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Facade systems

krono - plan

“Kronoerg Pustków”
HPL facade systems

Introduction.

The Kronoplan panels are a multi-ply material designed for outdoor applications. It is manufactured through pressing cellulose papers impregnated with phenol and melamine resins under heat (160°C) and pressure (9 MPa) conditions. The outer decor layer is protected with a special UV film to prevent the product from an unfavourable impact of the sunlight. High resistance to weather conditions (e.g. temperature, increased humidity, acid rains) allows the use of the Kronoplan panels in construction industry.

Standard dimensions:

- 2800x1300mm
- 3050x1300mm
- 5580x2040mm

Panel thickness: 6, 8 ,10 mm

For 2800x1300mm

- SM - matt and smooth,
- SQ - glossy
- BS - orange peel
- PE - pearly.
- PR - woodgrain

For 3050x1300mm

- SM - matt and smooth,
- SQ - glossy,
- PE - pearly

For 5580x1300mm

- BS - orange peel

Typical applications of the "Kronoplan" laminates:

- facade systems
- balcony balustrade panels
- balcony partition walls
- attic linings
- arcades
- bus shelters
- information boards

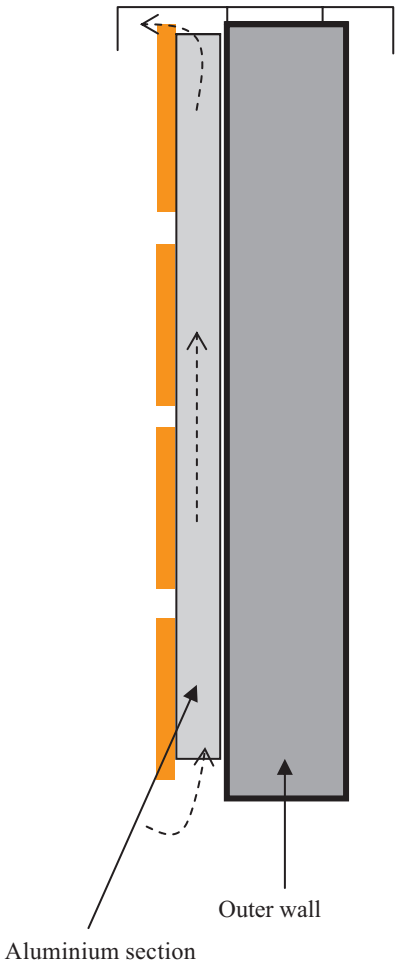
Facade system.

While assembling a "Kronoplan" laminate facade, one should take the following into account:

- HPLs tend to change the dimensions depending on the temperature and air humidity. A gap between two neighbouring laminate panels shall be wide enough to account for longitudinal and crosswise linear expansion of the material (2.5mm per running metre)
- a free ventilation space (min. 20 mm) should be provided between the laminate panel and a thermal insulation layer to avoid steam condensation and panel deformation.
- ventilation holes should be provided in the top and the bottom area of the facade, as well as by the window openings and doorways to allow the air to flow in easily.
- the size of the ventilation holes should depend on the local conditions and the height of the facade. The following arrangement is assumed:

- min. 52 cm^2 of the hole / 1 running metre for >1m facades
- min. 21 cm^2 of the hole / 1 running metre for <1m facades

- in some locations the ventilation hole diameter can be decreased to 5mm
- the ventilation holes which diameter exceeds 10mm shall be protected from insects
- only an aluminium or a galvanised steel sections should be used.



Gaps and joints between the Kronoplan laminate panels.

Guidelines on gaps and joints:

- an expansion gap (min. 10mm) should be provided between the Kronoplan panels to allow linear expansion of the material (i.e. 2.5mm/m). Weather conditions (temperature and air humidity) should be also considered.
- if an expansion gap is bigger than 10mm, a masking shape shall be used or a feather joint shall be made.
- do not apply an excessive force to assemble the panels.

Open gaps

Open gaps between external facade panels are exposed to rainwater and moisture penetration. Then, only moisture-proof and corrosion-resistant materials should be used (e.g. aluminium structure and stainless-steel bolts) along with heat-insulating materials protected against a wind impact.

Masked gaps

If the HPL panels used for the facade system are at least 8mm thick, a feather joint or an half-lap joint (in case of horizontal gaps) can be applied. In this way the gaps between the panels are masked. The minimum dimensional requirements for the feather joint are as follows:

Tongue:

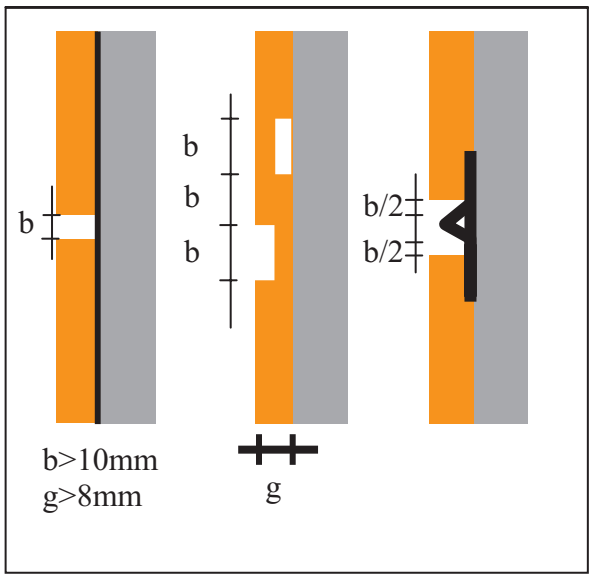
- 2x30mm in case of aluminium tongues
- 3x30mm in case of HPL tongues

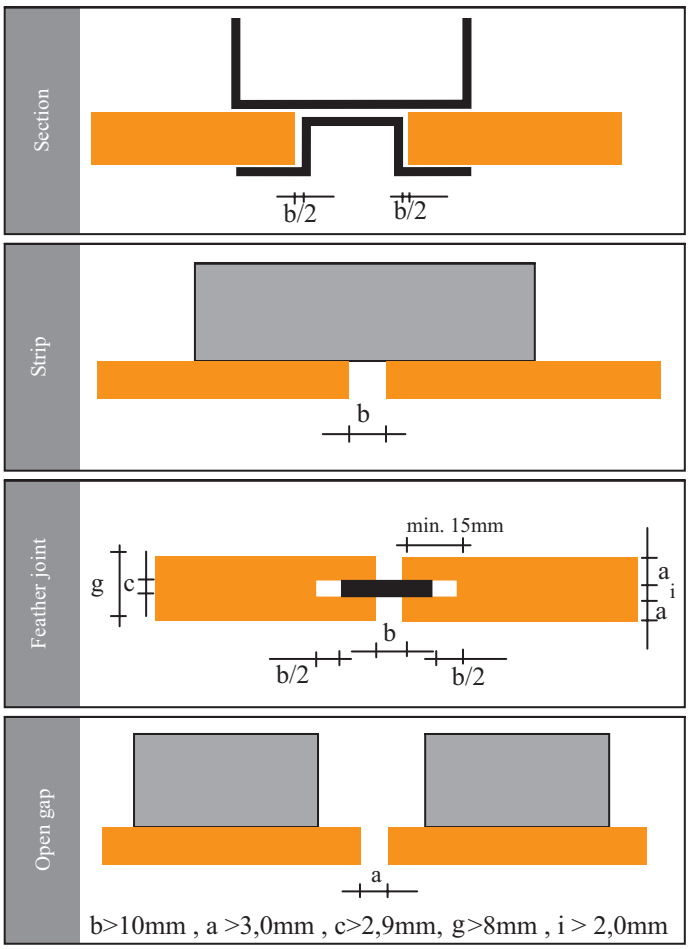
Groove:

- 3.3x15mm in case of Kronoerg tongues (panel thickness - 8 mm)
- 2.3x15mm in case of aluminium tongues (panel thickness - 8 mm)

Half-lap: 21 mm

In general, the gaps between the panels should not be filled with putty, which is due to the expansion of the facade panels. Besides, dirt can accumulate at the panel edges, which affects the aesthetics of the facade appearance.

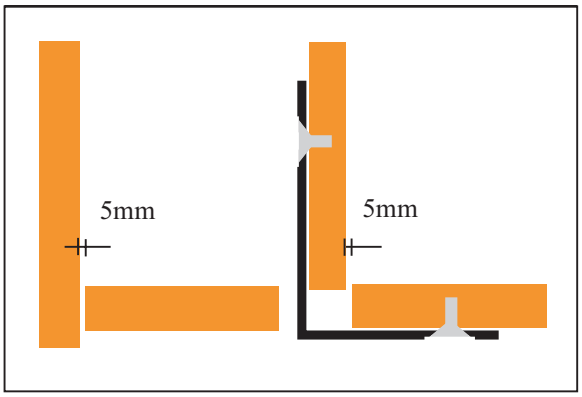




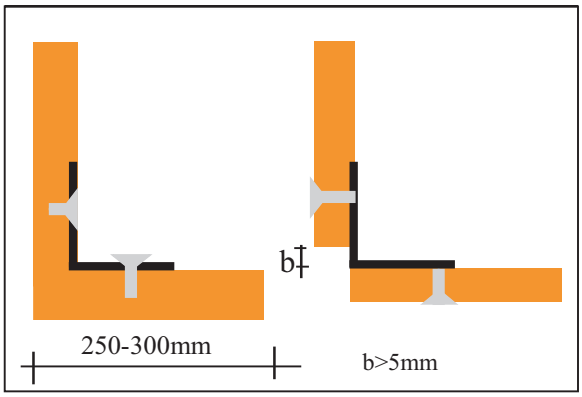
Corners.

In case of the facade corners the finish should depend on the thickness of the Kronoplan HPL panels used. If the thickness is 8 mm at least, aluminium or laminate angle sections can be used.

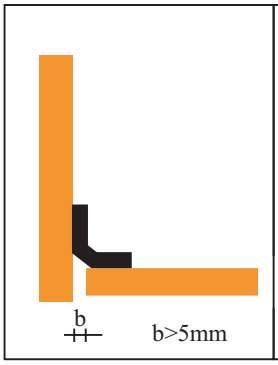
Open joint



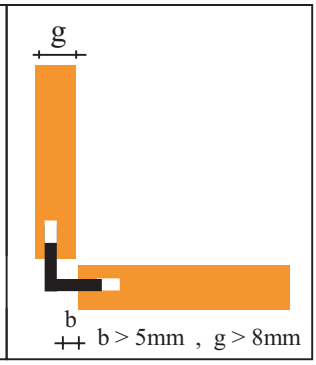
Aluminium section



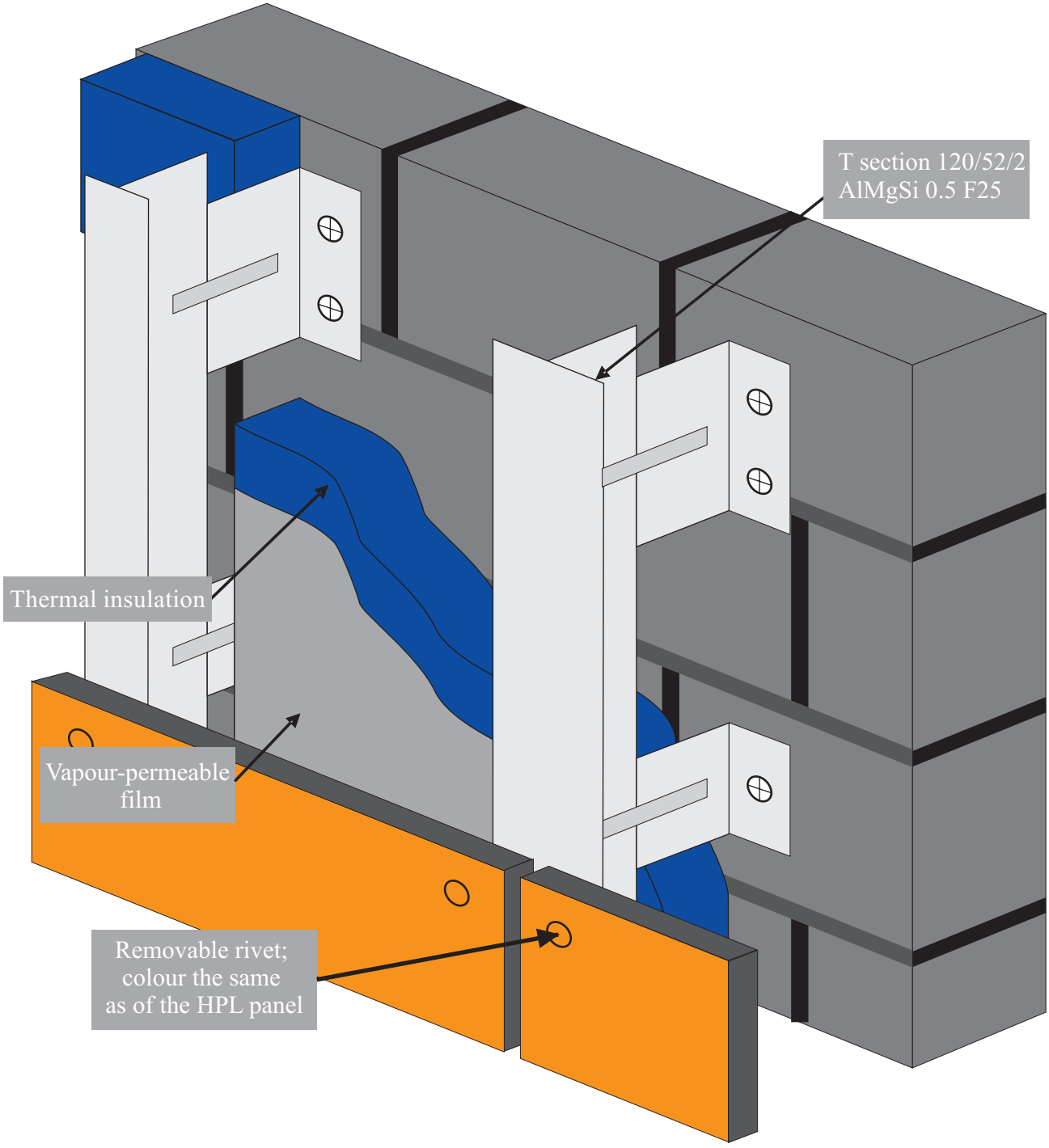
Strip



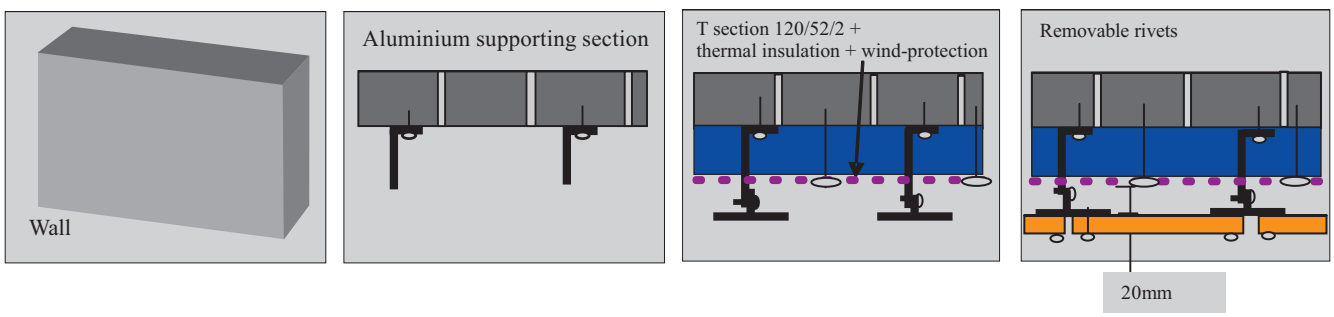
Feather joint



Visible joints - rivets.



Drawings



Visible joints.
Aluminium structure + removable rivets.

The high pressure laminates should be fixed to an aluminium supporting structure with AlMG5 or V4A steel rivets.

The panel thickness - at least 6 mm. The supporting structure is made of aluminium sections, widely available on the Polish market. The sections are approved by the Institute of Masonry Technology.

Panel thickness: at least 6mm Gaps: min. 10mm
Rivet hole diameter:

- rivet diameter + 5 mm; 10 mm for non-fixed points
- the rivet diameter for fixed points is 5.1mm

0.3mm riveting machine should be used.

