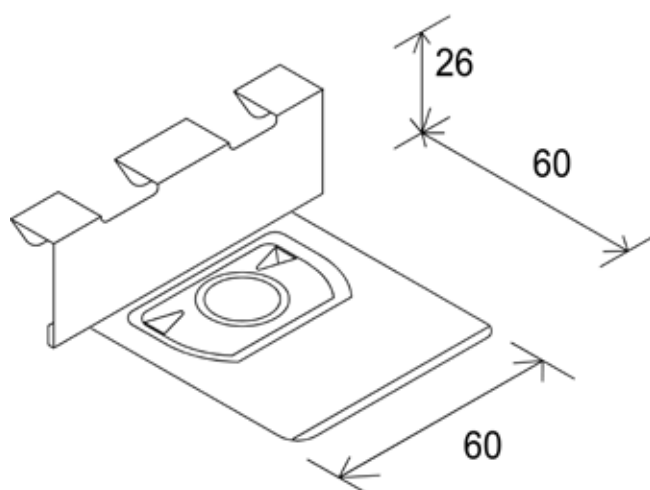
Item: KRPE

Description: Krabban stainless flat Extrem

Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 1.4310	0,15mm
Lower part	EN 1.4301	0,6mm



■ Fixing to substrate

The clip is installed in the substrate using a telescopic sleeve H30-H705. Where the insulation is thin steel washer H06-H09 is used. The fastener is adapted to the substrate.

■ Thermal movement

±40mm

STRENGTH

Centric load

Ultimate tensile strength	1273N
Characteristic tensile strength	1260N

Clip strength valid in combination with telescopic sleeve or steel washer H. Assumes that the fixing in actual substrate is stronger than the clip.

Date
2011-02-09

Clip – drawing number
KRPE:1

Revise
-

Date
-

Technical information

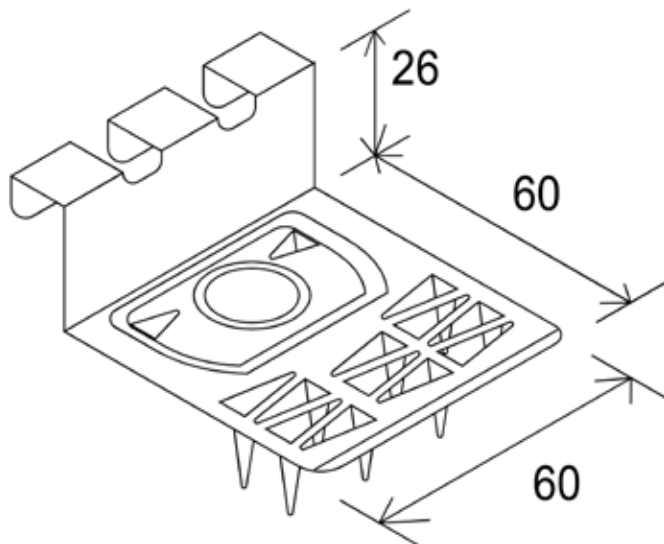
Item: KGF

Description: Krabban galvanized fixed

Material: Hot-dip galvanized steel

MATERIAL DESCRIPTION

Quality	Thickness	Ytbehandling
EN 10142	0.6mm	Hot-dip galvanized 275g/m ²



■ Fixing to substrate

The clip is installed in the substrate using a telescopic sleeve H30-H705. Where the insulation is thin steel washer H06-H09 is used. The fastener is adapted to the substrate.

■ Thermal movement

Fixed clip

STRENGTH

	Centric load	Shear load-roof slope
Ultimate tensile strength	1080N	Dimensional value: 1.EPS-S80 200N/fastener
Characteristic tensile strength	1030N	2.Mineral wool: 400N/fastener

Clip strength valid in combination with telescopic sleeve or steel washer H.

Assumes that the fixing in actual substrate is stronger than the clip.

