

Inclined Roof System **Trimoterm SNV**



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1 Technical Description of Roof System Trimoterm SNV

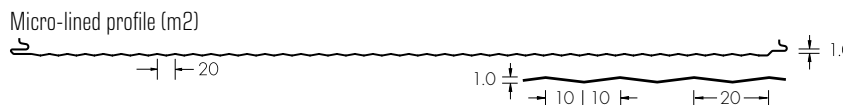
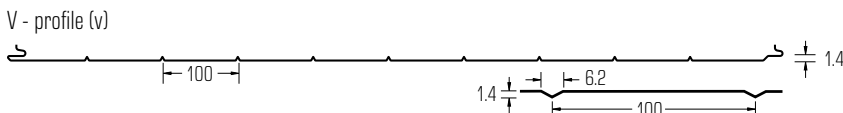
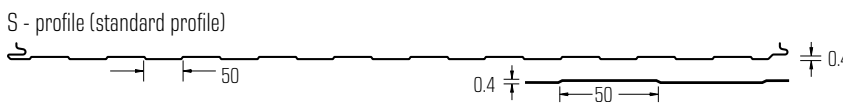
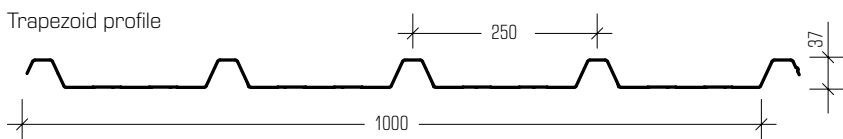
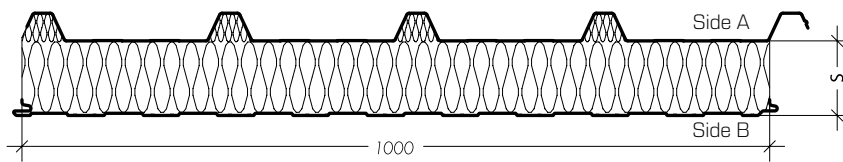
1.1 General

Trimoterm SNV roof panels in a standard module width of 1000 mm represent basic Trimo roof system. They are fixed on roof purlins that are placed over the roof slope at specified spans.

The SNV roof system offers excellent technical properties, a long life span and allows creative design freedom. The assembly system using Trimoterm fire-proof panels excels in high fire-resistance, excellent thermal and sound insulation. The range of application of SNV roofs is extremely wide. They are suitable for business, commercial, production buildings, as well as those constructed for representative purposes. Trimoterm SNV panels can be also used as façade panels.

1.2 Panel Profile

The top steel sheet is a uniform trapezoid form. The bottom steel sheet can be made of various profiles forms.



Profile Type	A	B
Trapezoid	•	
S - profile (s)		•
V - profile (v)		•
Smooth profile (g)		•
Micro-lined profile (m2)		•

Thickness selection for the panels 60, 80, 100, 120, 150, 172 and 200 mm.

Note: Complete panel range can be found in brochure Trimoterm Fireproof panels - Product range.

1.3 Panel Composition

Trimoterm SNV fireproof panels consist of a completely galvanised shallow and deep-profiled colour coated steel sheet of 0.5 mm and 0.6 mm thicknesses. The steel sheet is bonded to the panel core which is made of incombustible lamellated class A1 mineral wool (EN 13501-1). All three layers make a solid panel with a thickness ranging between 60 - 200 mm depending on the required load-bearing capacity, tightness and assembly requirements.

A protective polyethylene foil is applied to the panel surface to protect it during handling, transport and assembly. The foil is removed after the assembly has been completed.

Panels can be up to 14 m long.

1.4 Technical Data

1.4.1 Basic Technical Data

Table 1: Technical data for Trimoterm SNV roof panels

Technical data SNV, SNV-3L		SNV 60	SNV 80	SNV 100	SNV 120	SNV 150	SNV 172	SNV 200
Panel thickness [mm]		60	80	100	120	150	172	200
Weight SNV [kg/m ²]	Fe 0.6 / Fe 0.6	18.9	21.3	23.7	26.1	29.7	32.4	35.7
Min. roof slope		5° or 3° with additional sealing						
Cover width [mm]		1000						
Panel length [m]		up to 14						

Complete Technical data are available in Technical Specification data sheet.