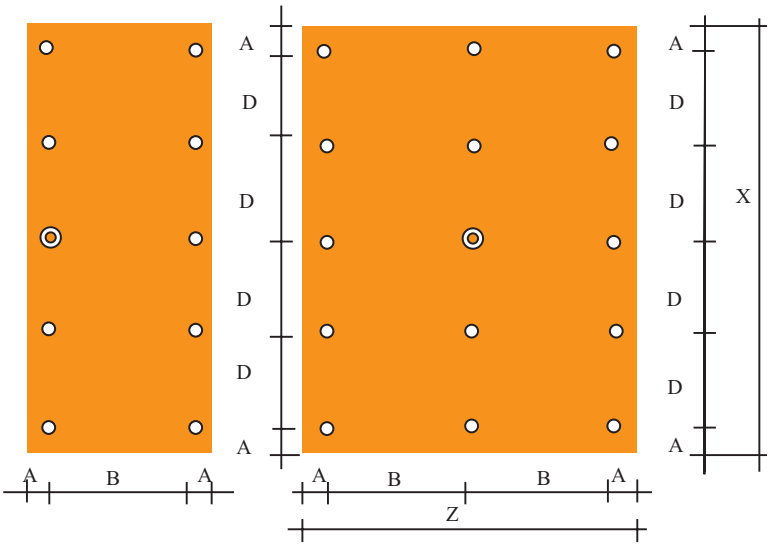
The distance between the rivet and the panel edge:
A = distance between the rivets and the panel edge

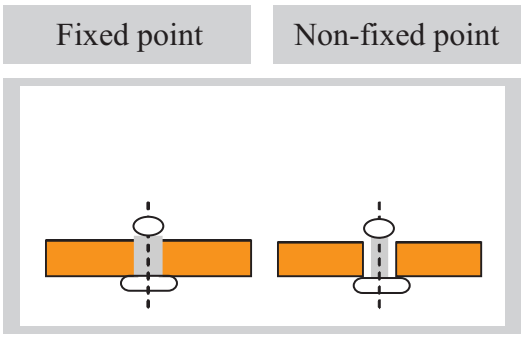
- max. 10-fold panel thickness
- min. 20 mm

B = horizontal rivet-to-rivet distance (see the table)
D = vertical rivet-to-rivet distance
Z = panel width
X = panel height

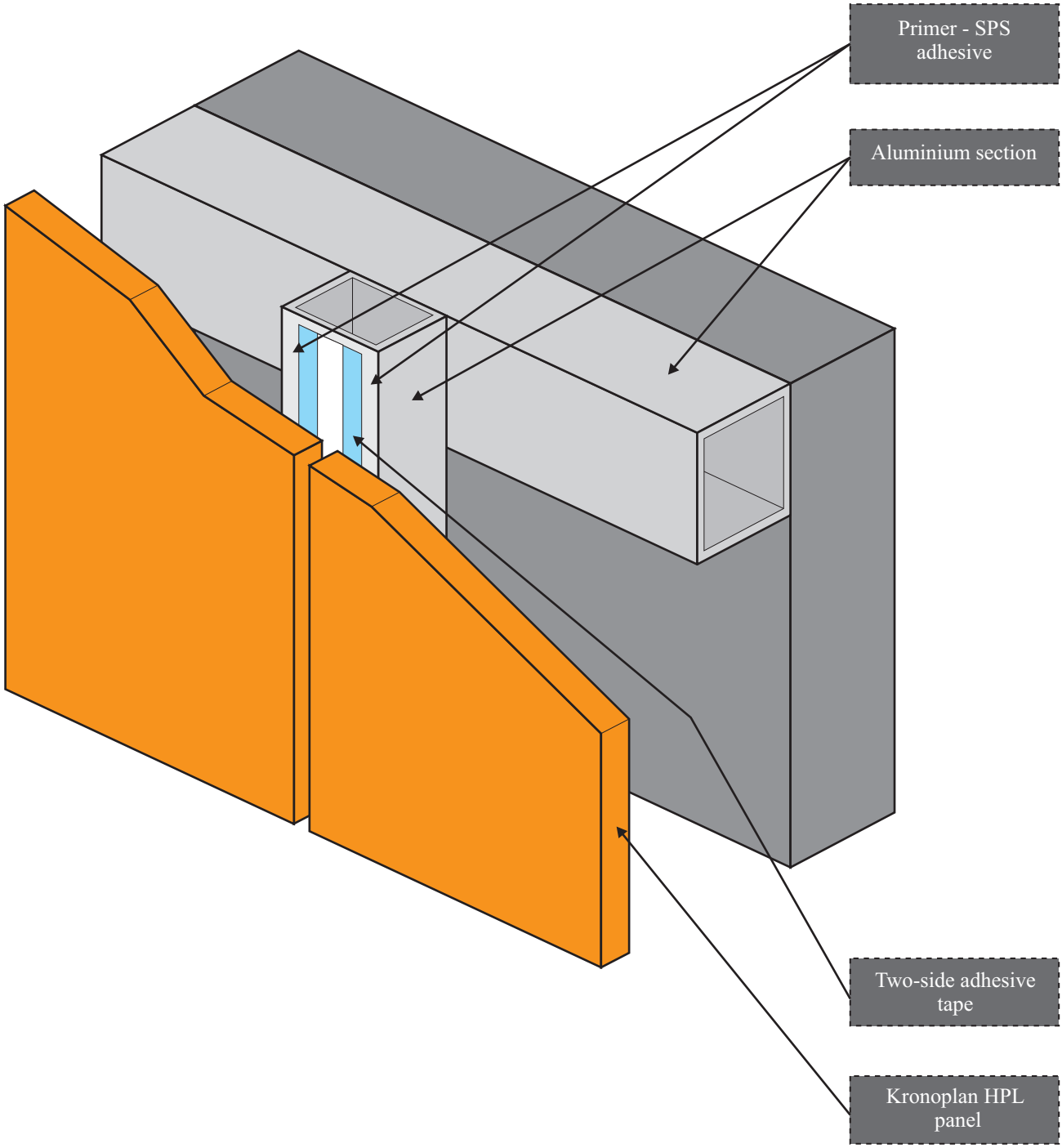
● fixed point
○ non-fixed point

Max. rivet-to-rivet distances for small buildings	Kronoplan HPL panel thickness (mm)			
	6mm	8mm	10mm	13mm
Single-span assembly	440	590	740	940
Multiple-span assembly	540	740	890	1190





Hidden joint - adhesive.



Hidden joints.
Aluminium structure + SPS adhesive.

The assembly works shall be performed in compliance with the technical requirements for glued joints. It is very important to determine the air humidity and a minimum temperature that allows the assembly works. That is why the following guidelines should be observed:

- in case of glued joints do not use panels, which area is larger than recommended
- do not exceed the dimensions recommended for glued joints
- to increase safety apply two rivets or bolts to the upper part of the KronoplanHPL panel
- the gaps between the assembly tapes to be filled with an adhesive can be arranged vertically only

Application: buildings, height up to 7m
Panel thickness: 6mm
Panel-to-panel gap: min. 10 mm
Max. HPL panel area:

- 2.5m^2

for Z = 2800 X_{max} = 890 mm
for Z = 3050 X_{max} = 810 mm

The distance between the rivet and the panel edge:
A = distance between the connector (rivet or lacquered bolt) and the panel edge

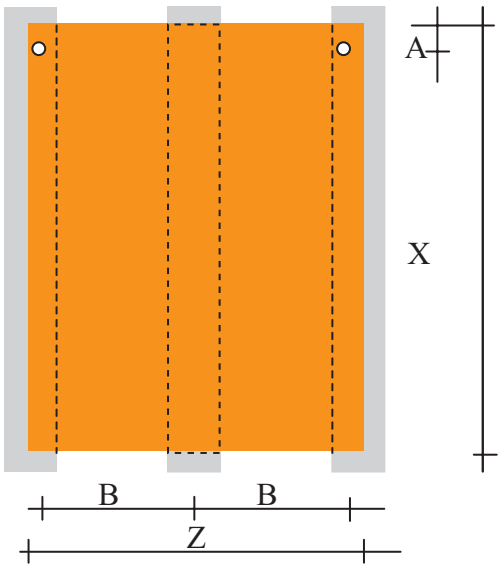
- max. 10-fold panel thickness
- min. 20 mm

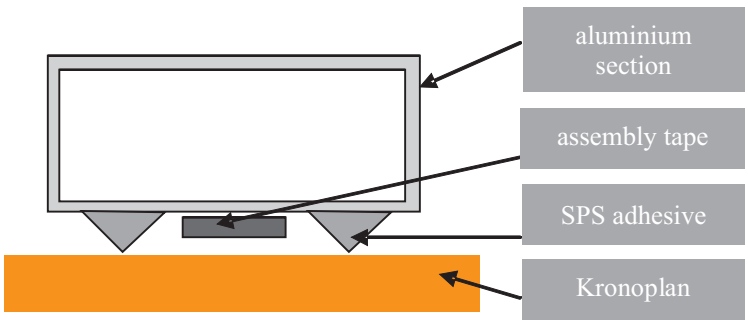
Z = panel width
X = panel height
Bolt hole diameter:

- 8.5mm for spray-painted bolts
- 7.5mm for bolts with washer or masking cap

Minimum dimensions of aluminium sections used to assembly the supporting structure:

- the section shall be selected depending on the panel weight (structural calculations)
- the section shall be selected depending on the panel weight (panel joints)
- aluminium square section





Max. rivet-to-rivet distances for small buildings	Kronoplan HPL panel thickness (mm)		
	6mm	8mm	10mm
Single-span assembly	440	590	640
Multiple-span assembly	540	640	640

Balcony balustrades
Balcony partition walls

krono - exterior

"Kronoerg Pustków"

HPL balcony balustrade panel systems

Balcony balustrades.
"Kronoplan" laminate application guidelines.

Before assembling balcony balustrades using HPL Kronoplan panels please read the following notes:

- only aluminium or galvanised steel sections can be used because of their high resistance to corrosion and durability
- the optimum height of the balustrade (measured from the balcony floor level to the balustrade rail) depends on the height of the building as per the local regulations
- while selecting a joint type take the wind pressure into account
- do not apply excessive force to assemble the HPL panel. Failure to do this may lead to a rupture of the rivet or bolt used for fixing the panel to the supporting structure
- depending on the HPL panel dimensions the gap between the neighbouring panels shall be at least equal to the panel length x 2.5mm/1m (min. 10 mm)
- the assembly works shall be performed by qualified personnel

Fixing HPL panels to balustrades with special bolts and removable rivets.

The HPL laminate panels are usually fixed to the balcony balustrade using special bolts or removable rivets. The correct layout of the joints shall be calculated on the basis of the assembly data for high pressure laminates. The fixing elements shall have the same colour as the panel (rivets) or should be capped.

Panel thickness: at least 6mm Gaps: min. 10mm
Rivet hole diameter:

- rivet diameter + 5 mm; 10 mm for non-fixed points
- the rivet diameter for fixed points is 5.15mm

0.3mm riveting machine should be used.

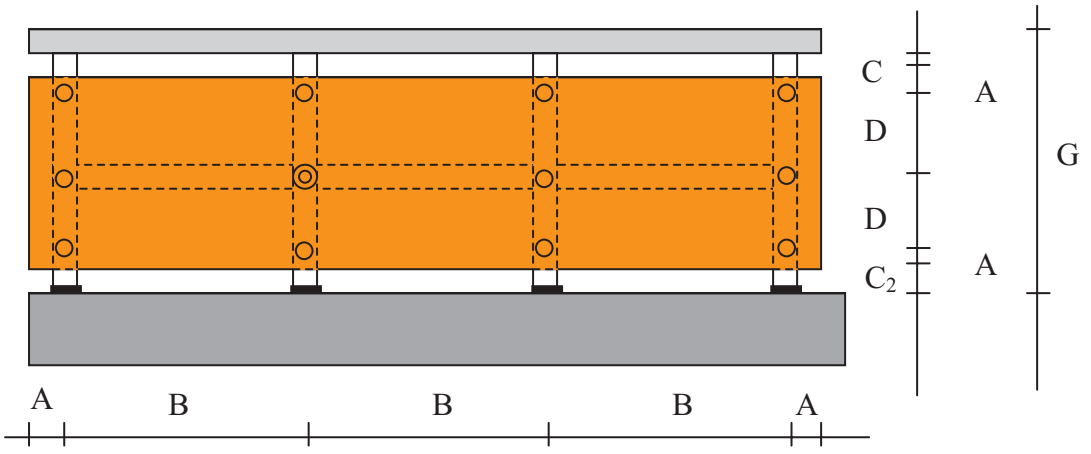
B = horizontal rivet-to-rivet distance (see the table)

- max. 20-fold panel thickness
- min. 20 mm

D = vertical rivet-to-rivet distance
C_2 = distance between the balcony floor and the bottom edge of the panel
C = the distance between the panel and the balustrade rail (min. 120mm)
G = balustrade height depending on the standard requirements

● fixed point
○ non-fixed point

Max. rivet-to-rivet distances	Panel thickness (mm)			
	6	8	10	13
Single-span assembly	539	735	931	1200
Multiple-span assembly	686	882	1127	1470

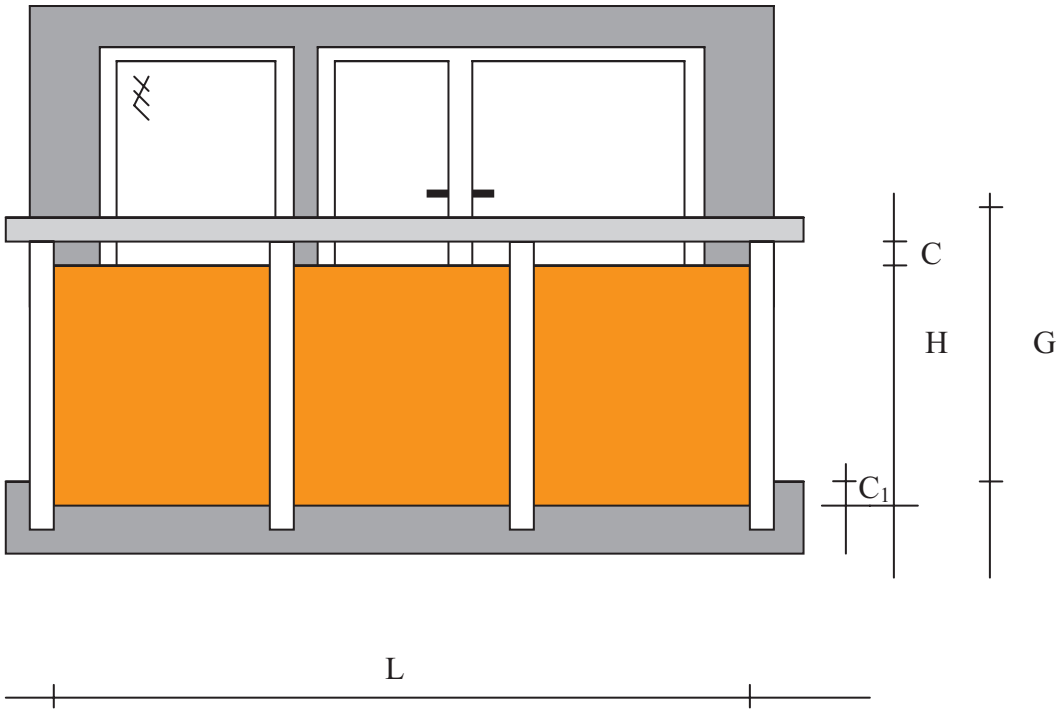


Fixing Kronoplan laminate panels to aluminium and steel balustrade sections.

It is possible to fix even 6mm-thick Kronoplan panels to the balustrade if standard sections are used. In this case the panel shall not be fixed tight to the sections to ensure it rests properly regardless of the weather conditions. That is why the EPDM rubber sections should be used. The dimensions of the aluminium and steel sections should depend on the HPL panel thickness and dimensions.

Panel thickness: at least 6 mm
The depth of the panel insertion into the section: min. 120 mm
Water drain: groove 4x27 mm, in the section
Panel edge: free space in the section - min 6 mm

C_1 = distance between the balcony floor and the bottom edge of the panel
C = the distance between the panel and the balustrade rail (min. 120mm)
G = balustrade height depending on the standard requirements
H = shorter side of the panel
L = longer side of the panel



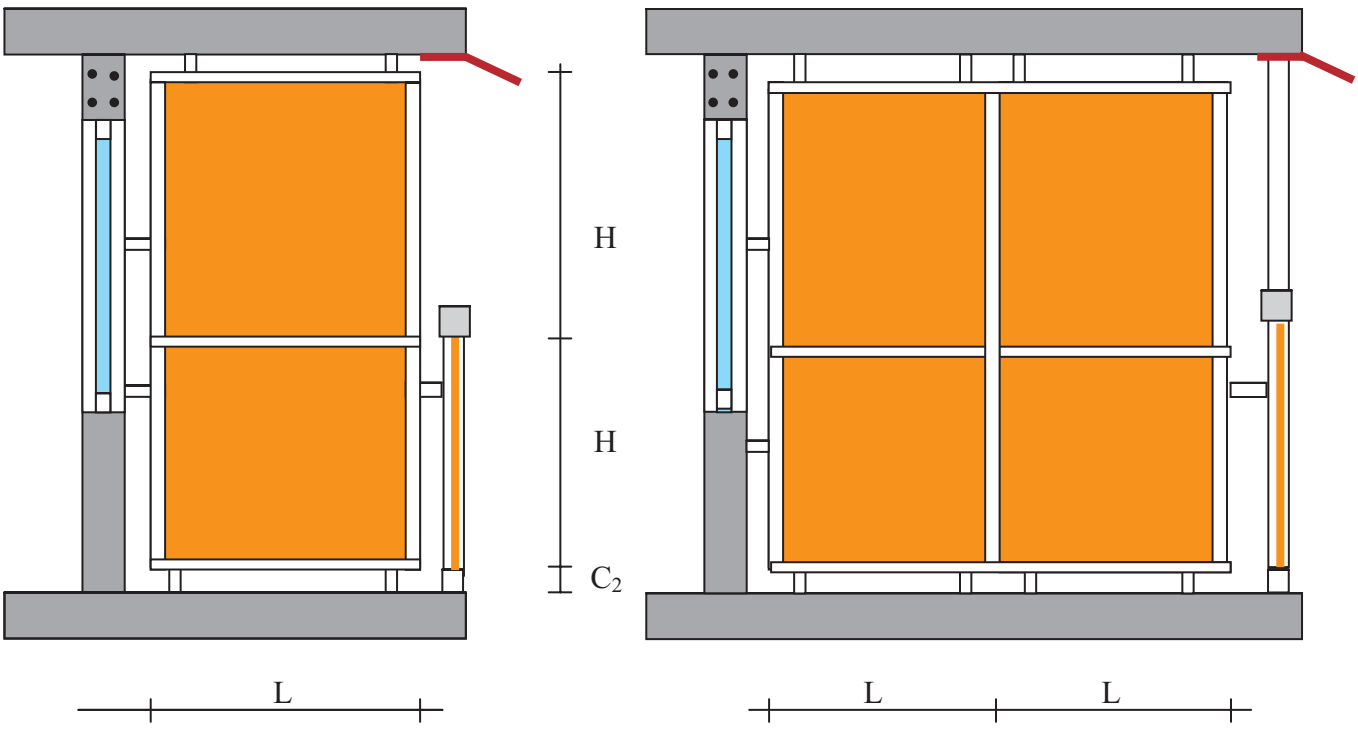
Balcony partition walls.

The balcony partition walls are used in residential multi-apartment buildings to provide each apartment owner with his/her own "box" on the same balcony or terrace.
The "krono-exterior" system based on Kronoplan high pressure laminates offers a good solution. The assembly of the partition wall depends on the dimensions of the Kronoplan panel. The examples of such solutions and some further guidelines are given below.

