

## **Assembly instruction**

### **Sandwich panels**

Packing, transport, delivery, storage, assembly

Design of Ruukki sandwich panels makes it possible to easily and quickly assemble both vertically and horizontally. Panels can be assembled in almost any weather conditions, time is additionally saved and cost is reduced. Good strain resistance of sandwich panels enables to reduce the required size of supporting structures. Width and panel packing have been designed to make optimal use of carrier space.

#### **Product application**

- sandwich panels with polyurethane core
- sandwich panels with mineral wool core
- sandwich panels with polystyrene core

Ruukki is a metal expert you can rely on all the way, whenever you need metal based materials, components, systems or total solutions. We constantly develop our product range and operating models to match your needs.

● **Packing**

Ruukki sandwich panels are delivered on load-carrying wooden pallets and non-load polystyrene pallets (package edge) – see page 16. Basic features of panel package:

- package height – max 1.20 m,
- package width – max 1.17 m,
- package length – max 21.0 m,
- package weight – max 4 500 kg.

● **Delivery of panels**

The minimum delivery time of Ruukki panels, depending on the core type, is as follows:

- 24 hours for mineral wools or polystyrene core panels,
- 48 hours for polyurethane core panels,
- 4 days between 1<sup>st</sup> May and 30<sup>th</sup> September,  
5 days between 1<sup>st</sup> October and 30<sup>th</sup> April for panels with no relief and with PIR core.

● **Transport**

Ruukki sandwich panels can be transported only by roadworthy trucks loaded from the top; this does not apply to mineral wools core panels, which have to be carried only by covered trucks (with loading from top possible).

Load-carrying surfaces must be clean. No nails or other sharp objects can protrude from the truck bed or its walls. Protruding objects have to be properly secured (e.g. with wooden blocks or waste foam), to avoid damage to the panels.

The vehicle (truck bed) has to be long enough to ensure complete support coverage for the loaded package. The package is allowed to protrude no more than 1.5 m out off the truck bed.

For transport of 16÷21 m long packages, the carrier has to obtain oversized transport permit, and to provide adequate support to protect protruding panel edges from bending. While carrying the panels with articulated vehicle, the surfaces of both load beds have to be on the same level.

Packages transported by truck can be piled into max. two layers – see fig. 1 (it does not apply to panels with stainless steel facings, which cannot be piled).

Bearing in mind the condition of highways, the carriers – drivers are bound to periodically check (every ~100 km) the condition of cargo fastening and to correct it accordingly.

The recommended loading space width ranges is about 2 500 mm, whereas the maximum travelling speed cannot exceed 70 km/h.

The vehicle to carry the panels, should be equipped with cargo straps, e.g. APT-50 or similar (minimum width of 50 mm), to secure the cargo on the vehicle bed. Number of the straps depends upon the panels length; the straps should be spaced approx. every 2 m.

It is recommended that the truck is provided with 2 sets of flat, 6 m long lifting slings with closed loops of load capacity 5 tons, for unloading the panels.

Flashing packages carried together with panel packages should be fastened separately from panel packages (with separate straps).

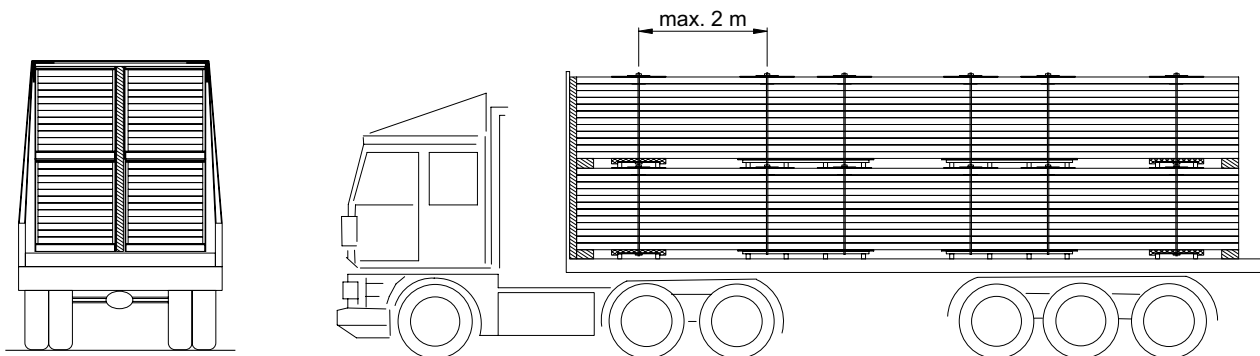


Fig. 1. A way of placing panels on transport means.

● **Unloading**

Before starting to unload Ruukki sandwich panels, check the package condition.

Each panel package supplied on wooden pallets, has the lifting sling attachment points marked with a coloured marker or chalk.

The packages should be unloaded with an overhead travelling crane, lift or crane, using a cross-beam and 4-rope looped slings and approx. 6 m long flat slings with loops.

When lifting the packages with cargo straps, attached to the load-carrying wooden pallets, use 1.2 m long wooden spreaders – fig. 2, to keep the straps spacing wider than the package, to prevent the top panels from damaging. Attaching the straps to polystyrene pallets is not allowed.

For 8-21 m long packages an additional 8 m long cross-beam should be used, as shown in fig. 3.

For panel package unloading attachment layout, depending on package length refer to pages 16+17.

It is prohibited to load and unload the panel packages without flat lifting slings with loops.

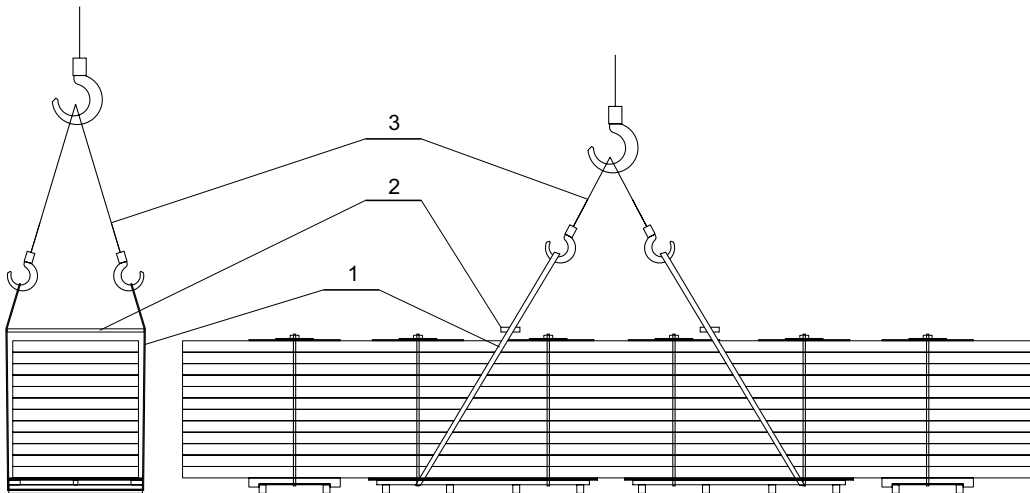


Fig. 2. Unloading of panels of  $\leq 8.7$  length, where: 1 – transport sling, 2 – wooden separator, 3 – lifting sling.

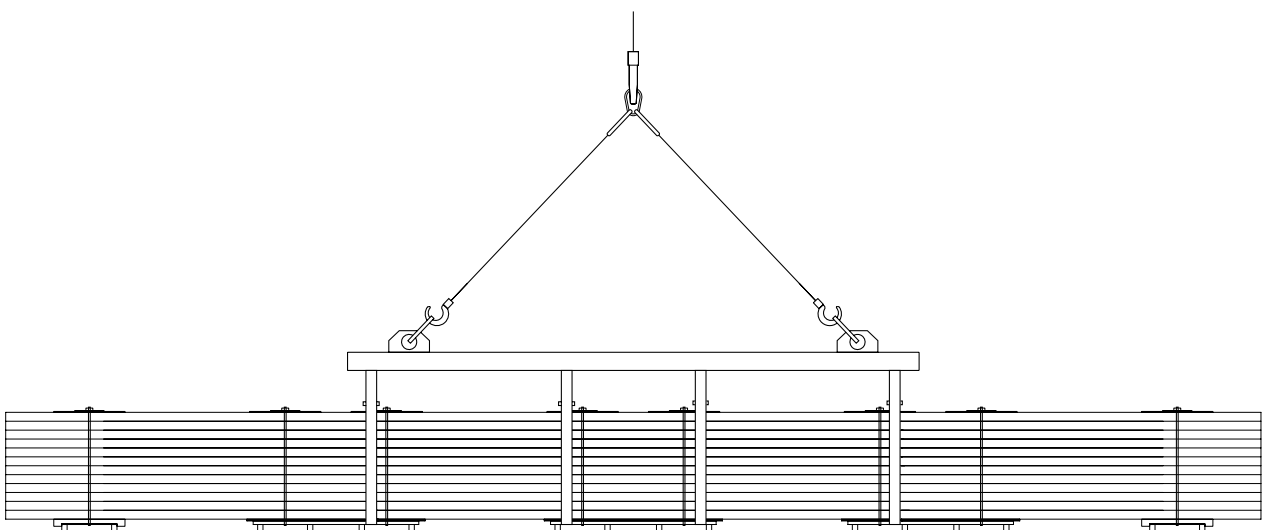


Fig. 3. Unloading of  $> 8.7$ m long panels.

● **Storage**

Store the Ruukki sandwich panels in slightly inclined position, on one side edge, to ensure free drainage of rainwater which might otherwise penetrate into the package – fig. 4.

Provide panels intended for open-air-storage with adequate protection against rainwater, snow, wind and contamination. Use canvas covers to provide adequate protection – see fig. 5 (it is forbidden to use plastic film for protection purposes).

The canvas covers ensure adequate ventilation and prompt evaporation of accumulated moisture. Absolutely avoid water collection between the panels, as in case of prolonged storage without adequate ventilation, this may damage them.

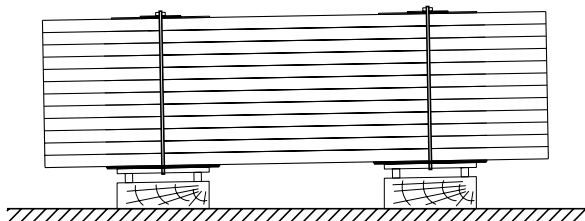


Fig. 4. Panels storage with difference of levels along side edge.

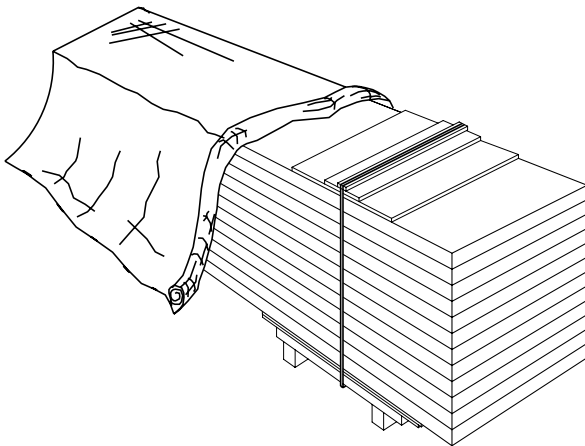


Fig. 5. Correct protection of panels with textile cover.

