

technical information

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facades



**bruno**spann



Introduction	3
Characteristics of elevation panel	4
General recommendations how to proceed	4
Machining of panels	5
Application of panels	6
Dimensions of panels	6
Division with regard to colours	6
Fire resistance rating	6
Technical data of Kronoplan Color panels	7
Rules of installation for elevation panels	8
Joining of panels	9
Corner solutions	9
Visible installation	
Mechanical	10
Spacing of installation holes	11
Fixing elements	11
Invisible installation	
System adhesives	14
Elements of the system	14
Installation of panels	15
Invisible installation	
Mechanical	16
Distribution of fittings	16
Preparation for construction	17
Installation fittings	
Fitting KEIL	17
Fitting SFS	18
Installation accessories	18

## Introduction

Main purpose of using the ventilated facades is to protect the building against ambient factors with simultaneous increase of its thermal insulation.

Elevation made from Kronoplan Color panels features very long life cycle. It does not require any costly maintenance or overhauls.

Using self-bearing elevation systems based on the Kronoplan Color panels you can plan the use of warming materials of any thickness and heat permeability and reduce the energy consumption by the building. Due to this flexibility in selection of insulation the heat retention ability of the building is maximized especially in winter while in the summer the temperature can be kept at lower level. These properties allow to create realizations of advantageous energy balance and to reduce the emission of CO<sub>2</sub>.

The wall and its external lining cooperate with each other in order to make good thermal insulation, insulation against moisture as well as the acoustic one. The use of ventilated facades allows to combine these requirements.

### Resistance to moisture

Elevation is designed in a manner facilitating the removal of moisture from the supporting structure and protecting against condensation of water steam.

Fast dissipation of moisture is supported by the empty space between the panel and the warming layer due to which neither mould nor fungi can develop.

### Noise reduction

Use of elevation panels influences the noise heard inside the object. The level of noise suppression depends among others on the thickness of the elevation panels used, dimensions of the installation panels, distribution and number of installation holes.

# technical information

## Characteristics of elevation panel

### Resistance to weather factors

The **Kronoplan Color** panels are extremely resistant to weather conditions. Sun, acid rains and humidity do not deteriorate the quality of surface or middle layers of the panel. Resistance to UV radiation and light is very high. Negative influence on the panel does not have also too high or too quick temperature changes.

Due to the closed structure of the surface and panel edge the **Kronoplan Color** panels are easy to clean. Dirt does not deposit and the putrefactive bacteria cannot develop and so the material does not decompose. Due to that, both aesthetic properties as well as the physical and mechanical ones do not change almost at all for many years.

### Vandal proof

Due to combination of bending strength and elasticity the **Kronoplan Color** panels are to the great extent resistant to impact loads and are perfectly suited for use in the places under vandal threat.

Graffiti can be easily removed without leaving any traces using appropriate solvent without damaging the panel surface.

### Fire resistance

The material the panels are made of has high fire resistance (according to EN 13501, DIN 4102, NRO) - it does not melt, does not drip, is not explosive and does not flake under the impact of fire as well as it keeps its stability for long time. Due to low smoke emission it is not dangerous toxicologically.

### Cutting edges

Surfaces and cutting edges do not require painting or coating with protective coats. For machining, for instance, cutting, drilling or milling you can use all type of tools suitable for machining of hard wood. To prevent damage, the smoothing of cutting surfaces is recommended, for instance, using the flat metal file or cutter with carbide insert.

## General recommendations how to proceed

### Transport and unloading

The **Kronoplan Color** panels are characterized with excellent strength, however, during transport there is a danger they can get damage, both the panels themselves and their decorative surfaces.

Therefore the following guidelines should be followed:

- the panels should be secured so to prevent them from shifting,
- before placing the panels on a pallet they all should be cleaned and all obstacles removed,
- put maximum 5 pallets one on top another,
- to protect the panels against dirt use the protective foil.

During unloading do exercise caution; lifting should be carried out always in vertical position, don't pull and don't shift in relation to each other without lifting them.

**Attention! Don't hit the edges and surfaces of the panels.**

### Storage

For storage the panels should be placed on flat and stable surfaces or racks in natural climatic conditions, dry and protected against water. During storage the edges of panels should be aligned.

Top panel should be covered on its entire surface with the cover board and the stack should be wrapped with plastics foil. Also, avoid humidity in places of application (installation) and machining by covering with foil. Original packing of the panels should be removed directly before they are used (from both sides at the same time).

The **Kronoplan Color** panels are protected with foil with special UV filter. Remove the foil after the panel is installed. Never lean the panels against a wall; it can cause the irreversible bending of the panel.

Incorrect storage may lead to permanent deformation and surface damage, which cannot be used as a justification for lodging the complaint.

## Cleaning

The **Kronoplan Color** panels are exceptionally easy in maintenance. Small contaminations can be wiped up with a cloth wetted with water with addition of soap or other household cleaning agents.

Difficult to remove dirt can be cleaned using the cleaning agents in commercial offer and suitable for household use. Cleaning should be started from a small part of the surface to check whether any changes occur.



Fig. Cleaning.

## Method of cleaning the panels with UV filter

The **Kronoplan Color** panels with special UV filters can be washed up using alcohol solvents. Basically, any cleaning agents that can scratch the panel surface cannot be used.

Thorough cleaning can be performed using pressure devices. During cleaning with pressure devices perform movements from the bottom up and crosswise.

After cleaning rinse with a stream of clean water. The distance from the surface should not be less than 20-30 cm. Water temperature should not exceed 90-100°C. Working pressure should be maximum 100 bars.

## Machining of panels

The panels are machined at the same way as the hard wood or laminated chip boards. For machining use the standard tools used for wood with parts covered with hard metal. The panels can be cut, drilled and milled.

To obtain straight cutting line and avoid excessive heating of the edges the tools should be sharp.

The panels can be tapped as well as the self-threading screws can be used.

## Optimum machining parameters

Cutting of HPL panels can be performed using the circular saw blades, stationary or manual, with guides.

Best edge quality is obtained when using carbide saw blades with alternating flat-trapezoidal tooth FZ/TR. The saw should be guided with constant speed. The condition to obtain good cutting quality is optimization of the projection  $W$  of the circular blade over the board surface - its increasing improves the quality of upper edge of the cut material and deteriorates the lower one, and vice versa.