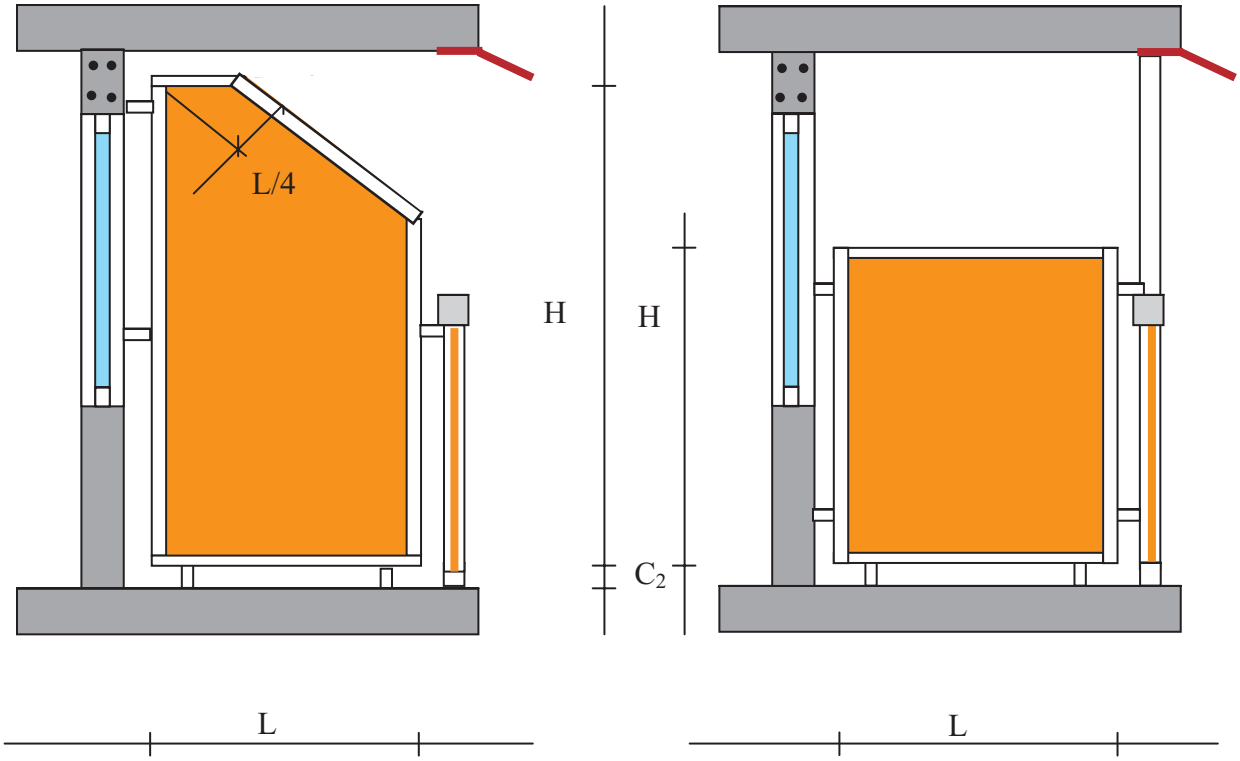
Frame - 4 sides

Frame - 4 sides Max. spacing L in mm	Laminate panel thickness (mm)				
Height / Width ratio	H/L	6	8	10	13
	0,98	765	1029	1284	1666
	1,18	725	960	1196	1558
	1,38	686	902	1127	1470
	1,58	647	853	1068	1392
	1,78	608	813	1019	1323
	1,98	578	774	970	1264
Frame 2 and more sides	>2,48	559	745	931	1206

Minimum thickness of the laminate panel: 6 mm
C_2 = distance between the balcony floor and the bottom edge of the panel



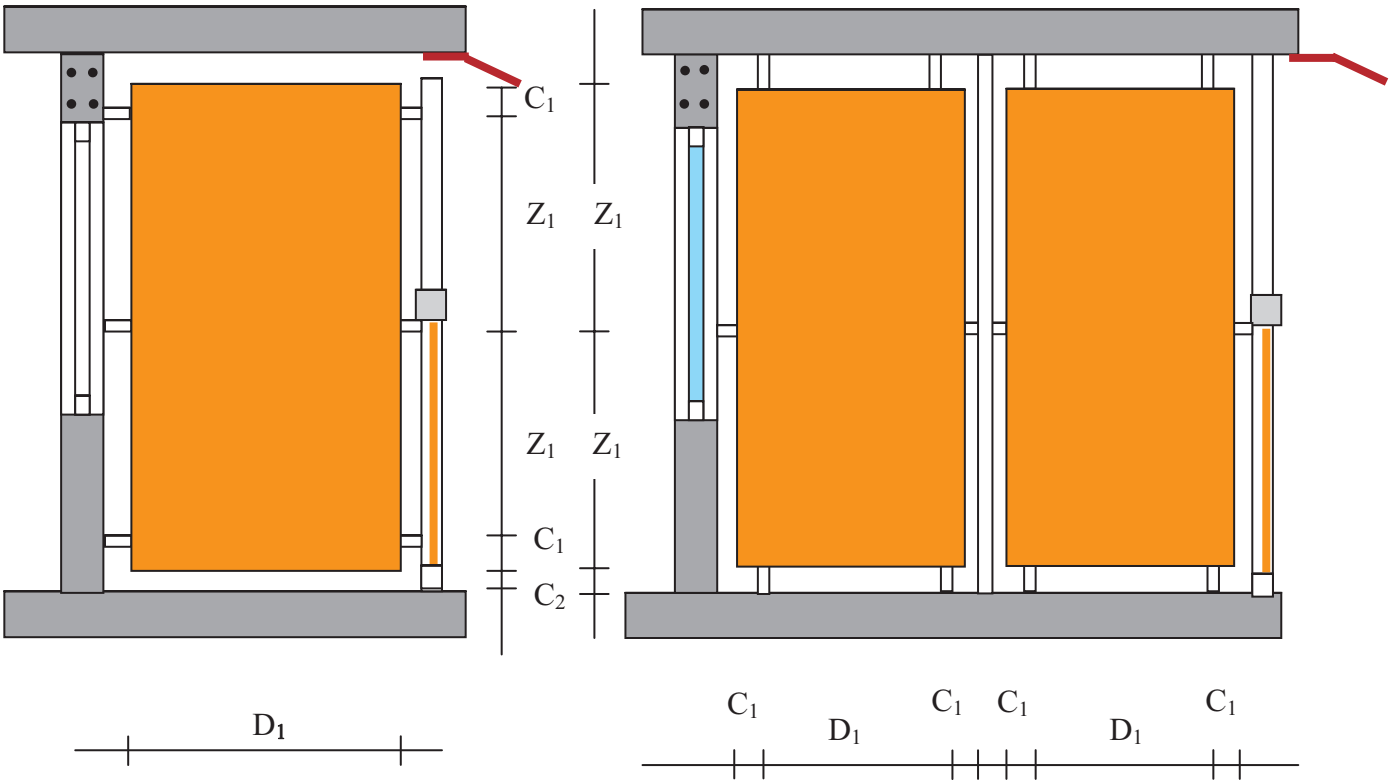
Frame - 4 sides (cont.)

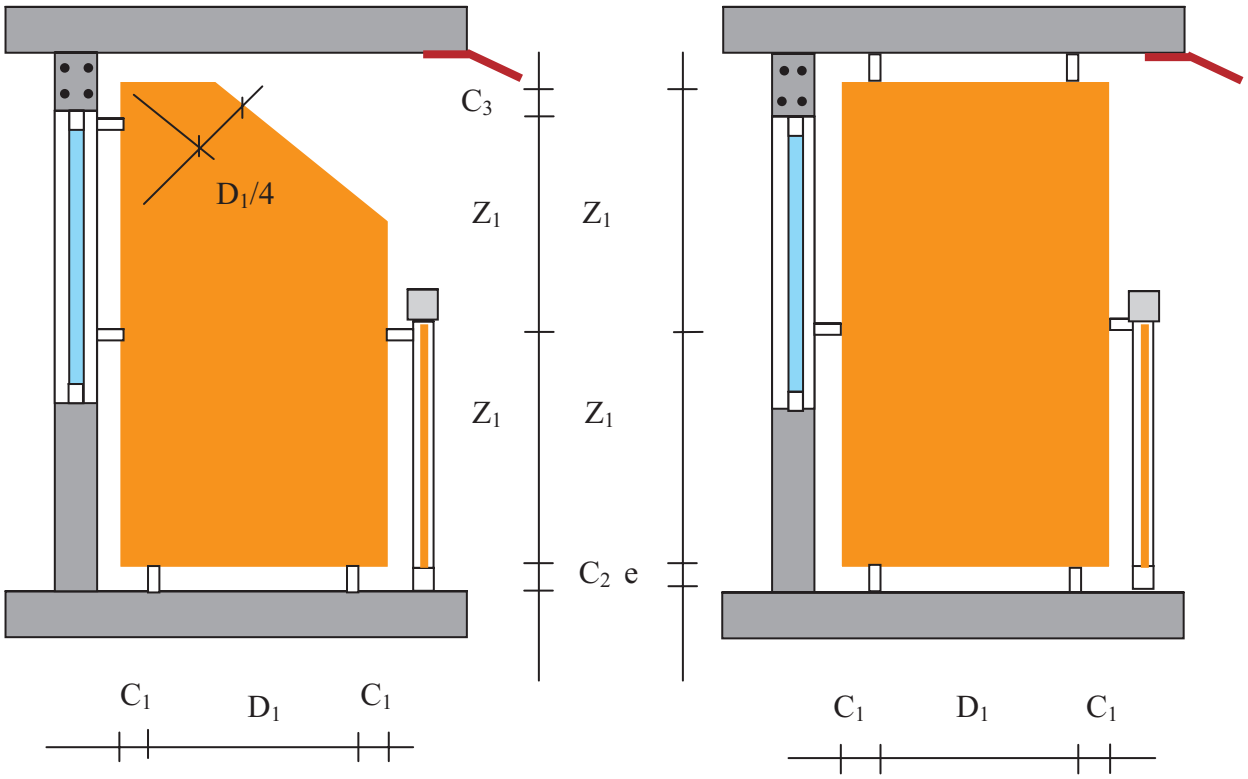


Fixing laminate panels to the sections

	Panel thickness (mm)		
Max. rivet-to-rivet distances (mm)	8	10	13
D_1 for single-span assembly	588	735	931
Z_1 for multiple-span assembly	735	882	1176

C_1 = distance between the holder and the edge of the panel
C_2 = distance between the balcony floor and the bottom edge of the panel
C_3 = distance between the edge of the upper panel and the holder

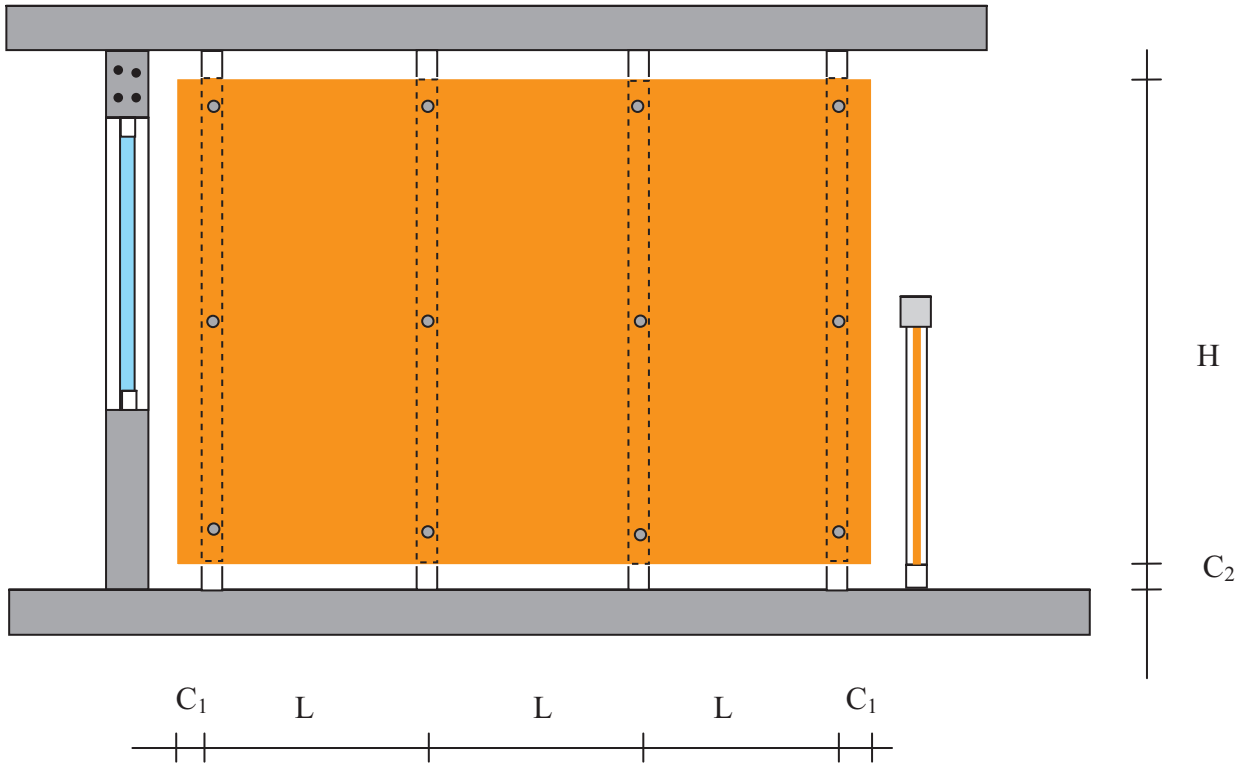

C1
Z1
Z1
Z1
Z1
C1
C2
D1
C1
D1
C1
C1
D1
C1


C3
D1/4
Z1
Z1
Z1
Z1
C2
e
C1
D1
C1
C1
D1
C1

Fixing balcony partition walls to the sections with special bolts and rivets.

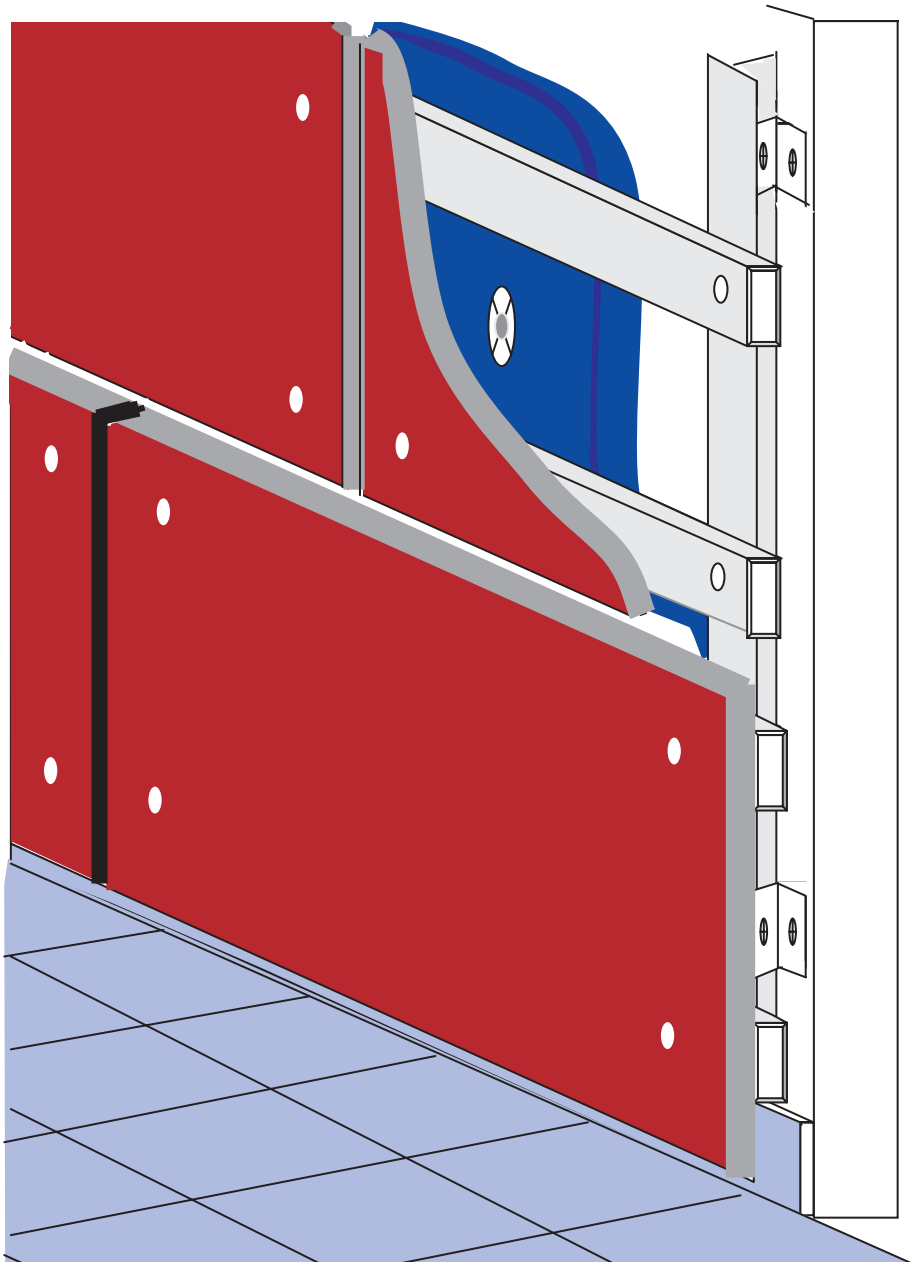
Max. rivet-to-rivet distance (L)	Panel thickness (mm)			
	6	8	10	13
Single-span assembly	539	735	931	1176
Multiple-span assembly	686	882	1127	1470

C_1 = 149mm (min.)
C_2 = 20-fold thickness of the laminate panel (max.)
- bolts or rivets



Balcony partition walls - examples

Facings
Safety rails



krono – compact

"Kronoerg Pustków"
HPL facings

Introduction.

Our next proposal is to use the Kronocompakt high pressure laminates as wall facings in public buildings. Wide palette of colours and patterns (including plain, woodgrain and fantasy options) enables an optimum décor arrangement for any interior - depending on its functionality.
All laminates for indoor use can be characterised by high scratch resistance and impact strength. They can be kept clean easily and are resistant to moisture environment.