● **Weather conditions**

The following weather conditions are of critical importance for assembly of Ruukki sandwich panels: due to the relatively low weight-surface ratio of the panels, the wind speed should not exceed 4 degrees Beaufort (9 m/s).

To avoid indentations and prints on the panels, it is forbidden to pile panel packages at the construction site – see fig. 6.

Store the packages on hardened and even surface to avoid damage to the panels. Partially unpacked panel packages must be always protected against rainwater and strong wind.

Due to the additional load exerted on the structure, for temporary on-roof storage and during assembly, the roof panels can only be placed on the load-bearing framework. This has to be agreed each time with the chief supervisor.

Panel packages must be supported on the load-bearing framework by their bottom pallets. For safety reasons, the packages may not be piled while stored on the roof structure.

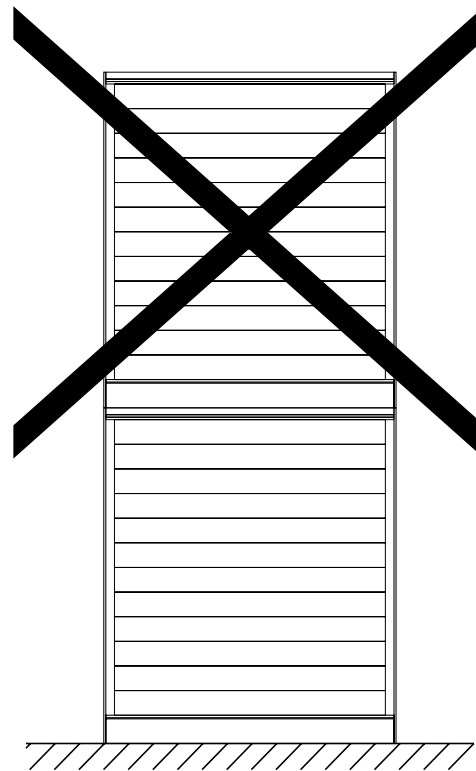


Fig. 6. Ban of panels piling at building site.

The panels should not be installed during snow and rain falls or during a dense fog. The panel assembly works should be stopped when the visibility reduces at dusk, and there is no artificial lighting provided. Sealing operations should be performed in the ambient temperature above 4°C.

● **Health and Safety considerations**

All works related to the assembly of Ruukki sandwich panels, have to be carried out in keeping with the applicable occupational health and safety regulations, for the assembly and roofing works, and to the “Technical Conditions for Construction and Assembly Works” (Part I – General Construction Works – developed by ITB – Building Research Institute), under supervision of authorised staff.

In addition use the following fall restraint equipment during panel assembly:

- rope barriers to secure the building's in perimeter,
- lifelines and safety belts of assembler type 121-II,
- safety apparatus AB-100.

● **Preparing for assembly**

Before you attempt to install Ruukki sandwich panels proceed as follows:

Check the structure for compliance with design specifications and construction accuracy (rectify any possible discrepancies).

Make sure the spacing of purlins, columns and spandrel beams is consistent with the guidelines contained in static load tables.

Make sure the purlins surfaces form a plane.

Verify the alignment of column spandrels of the wall structure (possible deviations according to PN-B-06200:2002).

Check the quality of socle related works and other wet works performance.

Prepare necessary tools for assembly of panels.

Proper structure preparation will facilitate the assembly, and result in faultless performance of fasteners and joints, ensuring aesthetical building finish. No welding is allowed in the proximity of panels as this might permanently damage the panel coat.

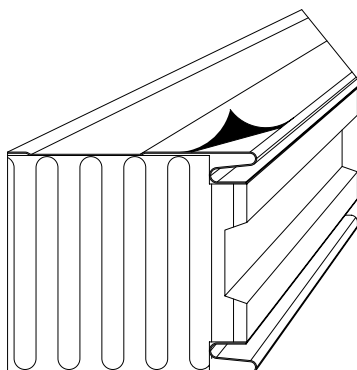


Fig. 7. Rise of protective film from internal facing of panels.

● **Protective film**

The external facings of panels manufactured by Ruukki Polska, are protected with protective film from dirt and damage. The film is applied during the panel production process.

Remove the film while installing the panel, not later, however, than 2 months from purchasing Ruukki sandwich panels.

After short-term exposure to weather conditions, the film starts to crack, which in turn may make its removal from panel external cladding difficult.

Peel the protective film off the longitudinal edges of Ruukki SP2D PU panels (applies to microprofiled, metallic varnish - e.g. Silver Metallic – RAL 9006) prior to commencement of assembly.

Remove protective film from internal cladding of panels, where such elements as flanges, dome skylights or water drains are installed – see fig. 7.

No peeled film can be left on the panel after the assembly. The film, when left, might lead to varnish staining due to penetration of water – see fig. 7a.

Ruukki SP2B PU, SPB W, SPB S nad SP2E PU wall panels can be covered with blue film that comes inside the structure under construction.

Elevation/outer side of Ruukki SP2B PU, SPB W, SPB S and SP2E PU panels made of facings in the same colours and the same profiles is marked with overprint on panel side: “elewacja ↓ outside ↓ фасад”. Arrows indicate external facing of panel.

**Assembly inconsistent with marking will cause loss of warranty!**

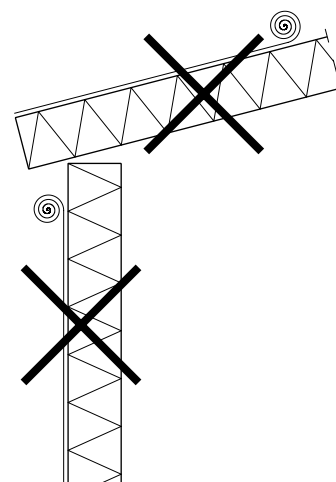


Fig. 7a. Ban of leaving a film risen.

● **Cutting panels and flashings on site**

It is recommended to cut Ruukki sandwich panels with sawing machines having fine-toothed blades, or with circular saws, provided that they are fitted with accurate guiding systems. Remove swarf immediately after cutting – see pic. 1.

No angle grinders, and any other machines that might cause overheating within the cutting zone – and consequently damage the corrosion protection – are allowed for cutting panels and flashings – see pic. 2.

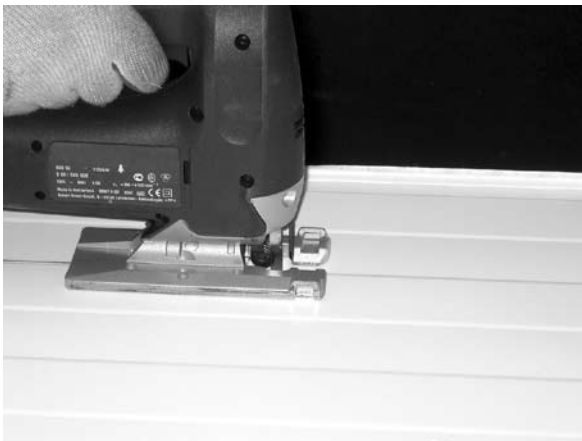
Openings cut in roof and wall components, before the panel is assembled, weaken its cross-sectional structure, therefore adequate stiffening should be provided in those places.

Use snips for cutting flashings (refer to pages 18÷21 for basic flashings cutting methods).

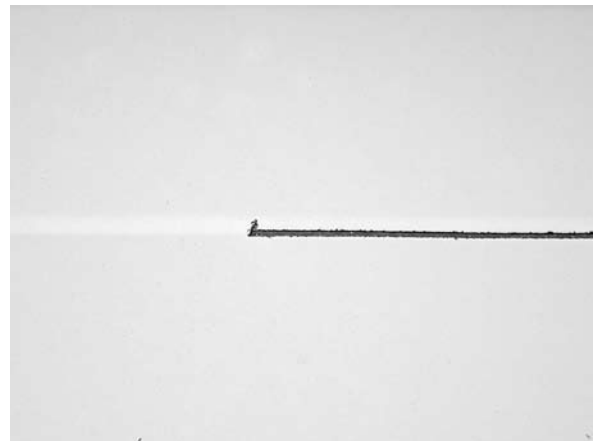
In order to protect the surface from damage cut the panels and flashings on special stands lined with soft fabric such as felt etc.

Remove the protective film, if any, from the flashings, before their assembling.

It is prohibited to cut the panels on roof, work platforms, scaffolding etc.



*Pic. 1. Sawing machines are recommended for panels cutting.*



*Pic. 2. Do not cut panels with angular grinding machine as anticorrosive covers can be devastated.*



• **Fasteners for panel assembly**

Use manufacturer recommended self-drilling fasteners for fixing Ruukki sandwich panels.

The fastener type will depend upon the load carrying structure and the thickness of panel being assembled.

In order to achieve adequate fastening of the panel to the structure, it is essential to maintain perpendicular fastener position while fixing, therefore the use of special screw guns fitted with heads for long fasteners is highly recommended.

Use stainless steel fasteners for fixing panels to structures where the following conditions are present:

- the atmosphere inside is characterised by a permanent moisture content of above 70%,
- chemically aggressive atmosphere is present inside,
- the equipment stored requires particular protection.

Thanks to specially designed support thread with no thread in the area under fastener head and a washer with EPDM vulcanised layer, watertight and durable fastening is achieved in one operation, which eliminates clearance between the sandwich panel and its base (spandrel beam, purlin or other steel structure component) – see fig. 8.

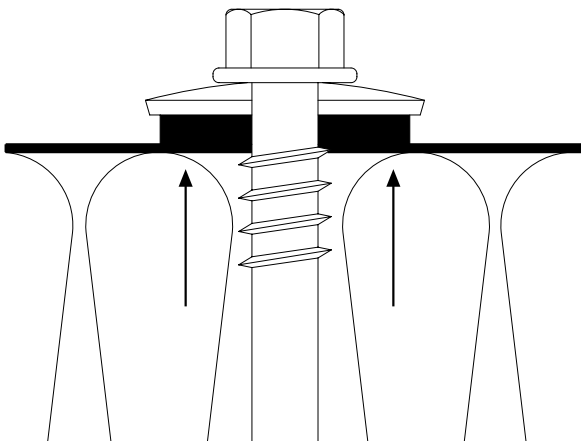


Fig. 8. Correct installation of fastener.

• **Important information for designers and assembly works contractors**

Proper layout of particular elements of construction work (edges, continuous colour elements in different colours, continuous belts of window frames, etc.) yet made in the stage of architectural planning can visually lighten the building and hide minor colour deviations.

Assembly work contractor should, if possible, assemble panels according to sequence of panels numeration (mainly refers to panels in metallic colours, e.g. RAL 9006, RAL 9007).