1.4.2 Coatings

Trimoterm SNV roof panels consist of a filling (mineral wool) and covering made of galvanised pre-painted thin steel sheet. Steel sheet metal is preliminary hot galvanised (usually 275 g/m²) in compliance with EN 10346, and additionally protected by organic coating in accordance with the »coil-coating« process (DIN EN 10169/1).

The following basic types of organic coating protection are applied to the steel sheet metal:

- based on SP polyester
- based on PVDF polyvinylidene fluoride
- based on PUR polyurethane
- based on PVC polyvinyl chloride, coating or film

Individual types of organic protection with the basic characteristics are presented in Table 1.

Table 2: Basic characteristics of an individual type of organic coating or protection.

TYPE OF CORROSION PROTECTION	SP	PVDF	PVDF+	PUR	PVC(P)	PVC+F
Corrosion classification (DIN 55928-8)	III	III	III	III	III	III
Total organic thickness (my) [EN 13523-1]	25	25	35	50	175-200	120-200
Temperature resistance (°C)	+80	+110	+110	+110	+70	+70
UV resistance category [EN 13523-10]	Ruv3	Ruv4	Ruv4	Ruv4	Ruv2	—
Flexibility	••	•••	••••	••••	••••	••••
Staining resistance	•••	••••	••••	••••	••	••••

Note:

•••• suitable without reservations ••• very suitable •• suitable • suitable with reservations/contact Trimo - unsuitable

Note: detailed coating explanation together with Instructions **for the use and Maintenance can be found in »Technical instructions for the use and maintenance of Trimo products«.**

2 Design Procedure

2.1 Panel Thickness Selection

With respect to the client's or project's requirements or in accordance with the legislation appropriate thickness of Trimoterm SNV roof panel shall be selected. Thickness has a direct influence on the load-bearing capacity of the panel, thermal insulation of the roof and heat stability of the structure.

2.2 Structural Design Data

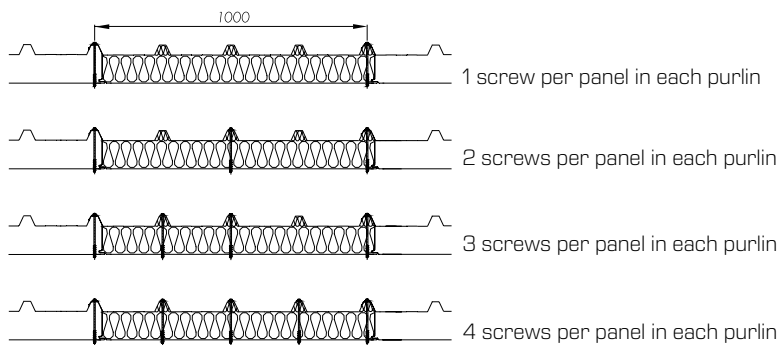
Allowed distances between supports are determined in relation to the selected panel thickness, loads and support widths.

Exact Structural calculation is available by contacting Trimo Technical service.

2.3 Fixing Method

Structural engineer will determine the required number of screws in accordance with the standards and regulations of an individual country. A detailed calculation prepared by Trimo's technical department is recommended for each individual building. The principle of screw arrangement relating to the calculated number is shown in Fig. 1.

Fig. 1: Fixing arrangement.



The main factors influencing the fixing calculation are:

Wind load:

- basic wind load,
- height of building above the ground,
- area on the roof (edge and corner areas are more exposed to wind suction).

Building type:

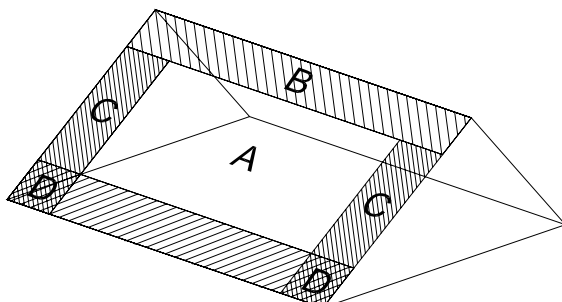
- Open, partly open, closed buildings.