Standard dimensions:

- 2800x1300mm
- 3050x1300mm
- 5580x2040mm

Panel thickness: 4, 6, 8, 10, 12, 13, 15, 18, 20 mm

Krono-compakt finish type:

For 2800x1300mm	For 3050x1300mm	For 5580x1300mm
• SM - matt and smooth, • SQ - glossy, • BS - orange peel • PE - matt, pearly. • PR - woodgrain	• SM - matt and smooth, • SQ - glossy, • PE - matt, pearly	• BS - orange peel

Typical applications:
- schools
- sports halls and offices
- hotels
- hospitals
- cubicles
- swimming pool lockers
- safety rails

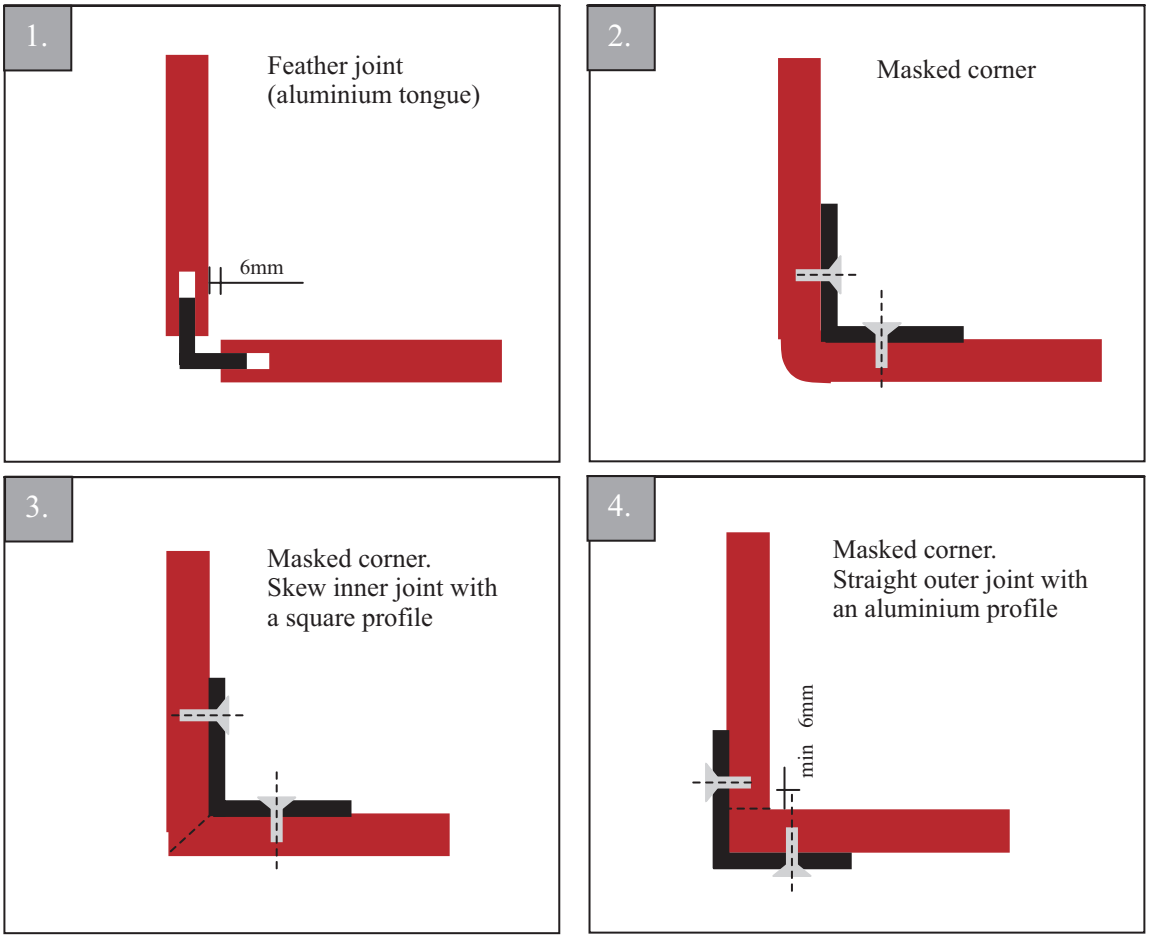
Guidelines on application of Kronocompakt laminates as wall facings.

The following guidelines have to be followed:

- the aluminium or galvanised steel sections should be used because of their high resistance to corrosion
- it is necessary to leave a 20mm ventilation gap between the Kronocompakt panel and the wall (full height)
- use fixed and non-fixed points while fixing the panels to a steel or aluminium structure with bolts and rivets
- all panel-to-panel gaps should be masked
- do not apply excessive force to assemble the HPL panels with rivets and bolts
  in case of a glued joint the adhesive shall be distributed uniformly in vertical direction and the laminate panel area should not exceed 2.5m^2
- the spacing of the structural elements should depend on the Kronocompakt laminate thickness
- all electrical and plumbing works should be performed prior to the assembly according to the national standards and regulations.

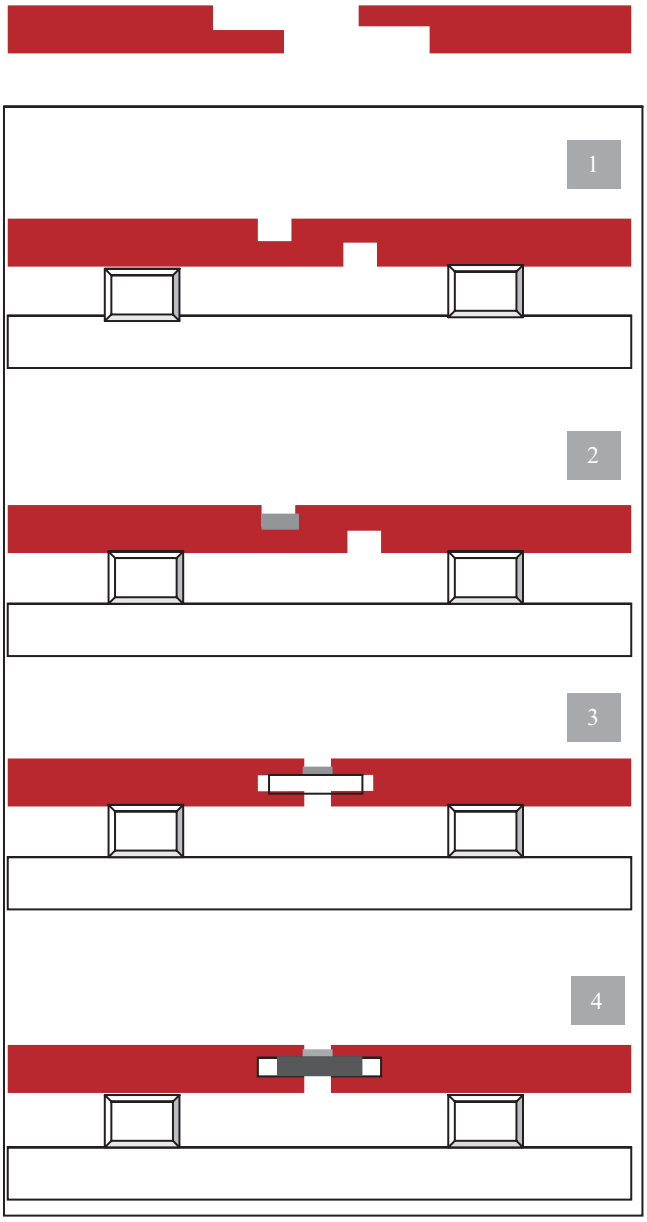
Corners.

The thickness of the Kronocompakt laminate panels should not be less than 6 mm. Otherwise, a bolt will not sit in the panel properly. Besides, as the Fig. 1 shows, it is necessary to make a 3mm-groove for the aluminium tongue (feather joint). The number and layout of bolts and rivets depends on the spacing of the structure elements.
Only materials certified and approved for the construction industry should be used to assemble decor Kronocompakt HPL facings.



Panel-to-panel joints and gaps.

The gaps between the neighbouring panels should be masked or filled with a proper sealing material. Typical solutions are presented below. The most popular horizontal solution is a half-lap joint. In case of vertical solutions the most popular are the feather joint or a so-called "false feather" joint. In the latter solution a flat aluminium bar (up to 2mm thick) is used. The bar is painted in the same colour as the HPL panel.



Half-lap joint

Half -lap joint + sealing material

Feather joint with sealing material and a flat aluminium bar

Feather joint + sealing material and a 3mm-thick laminate tongue

Visible joints.
Aluminium structure + removable rivets.

To make a wall facing the high pressure laminate panels should be fixed to an aluminium supporting structure with AlMG5 or V4A steel rivets.

The panel thickness - at least 6 mm. The supporting structure is made of aluminium sections, widely available on the Polish market. The sections are approved by the Institute of Masonry Technology.

Panel thickness: at least 6mm Gaps: min. 10mm (masked)
Rivet hole diameter:

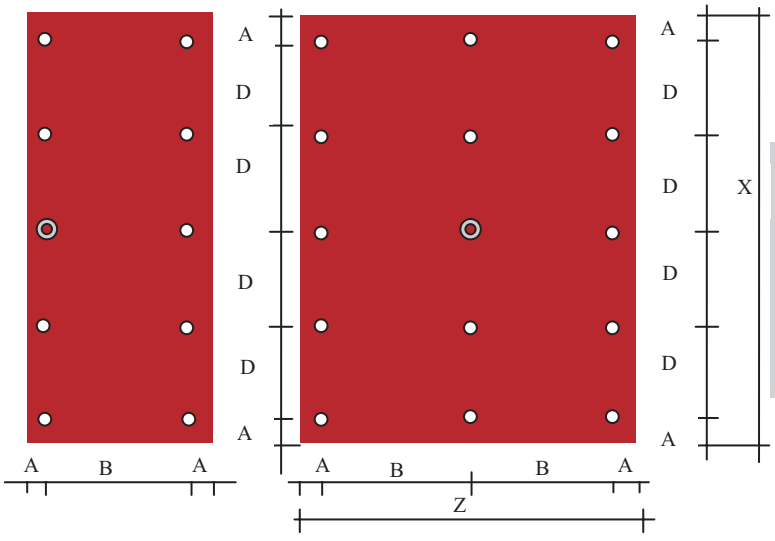
- rivet diameter + 5 mm; 10 mm for non-fixed points
- the rivet diameter for fixed points is 5.15mm

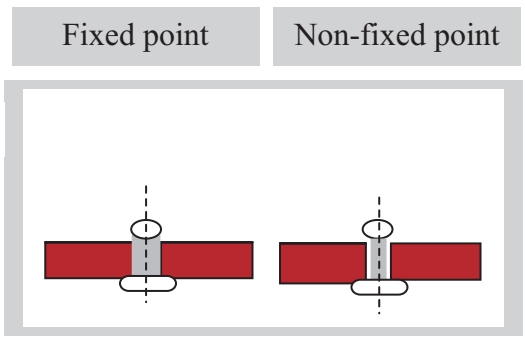
0.3mm riveting machine should be used.

B = horizontal rivet-to-rivet distance (see the table)
A = distance between the rivets and the panel edge
max. 10-fold panel thickness
min. 20 mm
D = vertical rivet-to-rivet distance
Z = panel width
X = panel height

● fixed point
○ non-fixed point

Max. rivet-to-rivet distances for small buildings	Kronocompakt HPL panel thickness			
	6mm	8mm	10mm	13mm
Single-span assembly	440	590	740	940
Multiple-span assembly	540	740	890	1190





Hidden joints.
Aluminium structure + SPS adhesive.

The Kronocompakt HPL wall facing assembly works shall be performed in compliance with the technical requirements for glued joints. It is very important to determine the air humidity and a minimum temperature that allows the assembly works. That is why the following guidelines should be observed:

- the gaps between the assembly tapes to be filled with an adhesive can be arranged vertically only
- do not exceed the Kronocompakt panel dimensions recommended for glued joints
- adhere to manufacturer's instructions for SPS adhesive and high pressure laminates

Application: indoor wall facings
Panel thickness: from 4mm Panel-to-panel gap: min. 10 mm (masked)
Max. HPL panel area:

- 2.5m^2

for Z = 2800 X_{max} = 890 mm
for Z = 3050 X_{max} = 810 mm

The distance between the rivet and the panel edge:
A = distance between the connector (rivet or lacquered bolt) and the panel edge

- max. 10-fold panel thickness
- min. 20 mm

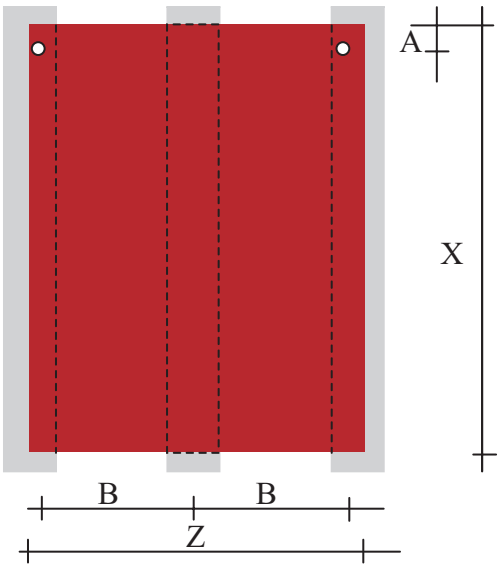
B = horizontal rivet-to-rivet distance (see the table)

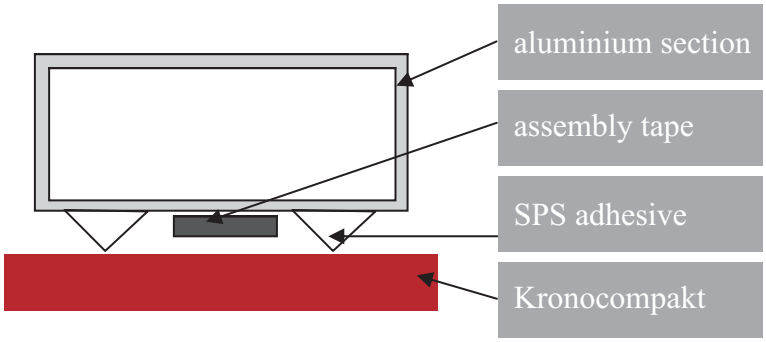
Z = panel width
X = panel height
Bolt hole diameter:

- 8.5mm for spray-painted bolts
- 7.5mm for bolts with washer or masking cap

Minimum dimensions of aluminium sections used to assembly the supporting structure:

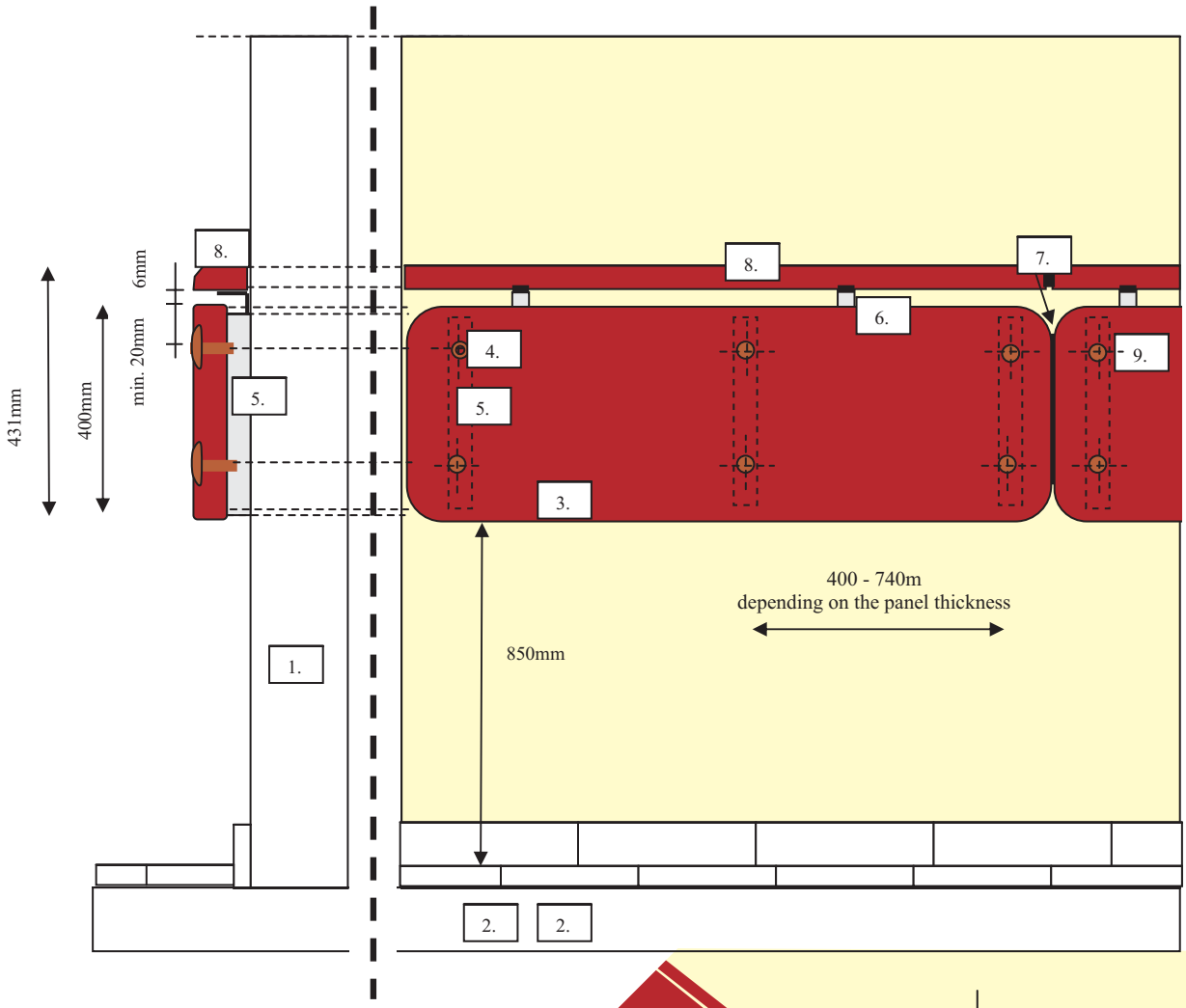
- aluminium section 50x30x2.5mm
- aluminium section (panel-to-panel joints) 85x30x2mm

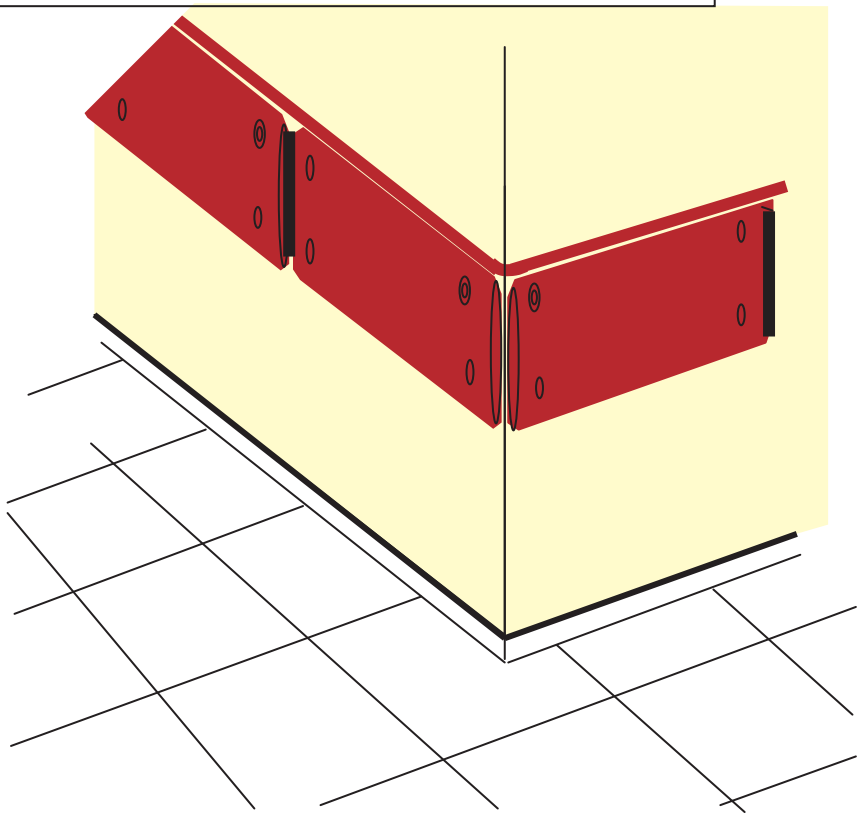




Max. rivet-to-rivet distances for small buildings	Kronoplan HPL panel thickness		
	6mm	8mm	10mm
Single-span assembly	440	590	640
Multiple-span assembly	540	640	640

Kronocompakt safety rails (rivets + screws).