Assembly of panels and flashings should always proceed in accordance with production course. Rotation by 180° automatically leads to colour differences in a place of joining particular element with element already reversed. Colour differences will occur again in place of joining with a panel assembled in accordance with production course.

Assembly in large spaces requires current assessment of achieved colour conformity from the distance of at least 25 m. The further an assessing person stands from an assessed construction work, the more visible are even relatively minor colour differences.

During assembly of panels with facings in metallic colours assessment should be made as often as possible and from many sides (places). Moreover, in order to facilitate assessment, we recommend to remove protective film on regular basis.

● **Roof inclination**

The following minimum inclination of roof made of Ruukki sandwich panels is required:

> 5 % for roofs of continuous panels, without transverse joining and skylights.

> 7 % for roofs of joined panels or with skylights.

● **Minimum width for roof supports**

Always check the support for compliance with design specifications – see fig. 9 and 9a.

When adjusting width of supports, remarks included in tables of admissible loads should be considered.

● **Taking panels from package**

The use of a lift is the most convenient method for panel assembly on the roof.

Panels can be lifted one-by-one from the package – see fig. 10, using appropriate commercially available tools, such as clamps with felt or rubber lined metal pads – see fig. 11.

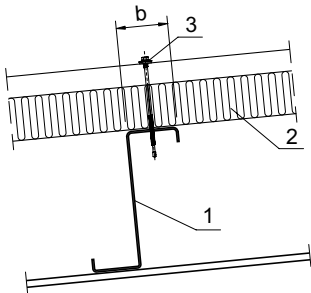


Fig. 9. Intermediate supports  $b \geq 60$  mm, where:  
1 – steel purlin, 2 – roof panel, 3 – fastener.

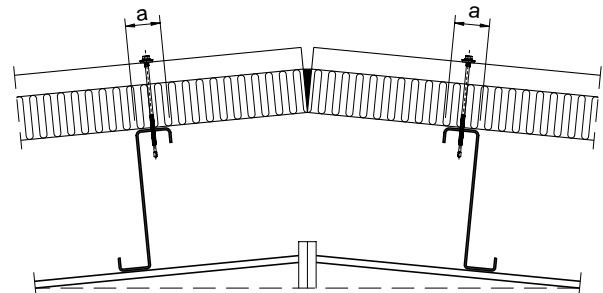


Fig. 9a. Extreme supports  $a \geq 40$  mm.

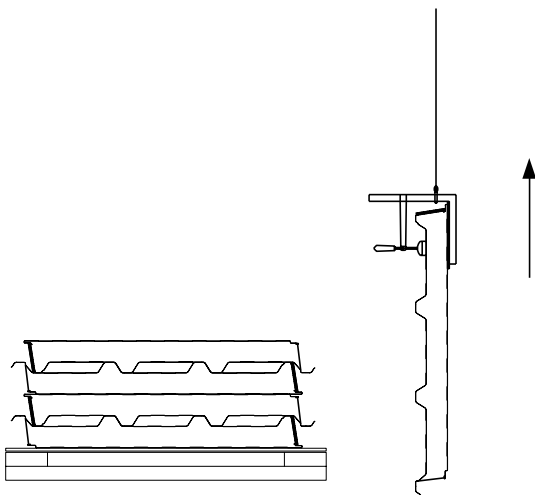


Fig. 10. Taking panels from package.

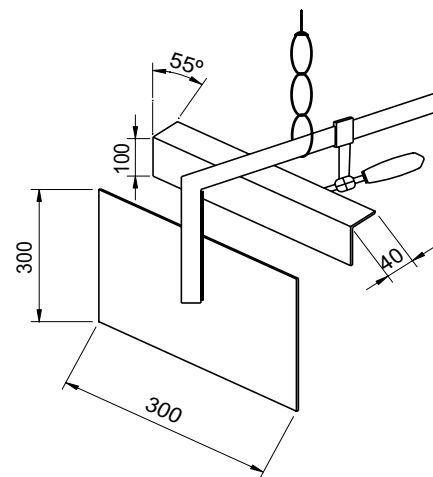


Fig. 11. Joinery squeeze with steel plate and felt strap.

When assembling roof panels which are longer than 12 m, use cross beams. Use a piece of section:

I-bar or channel bar as a holder to attach the panel in several points along the cross beam (every 3-4 m) – see fig. 13.

While assembling the panels with the use of a lift, bear in mind the roof inclination, otherwise the panel edges might get damaged – see fig. 12 and 13.

Panels of a low specific weight can be manually lifted and placed on roof.

Remove the protection film from the inside panel facing before placing it onto the roof structure.

Soft shoes (in order not to damage panel coating) should be worn by the workers while installing the roof panels.

Merge each subsequent panel with the previous one by putting the trapezoid-shaped flash of the top panel cladding onto the ridge of the adjoining panel – see fig. 14 and 14a.

While joining mineral wools and polystyrene core roof panels, apply butyl sealing compound in the scarf joint groove, to eliminate the risk of air and moisture penetration.

It does not recommend sealing roof structures with materials other than specified in on page 15, especially with acid silicone.

Correct facing between roof panels is presented in fig. M04/S01, M07/S01, M09/S01\*.

The lengthwise displacement should be reduced to minimum, to protect the sealants.

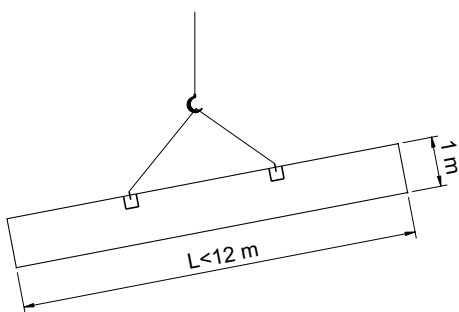


Fig. 12. Placing of panels with crane taking into consideration roof slope.

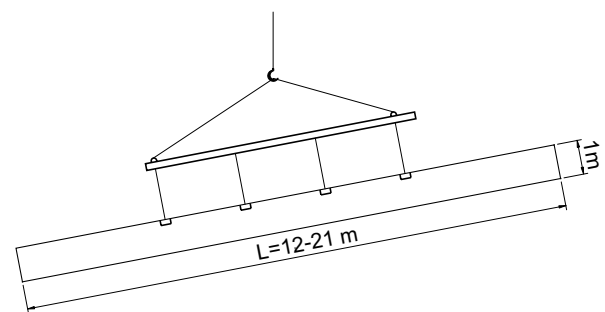


Fig. 13. Usage of traverse beam when placing over 12 m long panels.

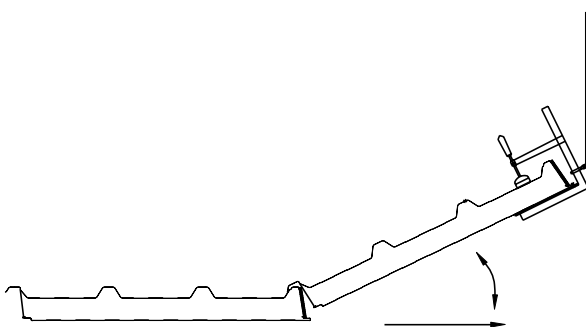


Fig. 14. Stages of roof panels assembly.



Fig. 14a. Stages of roof panels assembly. Lowering and pressing panels down.

\* the drawings are contained in catalogues "Sandwich panels with polyurethane, mineral wool and polystyrene core"

● **Assembly tools**

Special self-clamping tool No. 1410 – see pic. 3 (manufactured by Ruukki Polska) helps to ensure proper piece joining without risk of any damage to panel edges. At least two such tools will be needed for panel assembly.

Lifting assembly tool for Ruukki sandwich panels in vertical and horizontal panel arrangement. For lifting panels in horizontal panel arrangement two assembly tools should be used at least. You can find detail information in our guides named "Instruction for applying lifting assembly tool" and "The rules for borrowing lifting assembly tools from Ruukki".



Pic. 3. Assembly tool No. 1410.



Pic. 4. Lifting assembly tool for Ruukki sandwich panels in horizontal panel arrangement.



Pic. 5. Lifting assembly tool for Ruukki sandwich panels in vertical panel arrangement.



Pic. 6. Lifting assembly tool for Ruukki sandwich panels in vertical panel arrangement.



Pic. 7. Lifting assembly tool for Ruukki sandwich panels in vertical panel arrangement.

● **Screw guns**

For assembling the fasteners special screw guns with heads for long fasteners, featuring adjustment of fastener head relative depth, are recommended.

It is also allowed to use an alternative multipurpose gun, featured with adjustment of fastener head relative depth, of the following parameters:

- power output: 600 ÷ 750 W,
- operating speed at that power: 1500 – 2000 rpm,
- torque 600 – 700 Ncm.

● **Assembling roof panels**

At first, fix the panel with one fastener to the purlin below the roof ridge, then at the eaves and to the other purlins (except for the roof ridge purlin).

The edge panels are fixed to the structure (purlin) with three self-drilling fasteners through the top of the trapezoidal panel.

The middle panels are fixed to the structure (purlin) with two fasteners.

The same self-drilling fasteners are used for fixing both, the middle and edge panels, i.e. L01 fastener for hot-rolled and L02 fastener for cold-bent purlins.

In order to ensure complete joint tightness use additional L03A self-drilling fastener spaced approximately every ~ 430 mm.

The use of a multipurpose screw gun is recommended for fixing L03A fasteners - fig. 15a.

Due to diversified loads in nominal and edge zones, the final number of fasteners is defined by constructor in the project.

● **Roof ridge**

After assembling the Ruukki roof panels proceed as follows:

Rivet EA1B10 bottom ridge flashing, between the roof ridge purlins, as shown in fig. M04/S02, M07/S02, M09/S02.\*

Fill the gap between the panels with polyurethane foam; after the foam has cured cut possible flash off and place U01 shaped polyethylene sealant on both sides of the roof ridge.

In case of mineral wools core roof panels fill the gap between panels at the core depth with butyl sealing compound and mineral wool – see fig. M07/S02.\*

Fix EA1B13 side ridge flashing to panel ridges with L03 fasteners or with tight rivets.

Apply the self-adhesive 4x20 polyurethane sealant to EA1B13 side ridge flashing.

Put EA1B09 top ridge flashing on the roof ridge top and fix it with roofing sandwich panel using L03 fasteners.

● **Eaves**

While constructing an eaves of the Ruukki roof panels proceed as follows:

**Option 1: PVC gutter – fig. M04/S04, M07/S04, M09/S04\***

In order to provide adequate dewatering of the roof surface, finish the eaves panels with EA1B11 drip roof flashing.

Cut the core under the top panel facing, using an electric drill of minimum 3 000 rpm with an extended min. 65 mm long and around 5 mm diameter twist drill (make the cut crosswise the panel, under its top facing).

Fit EA1B20 assembly flashing in and fix it to the bottom panel cladding.

Fasten gutter hooks to EA1B20 assembly flashing, in order to ensure appropriate gutter inclination.

Fit EA1B11 drip roof flashing under the top panel facing and rivet it down with tight rivets and apply sealing compound along the strip.