Various loads appear on the roof in relation to the factors mentioned and the fixing method should be adjusted to accommodate them. Fig. 2 shows the characteristic fixing areas.

Tables for the calculation of fixing are given in Separate document.

Tables for the calculation of fixing are given in the Appendix to the catalogue.

Fig. 2: Characteristic fixing areas.



2.4 Snow Guards

2.4.1 General

Installation of snow guards is recommended for all buildings where sliding of snow may present a danger to people and property. Legislation in various countries prescribes obligatory installation of snow guards on buildings with roofs where the inclination is greater than 22° (e.g. Slovenia), but the experience shows that they are actually needed also on low pitch roofs.

For Trimoterm SNV roof panels snow guards of type 330 placed in a line are used. They are made of galvanised and colour coated steel sheet.

2.4.2 Snow Guards Arrangement and Fixing

As a priority, snow guards arranged in a line are fixed with screws that are intended for fixing panels on purlins.

The fixing method and the basic principle of arrangement are presented in Fig. 3 and 4. Informative number of snow guards required and the corresponding number of screws required for fixing per panel width are shown in Table 3.

Table 3: Number of snow guards and number of screws.

Snow		Length of a roof slope											
		0 - 6		(6) - 10		(10) - 15		(15) - 20		(20) - 25		(25) - 30	
S ₀ (kN/m ²)	Roof angle β	n _v	N _s	n _v	N _s	n _v	N _s	n _v	N _s	n _v	N _s	n _v	N _s
0,75	0° - 10°	2	1	2	1	2	1	2	1	4	1	4	1
	(10°) - 20°	2	1	3	1	4	2	4	3	4	3	4	3
	(20°) - 30°	2	1	4	3	4	3	4	3	4	4	4	4
1,00	0° - 10°	2	1	2	1	2	1	4	1	4	2	4	3
	(10°) - 20°	2	1	4	1	4	3	4	3	4	3	4	4
	(20°) - 30°	4	1	4	3	4	4	4	4	4	4	4	5
1,25	0° - 10°	2	1	2	1	4	1	4	2	4	3	4	3
	(10°) - 20°	3	1	4	2	4	3	4	3	4	4	4	4
	(20°) - 30°	4	2	4	3	4	4	4	4	4	5	4	6
1,50	0° - 10°	2	1	2	1	4	2	4	3	4	3	4	3
	(10°) - 20°	3	1	4	3	4	4	4	4	4	4	4	5
	(20°) - 30°	4	2	4	3	4	4	4	5	4	6	4	7
2,00	0° - 10°	2	1	4	1	4	3	4	3	4	3	4	4
	(10°) - 10°	4	2	4	3	4	4	4	5	4	5	4	6
	(20°) - 30°	4	3	4	4	4	5	4	6	4	7	4	8

For roofs of inclination greater than 30° and higher loads a special calculation to determine snow guard number and screw number is needed.

The first snow guard at the eaves should be fixed at the location of the first purlin.

Fig. 3: Principle of snow guard arrangement on a roof slope.