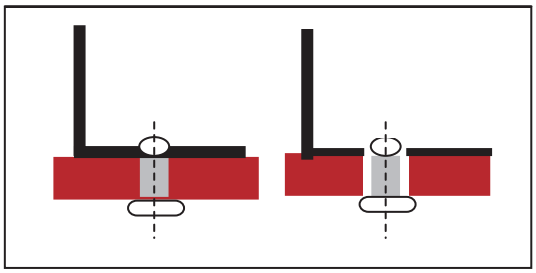




1. Wall
2. Floor
3. Kronocompakt safety rail
4. Fixed point + connectors (rivets or screws)
5. Aluminium section
6. Aluminium angle section
7. HPL tongue, 3mm thick
8. HPL bar
9. Non-fixed points

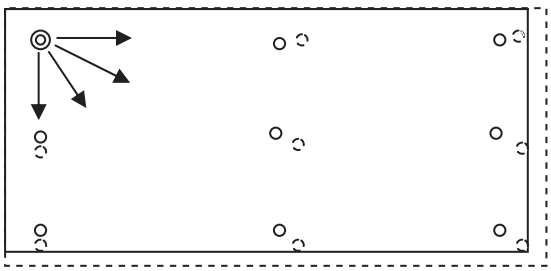
Kronocompakt safety rails (rivets + screws).

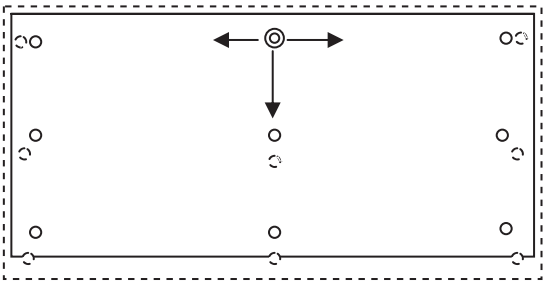
The laminate panels for the safety rails should not be thinner than 8 mm. The layout of aluminium sections, which the panels are fixed to, depends on the thickness of the panels and should be between 440mm and 1190mm. The neighbouring safety rail units are joint using a 3mm-thick HPL feather joint (see: "Panel-to-panel joints and gaps", Example 3 and 4).
This solution requires a free space in the centre of the panel thickness for the laminate tongue. Such a requirement results from the properties of the panel material. All safety rail edges should be rounded using a milling machine with concave knives.
Each safety rail unit should be provided with one fixed assembly point. Other locations where the rail is fixed to the aluminium structure should be non-fixed points. The difference lies in the rivet hole diameter in the panel and in the aluminium section, as depicted below:

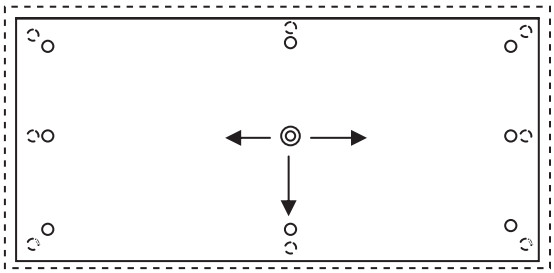


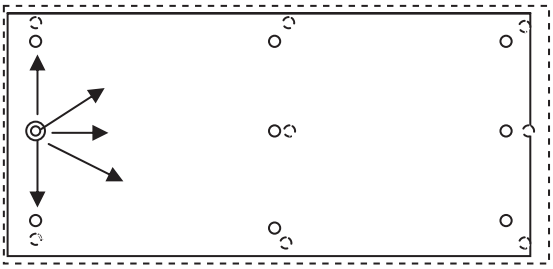
Fixed point | Non-fixed point

The stress distribution in the laminate panel depends on the location of the fixed point:

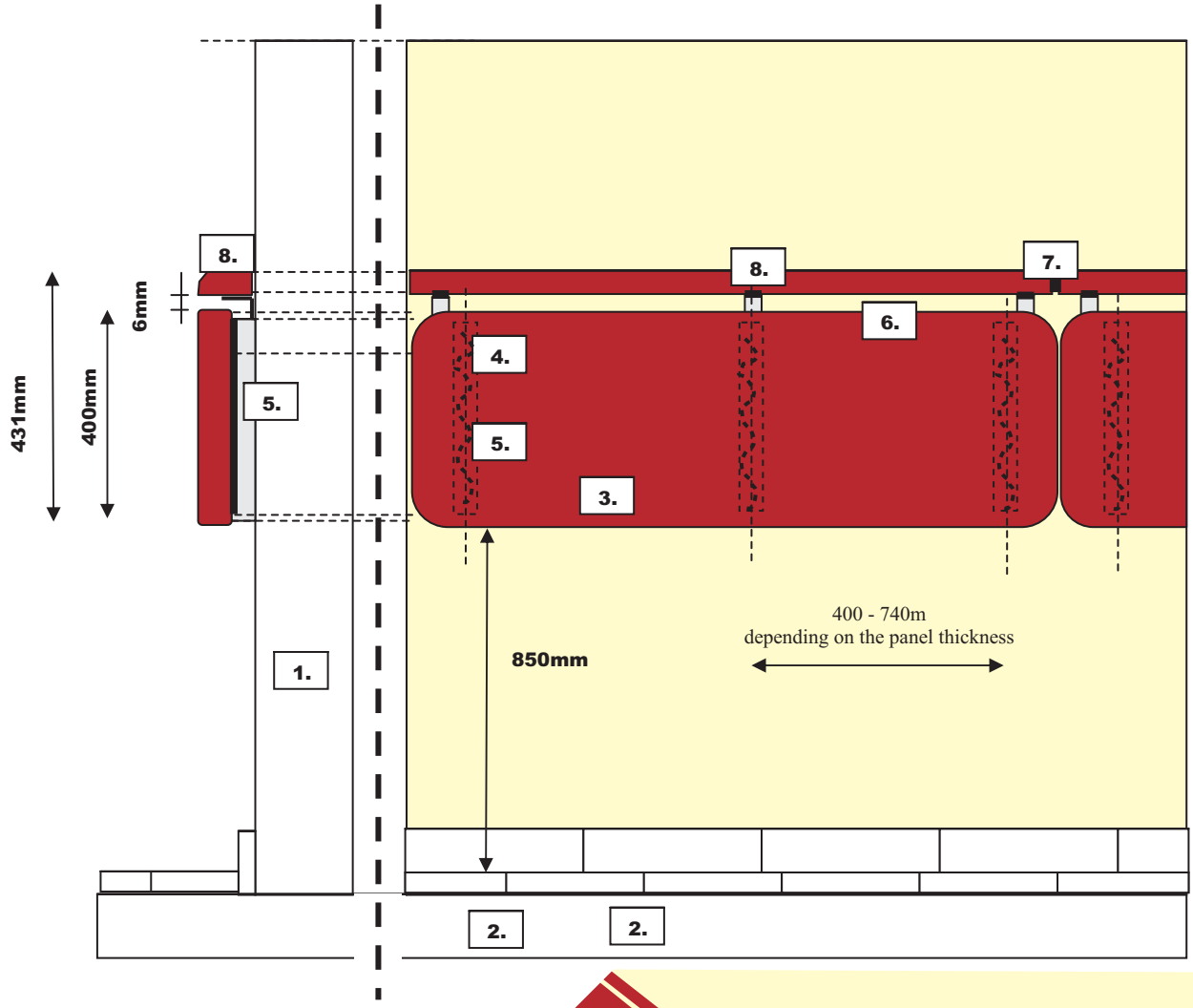


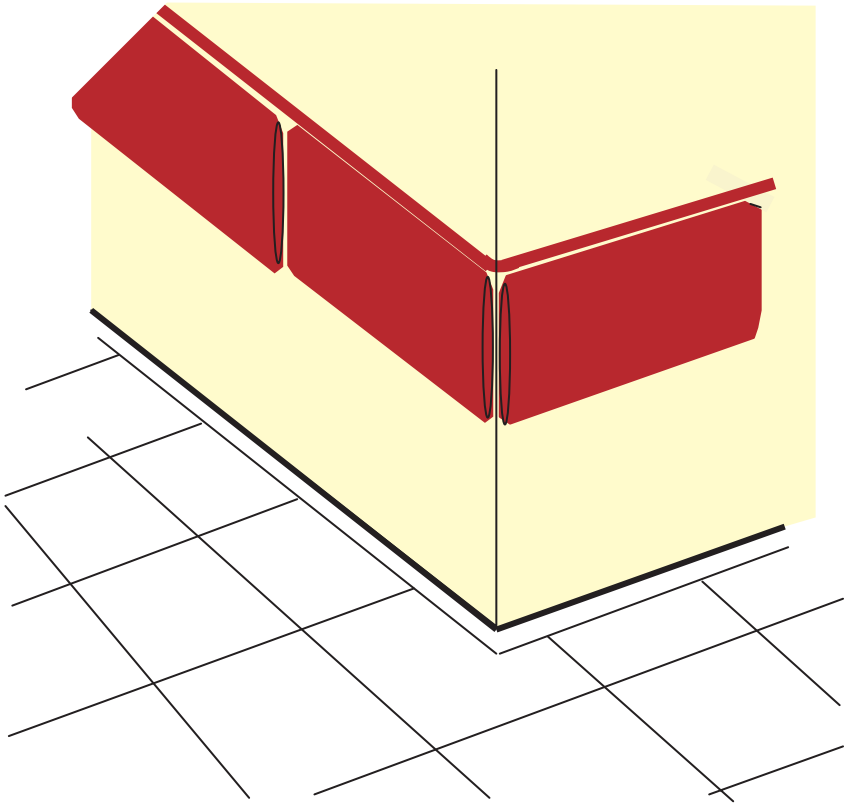






Kronocompakt safety rails (SPS adhesive).





1. Wall
2. Floor
3. Kronocompakt safety rail
4. SPS adhesive
5. Aluminium section
6. Aluminium angle section
7. HPL tongue, 3mm thick
8. HPL bar

Swimming pool lockers

krono – box

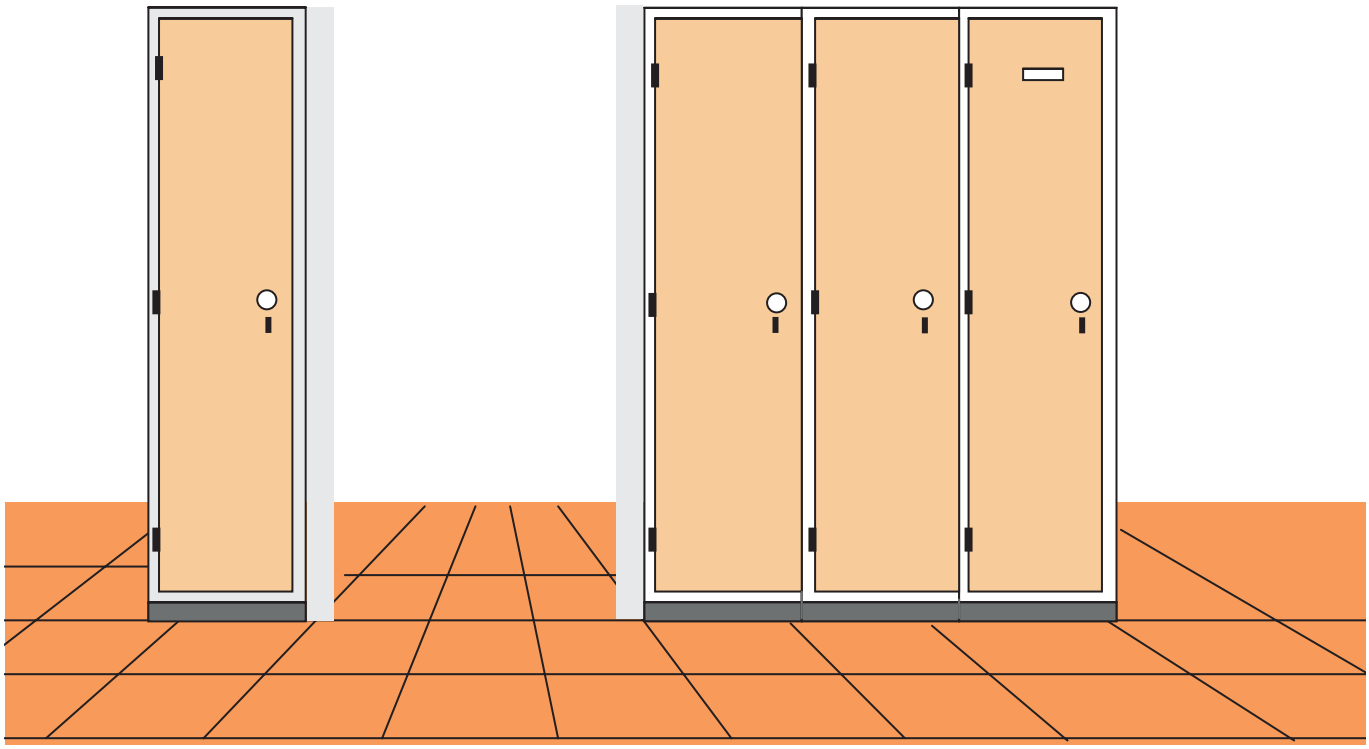
"Kronoerg Pustków"

HPL swimming pool locker systems

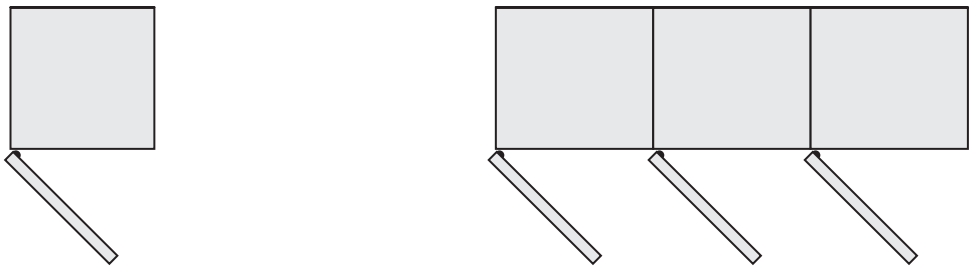
Swimming pool lockers.
"Krono-box" swimming pool locker families.

Single

Multiple

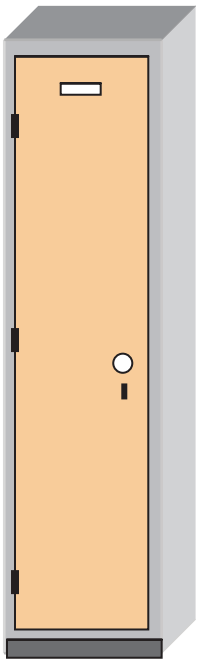


Top view

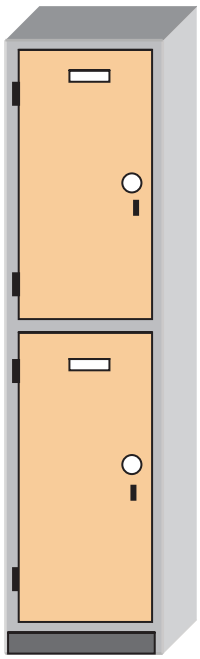


Locker types.

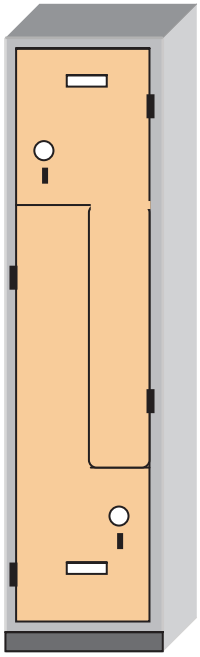
Single locker - **S1** type



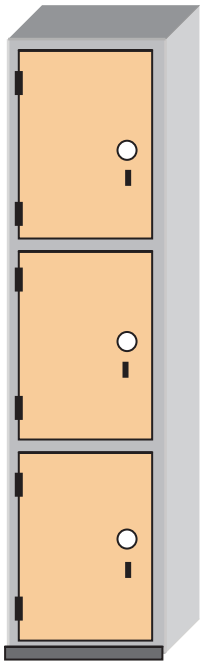
Swimming pool locker - **S2, …, Sn** type
n - number pf compartments

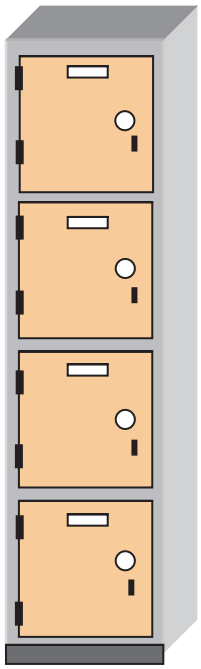


Swimming pool locker - **L2** type



Swimming pool locker - **S3** type

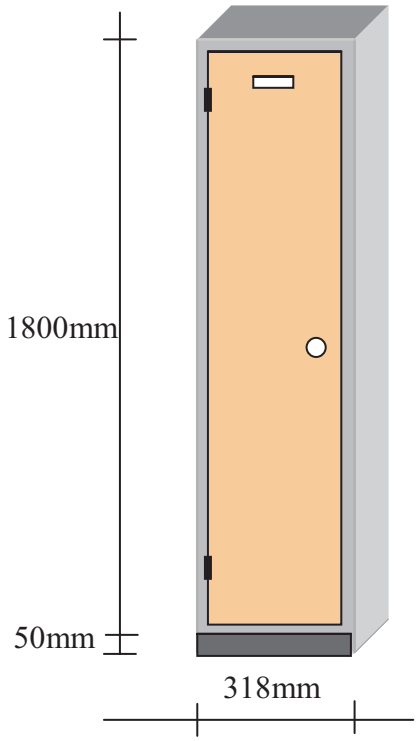




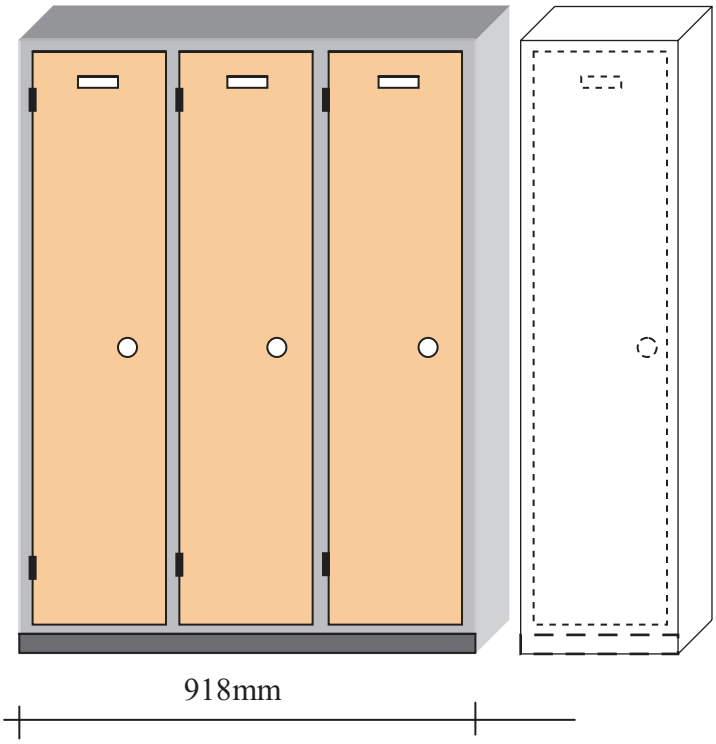
Swimming pool locker - **S4** type

Dimensions of single and multiple lockers.