Place PVC gutters.

Place EA1B25 drip roof flashing onto the eaves ridges.

**Option II: steel gutter - fig. M04/S05, M07/S05, M09/S05\***

In order to provide adequate dewatering of the roof surface, finish the eaves panels with EA1B27 and EA1B26 drip roof flashings – this applies to mineral wool and polystyrene core roof panels (fig. M07/S05, M09/S05\*) or EA1B24 drip roof flashing– for polyurethane core panels (fig. M04/S05\*).

Cut the core under the top panel facing, using an electric drill of minimum 3 000 rpm with an extended min. 65 mm long and around 5 mm diameter twist drill (make the cut crosswise the panel, under its top facing).

Fit in EA1B27 drip roof flashing and rivet it.

Apply EA1B26 drip roof flashing to the bottom panel facing and rivet it to the panel.

Fasten gutter hooks to the panel, so arranged to ensure appropriate gutter inclination.

Fit the steel gutter and apply sealant along EA1B27 drip roof flashing.

Place EA1B25 drip roof flashing onto the eaves ridges.

\* the drawings are contained in catalogues "Sandwich panels with polyurethane, mineral wool and polystyrene core"

● **Assembling wall panels**

The use of a lift is the most convenient method for assembly of Ruukki wall panels.

Prepare lifting sling of appropriate length, matched to that of the panel – fig. 15.

Subsequent panels can be lifted directly from the package with the use of the channel bar holder lined with soft material such as felt or rubber in the inside. The holder width has to be matched to the panel thickness – fig. 16.

Panels can be also lifted from the package using special lifting assembly tool for sandwich panels in horizontal panel arrangement (picture No. 4 and No. 5 on page 10).

Slide the top package panel off as far as two holes can be drilled, to allow placing bolts through the holder and through the panel.

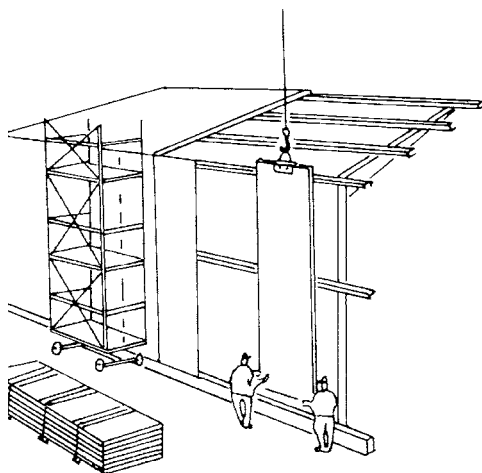


Fig. 15. Placing wall panels with crane.

Panels of low specific weight can be lifted from the pack and placed manually – fig. 18 and 19.

While lifting long panels for vertical arrangement from the package, secure the lifting to avoid damaging edges of the panel lifted and panels remaining in the package; this particularly applies to deflection above  $L/250$ .

Lift the Ruukki panels for horizontal arrangement using the channel bar holder – see fig. 20, 21, 22 or lifting assembly tool for sandwich panels in horizontal panel arrangement (picture No. 4 and No. 5 on page 10).

Remove the protective film from the panels before assembly, and put the 20x30 impregnated polyurethane sealant on the ground beam.

Put EA1B01 plinth flashing (of the width depending on the panel thickness) on the sealant.

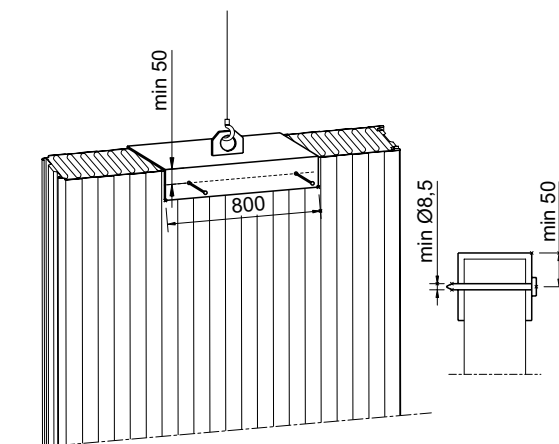


Fig. 16. Strap width must be adjusted to thickness of assembled panel.

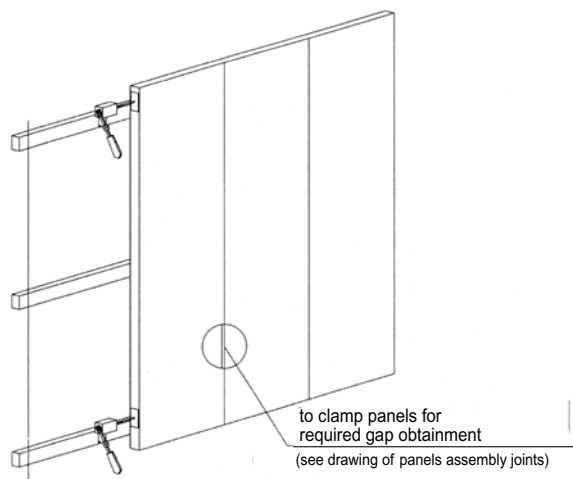


Fig. 17. Obtainment of proper shape with assembly tool usage.

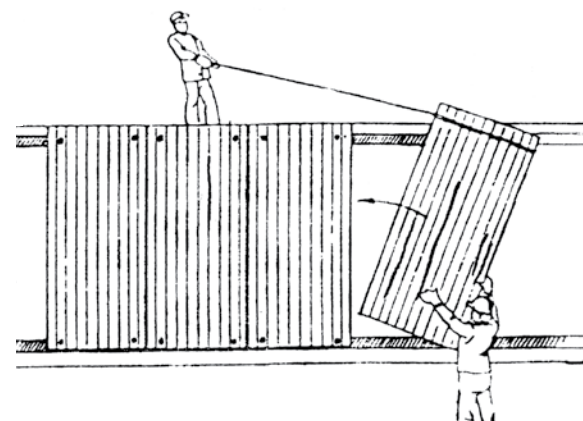


Fig. 18. Manual placing of panels on wall.

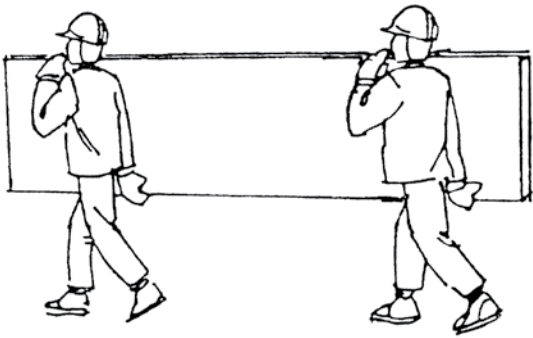


Fig. 19. Taking panels and their transfer.

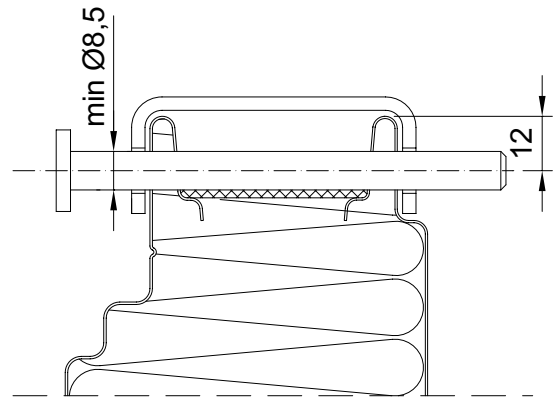


Fig. 20. Application of channel cover plate for panels in horizontal arrangement.

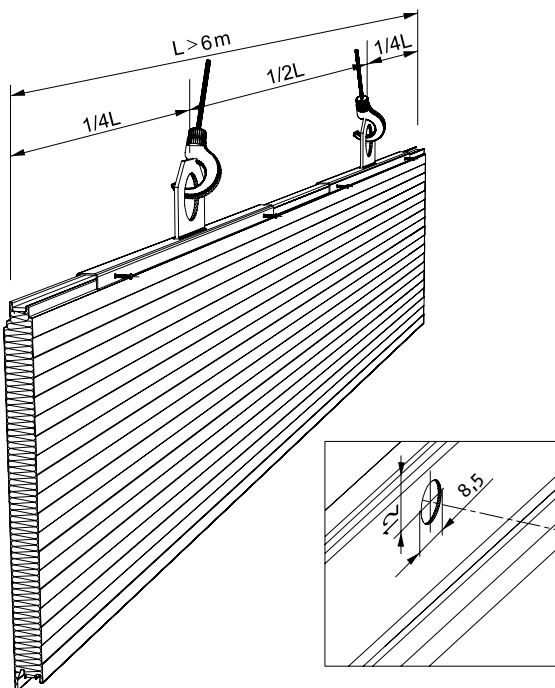


Fig. 21. Application of channel cover plate when taking wall panels  $L > 6$  m.

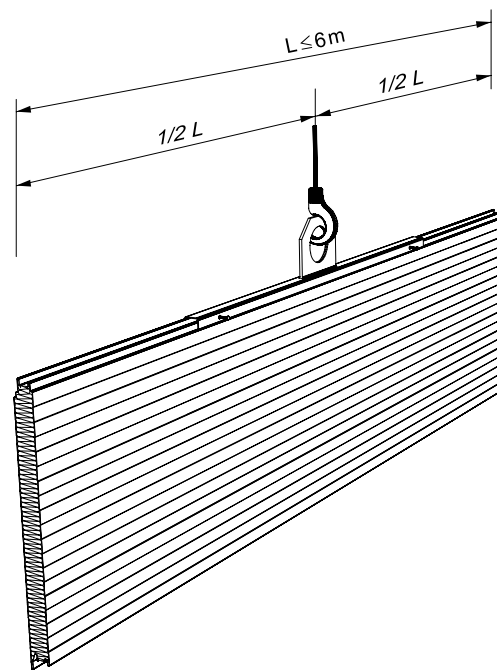


Fig. 22. Application of channel cover plate when taking wall panels  $L \leq 6$  m.



Pic. 8. Using lifting assembly tool with sandwich panels in horizontal panel arrangement.



Pic. 9. Using lifting assembly tool with sandwich panels in vertical panel arrangement  $L \leq 6$  m.

● **Taking panels from package – vertical arrangement**

Lift the mineral wool core Ruukki wall panel, intended for vertical arrangement, to stand on its side edge first, to allow attachment of appropriate channel bar holder, and then lift it to the upright position – see fig. 23, 24, 25, 26 and 27.

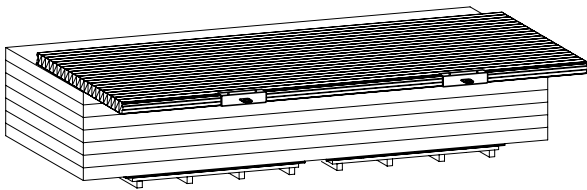


Fig. 23. 1. Stage – advance panels from package and fasten gripping devices or lifting assembly tool symmetrically to panels center.