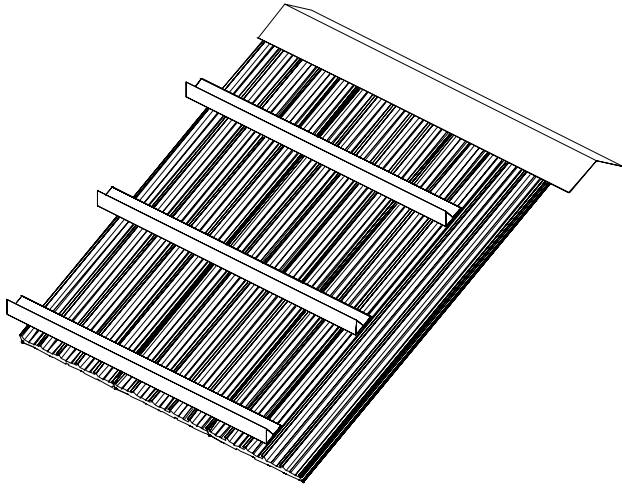
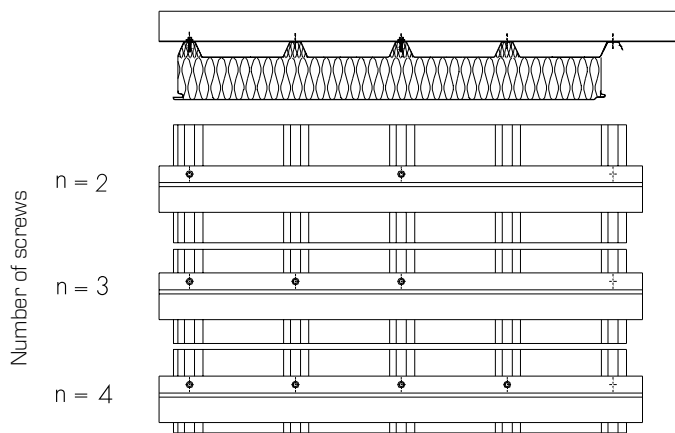


Fig. 4: Number of screws per panel width.

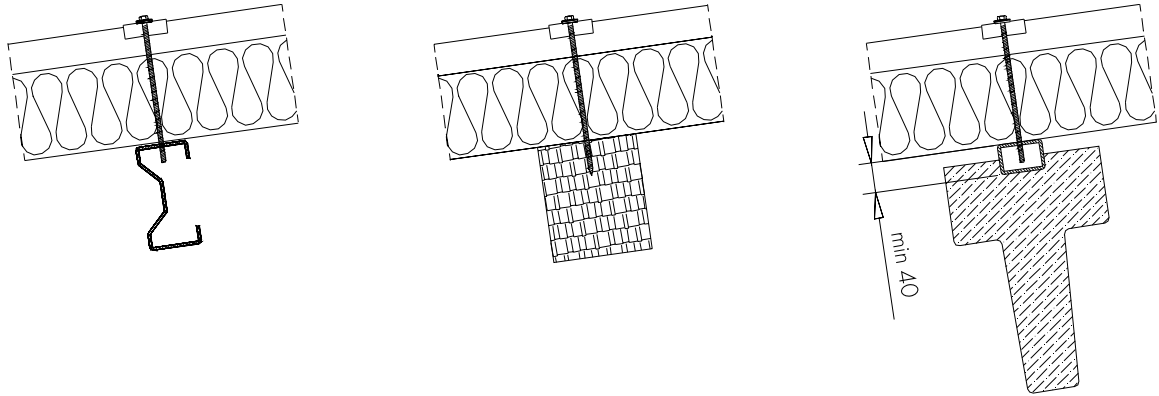


3 Assembly Instructions

3.1 Installation Recommendations

Trimoterm SNV roof panels can be fixed into roof load-bearing steel, wood or concrete purlins with an integrated steel profile of minimal dimensions 60/40/3 (Fig. 5). For fixing into wood, lamelated beams are commonly used. Where the substructure is made of solid wood, additional steel sheet is required.

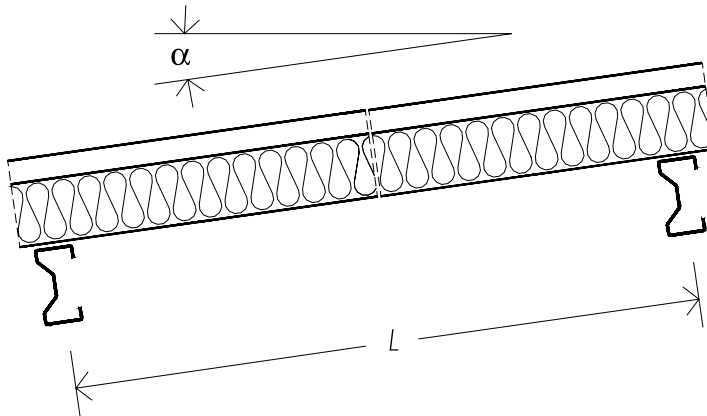
Fig. 5: Sub-structure types for fixing Trimoterm SNV panels.