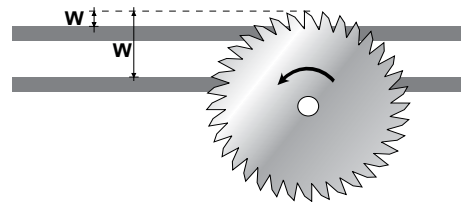


Fig. Optimization of projection  $W$  – improvement of cutting quality of the panel edge.

Panel feed speed is 6-10 m/min and depends on the panel thickness.

## Technical parameters of circular saw blades

Tooth shape	Trapezoidal-flat or alternating
Tool	Hard alloy or diamond
Cutting angle	Entrance angle 45°

Tab. Recommended machining parameters.

Diameter [mm]	Number of teeth	Speed [rpm]	Saw blade thickness [mm]	Projection [mm]
300	72	6000	3.4	30
350	84	5000	4.0	35
400	96	4000	4.8	40

Tab. Parameters of saw blade for machining of panels..

## Technical parameters of drills

HSS drills; cut 60 - 800, drill blade  $\leq 90^\circ$ .

In the case of using a drill from hard metals use the upright drilling machines.

Drill diameter [mm]	Speed [rpm]	Entrance speed [rpm]
5	3000	60-120
8	2000	40-80
10	1500	30-60

Tab. Parameters of drills.

The drills cannot go out into empty space. If necessary press a block to avoid cracking when the drill exits the panel.

# technical information

## Application of panels

The **Kronoplan Color** panels are designed especially for external applications and are used as:

- decorative facade facings,
- balcony panelling and covers,
- linings for attics and roof windows,
- stops and pavilions,
- composite elements and built into the facade and window panelling,
- panelling in stair balustrades.

## Dimensions of panels

**Kronoplan Color** panels are manufactured in following basic dimensions:

Dimensions [mm]	Surface area [m <sup>2</sup> ]
5600 x 2040	11,42
2800 x 2040	5,71
3050 x 1300	3,96
2800 x 1300	3,64

Tab. Dimensions and surface area of the offered Kronoplan Color panels.

Tolerance of dimension: lengthwise / crosswise:  
-0 / +10 mm.

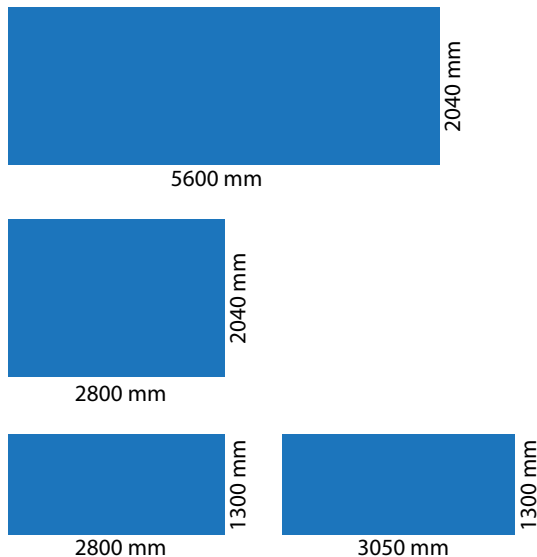


Fig. Dimensions of the Kronoplan Color panels.

## Division with regard to colours

### Kronoplan Color

The **Kronoplan Color** panels are offered according to our programme of colours with mono-colour decors, wood-like and fanciful.

The panels have special surface filtrating UV rays. This surface is covered with protective foil which should be removed immediately after installation and which constitutes the external, visible side.

### Kronoplan Color Baucompact

The **Kronoplan Color Baucompact** panels are offered according to our programme of colours.

They have, as a standard, the surface that filters UV rays. They do not require of using the protective foil.

Standard surface texture - "BS".

## Fire resistance rating

### Kronoplan Color Standard

The **Kronoplan Color Standard** plates are of type EDS according to the standard EN 438.

They are classified with regard to fire resistance as follows:

Standard	Fire resistance class	Panel thickness [mm]
EN 13501	up to the class D-s1,d0	6-9
	up to the class C-s1,d0	10-15
DIN 4102	up to the class B2	-

Tab. Fire resistance rating for Kronoplan Color Standard.

### Kronoplan Color FR

The **Kronoplan Color FR** panels are of EDF type according to the standard EN 438.

They are classified with regard to fire resistance as follows:

Standard	Fire resistance class
EN 13501	up to the class B-s2,d0
DIN 4102	up to the class B1

Tab. Fire resistance rating for Kronoplan Color FR

Standard thickness of panels: 6, 8 and 10 mm.

## Technical data of the Kronoplan Color panels

Parameter	Unit	Standard	Required value	EDS	EDF
Tolerance of thickness	mm	EN 438/2-5	0,40 (for 5-7 mm)	-	-
			0,50 (for 8-11 mm)	-	-
Density	g/cm <sup>3</sup>	EN ISO 1183-1:2004	1,35	1.4	1.4
Abrasion resistance	number	EN 438/2-10	min. 3	4	4
Bending strength	MPa	EN ISO 178:2003	80	220 (lengthwise)	212
				184 (crosswise)	167
Tensile strength	MPa	EN ISO 527-2:1996	60	187 (lengthwise)	156
				111 (crosswise)	104
Modulus of elasticity	MPa	EN ISO 178:2003	9000	16.000 (lengthwise 13.000)	-
				11.000 (crosswise 10.000)	-
Impact strength	kJ/m <sup>2</sup>	DIN 53453	-	18 (lengthwise)	15
				13 (crosswise)	11
<b>Hit strength</b>					
• Large ball	mm	EN 438/2-21	1800/ 6 mm	1800	1800
• Imprint diameter	mm		max. 10	3	3
Pull out strength	N/mm <sup>2</sup>	EN 320	-	417	409
<b>Water swelling at 20 °C</b>					
• 24 h	%	DIN 53495	-	0,3	0,5
• 100 h	%		-	1,1	1,6
• 500 h	%		-	3,2	3,7
Dimensional stability at elevated temperature	%	EN 438/2-17	0,3	max. 0,16 0,013 (lengthwise)	0,02
			0,6	max. 0,21 0,026 (crosswise)	0,026
Thermal conductivity	W/mK	DIN 52612		0,2076	
Thermal elongation index	ppm/K	DIN 52328	-	93,83 (thickness)	92,5
			-	8,48 (lengthwise)	9,4
			-	20,64 (crosswise)	23,88
Resistance to UV rays	greyscale	DIN 20105-AO2	-	5	5
	greyscale	EN 438/2-28	3/1500 Std	min. 4	min. 4
Resistance to acid rains	-	DIN 50018	-	without changes	-
Staining resistance*	grade	EN 438/2-26	5/4.	5/5.	5/5.
Fire resistance rating	class	DIN 4102	-	B2	B1
		EN 13501-1	-	D-s1,d0	B-s2,d0

Tab. Technical parameters of facade panels.