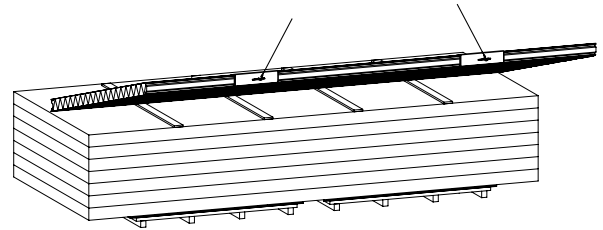


Fig. 24. 2. Stage – put spacers under panel lifted, in order not to damage another panel and lift very carefully.

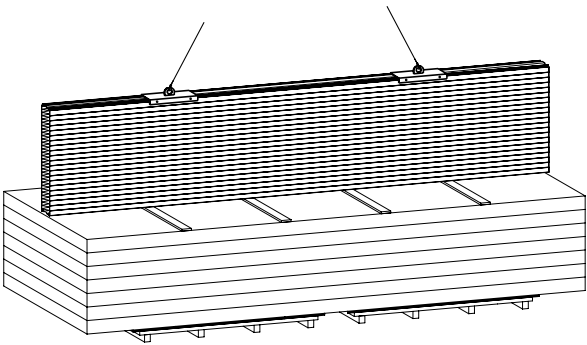


Fig. 25. 3. Stage – position panel on its longer edge on package.

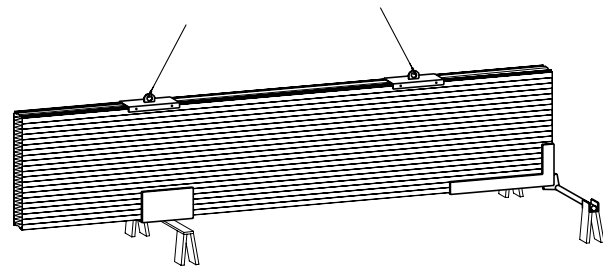


Fig. 26. 4. Stage – place panel on a stand, fasten a suitable gripping device or lifting assembly tool for sandwich panels in vertical panel arrangement (picture 9 on page 13).

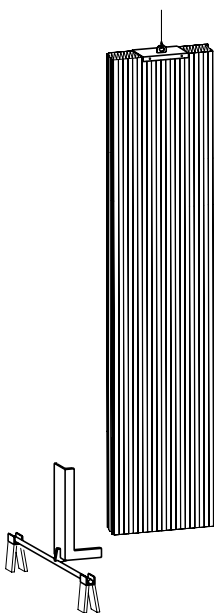


Fig. 27. 5. Stage – turn panel vertically.

● **Note**

Before fixing the mineral wool or polystyrene core wall panels to the structure, apply butyl sealing compound in the external and internal panel groove, as specified in the design.

Position the panel vertically after placing it against the structure.

Level the drip and fix the panel complete with the drip (applies to vertical panel arrangement) to the socle rail – fig. M30/S01, M27/S01, M29/S01, M28/S01, M32/S01, M35/S01 and M34/S01.\*

Precise positioning of the edge panel will help to avoid misalignment of all the panels in row.

The tongue-and-groove system makes the assembly of panels much faster.

In order to ensure desired tightness of the longitudinal joint use the special assembly tool No. 1410, which allows to press the components together without damaging panel edges. You will need at least two such tools to complete the assemble.

Use varied pressing force, depending on the wall panels type and thickness.

Use the self-drilling fasteners for fixing the wall panels, of L01 type for hot-rolled and L02 for cold-bent sheeting rails.

Use special screw guns with adequate accessories for fixing the fasteners.

Specific solutions for assembling basic structures are presented in the following catalogues:

- Sandwich panels with polyurethane core.
- Sandwich panels with mineral wool core.
- Sandwich panels with polystyrene core.
- Sandwich panels for cold storage facilities.

For details regarding flashings and other panel assembly accessories refer to the "Accessories for sandwich panels" catalogue. In cases not covered in the mentioned catalogues, proceed with the assembly as specified in the light housing design.

**According to Ruukki Polska experience, the most common reasons for performance defects reported for structures made in Ruukki light housing design, are the following:**

- **applying solutions other than recommended by the sandwich panel manufacturer's information,**
- **replacing the manufacturer-recommended materials with others,**
- **failure to utilize professional equipment,**
- **untrained workers fixing the panels.**

**Due to high defect removal cost we encourage you to make use of the information available in our catalogues or to visit us at [www.ruukki.com/pl](http://www.ruukki.com/pl). Also consultancy services rendered by our employees are available.**

● **Cleaning and preservation**

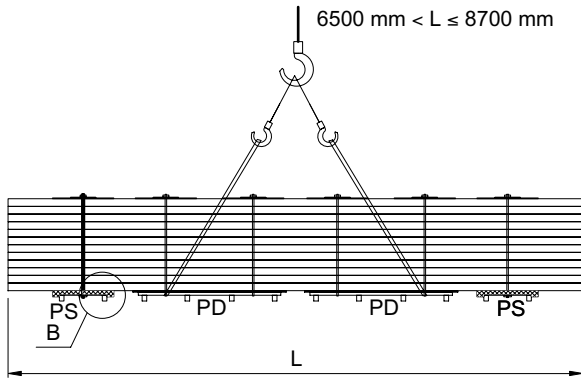
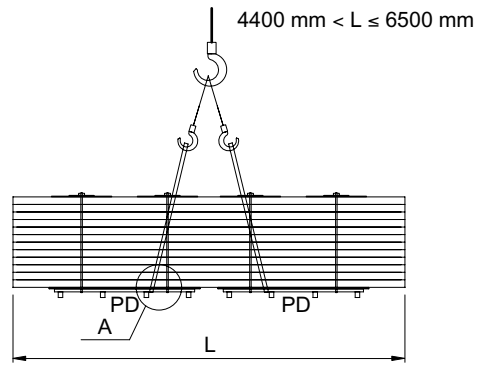
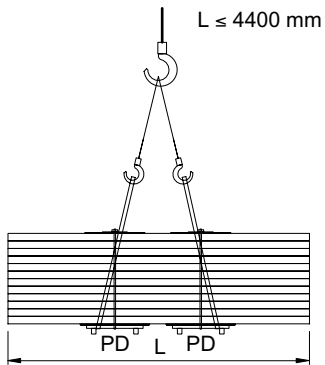
After completion of assembly and removing the protective film, manually remove all dirt, grease and dust, with (pH=7) water solution of mild cleaning agent, using cotton cloth or sponge. Next, rinse the surface with fresh water. Cleaning should be done in temperatures above zero.

● **Sealing materials**

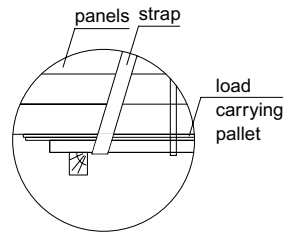
- butyl sealing compounds – Sikalastomer 710, Butylene-X,
- permanently elastic sealing compounds – Sikaflex PRO3WF,
- sealing compounds increasing fire resistance –Terostat MS-939,
- compounds for sealing the passes of assembly conduits in roof – Terostat MS-9302 and MS-930.

\* the drawings are contained in catalogues "Sandwich panels with polyurethane, mineral wool and polystyrene core"

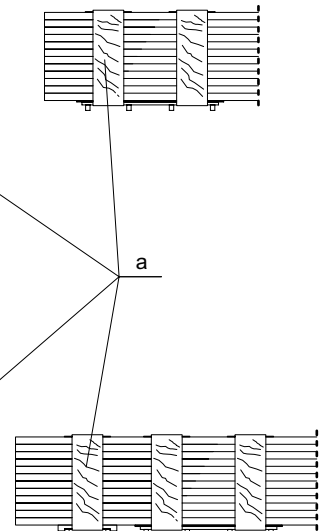
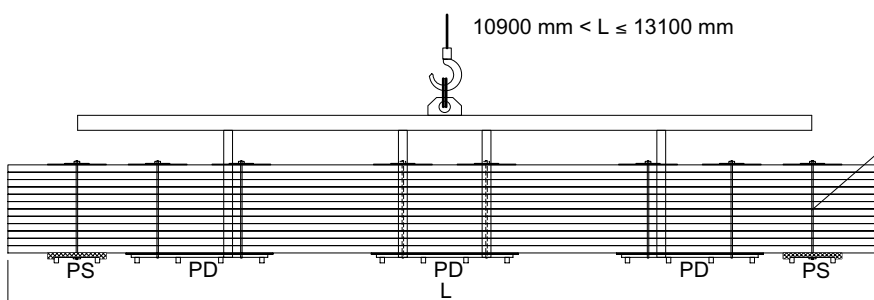
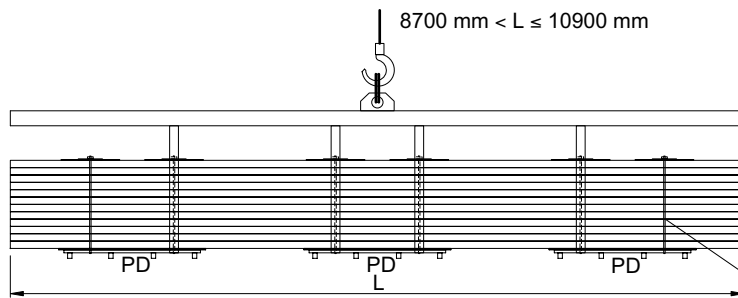
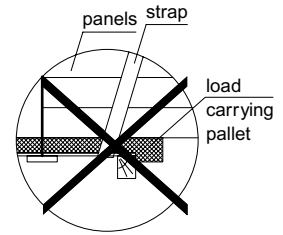
• Attachment of panel packages while unloading