1. EPS S80 Density 17kg/m³

2. Mineral wool 20mm roof board Density 180kg/m³

Date
2011-02-09

Clip – drawing number
KGF:1

Revise
-

Date
-

Technical information

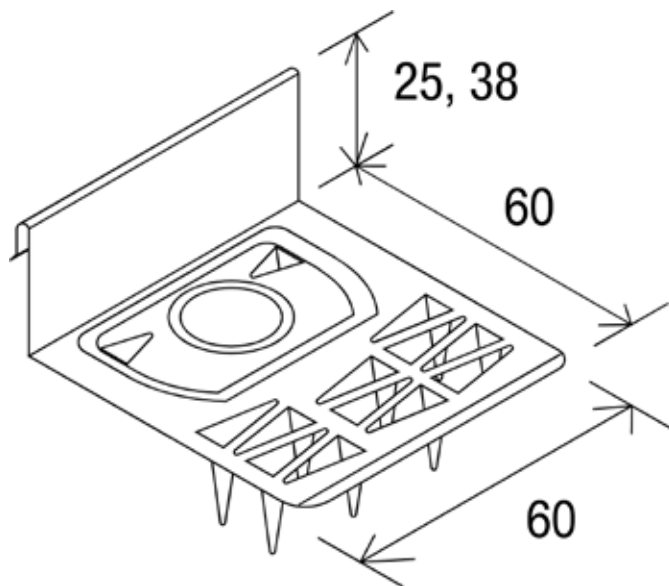
Item: KG25, KG38

Description: Krabban galvanized 25, 38mm "snap falz"

Material: Hot-dip galvanized steel

MATERIAL DESCRIPTION

Quality	Thickness	Ytbehandling
EN 10142	0.6mm	Hot-dip galvanized 275g/m ²



■ Fixing to substrate

The clip is installed in the substrate using a telescopic sleeve H30-H705. Where the insulation is thin steel washer H06-H09 is used. The fastener is adapted to the substrate.

■ Thermal movement

Fixed clip

STRENGTH

Centric load	
Ultimate tensile strength	1080N
Characteristic tensile strength	1030N

Clip strength valid in combination with telescopic sleeve or steel washer H. Assumes that the fixing in actual substrate is stronger than the clip.

Date
2011-02-09

Clip – drawing number
KG25-KG38:1

Revise
-

Date
-

Technical information

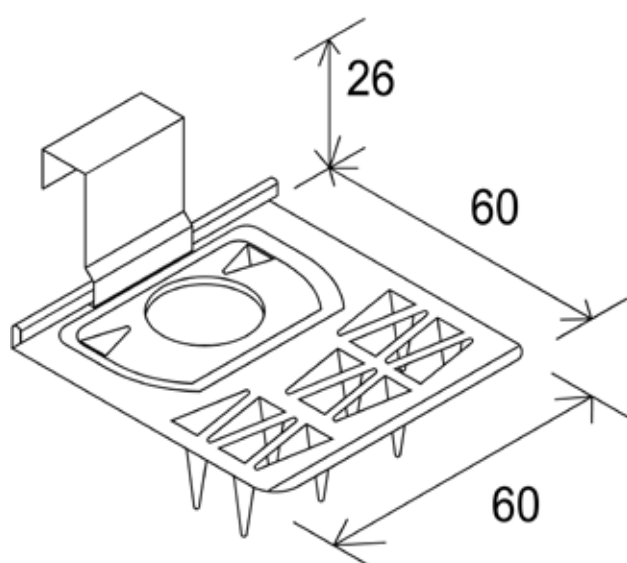
Item: KG

Description: Krabban galvanized

Material: Hot-dip galvanized steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 10142	0,4mm
Lower part	EN 10142	0,6mm



■ Fixing to substrate

The clip is installed in the substrate using a telescopic sleeve H30-H705. Where the insulation is thin steel washer H06-H09 is used. The fastener is adapted to the substrate.

■ Thermal movement

±15mm

STRENGTH

Centric load

Ultimate tensile strength	1080N
Characteristic tensile strength	1030N

Clip strength valid in combination with telescopic sleeve or steel washer H. Assumes that the fixing in actual substrate is stronger than the clip.