\* - does not apply to the Kronoplan Color panels

## Rules of installation for elevation panels

Before and during the installation a few rules should be observed that are listed below.

- The **Kronoplan Color** panels can be fixed to metal bearing structures (aluminium, galvanized steel) or from wood.
- The panels can be fixed to the bearing structure using rivets, bolts/elevation screws, adhesive systems or staples fixed to rear side (invisible mechanical fixing). All joints of panels with other elements and the substrate should be made in firm manner.
- Fixing elements should be spaced so as to enable the panel moving (by appropriate arrangement of fixed and non-fixed holes).
- Installation of the panel should be always commenced with from its centre.
- During installation and joining of elevation panels all elements should always be fixed observing one direction of fibres.
- The head of the fixing element should be of such size that the hole in the panel is always covered. The fixing element of the non-fixed point should be positioned so as to enable movement of the panel.
- The fixing elements should be of the same colour as the panel or be covered with a cap matching in colour.
- Rivets should be put using the articulated fixtures..
- The set distance from rivet head should make possible movement of elements in the drilled hole (clearance: +0,3 mm).
- It is a good practice guaranteeing flexible fixing to make precise preliminary drilling with exactness to one millimetre.
- The centre of the hole in the supporting structure should line up with the centre of the hole in the panel. The holes should be drilled using the centering sleeve.
- In order to obtain better cooperation in places of connections one can use rubber profiles from flexible EPDM.
- Screws cannot be tightened using excessive torque. The HPL panels used for elevation cannot be press fitted as it can cause uneven cooperation with substructure and lead up to breaking the rivets or screws
- Do not use the sunk head screws!
- The spacers should be mounted only when necessary.
- No formats can be fixed at the same time with two different profiles of the substructure and fixed one on top of another with expansion joint as the facing panels should have a possibility of making the same movements.
- Installation of the panels should be carried out only by qualified gang of fitters.
- For rivets the recommended hole diameter in the facade panel for the fixed point is  $\varnothing 5,1$  mm, and for the non-fixed point min. 1,5 larger from the diameter of the fixed point diameter. The diameter of the hole in the structure  $\varnothing 5,1$ . For torx screws the recommended diameters for non-fixed points are  $\varnothing 8$  mm, and for fixed points  $\varnothing 5,7$  mm.
- The line expansion crosswise and lengthwise should be taken into account when selecting the gap between subsequent formats assuming that the dimension of material can increase by about 2,5mm per one current meter of the lining.
- Dimensions of the profiles used depend on the thicknesses of panels (6, 8, 10 mm or more).
- Installation of the lining from the Kronoplan Color panels should be carried out assuring constant ventilation of the elevation material from both sides.
- Recommended ventilation distance between thermo insulating board and the panel should be min. 20 mm. Lack of distance between the panel and the bearing structure and thermal insulation can cause condensation and deformation of the panels.
- Only aluminium or from galvanized steel profiles should be used because of the resistance to corrosion and durability. In the case of other material of the substructure, care must be taken to protect it appropriately against weather conditions. In the case of other material of the substructure, provide for its protection against weather conditions.
- When selecting a connector it must be taken into account the wind pressure to which the entire balustrade structure is exposed including its filling as well as the legal regulations in force.
- Stability and durability of the structure and its anchoring should be demonstrated independently on the certificates of the facing panels. Correct spacing of connectors on the panel surface should be calculated based on the installation data for the high pressure laminates.



## Joining of panels

Most popular solution used for joining of panels consists in using the open gaps. During their use the materials resistant to moisture and corrosion should absolutely be used and the thermo insulating layer should be protected from inside with insulation against wind.

Recommended size of the expansion gap is min. 8 mm.

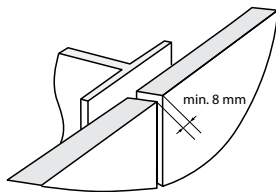


Fig. Open arrangement of gaps.

When using the elevation panel of thickness **8 mm or more**, you can join the subsequent panels making tongue and groove joint and the horizontal gaps with overlapping. In this way you obtain the closed arrangement of gaps.

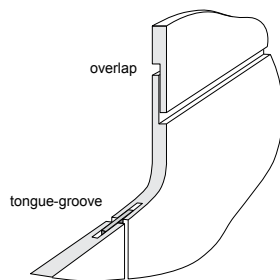


Fig. Closed arrangement of gaps.

Minimal parameters of tongue and groove to be observed are given below.

Type of tongue	HPL	Aluminium
Dimension of tongue [mm]	3 x 30	2 x 30
Dimension of groove [mm]	3,3 x 15	2,3 x 15
Dimension of overlap [mm]		21

Tab. Close arrangement of gaps – recommended minimal parameters for tongue and groove.

## Solutions for corners

Methods of finishing of elevation corners made from the **Kronoplan Color** panels depend on the thickness of the panels used. Recommended are the thicknesses from 8 mm up. This condition results from the necessity of correct setting of the screw in the material or from the necessity of making the groove for the tongue (when installing using tongue and groove the thickness is 3 mm). Number of connectors and their mutual distances between each other are connected with the spacing of the substructure.