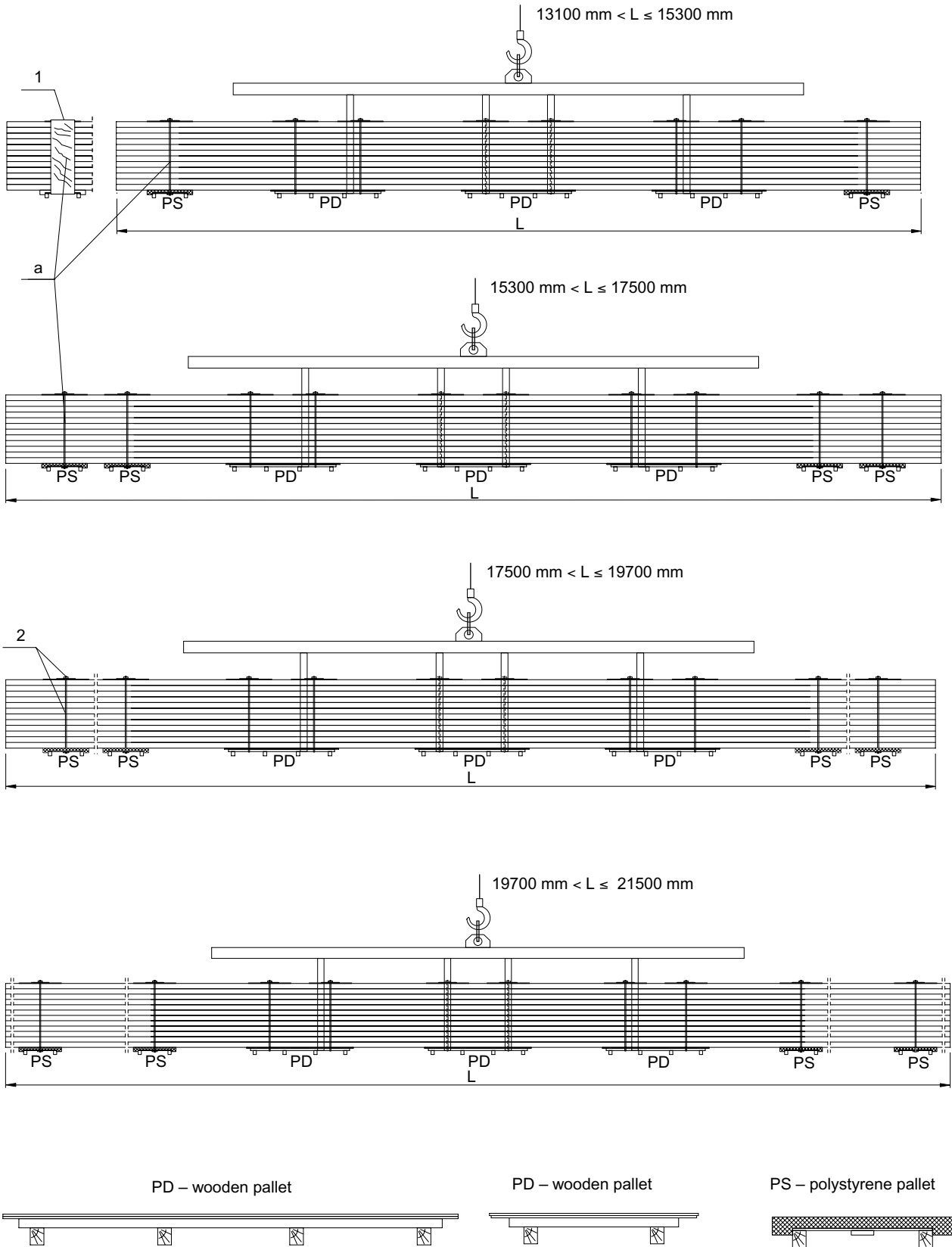


Detail A  
(wooden pallets unloading attachment layout)



Detail B  
(it is prohibited to attach lifting slings to the polystyrene pallets)





• **Two methods of panel banding in the package**

1. Stretch film.
2. Polyester band + 30x80 square-sawn timber.

*Note:*  
Standard film wrapping of the entire package.

• Flashing assembly

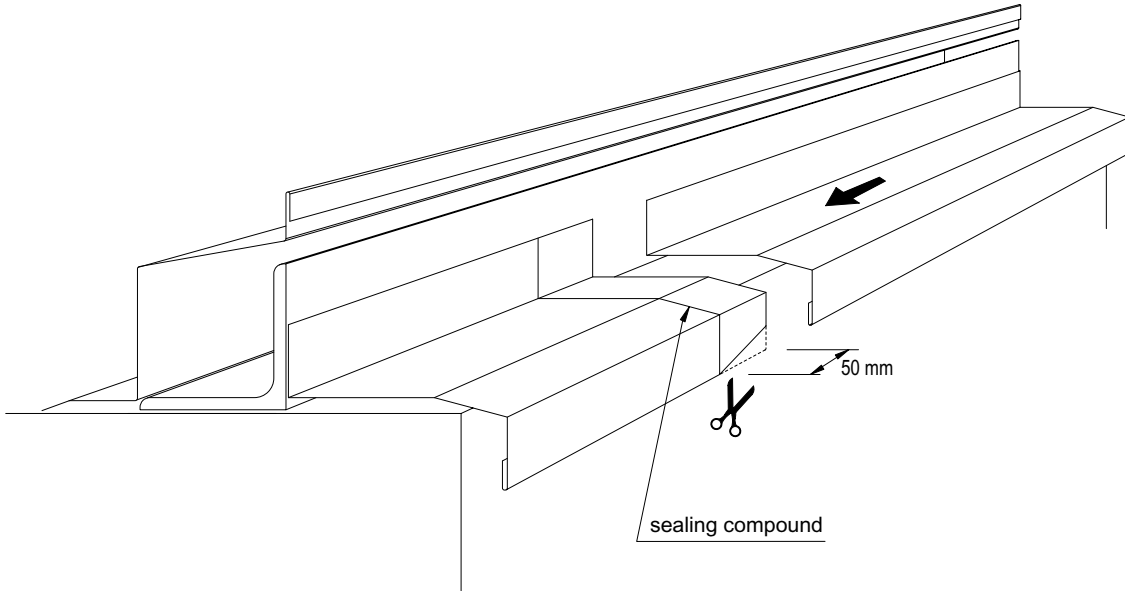


Fig. 1. Joining the socle flashing.

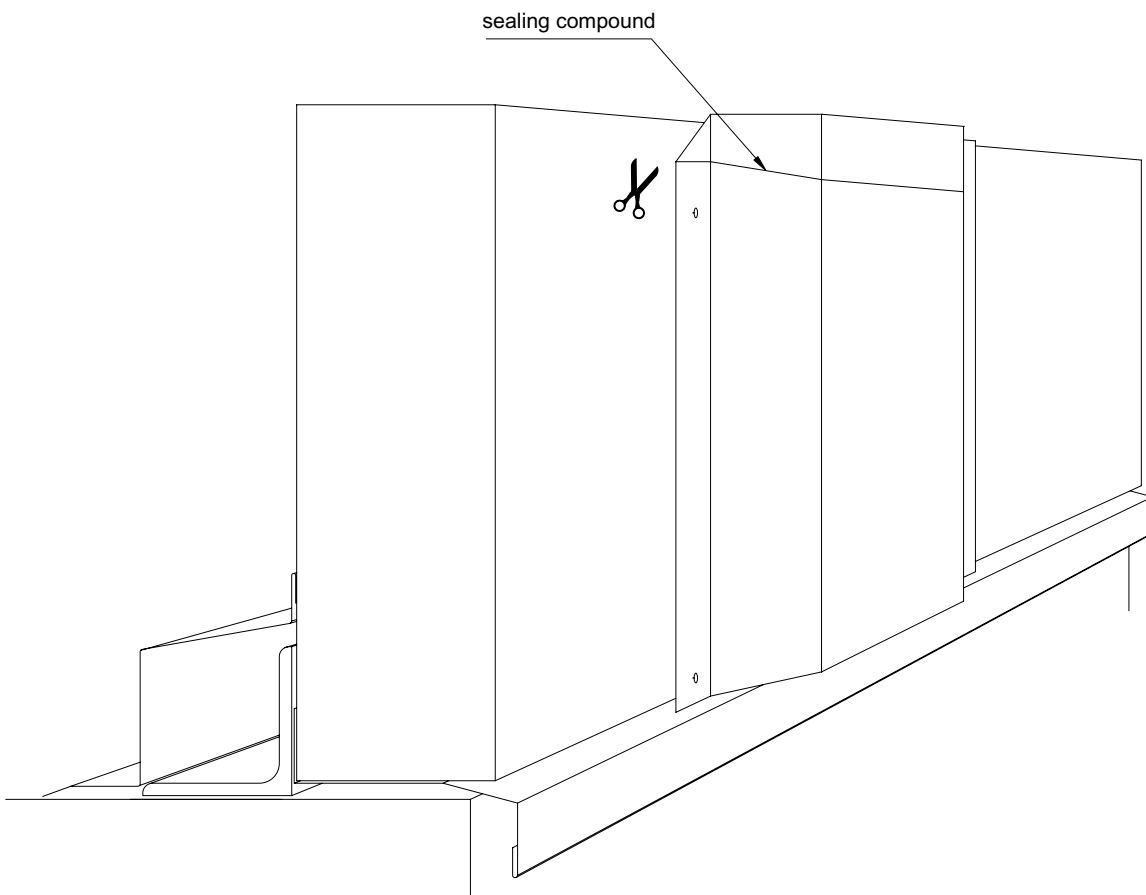


Fig. 2. Joint between the socle and vertical flashing.

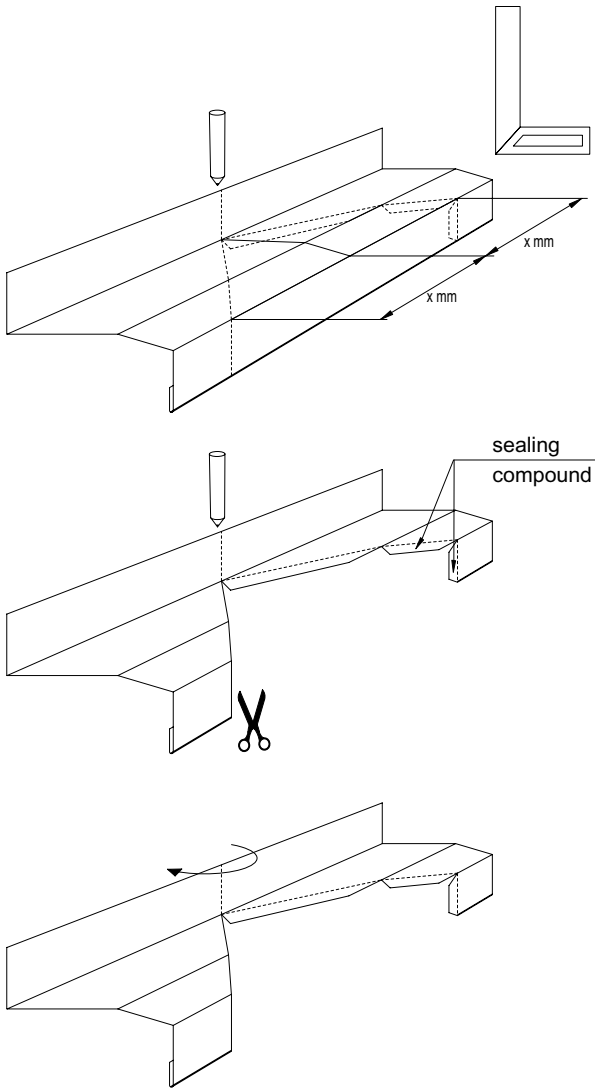


Fig. 3. External socle corner.