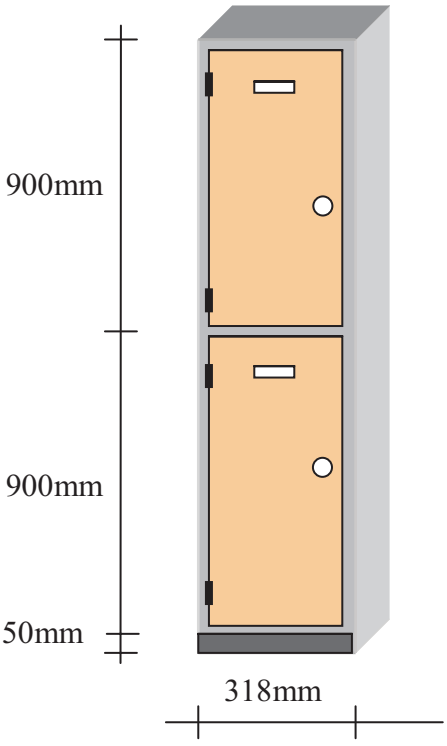
Swimming pool locker - S4 type



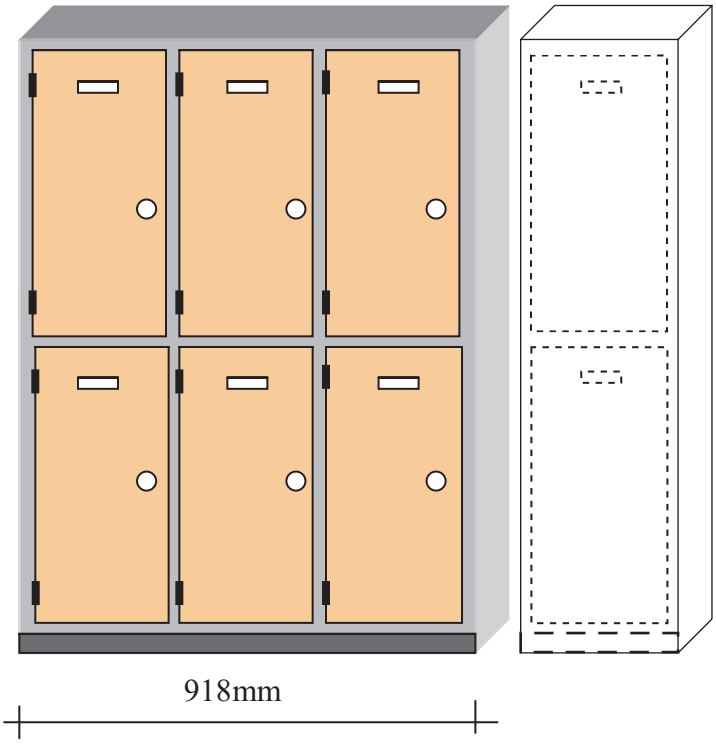
3S1



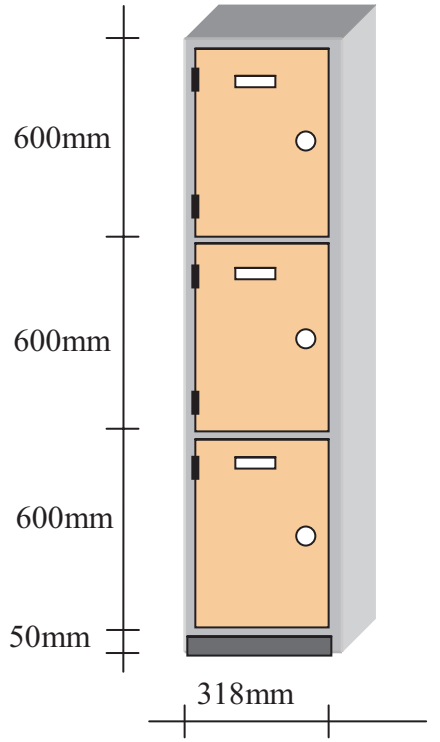
Swimming pool locker S2



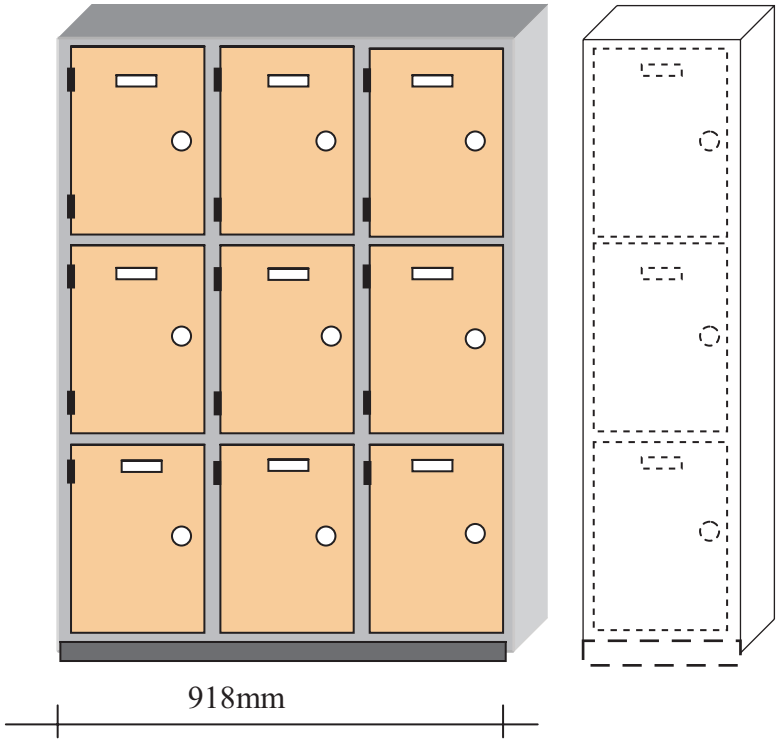
3S2



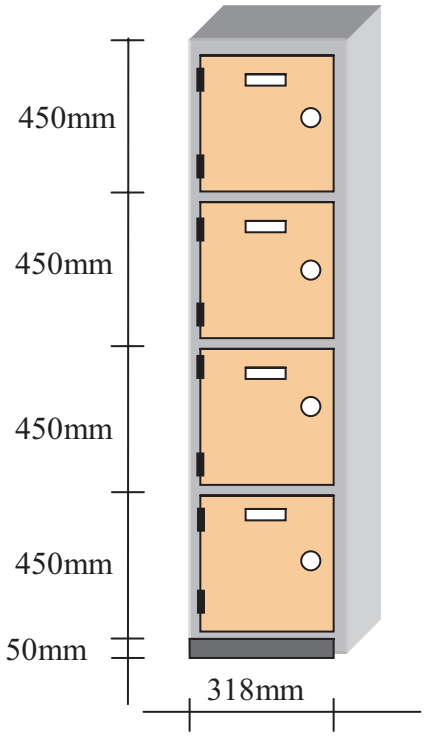
Single locker S3



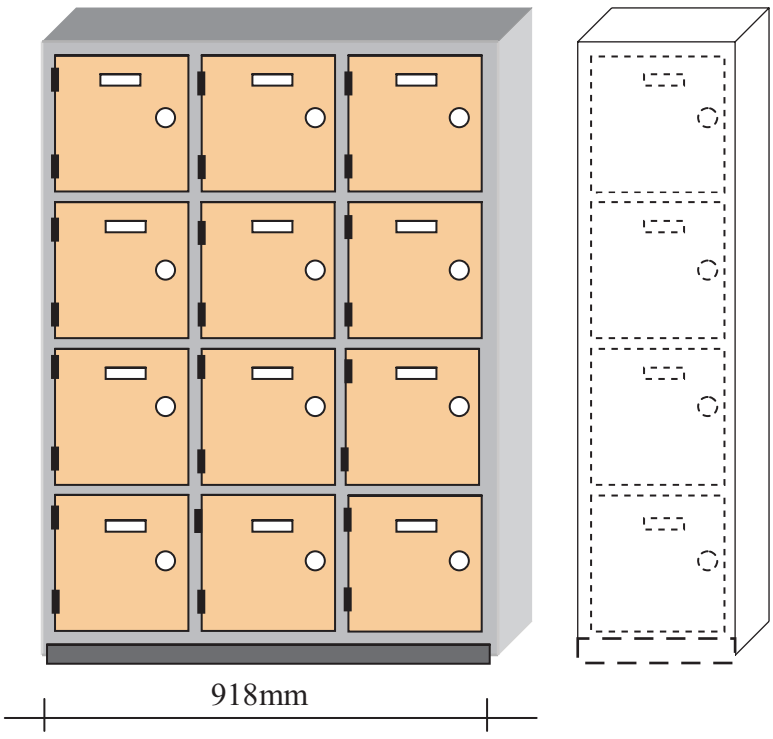
3S3



Swimming pool locker S4

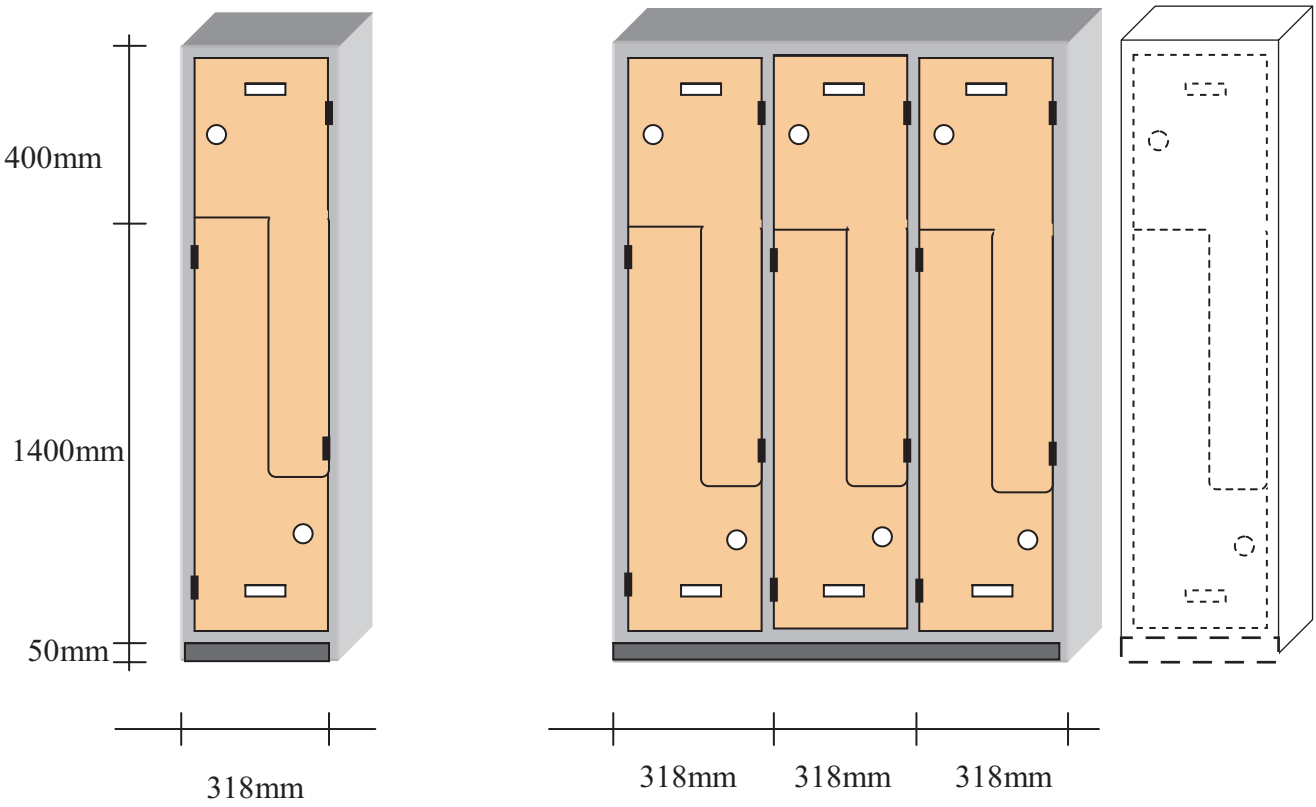


3S4



Swimming pool locker L2

3 L2



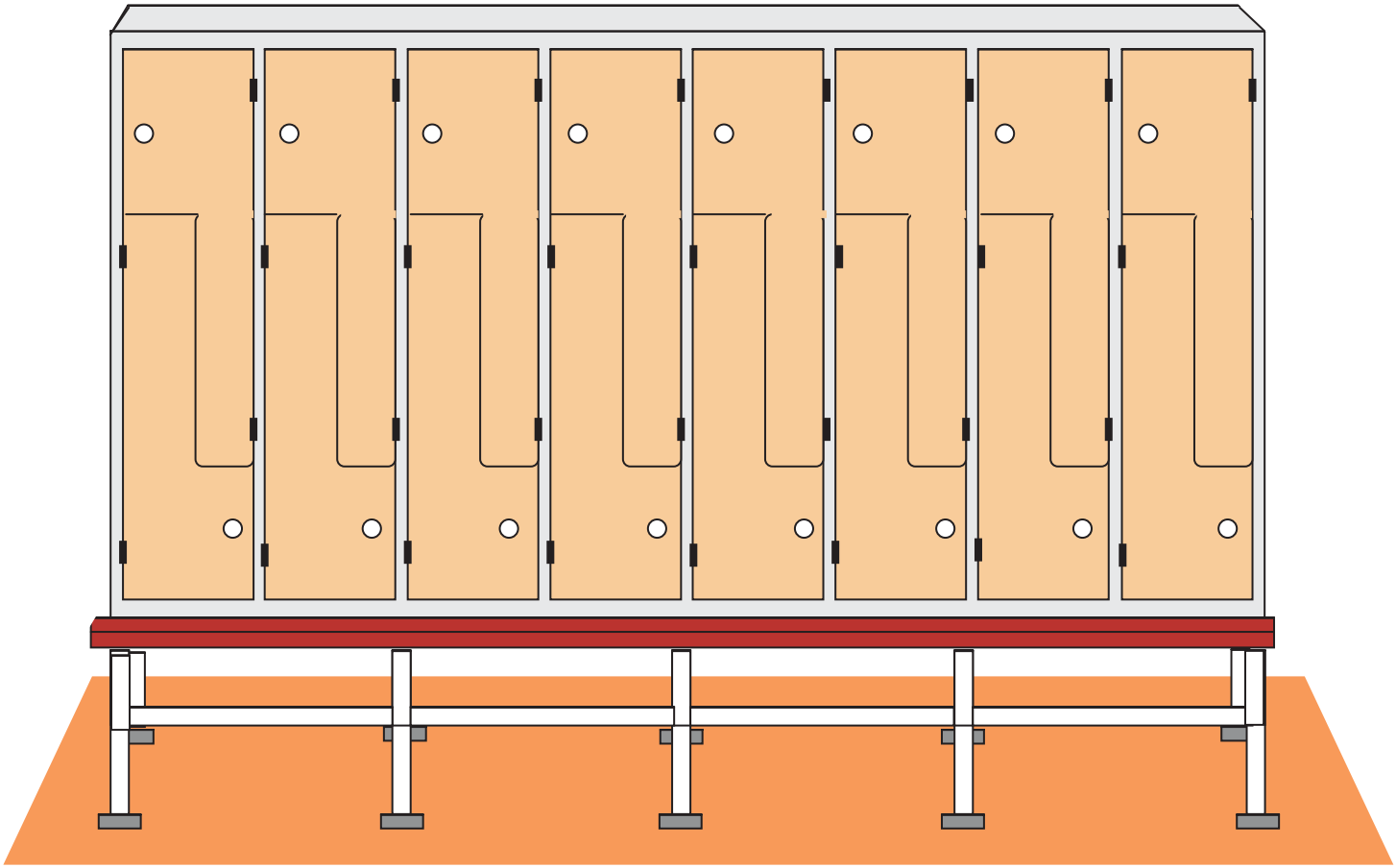
Locker description:

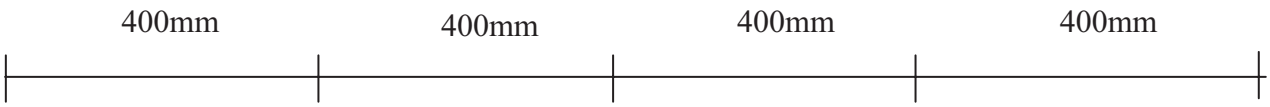
- door, base - HPL panel, 10 mm
- rear wall - HPL panel, 3mm
- shelves, top - HPL panel, 10 mm
- stainless steel hinges, not accessible from the outside to protect the locker from breaking the door down (or an electronic locking system upon customer's request)
- pegs and other accessories upon customer's request

During the assembly works the lockers are combined in sets. The number of sets and the number of lockers per set is not limited.