Date
2011-02-09

Clip – drawing number
KG:1

Revise
-

Date
-

Technical information

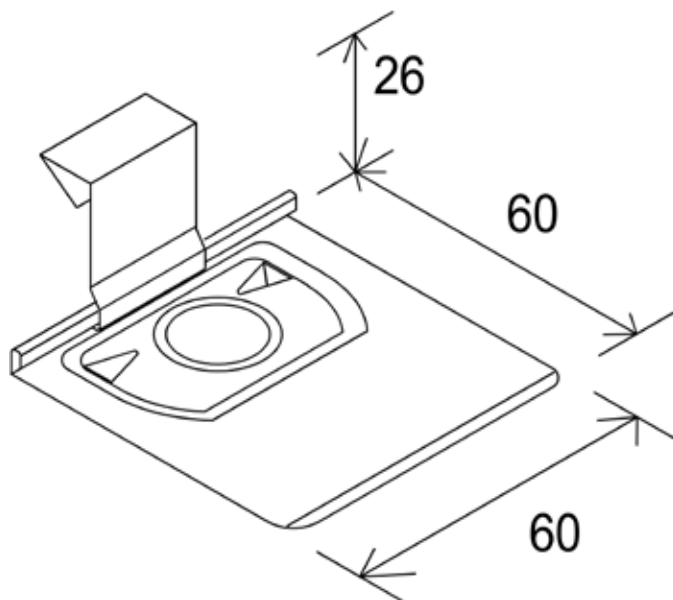
Item: KGP

Description: Krabban galvanized flat

Material: Hot-dip galvanized steel

MATERIAL DESCRIPTION

Part	Quality	Thickness
Upper part	EN 10142	0,4mm
Lower part	EN 10142	0,6mm



■ Fixing to substrate

The clip is installed in the substrate using a telescopic sleeve H30-H705. Where the insulation is thin steel washer H06-H09 is used. The fastener is adapted to the substrate.

■ Thermal movement

±15mm

STRENGTH

Centric load

Ultimate tensile strength	1080N
Characteristic tensile strength	1030N

Clip strength valid in combination with telescopic sleeve or steel washer H. Assumes that the fixing in actual substrate is stronger than the clip.

Date
2011-02-09

Clip – drawing number
KGP:1

Revise
-

Date
-

Technical information



Item: KLRT, KLRT35

Description: Clip screw

Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Dimension	Quality	Drive	Point
4.5xL	1.4301	Torx T20	Penetrating



STRENGTH

Substrate	Thickness (mm)	Characteristic pull out value	Material quality Wood substrate
Soft wood	17	865N	At least G4-2 or G2-2 SS-EN 16999-1
	22	1240N	
Plywood	-	-	Construction plywood P30
	18	930N	
	21	1320N	

Date
2011-02-14

Clip – drawing number
KLRT:1

Revise
-

Date
-

Technical information

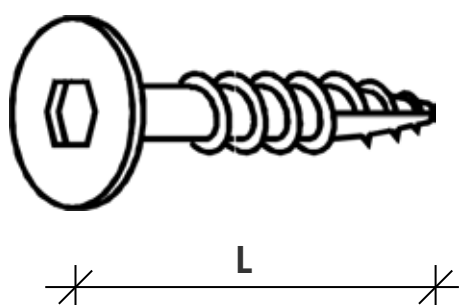
Item: KLRT20C, KLRT26C

Description: Clip screw

Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Dimension	Quality	Drive	Point
4.5xL	1.4301	Torx T20	Cutter



STRENGTH

Substrate	Thickness (mm)	Characteristic pull out value	Material quality Wood substrate
Soft wood	17	-	At least G4-2 or G2-2 SS-EN 16999-1
	22	-	
Plywood	-	-	Construction plywood P30
	18	-	
	21	-	