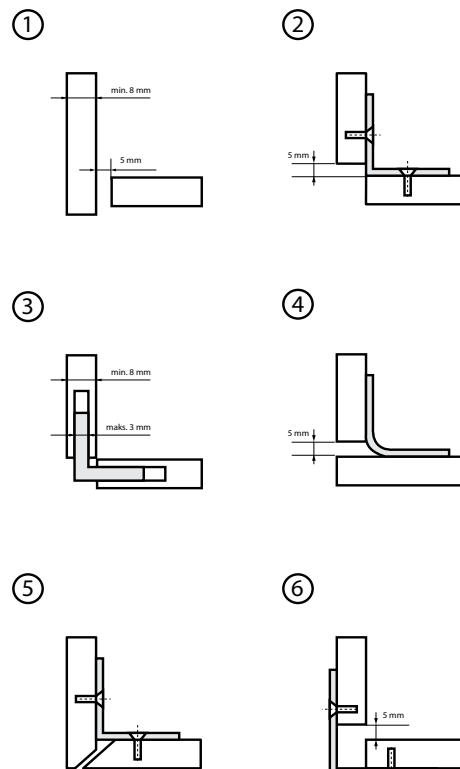
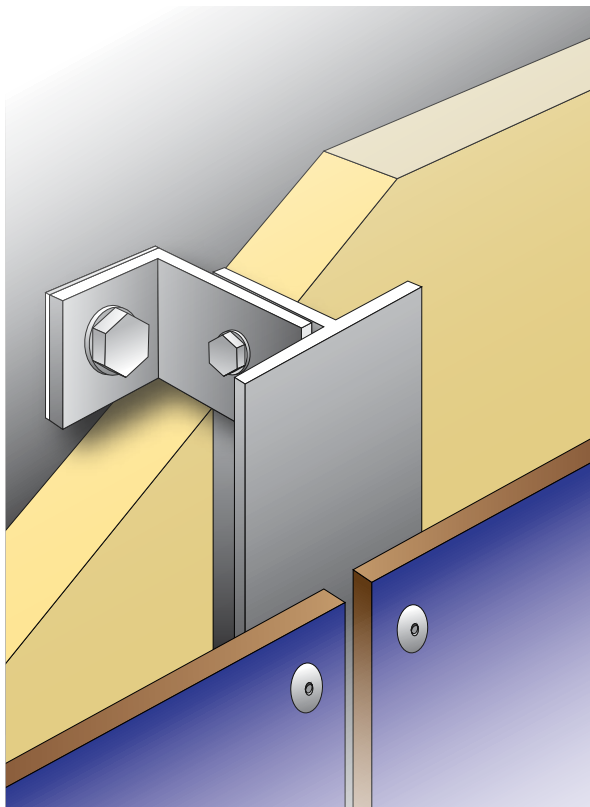


Fig. Corner finishings.

Types of corner finishings:

1. Open corner.
2. Closed corner, straight joining from inside by means of aluminium corner – there are pass-through connections (rivets) and not pass-through (KEIL or SFS).
3. The corner with tongue and groove joint (system tongue or from aluminium).
4. The corner joined using gap tape.
5. Closed corner, slantwise connection from inside by means of aluminium corner.
6. Closed corner, straight connection from outside by means of aluminium corner.



## Visible installation Mechanical

### Expansion of panels

The **Kronoplan Color** panels, because of their base material, behave in changing weather conditions as wood, that is they expand absorbing moisture and contract in dry air discharging moisture.

Taking into consideration these properties, during installation the appropriate compensation clearance should be applied

(the expansion gaps between panels 8-10 mm), assuring a possibility of uniform expansion of panels. To this end one fixed point should be made. The other fixing points can be made as non-fixed points.

### Fixed point / Non-fixed point

Making a fixed point always guarantees even facing of panels both lengthwise and crosswise.

For rivets the recommended diameter of a hole in the facade panel for the fixed point is  $\varnothing 5,1$  mm, and for the non-fixed point is minimum 1,5 times larger than the fixed-point diameter.

The hole diameter in the construction:  $\varnothing 5,1$  mm.

For Torx screws the recommended diameters of holes for non-fixed points is  $\varnothing 8$  mm, and for fixed points  $\varnothing 5,7$  mm.

### Bending

The standard **Kronoplan Color** panels can be bent only in mechanical visible system, without preliminary preparation. This is possible due to physical and chemical properties of panels. Minimum bending radius is  $R = 2$  m.

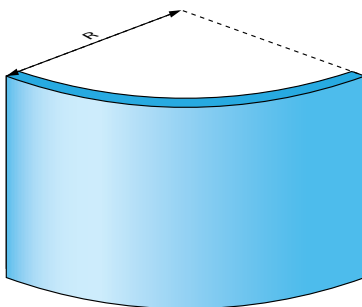


Fig. Bending of elevation panels.

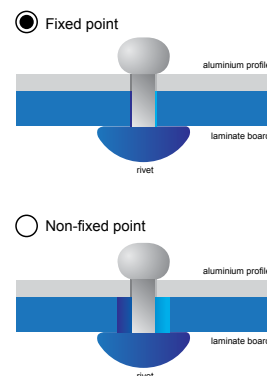


Fig. Fixed point and non-fixed point.

## Distribution of installation holes

### One-span fixing

Below are given the suggested distances of fixings for the one-span installation of elevation panels.

Thickness [mm]	max. D1 [mm]	max. D2 [mm]	a [mm]	b [mm]
6	400	400	20-40	20
8	550	500	20-50	20
10	700	600	20-60	20

Tab. Distribution of connectors – one-span fixing.

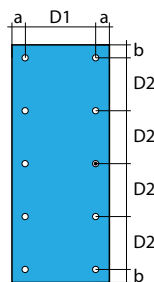


Fig. Distribution of holes with indicated fixed point.

### Multi-span fixing

In the case of multi-span fixing of panel, it is recommended to distribute the installation holes as given in the table below.

Thickness [mm]	max. D1 [mm]	max. D2 [mm]	a [mm]	b [mm]
6	550	400	20-60	20-50
8	700	500	20-80	20-60
10	800	600	20-100	20-80

Tab. Distribution of joints – multi-span fixing.

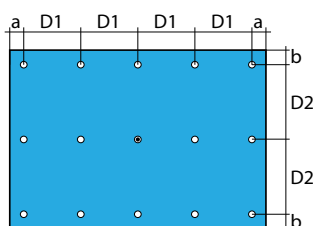


Fig. Distribution of holes with indicated fixed point.