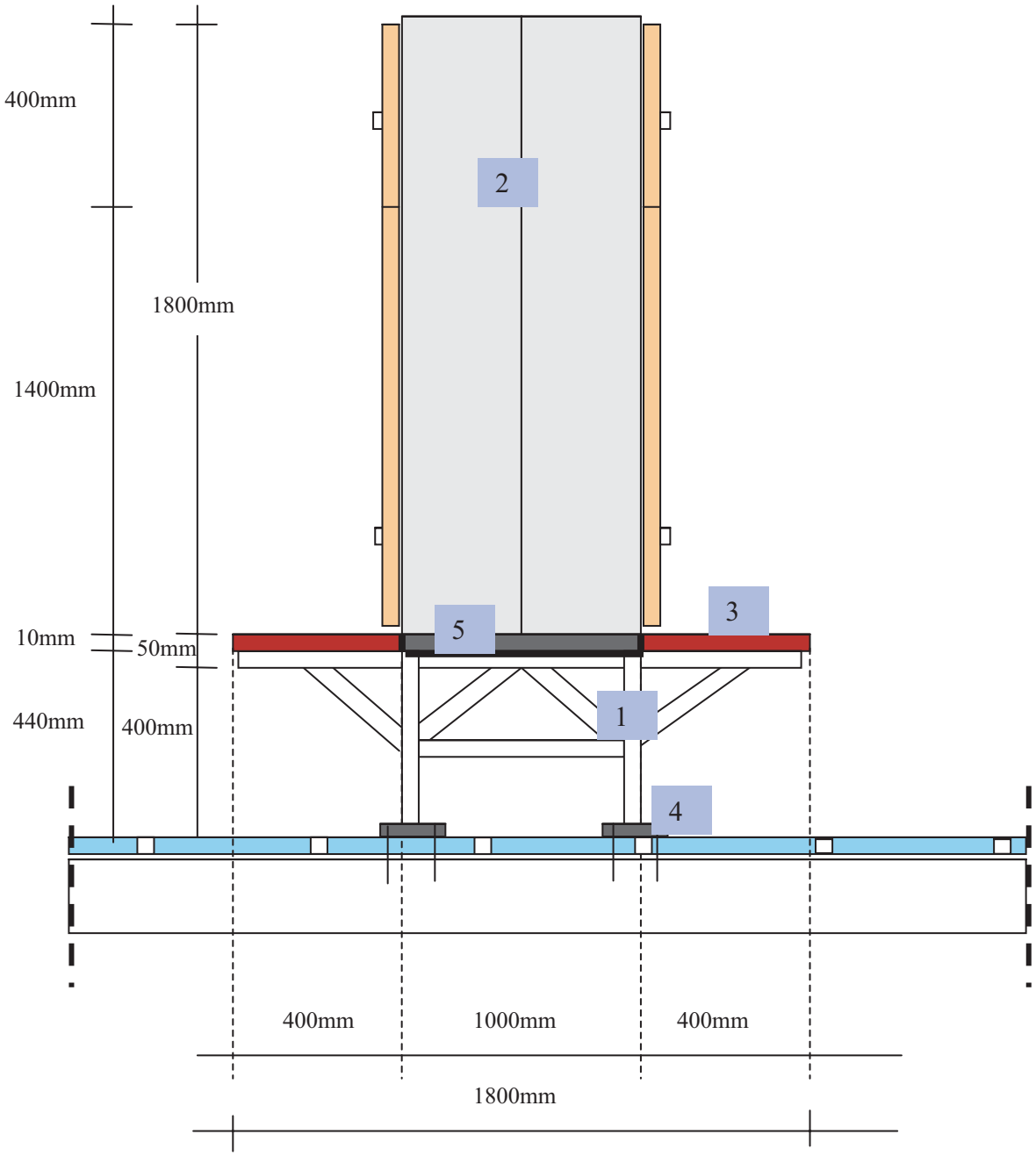
The standard dimensions of a set including one, two or three lockers are:
width 260, 300, 400 mm (other sizes upon request)
depth 500 mm
height 1800 mm plus the base 50 mm

Lockers with a bench system





Side view (locker with a bench)



1. Supporting structure made of galvanised steel sections
2. L2 locker made of Kronocompakt HPL
3. Kronocompakt, thickness 10 mm, as a bench
4. Adjustable feet
5. 2-3cm-deep cavity for the locker base

Examples


081
083
085
087
089
091
093
095
097
099
082
084
086
088
090
092
094
096
098
100
081-100


127
125
123
128
126

Cubicles

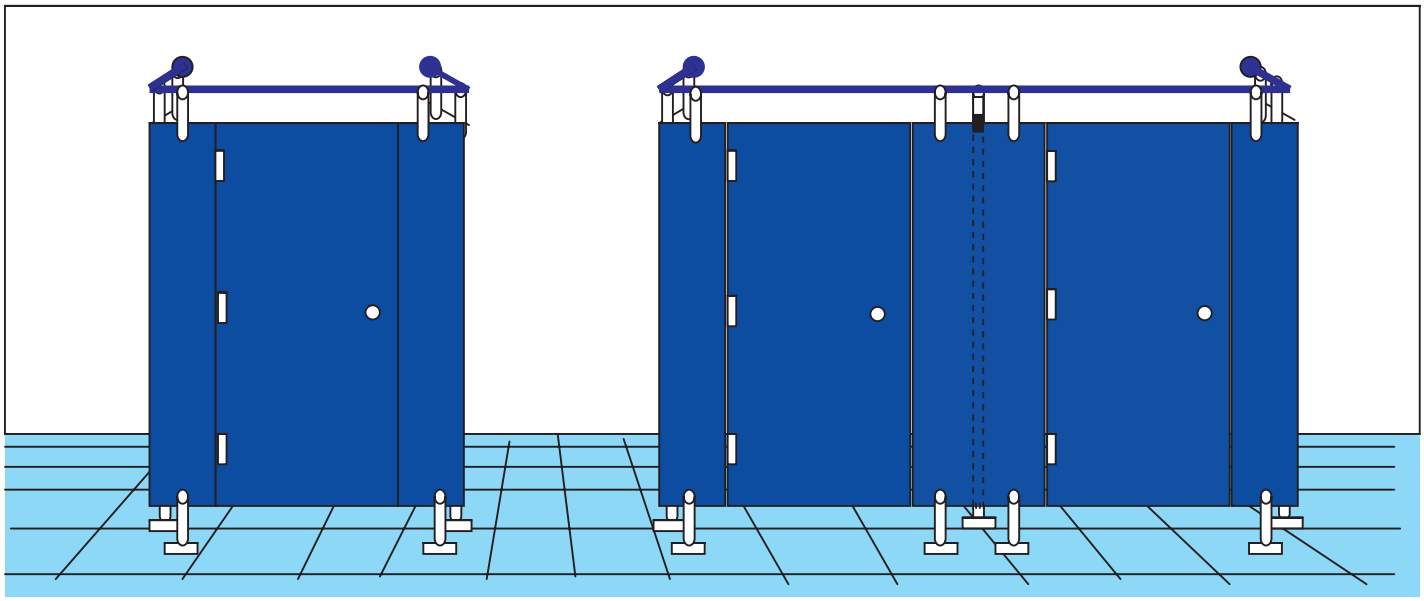
krono – kabina

"Kronoerg Pustków"
HPL cubicles

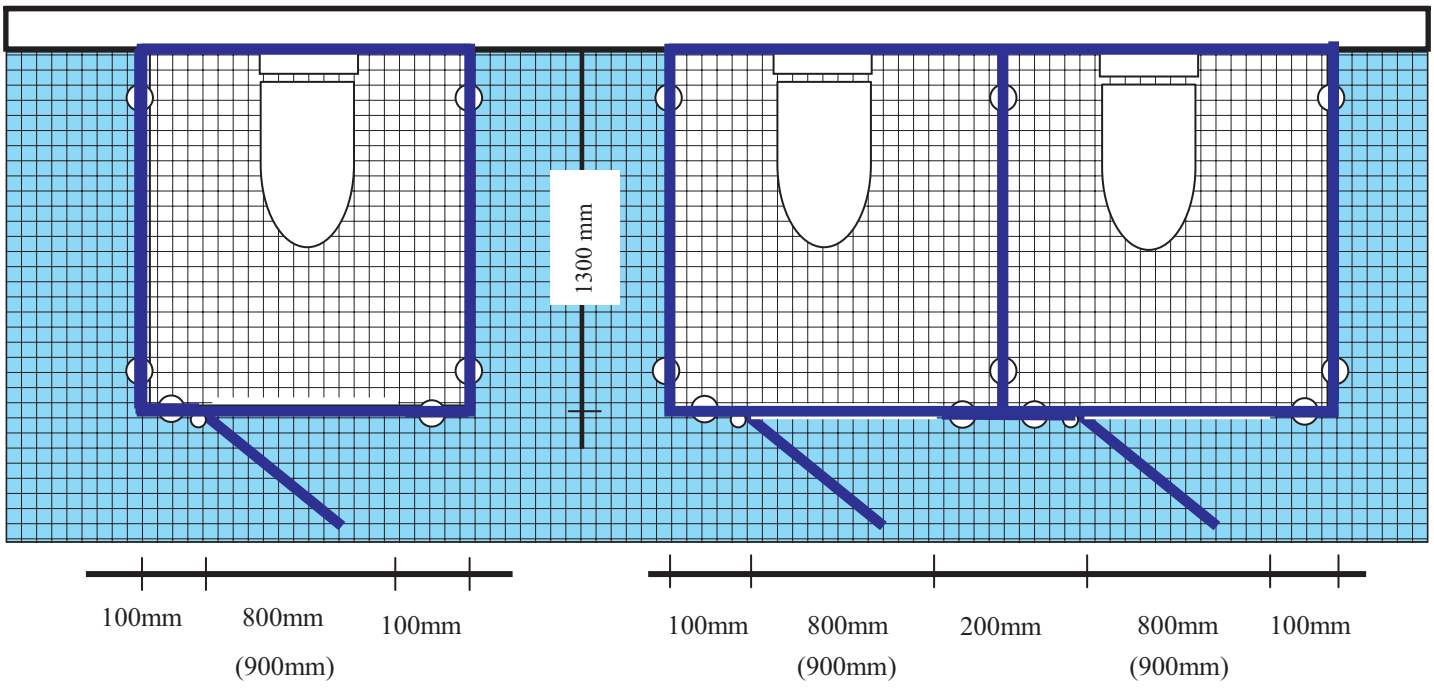
Cubicles.
"Krono-kabina" product families.

Single

Multiple

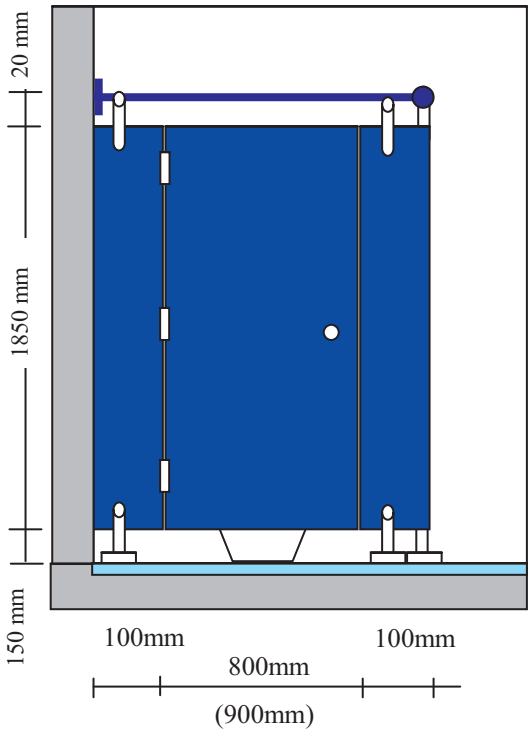


Views

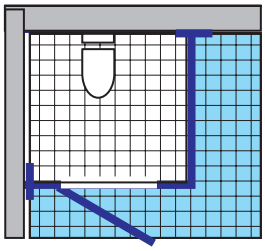


Single sanitary cubicles - modules.