Date
2011-02-14

Clip – drawing number
KLRTC:1

Revise
-

Date
-

Technical information

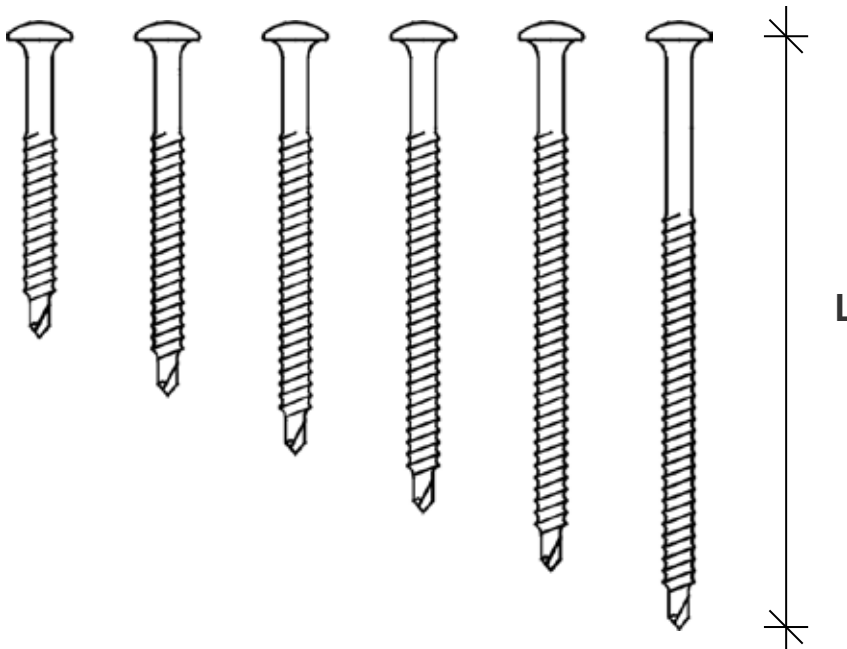
Item: LS50-LS300

Description: Roof screw with drill point 50-300mm

Material: Surface treated carbon steel

MATERIAL DESCRIPTION

Dimension	Quality	Drive	Point
4.8xL	SS 1370	Torx T25	Drillpoint



STRENGTH

Substrate	Thickness (mm)	Characteristic pull out value	Material quality Steel
Steel	0.7mm	1050N	Yield strength min 350Mpa
	0.8mm	1220N	

Drill capacity: min 0.7mm max 2x1.25mm

Coating: Enduroguard, equivalent to 15 Kesternish cycles according to ETAG 006

Date
2011-02-14

Clip – drawing number
LS:1

Revise
-

Date
-

Technical information

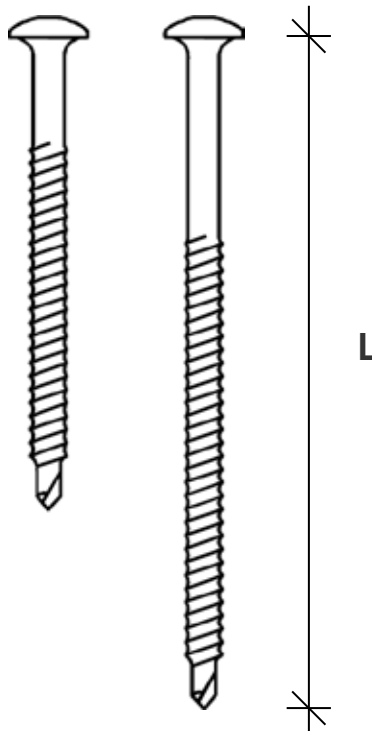
Item: RS60, RS100

Description: Roof screw with drill point 60mm, 100mm

Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Dimension	Quality	Drive	Point
4.8xL	1,4301	Torx T25	Drillpoint



STRENGTH

Substrate	Thickness (mm)	Characteristic pull out value	Material quality Steel
Steel	0.7mm	1050N	Yield strength min 350Mpa
	0.8mm	1220N	

Drill capacity: min 0.7mm max 2x1.25mm

Date
2011-02-14

Clip – drawing number
RS:1

Revise
-

Date
-

Technical information

Item: BS11

Description: Blind rivet

Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Dimension	Quality	Predrilling	Grip area
3.2x12.5	1,4301	3.3-3.4mm	1.1-7.0mm



STRENGTH

Substrate	Thickness (mm)	Characteristic pull out value	Material quality
Steel	0.6mm	390N	Yield strength min 350MPa
	0.7mm	600N	

Date
2011-02-14

Clip – drawing number
BS11:1

Revise
-

Date
-

Technical information

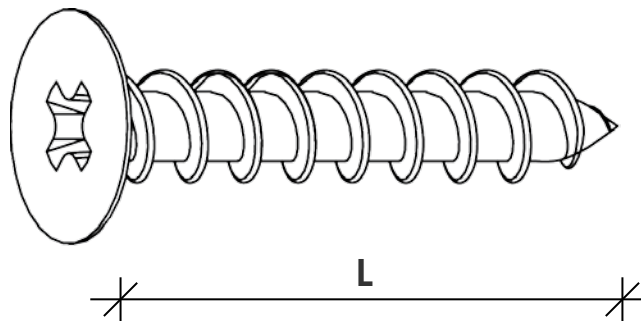
Item: KLGP25

Description: Clip screw

Material: Zink nickel surface treated carbon steel

MATERIAL DESCRIPTION

Dimension	Quality	Drive	Point
4.5x25	C1022	PH2	Penetrating



STRENGTH

Substrate	Thickness (mm)	Characteristic pull out value	Material quality Steel
Soft wood	22	1257N	At least G4-2 or G2-2 SS-EN 16999-1
	-	-	