Generally, it can be assumed that the distance of joints from the panel edge should be maximum 10 fold panel thickness and minimum 20 mm.

For panels placed near the building corners the distance between the joints should be less than in the centre part (taking into account the suction forces of wind).

## Sizes of installation panels

It is recommended not to exceed the elevation format surface over 4 m<sup>2</sup>, whereas the maximum acceptable side length should not exceed 3050 mm.

## Fixing elements

### Elevation screw with Torx 20

Used for installation of HPL panels, for wooden bearing elements. They are made from austenitic stainless steel with colour coating from powder paint.

The fixing screw without a washer from stainless steel with single or double thread.

No of material	1,4301
Diameter Ø d2 [mm]	12
Diameter Ø d1 [mm]	5,2
Length L [mm]	24
Screw driver tip	TORX T20W
Pitch of the screw P [mm]	2,2

Tab. Technical data of fitting screws Torx.

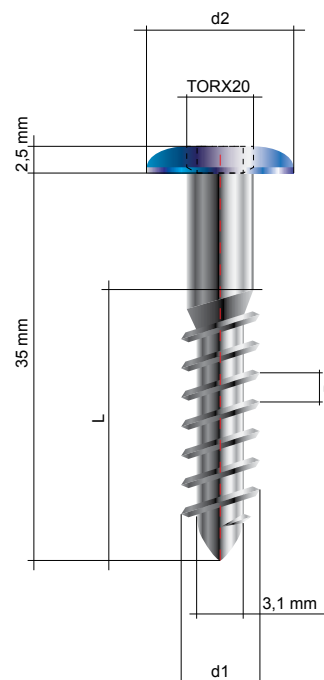


Fig. Fixing screw Torx – construction and dimensions.

# technical information

## Self-drilling connectors from stainless steel

The connectors SX-L12 (SFS) are designed in order to achieve best look of the fitted elevation panels to aluminium or steel bearing elements.



Fig. Self-drilling connector with head Torx.

Special flat head L12 matches in terms of colour to the facing and assures aesthetic almost invisible fitting. Colour heads are powder painted.



Fig. Self-drilling connector with the head Irius® L12.

Element	Type of material	No of material
Connector SX	austenitic stainless steel	grade acc. to AISI 304 (1.4301 wg. PN-EN)
Washer S	austenitic stainless steel	grade acc. to AISI 304 (1.4301 wg. PN-EN)
Drilling tip	carbon steel hardened	-

Tab. Self-drilling connectors – materials used

Heads of connectors, depending on version:

- L12 - irius® Ø 12 mm,
- D10 - flat head Ø 10 mm with a seat T20,
- D12 - flat head Ø 12 mm with a seat T25.

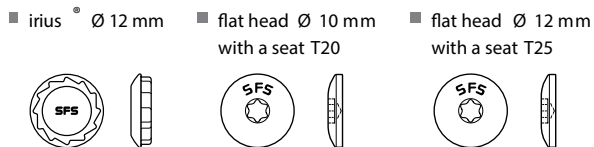


Fig. HD head / seat.

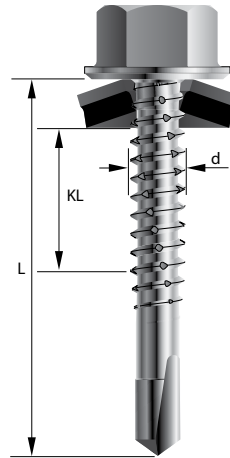
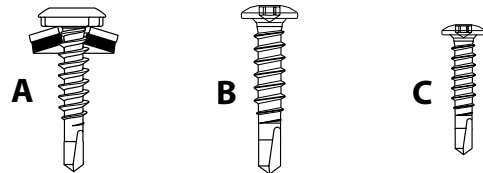


Fig. Self-drilling connector - construction.

- KL** thickness of joined elements
- d** thread diameter
- L** total length
- VD** maximum drilling capability
- HD** type of head / seat
- W** material and diameter of washer
- t** thickness of substrate



Rys. Self-drilling connector – types.

Product	Typ	VD	KL	HD	W	d	L	Application
A	SX	3/	15-	L12-	S16-	5,5x	32	VD max. steel: 3,0 mm t max. steel: 2,5 mm
B	SX	3/	15-	D12-		5,5x	30	VD max. steel: 3,0 mm t max. steel: 2,5 mm
C	SX	3/	15-	D10-		5,5x	24	VD max. steel: 3,0 mm t max. steel: 2,5 mm t min. steel: 1,0 mm t min. aluminium: 2,0 mm

Tab. Symbols and parameters of connectors (SFS). All dimensions in mm

Supplier: SFS Intec.

Exemplary designation of the connector:

**SX3/9-L12-S16-6,0x29**

## Painted rivets



Fig. Blind rivet, closed from one side, painted.

Rivets with large head, powder painted are used in the systems of visible fixing on balconies, to aluminium supporting elements to the extent allowed by certificates.

Element	Type of material	No of material
Sleeve	Al Mg 5	3.3555.10
Stem	stainless steel	1.4541 (Alfo®), 1.4301 (SFS)

Tab. Parameters of blind rivets.

Breaking force of the rivet is 4,4-5,2 kN.

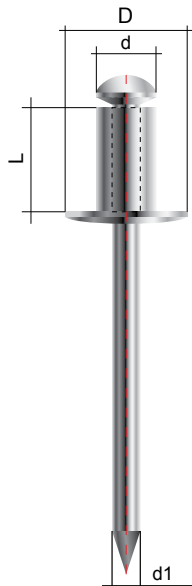


Fig. Blind rivet – construction and dimensions.

Diameter $\varnothing$ d / length L [mm]	5 / 18	5 / 21
Max. thickness of material [mm]	12	15
Diameter $\varnothing$ d1 [mm]	2,7	2,7
Diameter $\varnothing$ D [mm]	14	14
Catalogue no. (Alfo®)	12250180/14	12250210/14
Quantity	500 / carton	500 / carton
Catalogue no. (SFS)	AP14-50180-S	AP14-50210-S
Quantity	500 / carton	500 / carton

Tab. Technical data of the recommended connectors.