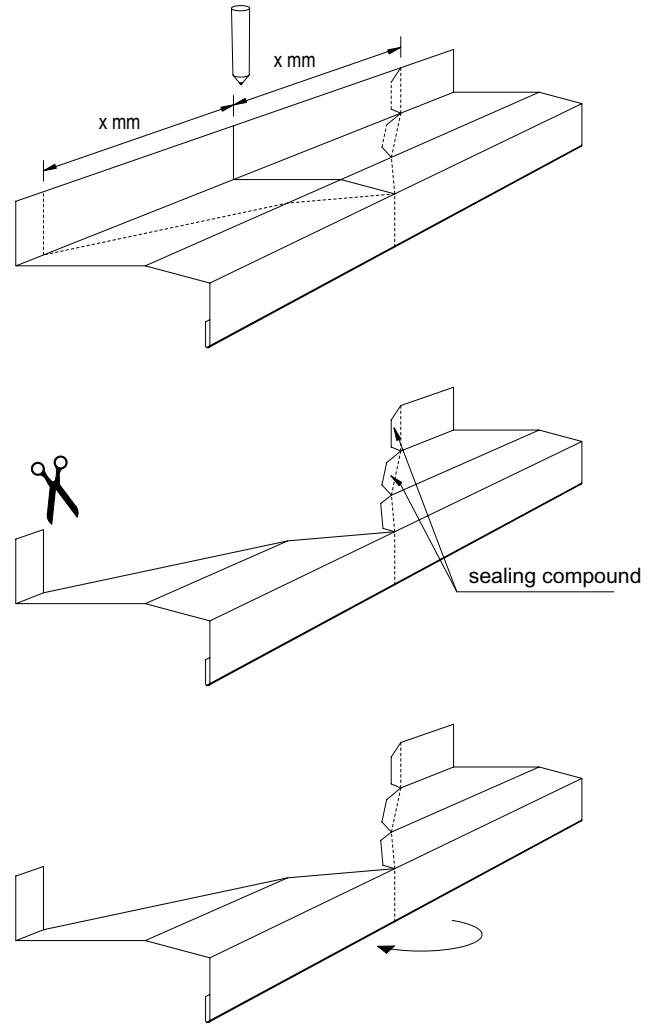


Fig. 4. Socle flashing external corner.

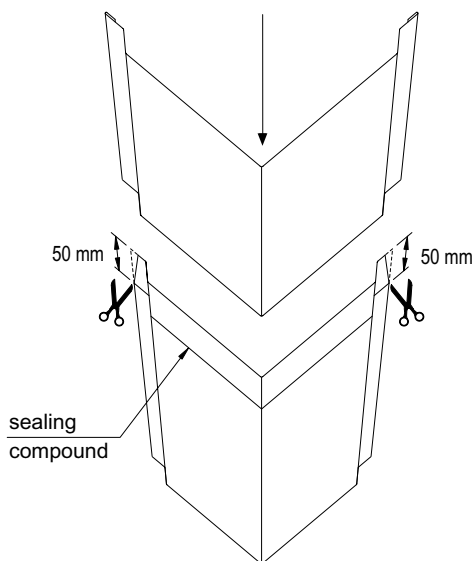


Fig. 5. Joining the corner flashing.

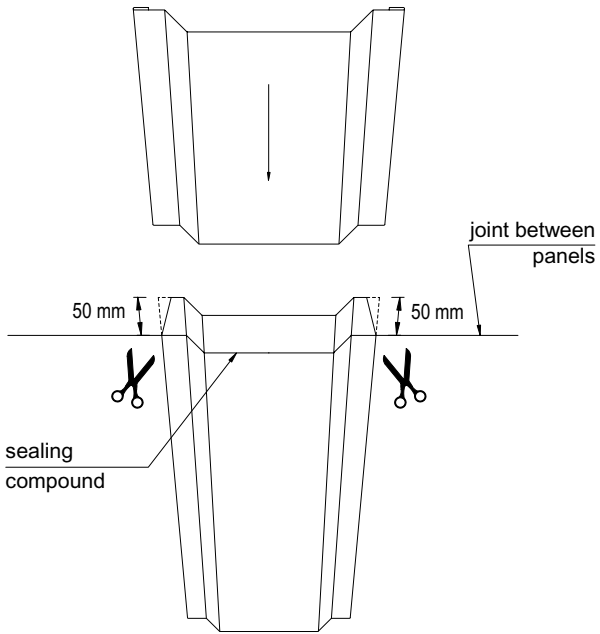


Fig. 6. Joining the vertical flashing.

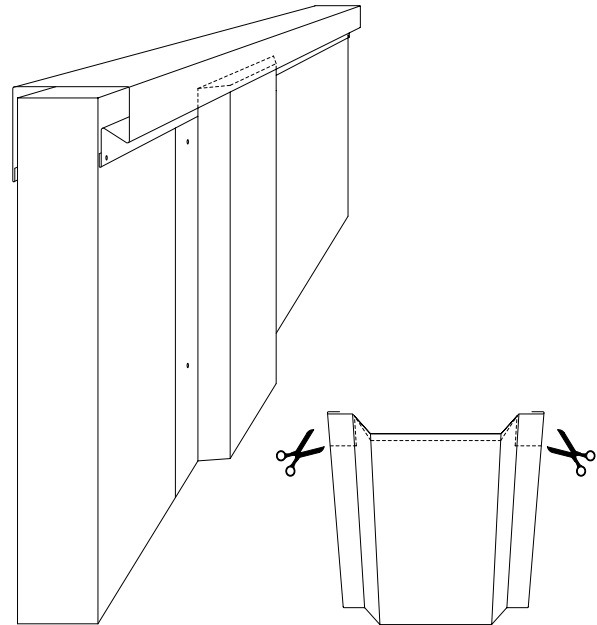


Fig. 7. Joint between the roof flashing and vertical flashing.

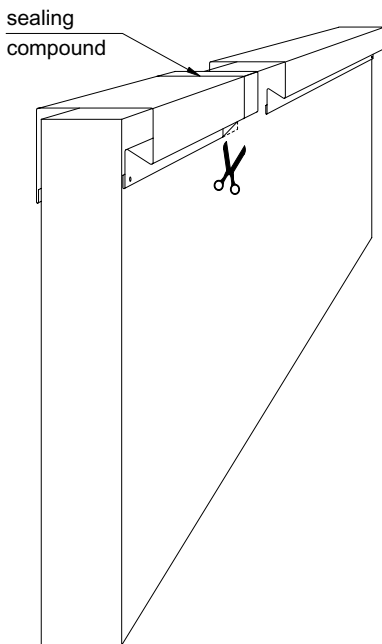


Fig. 8. Joining the cornice strip.

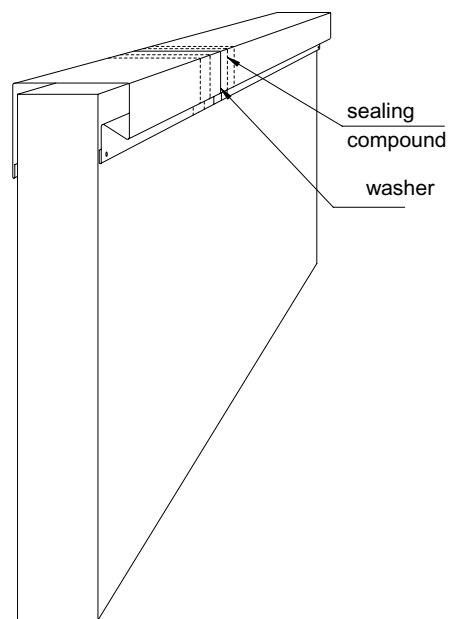
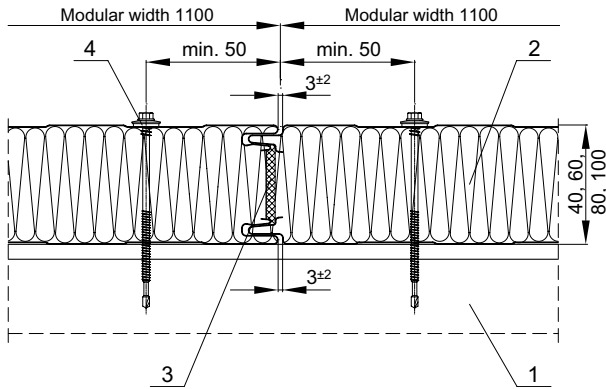


Fig. 9. Joining the cornice strip with additional plate sheet.

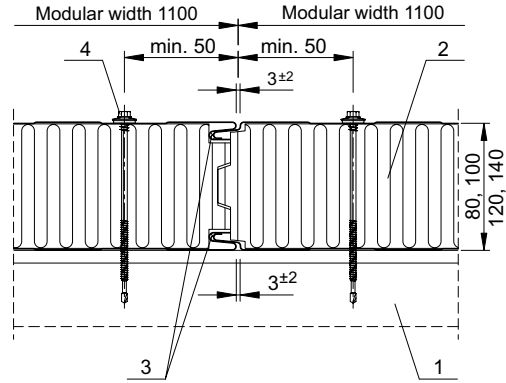
• Joints between the panels

• Joint between Ruukki SP2B PU panels



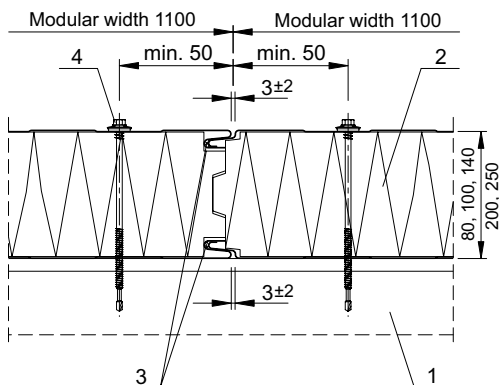
1. Steel rail or column acc. to engineering design of the structure.
2. Ruukki SP2B PU sandwich panel.
3. Factory-applied polyurethane sealant.
4. L01 fastener for hot-rolled section or L02 for cold-bent section.

• Relief joint between Ruukki SPB W panels



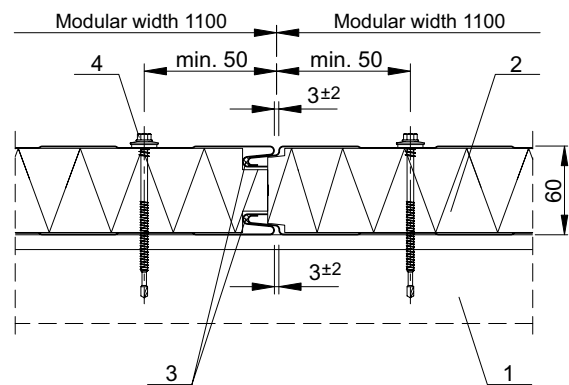
1. Steel rail or column acc. to engineering design of the structure.
2. Ruukki SPB W sandwich panel.
3. Butyl sealing compound in panel joint applied at the building site.
4. L01 fastener for hot-rolled section or L02 for cold-bent section.