Date
2011-02-14

Clip – drawing number
KLGP25:1

Revise
-

Date
-

Technical information

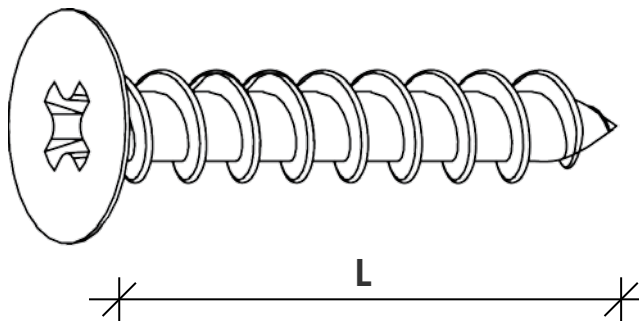
Item: KLRP25

Description: Clip screw

Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Dimension	Quality	Drive	Point
4.5x25	A2304	PH2	Penetrating



STRENGTH

Substrate	Thickness (mm)	Characteristic pull out value	Material quality Steel
Soft wood	22	1077N	At least G4-2 or G2-2 SS-EN 16999-1
	-	-	

Date
2011-02-14

Clip – drawing number
KLRP25:1

Revise
-

Date
-

Technical information

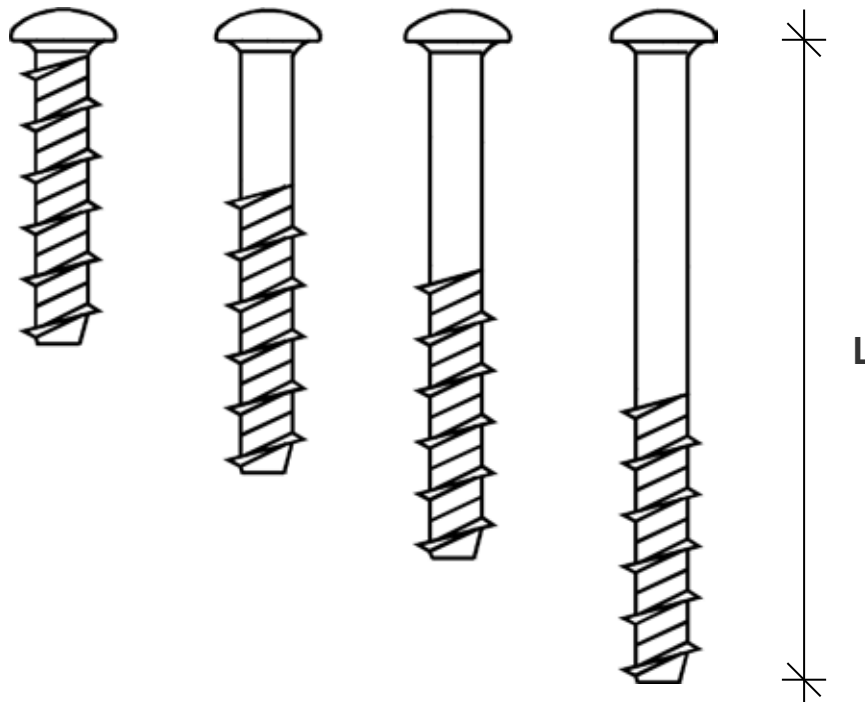
Item: BSC28-BSC280

Description: Concrete screw

Material: Surface treated carbon steel

MATERIAL DESCRIPTION

Dimension	Quality	Drive
6.1xL	SS 1370	Torx T25



STRENGTH

Substrate	Minimum	Characteristic pull out value	Concrete quality
Betong	20mm	1440N	C25/30

Predrilling: $\varnothing 5.0\text{mm}$

Coating: Enduroguard, equivalent to 15 Kesternish cycles according to ETAG 006.