In most cases for fitting will be suitable the connectors recommended in the table above.

Most colours are available from our stock. For fitting the fixtures PVC – catalogue no 0010000050 can be used.

The tools for riveting and accessories are available from the supplier of fixing elements. Among them there are tools for manual and machine riveting, distancing tips, positioner for centering during drilling and the positioning tip for centering during drilling of preliminary hole.

## Suppliers of fixings

### MBE GmbH

Moderne Befestigungs-Elemente GmbH

Siemensstrasse 1

D-58706 Menden

Phone: +49 (2373) 17430-0

Fax: +49 (2373) 17430-11

<http://www.mbe-gmbh.com>

### SFS Intec Sp. z o.o.

ul. Torowa 6,

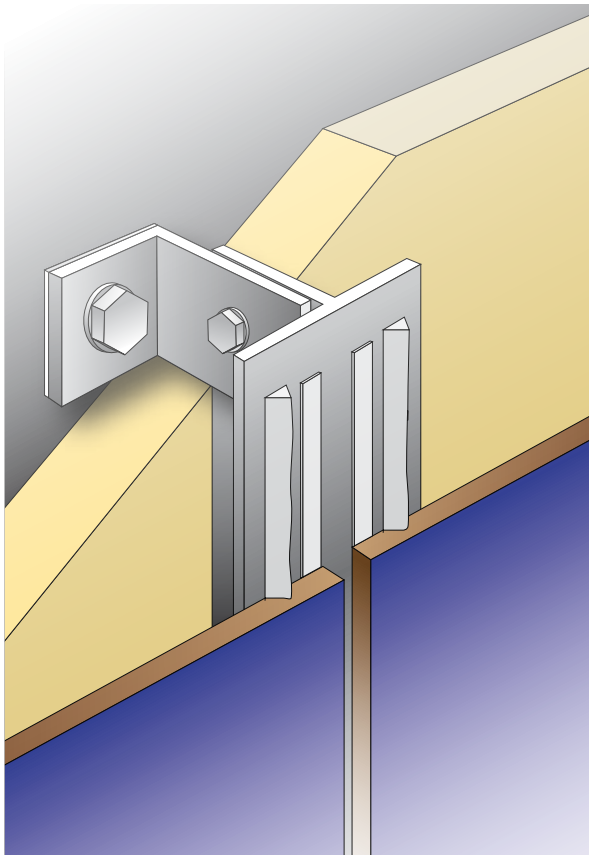
61-315 Poznań

Phone: +48 61 660 49 00

Fax: +48 61 660 49 10

<http://www.sfsintec.biz/pl>

# technical information



## Invisible installation System adhesives

The panels are installed using the adhesive based on the technology, for instance, MS POLYMER® manufactured by Soudal. It assures high adhesion to the substrate, high bonding force and resistance to extreme weather conditions.

### Elements of the system

The system SPS® includes:

- Flexible adhesive SPS®,
- Wood primer - SPS Wood Primer®,
- Substrate cleaning liquid - SPS Cleaner®,
- Liquid for non-porous surfaces - SPS Activator®,
- Double sided adhesive tape - SPS Tape®.

### Conditions of use

During installations the following conditions should be fulfilled:

- Ambient temperature should be from +10 °C to +30 °C.
- Temperature of substrate and joined materials cannot be lower than +8 °C.
- Temperature during curing of adhesive should not drop below +5 °C.
- Do not use during precipitations or directly after them.
- During installation it is imperative to assure protection against dust.
- Elevation panels should be fitted to the ventilated vertically built structure of the bearing framework.
- Width of external strip (that is the strip on which the panels join) should be at least 90 mm.
- Width of other strips should be at least 70 mm.
- Gaps between the installation tapes filled with system adhesive should run only vertically.

After installations of panels the seam between them can be durably filled with flexible filling compound Soudaseal 215 LM® (certificates: ATG 98/2241, ISO 11600-25F).

Maximum panel surface: 2,5 m<sup>2</sup>. Do not exceed this surface or the recommended maximum dimensions of elements fitted with adhesive (see the table).

Panel length [mm]	Max. height of panel [mm]
2800	890
3050	810

Tab. Recommended maximum dimensions of the format fitted on adhesive.

Distances between the bearing framework elements should be according to the recommended (see: table).

Panel thickness HPL [mm]	6	8	10
One-span installation [mm]	440	590	640
Multi-span installation [mm]	540	640	640

Tab. Distribution of bearing framework elements.

## Installation of panels

### Wooden structure

Wooden strips should be clean, dry and have small moisture content - maximum 15 % (DIN 1052).

The face side of the framework should be planned. Only the timber impregnated with salt agents is suitable for use as the strips of the framework. In the case of spruce or pine wood the impregnation is necessary in order to improve the bearing framework resistance to precipitations, wind, insects, fungi etc. To assure good adhesion of the glue, the wooden strips should be primed with SPS Wood Primer®.

### Aluminium structure

The structure of the bearing framework from aluminium (AlMgSiO,5 or F25, according to DIN 1748-1) should be cleaned and degreased using the liquid Surface Activator®. Such surfaces need not be primed with any other primer. Gluing of panels can be started just after Surface Activator® is completely dry, that is after about 5 minutes.

### Facade panels

The joined surfaces should be carefully cleaned and prepared using the liquid Surface Activator®. It should be used always in every place to be joined; its task is to clean, degrease and activate the surface contacting with the adhesive, due to which it is possible to obtain sufficiently high joining force.

Surface Activator® should be rubbed in the substrate using a wad of clean blotting paper or brush. After application of the agent wait 5 minutes.

### Application of tape

Glue the tape SPS Bonding Tape® to vertical elements of substructure. It is used for preliminary fixing of elevation panels to the bearing framework for the time necessary for the adhesive to be completely cured.

### Application of adhesive

Apply the adhesive with continuous bands using special application ending available from the adhesive manufacturer in order to obtain correct cross section in the form of the letter "V".

Correctly applied triangular band of adhesive should be 8 mm wide and 10 mm high.