Minimal roof slope is $\alpha = 3^\circ$ (~5%). Maximum spans should be taken into account (Fig. 6).

Spans for Trimoterm SNV roof panels are determined in Trimo's Technical department. The measures required due to the inclination are presented in Section 3.2.1.

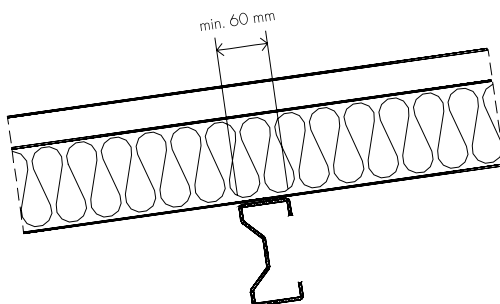
Fig. 6: Span and inclination of the roof slope.



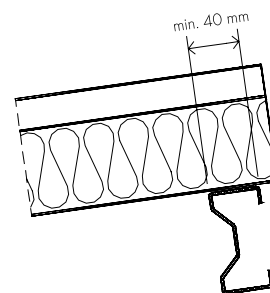
Minimal intermediate support width is 60 mm. At the end support is 40 mm which is determined according to static calculation (Fig. 7).

Fig. 7: Minimal support widths.

Intermediate support



End support



Before the first panel is placed the substructure geometry should be checked.

The first panel is placed in the end crosswise axis of the building by suitable levelling in the eaves – rectangular on the longitudinal axis of the building.

A dripping edge of at least 80 mm should be made on panels in the eaves to prevent moistening mineral wool in the panel (Fig. 8). A dripping edge for longer panels is usually made by Trimo. Cleanliness of these edges has to be checked on-site; if required the rests of wool and adhesive are to be removed. The dripping edge may be on the left or on the right side (Fig. 9). In case of a saddle roof this enables simultaneous assembly on both roof slopes from the same direction (Fig. 10).

Regardless of the roof inclination it is necessary to additionally bend the steel sheet of panels between trapezoids in the eaves at an angle of 45° - 60° downwards (Fig. 11) using a suitable plumbing tool.

Fig. 8: Dripping edge of a panel.

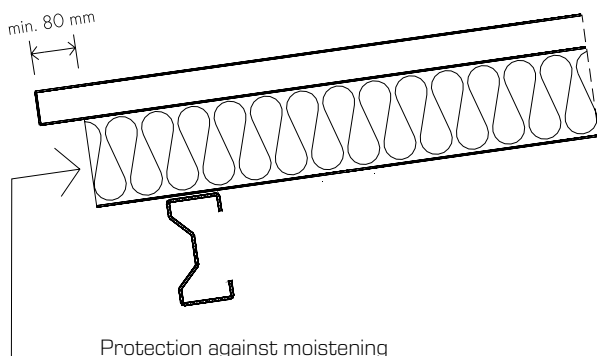


Fig. 9: Left and right dripping edges.

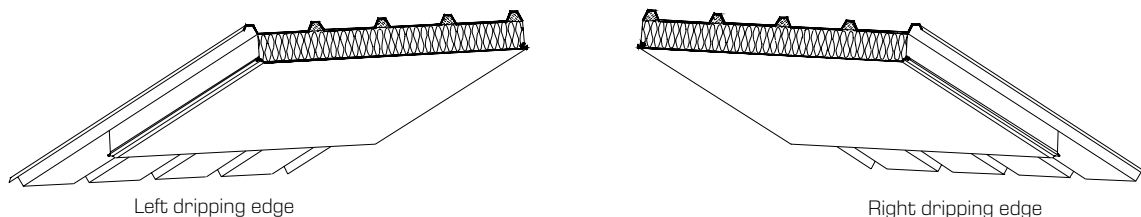


Fig. 10: An example of quick assembly of a saddle roof.