Date
2011-02-14

Clip – drawing number
BSC:1

Revise
-

Date
-

Technical information

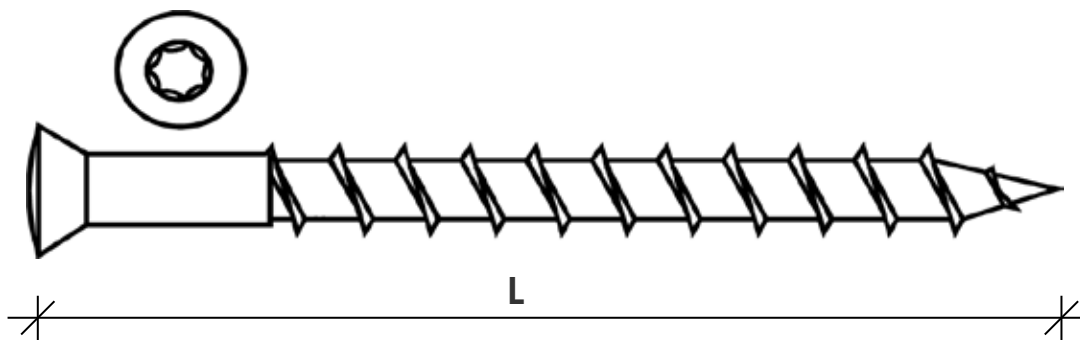
Item: LBS80-LBS130

Description: Light weight concrete screw

Material: Surface treated carbon steel

MATERIAL DESCRIPTION

Dimension	Quality	Drive	Point
8.0xL	SS 1370	Torx T25	Penetrating



STRENGTH

Substrate	Characteristic pull out value	Material quality	Fastener depth
Light weight concrete	1650N	Density 500kg/m ³	Min 75mm

Coating: Enduroguard, equivalent to 15 Kesternish cycles according to ETAG 006.

NOTE! PULL OUT TEST IS ALWAYS RECOMMENDED WHEN FASTENING IN LIGHT WEIGHT CONCRETE.

Date
2011-02-14

Clip – drawing number
LBS:1

Revise
-

Date
-

Technical information

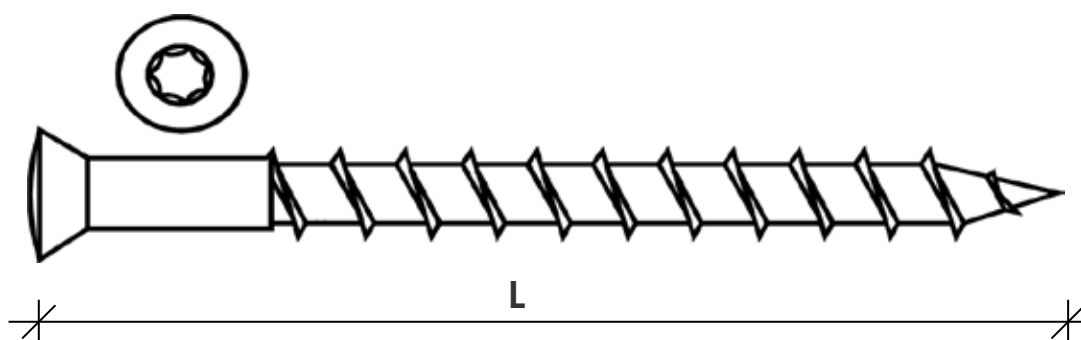
Item: LBSR80-LBSR130

Description: Light weight concrete screw

Material: Stainless austenitic steel

MATERIAL DESCRIPTION

Dimension	Quality	Drive	Point
8.0xL	1.4301	Torx T25	Penetrating



STRENGTH

Substrate	Characteristic pull out value	Material quality	Fastener depth
Light weight concrete	1650N	Density 500kg/m ³	Min 75mm

NOTE! PULL OUT TEST IS ALWAYS RECOMMENDED WHEN FASTENING IN LIGHT WEIGHT CONCRETE.