• Straight joint between Ruukki SPB S panels



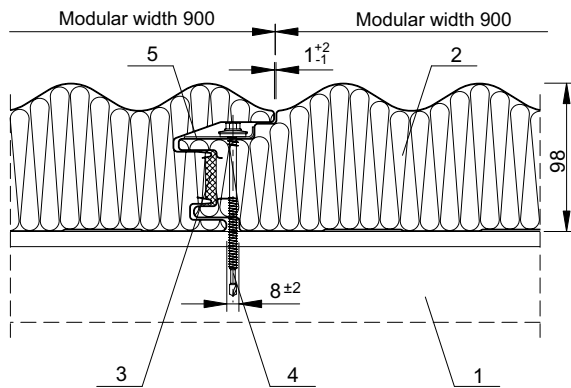
1. Steel rail or column acc. to engineering design of the structure.
2. Ruukki SPB S sandwich panel.
3. Butyl sealing compound in panel joint applied at the building site.
4. L01 fastener for hot-rolled section or L02 for cold-bent section.

• Relief joint between Ruukki SPB60S panels



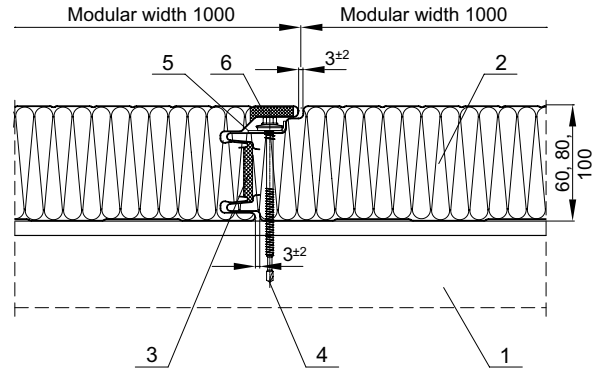
1. Steel purlin acc. to engineering design of the structure.
2. Ruukki SPB60S sandwich panel.
3. Butyl sealing compound in panel joint applied at the building site.
4. L01 fastener for hot-rolled section or L02 for cold-bent section.

● **Joint between Ruukki SPF98/80PU panels**



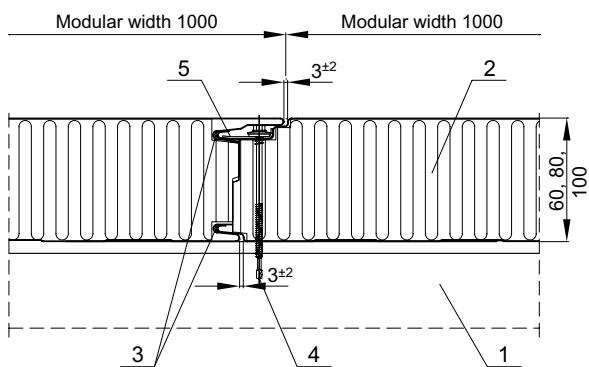
1. Steel rail or column acc. to engineering design of the structure.
2. Ruukki SPF98/80PU sandwich panel.
3. Factory-applied polyurethane sealant.
4. L01 fastener for hot-rolled section or L02 for cold-bent section.
5. L04 fastener.

● **Joint between Ruukki SP2D PU panels**



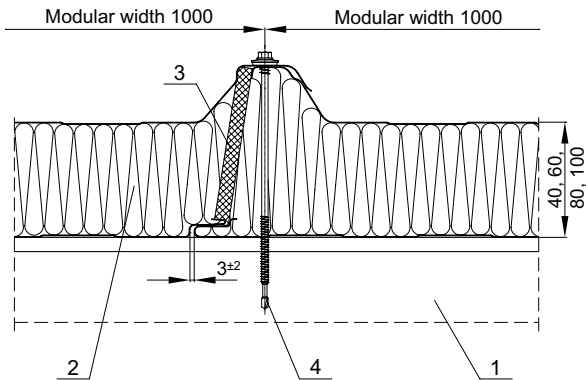
1. Steel rail or column acc. to engineering design of the structure.
2. Ruukki SP2D PU sandwich panel.
3. Factory-applied polyurethane sealant.
4. L01 fastener for hot-rolled section or L02 for cold-bent section.
5. L04 fastener.
6. Gas permeable polyurethane seal.

● **Joint between Ruukki SP2D W panels**



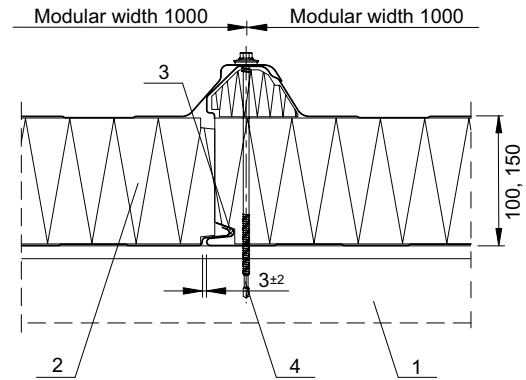
1. Steel rail acc. to engineering design of the structure.
2. Ruukki SP2D W sandwich panel.
3. Butyl sealing compound in panel joint applied at the building site.
4. L01 fastener for hot-rolled section or L02 for cold-bent section.
5. L15 fastener.

• **Joint between Ruukki SP2C PU panels**



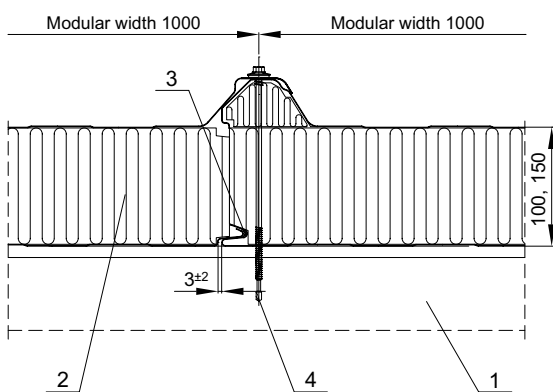
1. Steel purlin acc. to engineering design of the structure.
2. Ruukki SP2C PU sandwich panel.
3. Factory-applied polyurethane sealant.
4. L01 fastener for hot-rolled purlin or L02 for cold-bent purlin.

• **Relief joint between Ruukki SPC S panels**



1. Steel purlin acc. to engineering design of the structure.
2. Ruukki SPC S sandwich panel.
3. Butyl sealing compound in panel joint applied at the building site.
4. L01 fastener for hot-rolled purlin or L02 for cold-bent purlin.

• **Joint between Ruukki SPC W panels**



1. Steel purlin acc. to engineering design of the structure.
2. Ruukki SPC W sandwich panel.
3. Butyl sealing compound in panel joint applied at the building site.
4. L01 fastener for hot-rolled purlin or L02 for cold-bent purlin.

● **Fasteners for panel assembly**

● **Fasteners for Ruukki panels with polyurethane core**

Panel type	Thickness	SPF PU		SP2D PU			SP2B PU			SP2C PU						
		98/80	60	80	100	60	80	100	80/40	100/60	120/80	140/100				
Fastener type	Support wall thickness [mm]															
				hump		hollow		hump		hollow		hump		hollow		
L01	3.0-12.0	L01B L16**	L01A L16**	L01B L16**	L01C L16**	L01B	L01C	L01D	L01C	L01A	L01D	L01B	L01D	L01C	L01E	L01D
L02	1.5-5.0	L02B L16**	L02A L16	L02B L16**	L02C L16**	L02B	L02C	L02D	L02C	L02A	L02D	L02B	L02E	L02C	L02E	L02D
Estimated use per 100 m <sup>2</sup>		40 sets* <sup>1)</sup> 10 sets* <sup>2)</sup>				80 pcs.				75 pcs.						
L03		for fastening flashings							for fastening flashing and strips in panel joints							
Estimated use per 100 m <sup>2</sup>		depends on the number of flashings							180 pcs.							

\* single set includes 2 pcs. of L01 or L02 fasteners and one L16 fastener – load capacity of single set is 3.50 kN or three L01 or L02 fasteners and one L12 fastener

\*\* from span > 4.00 m – L16 C/N fastener

<sup>1)</sup> for vertical arrangement

<sup>2)</sup> for horizontal arrangement

• Fasteners for Ruukki panels with mineral wool core

Panel type Thickness	Support wall thickness [mm]	SP2D W		SPB W			SPC W				
		100	120	80	100	120	140	140/100		190/150	
Fastener type								<i>hump</i>	<i>hollow</i>	<i>hump</i>	<i>hollow</i>
L01	3.0-12.0	L01C L15**	L01D L15**	L01C	L01D	L01D	L01E	L01E +L06*	L01D	L01F +L06*	L01E
L02	1.5-5.0	L02C L15**	L02D L15**	L02C	L02D	L02E	L02E	L02E +L06*	L02D	L02F +L06*	L02E
<i>Orientacyjne zużycie na 100 m<sup>2</sup></i>		40 sets** <sup>1)</sup> 10 sets** <sup>2)</sup>		120 pcs. for vertical arrangement 90 pcs. for horizontal arrangement				75 pcs.			
L03		for fastening flashings					for fastening flashing and strips in panel joints				
<i>Estimated use per 100 m<sup>2</sup></i>		depends on the number of flashings					180 pcs.				

\* depending on the L01 (L02) fastener load

\*\* single set includes 2 pcs. of L01 or L02 fastener and one L15 fastener, load capacity of single set is 3.00 kN

<sup>1)</sup> for vertical arrangement

<sup>2)</sup> for horizontal arrangement

• Fasteners for Ruukki panels with polystyrene core

Panel type Thickness	Support wall thickness [mm]	SPB S						SPC S			
		60	80	100	140	200	250	140/100		190/150	
Fastener type								<i>hump</i>	<i>hollow</i>	<i>hump</i>	<i>hollow</i>
L01	3.0-12.0	L01B	L01C	L01D	L01E	L01F	L01G	L01E +L06*	L01D	L01F +L06*	L01E
L02	1.5-5.0	L02B	L02C	L02D	L02E	L02F	L02G	L02E +L06*	L02D	L02F +L06*	L02E
<i>Estimated use per 100 m<sup>2</sup></i>				120 pcs. <sup>1)</sup> 90 pcs. <sup>2)</sup>						75 pcs.	
L03		for fastening flashings					for fastening flashing and strips in panel joints				
<i>Estimated use per 100 m<sup>2</sup></i>		depends on the number of flashings					180 pcs.				

\* depending on the L01 (L02) fastener load

<sup>1)</sup> for vertical arrangement

<sup>2)</sup> for horizontal arrangement

- Sealants for panel assembly

- Sealants for Ruukki panel assembly

<i>Sealant type</i>	<i>Size</i>	<i>Application</i>
U01 sealant	30x45x1000	roof ridge and roof finishing sealing (sealant shape matched to the roof panel top facing profile)
U03 sealant	30x21x900	sealing of contact flashings with external facing of Ruukki SPF PU
Impregnated polyurethane sealant	20x30	sealing and finishing of Ruukki panels and windows
Impregnated polyurethane sealant	20x50	sealing and finishing of Ruukki panels and windows
Self-adhesive sealant	4x20	separator between Ruukki panel and reinforced column
Self-adhesive polyurethane sealant	8x40	separator between socle and Ruukki panel

- **Our sales representatives will be happy to give you more information.**

Customer Service

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