### Preliminary positioning and pressing of panel

Remove the parchment layer securing the double sided adhesive tape SPS Bonding Tape®. In 10 minutes place the panel in correct position and press preliminary to correctly set it on the elevation. That time must be kept in order to prevent creation of skin on the stripes of adhesive.

Press the panel to the bearing framework causing contact with the adhesive tape. After the panel has contacted the tape no adjustments of its position are possible.

### Distances between the adhesive layers and the tape

During applying the fixing tape and stripes of adhesive it is recommended to observe appropriate distances between them what is shown on the figures below.

#### External strips – two adjoining panels.

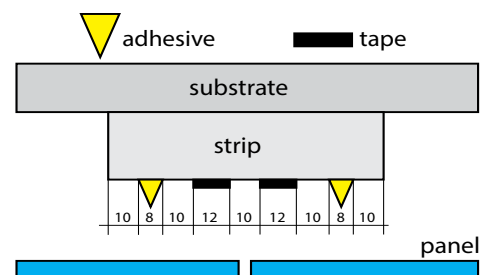


Fig. Recommended distances between the adhesive stripes and tape, dimensions in mm.

#### Internal strips – one panel.

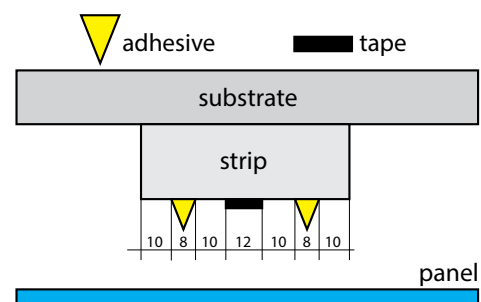
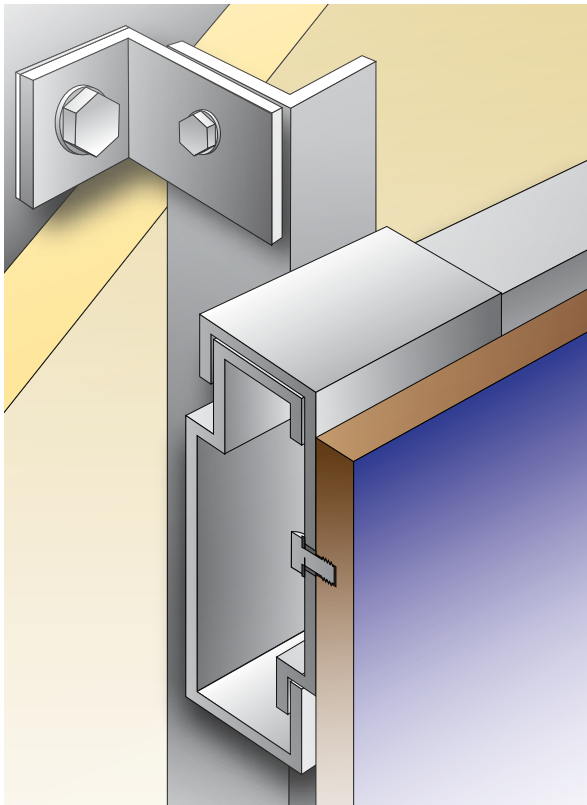


Fig. Recommended distances between the adhesive stripes and tape, dimensions in mm.

**Note!** The distance 10 mm is necessary to prevent outflowing of adhesive on the tape during pressing the panel.

# technical information



## Invisible installation Mechanical

The advantages of this system consist in large and more uniformly distributed fixing forces.

The connections of this type are durable and optimized with regard to bonding with substrate without any expanding stresses.

### Thickness of panels

Because of the perforation and the method of fixing it is recommended to use the panels of thickness 10 mm.

Minimum acceptable thickness of panels is 8 mm.

### Recommendations for installation

The length of lateral edge for every format (Z, X) should not exceed 3050 mm.

### Distribution of connectors

Depending on what type of installation you chose the arrangement of holes is recommended to be according to the below guidelines.

### One-span connections

Below are given recommended distances of fixing for one-span installation of elevation panels.

Thickness [mm]	max. B, D [mm]	max. d [mm]	max. b [mm]
10	740	125	150

Tab. Distribution of holes – one-span installation.

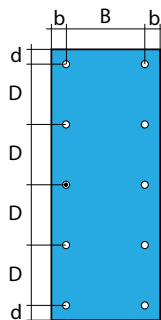


Fig. One-span installation, distribution of fixing points:

- fixed point
- non-fixed point

### Multi-span connection

In the case of multi-span connection of panel sit is recommended to distribute the installation holes as given in the table below.

Thickness [mm]	max. B, D [mm]	max. d [mm]	max. b [mm]
8	740	20-80	20-60
10	890	20-100	20-80

Tab. Distribution of holes – multi-span installation.

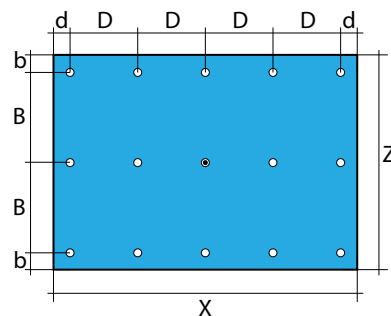


Fig. Multi-span installation, distribution of fixing points:

- fixed point
- non-fixed point



## Preparation of construction

Invisible mechanical installation requires two types of construction to be used.

The first one consists in vertical bearing elements to be fitted to the substrate which regulates the installation surface.

The second consists in horizontal elements fixing to the bearing vertical elements, which fix the format by means of special hanging connectors (hangers, safety pins and clips).

The connectors (screws, studs, clinch bolts) for invisible installation are selected depending on the type and thickness of material the panel is made from and conditions in which the elevation is used.