Date
2011-02-14

Clip – drawing number
LBSR:1

Revise
-

Date
-

Technical information

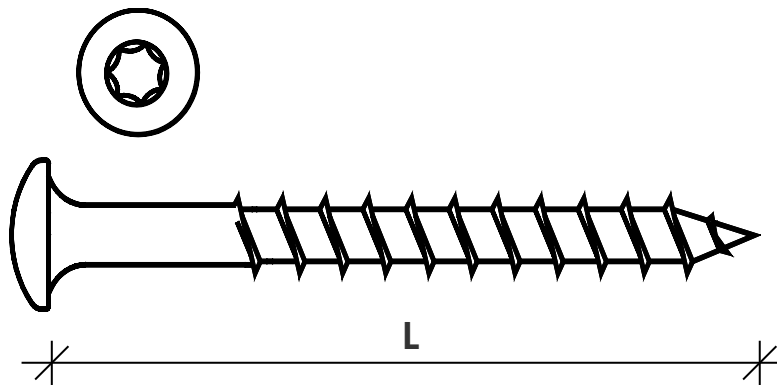
Item: LST40-LST90

Description: Wood screw

Material: Surface treated carbon steel

MATERIAL DESCRIPTION

Dimension	Quality	Drive	Point
5,0xL	C1022	Torx T25	Penetrating



STRENGTH

Substrate	Thickness (mm)	Characteristic pull out value	Material quality Steel
Soft wood	22	1914N	At least G4-2 or G2-2 SS-EN 16999-1
	-	-	

Date
2011-02-14

Clip – drawing number
LST:1

Revise
-

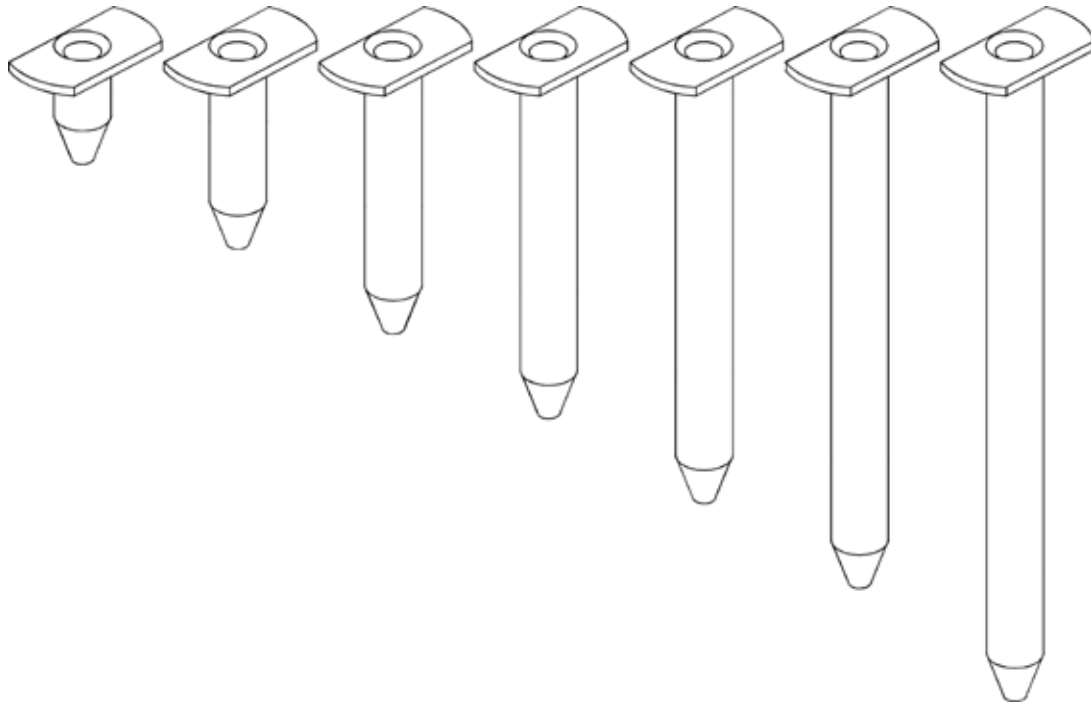
Date
-

Technical information

Item: H30-H705

Description: Telescopic sleeve

Material: Impact strength modified polypropylene



Tested and approved regarding impact and aging according to ETAG-006.

Date
2011-02-14

Clip – drawing number
H30-H705:1

Revise
-

Date
-

A. TYPE OF ROOF

Mono pitch roof

Length of roof pitch = 18.0m

Roof pitch = 14° (1:4)