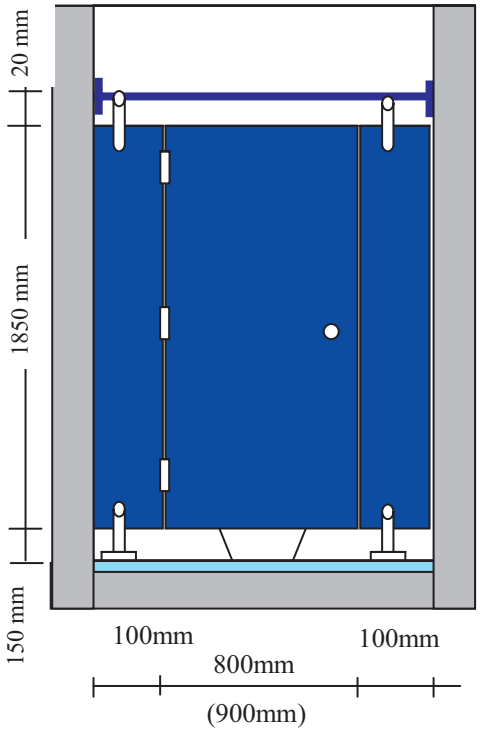
S1 type



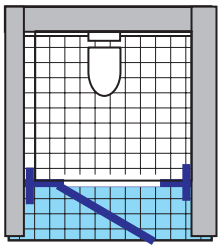
View



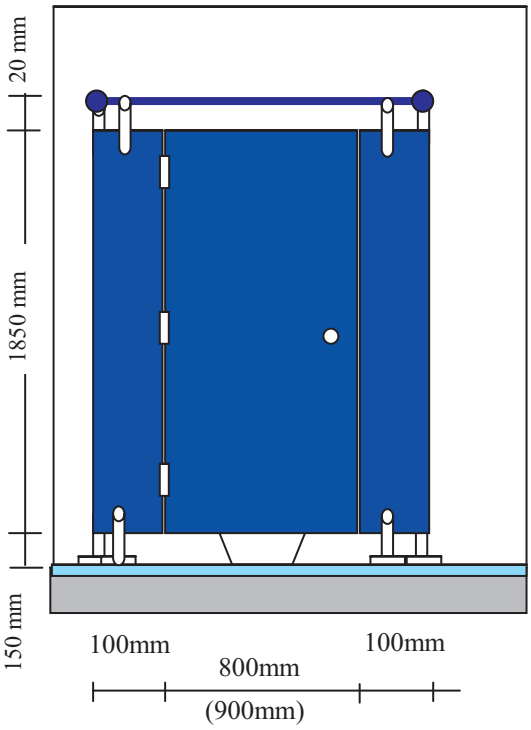
SC type



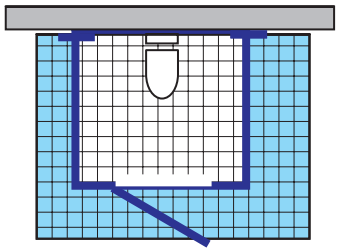
View



SP type

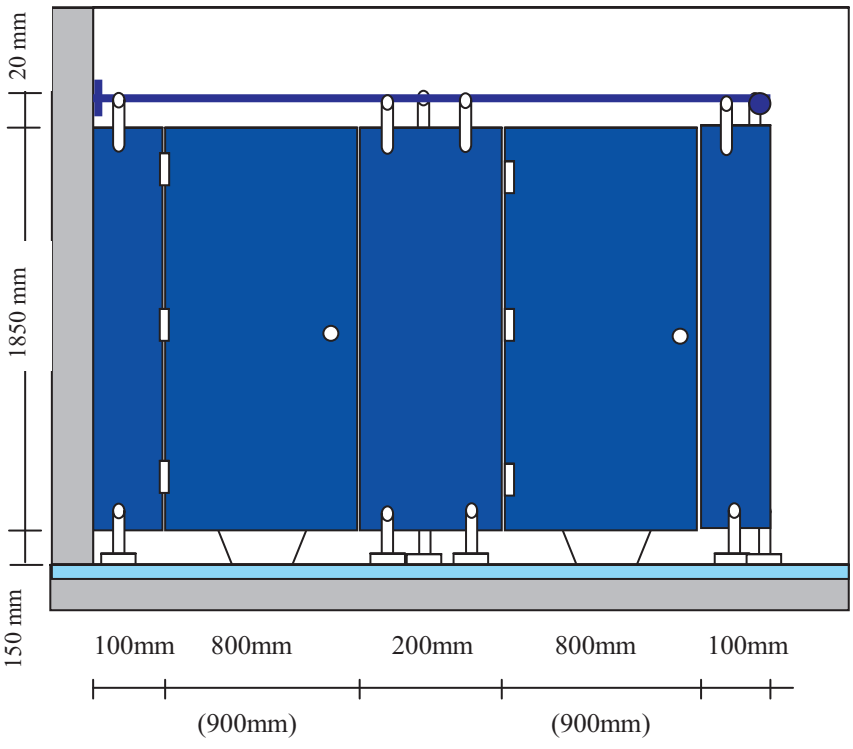


View

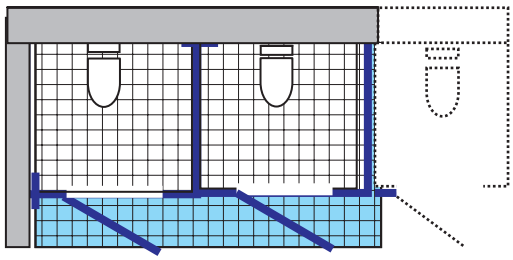


Multiple sanitary cubicles - modules

n SL type

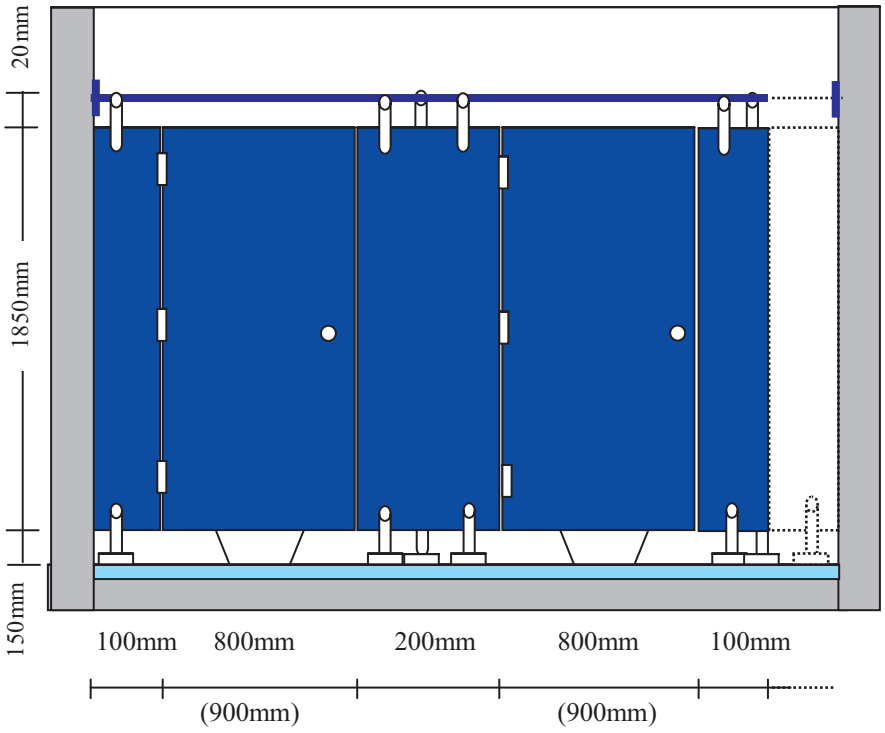


View

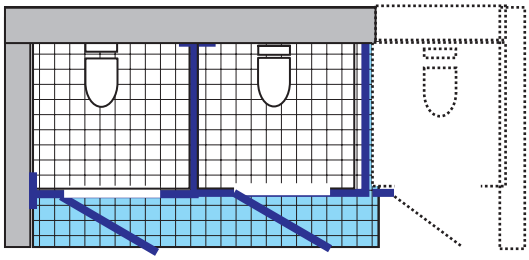


n - number of cubicles

n SC type

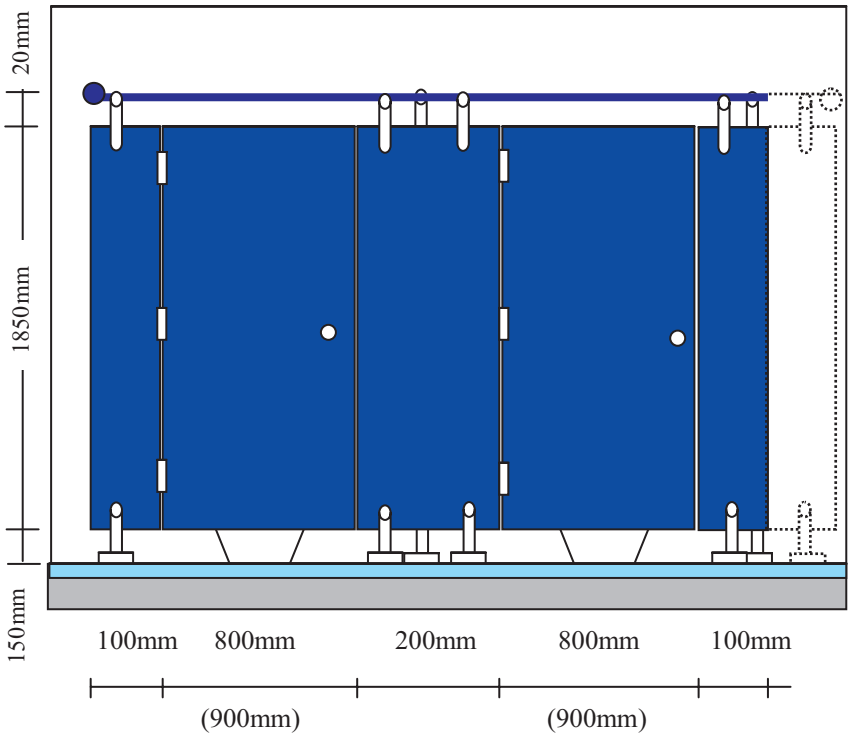


View

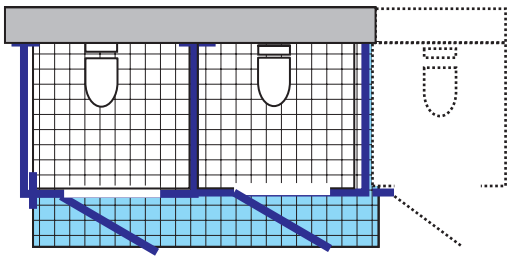


n - number of cubicles

n SP type



View



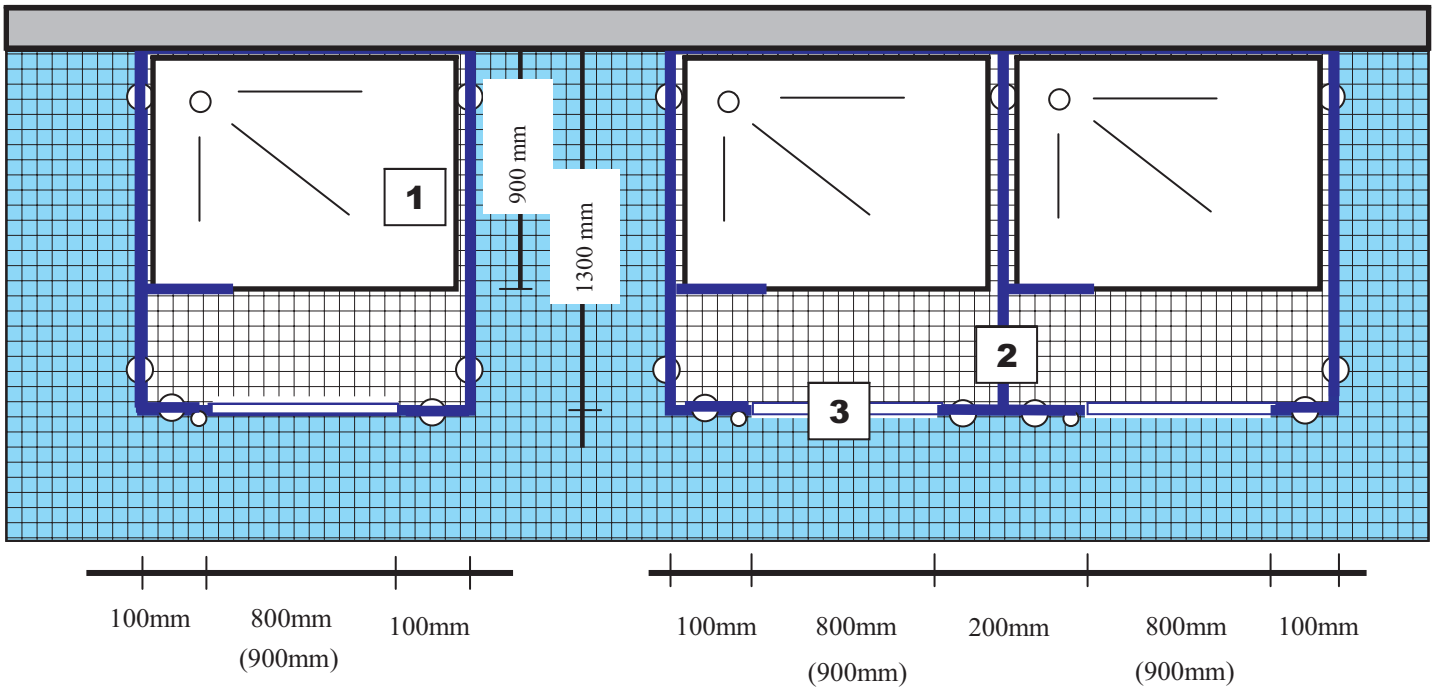
n - number of cubicles

Shower room partition walls.

Made of „Kronocompact" laminate, thickness: 10 mm or 13mm.
Shower hardware similar to that of the sanitary cubicles.

Single

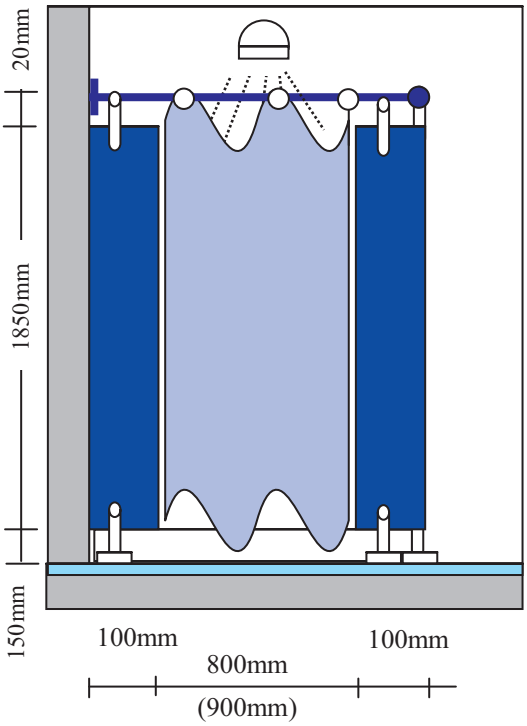
Multiple



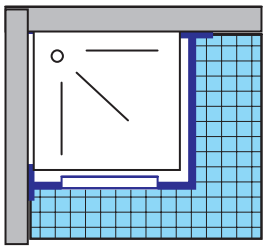
1. Shower tub
2. Kronocompakt partition walls mounted with standard brackets
3. Curtain

Single shower cubicles - modules.

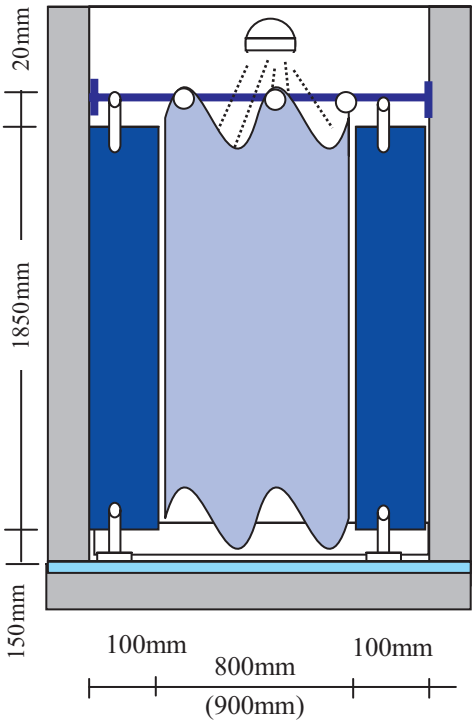
NL type



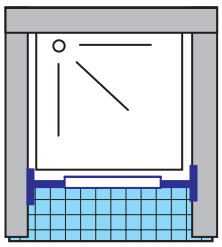
View



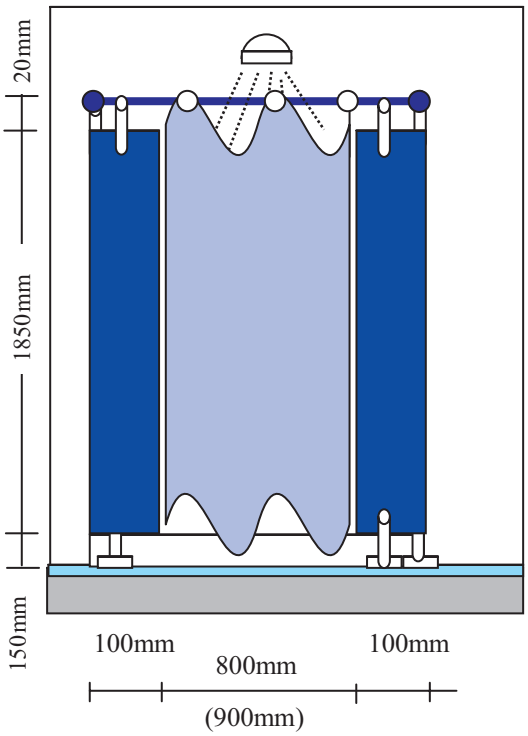
NC type



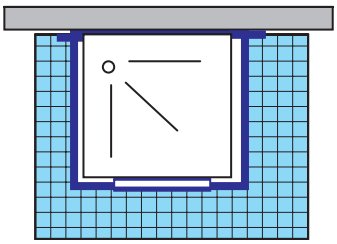
View



NP type

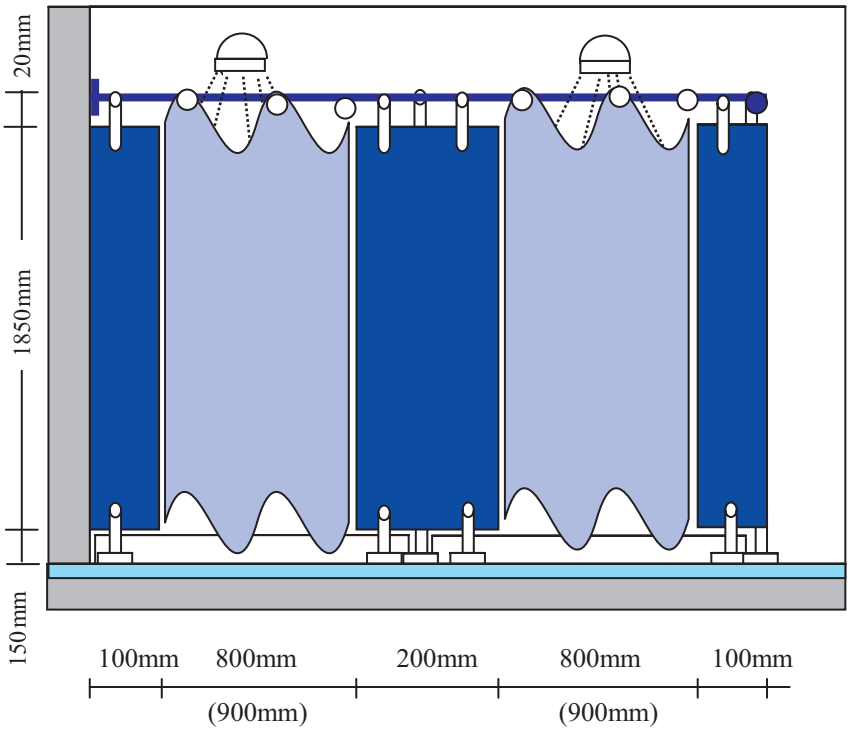


View

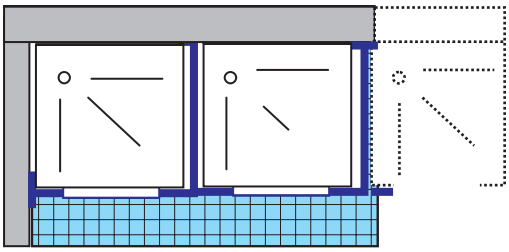


Multiple shower cubicles - modules.

n NL type

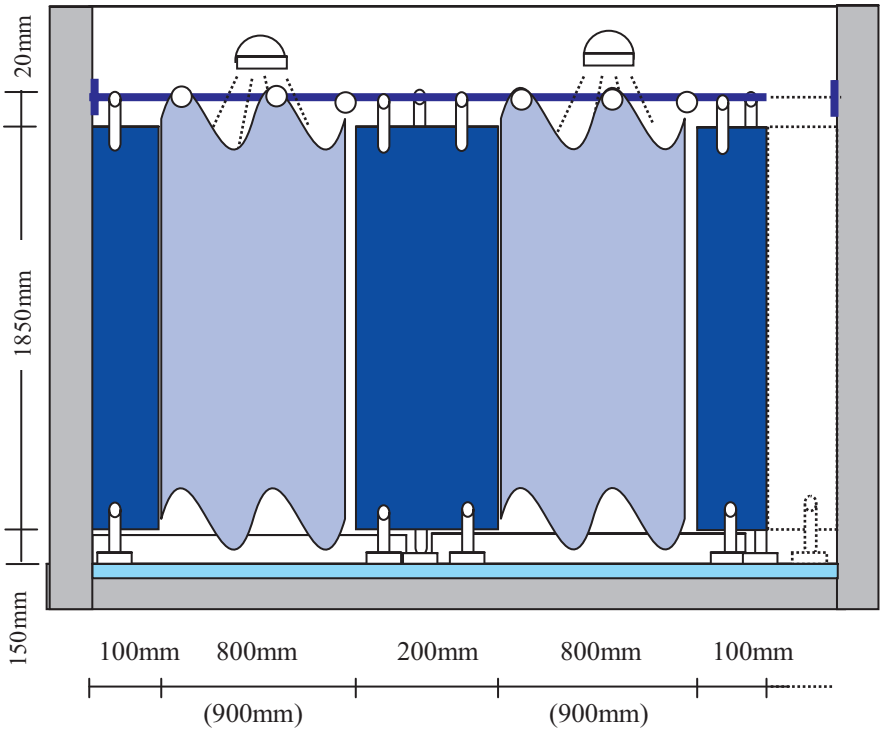


View

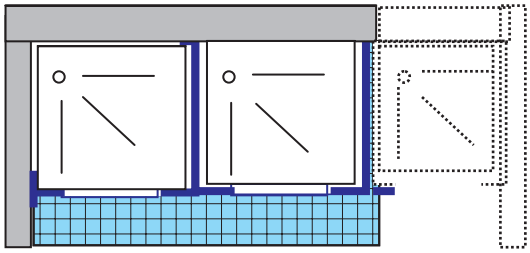


n - number of cubicles

n NC type

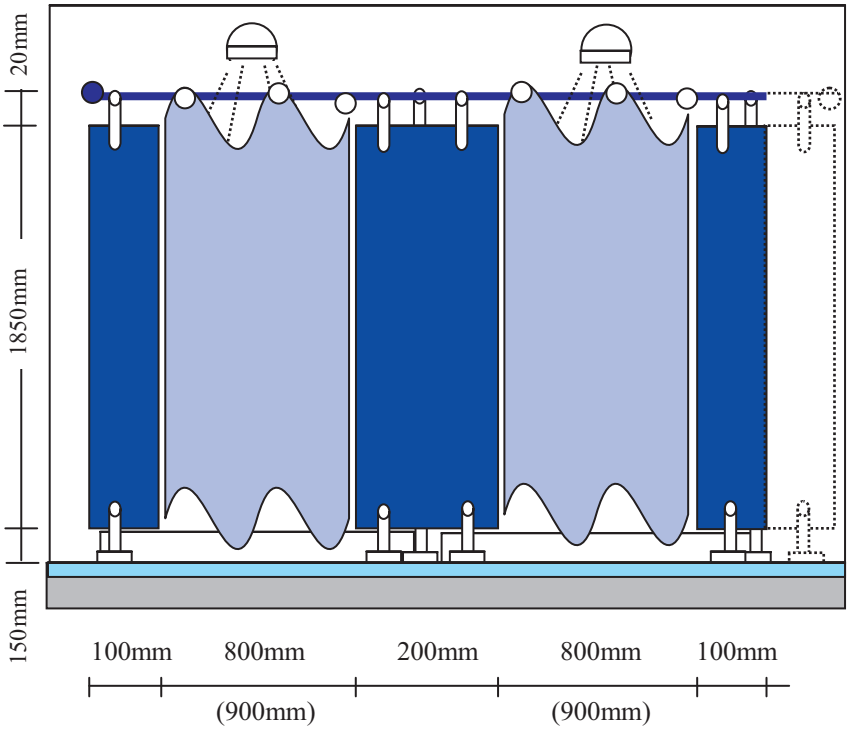


View

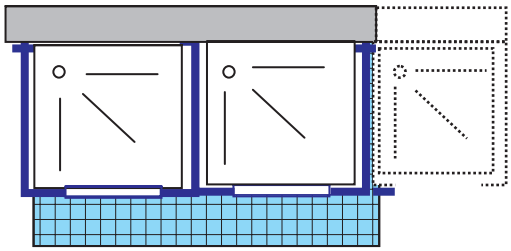


n - number of cubicles

n NP type



View



n - number of cubicles