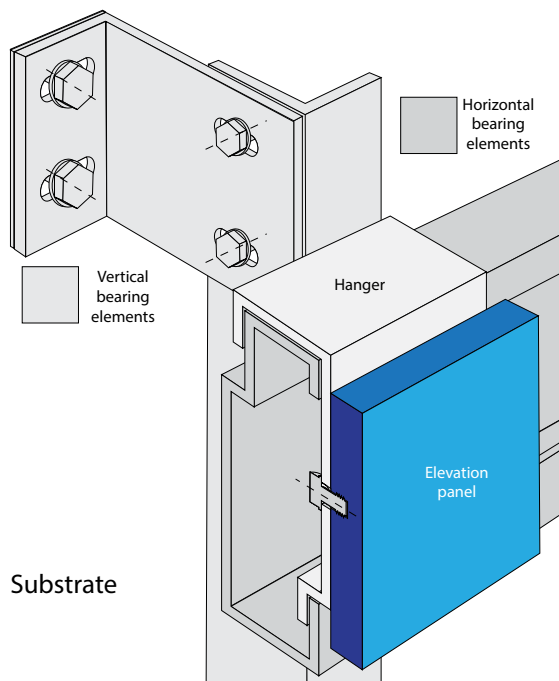


Fig. Vertical and horizontal construction - general diagram of construction.

Method of performing the bearing construction should guarantee the installation of the **Kronoplan Color** panels without stresses. Correctly completed elevation is resistant to weather conditions.

### Additional recommendations before installation

All installation parameters of the system should always be consulted with the manufacturers of the construction profiles as well as with the manufacturers of fixing elements. Facades based on the invisible fixings can be installed only by appropriately trained personnel.

**It is also necessary to carry out the appropriate static calculations for the installed elevation.**

## Fitting connectors

### Connector KEIL

Basic connector consists of a sleeve and a locking screw.

- $D_1$  Hole diameter (7 mm)
- $D_2$  Undercut diameter (9 mm)
- $H$  Panel thickness (od 6 mm)
- $H_s$  Anchorage depth
- $X_A$  Bolt height (3 mm)
- $X_Z$  Aluminium profile thickness in the structure

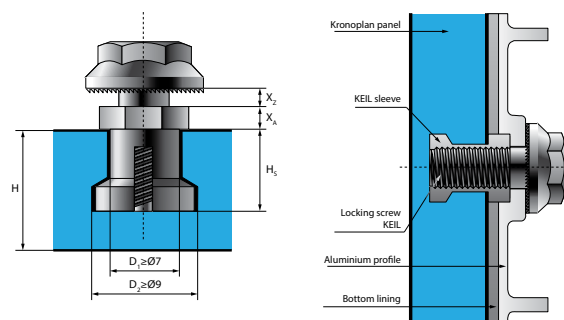


Fig. Connector KEIL – Construction and dimensions.



$H_s = 5,5 \text{ mm}$



$H_s = 7,0 \text{ mm}$



$H_s = 8,5 \text{ mm}$

Fig. Connector KEIL.

### Supplier of fittings

#### KEIL Befestigungstechnik GmbH

Postfach 1158

51751 Engelskirchen

mail01@keil.eu

Phone: +49 (02263) 807 0

Fax: +49 (02263) 807 333

# technical information

## Connector SFS

The sleeve is made from austenitic stainless steel (AISI 316, grade 1,4401 acc. to PN-EN), whereas the stem is from carbon steel (stem is completely removed during setting).

Type	Material S = steel	Ø	L	Panel thickness	Thickness of joined elements
TU-	S-	6,0x	9	8	2,5 - 3,5
				10-13	0,5 - 3,5
TU-	S-	6,0x	11	8	4,5 - 5,5
				10	2,5 - 5,5
				13	0,5 - 5,5
TU-	S-	6,0x	13	10	4,5 - 7,5
				13	2,5 - 7,5

Tab. Dimensions and designs of connectors (all dimensions in mm).

Exemplary designation for the connector: **TU-S6,0x9**.

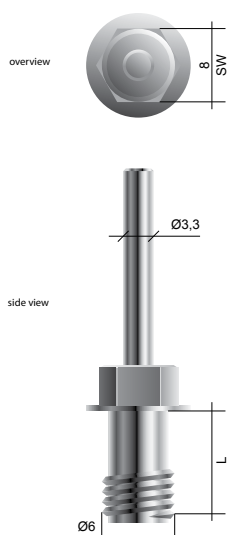


Fig. Clinch bolt – Construction and dimensions (mm).

## Supplier of fittings

**SFS Intec Sp. z o.o.**

ul. Torowa 6,

61-315 Poznań

Phone: +48 61 660 49 00

Fax: +48 61 660 49 10

<http://www.sfsintec.biz/pl>

## Installation accessories

### EPDM

Installation tape made from elastomer on basis of the modified EPDM is used for sealing the contacting surfaces between facade elements. It is very resistant to weather conditions and highly flexible. It keeps stable shape in elevated temperatures.



Fig. EPDM tape.

It is also available as one-sided adhesive tape facilitating the installation.

Item	DIN	Property
Class of construction material	4102	B2 (combustible)
Water vapour diffusion resistance factor		- 40°C - +130°C
Temperature of use		+ 5°C - + 35°C
Durability		Two years
Storage temperature		+ 5°C - + 25°C
Colour		Black

Tab. Technical details of EPDM tape.

Type	Width [mm]	Thickness [mm]	m/roll
EPDM-	60/	0,7	25
EPDM-	100/	0,7	25
EPDM-Adhesive-	60/	0,7	25
EPDM-Adhesive-	100/	0,7	25

Tab. Types and designations of EPDM tapes (Supplier: SFS).

Exemplary designation: **EPDM-60/07**.

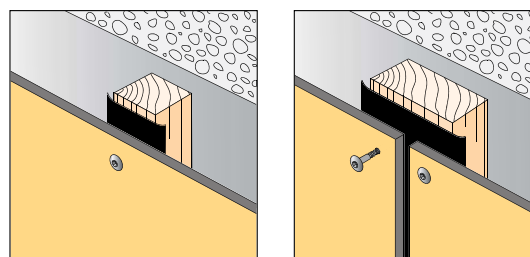


Fig. EPDM – examples of application.



IN B 542

Kronospan HPL Sp. z o.o.

ul. Wojska Polskiego 3

39-300 Mielec

Production plant:

Pustków-Osiedle 59E

39-206 Pustków 3

tel. +48 14 67 09 500 - 506

fax +48 14 67 09 555

e-mail: [hpl@kronospan.pl](mailto:hpl@kronospan.pl)

[www.kronospan-hpl.pl](http://www.kronospan-hpl.pl)