B. WIND LOAD SS-EN 1991-1-4

Design wind load

Corner zone: 4,92 kN/m²

Perimeter zone: 4,23 kN/m²

Mid area: 2,03 kN/m²

C. SNOW LOAD SS-EN 1991-1-3

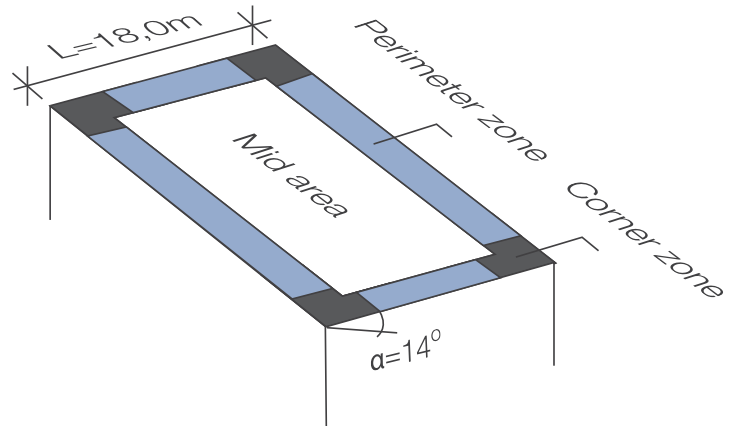
Design snow load

1,2 kN/m²

D. ROOF CONSTRUCTION

Standing seam roof steel sheet $C_{seam} = 600\text{mm}$

22mm soft wood substrate.



ROOF

Location: Malmö

Terrain type: 1

Height: 12,0m

E. FIXING

Clip type	Fastener	Situation
Fixed clip F01S	Screw 4,5x26 KLRT	Fixed zone- centre of roof pitch
Sliding clip G01S	Screw 4,5x26 KLRT	Movement zones

Design value clip and screw

F01S $F_d=620\text{N}$ $\gamma_m=1,25$ (SS-EN 1993-1-3)

G01S $F_d=1080\text{N}$ $\gamma_m=1,25$ (SS-EN 1993-1-3)

KLRT $F_d=1050\text{N}$ $k_{mod} 1,10$ $\gamma_m=1.3$ (SS-EN 1995-1-1)

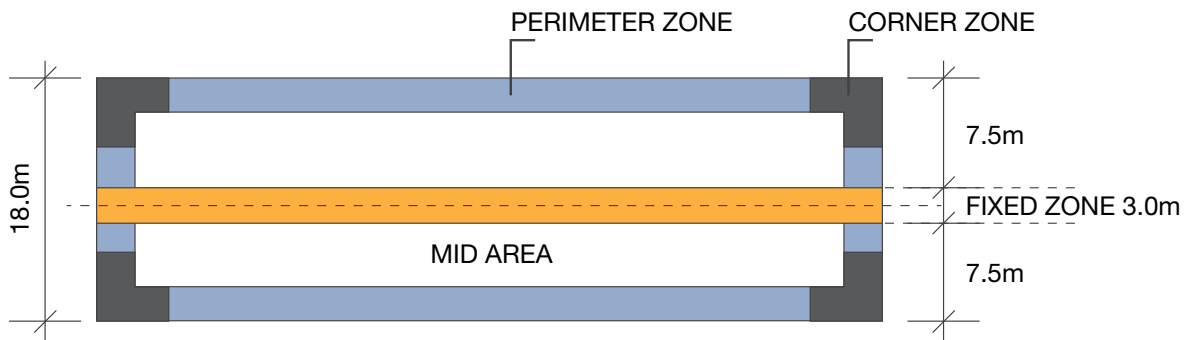
Design value fasteners – optimal c-measures

Clip	ROOF ZONES		
	Corner zone	Perimeter zone	Mid area
F01S	-	C240	C300
G01S	C350	C410	C 600*

*Maximum distance between clips

CALCULATION EXAMPLE

F. ROOF PLAN



Type of zone	Situation	Clip type c-measure
Fixed zone	Centre of roof mid area	F01S C=300mm
Fixed zone	Centre of roof perimeter area	F01S C=240mm
Movement zone	Corner zone	G01S C=350mm
Movement zone	Perimeter zone	G01S C=410mm
Movement zone	Mid area	G01S C=600mm

FORCES IN THE ROOF PITCH DIRECTION

The snow load causes 3kN load on each seam and the total roof length. Fixed clips are installed in the fixed zone with at c-measure of 300mm. Each clip takes 0,27kN that is transferred to the substrate.

THERMAL MOVEMENTS

Installation temperature +10°C results in an approximate length change of +7mm during summer and -5mm during winter. G01S takes movements ±10mm.

Note! The calculation is only valid for the fastening of the clip. Seam width according to the steel sheet manufacturer. If the seam width is reduced the fastening is adapted to actual width.

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