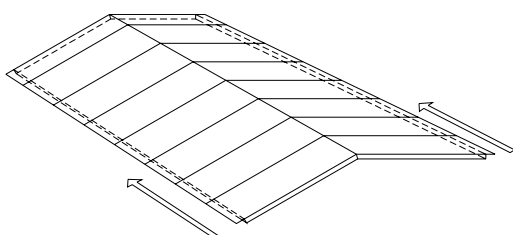
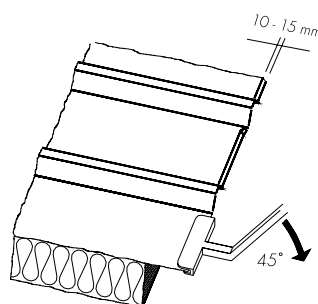
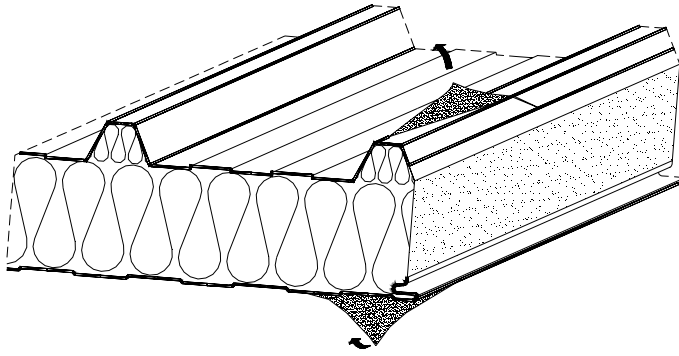


Fig. 11: Bending of steel sheet in the eaves.



Trimoterm SNV panels have a protective foil applied on the top and bottom sides to protect its colour coated surfaces against any possible damage during transport, handling and assembly. The foil is removed from the bottom side before the assembly of an individual panel. From the top side it is removed before the work has been completed. If necessary, it can be removed from some places already during the assembly (e.g. on the longitudinal joint of two panels, under screws, flashing, etc. - Fig. 13). If panels are stored for a longer period of time, the foil should be removed at the latest after the expiry of three months. If panels are stored in the open air, they should be protected against the sun; otherwise removing of the foil may be difficult.

Fig. 13: Removal of a protective foil.



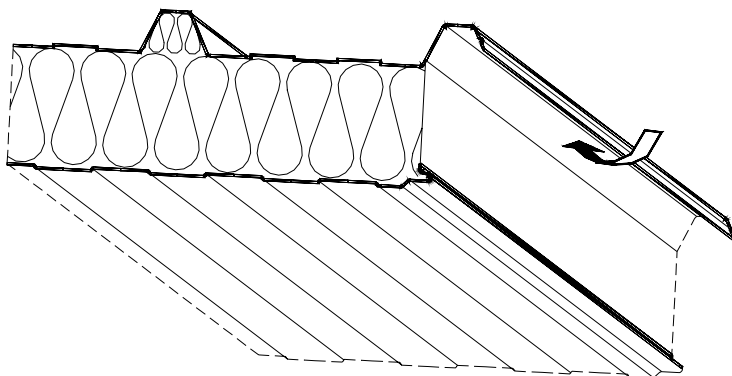
When panels are cut during the assembly, only scissors and saws that do not heat the cutting edge to a high temperature (Fig. 14) may be used. High temperature can destroy the anticorrosive protection in the immediate vicinity of a cut. Therefore use of grinding machines is prohibited for such purposes! All small metal parts that appear as a consequence of cutting and drilling have to be removed immediately from the surface of panels, or at the latest when the daily work has been completed.

Fig. 14 Recommended tools for panel cutting.



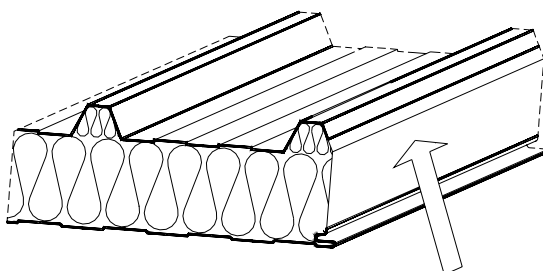
Marking or scratching with nails or similar sharp objects that can damage the protective colour coated layer is prohibited. Before panel assembly it should be checked that the end trapezoid that overlaps the trapezoid of the neighbouring panel is completely clean (Fig. 15). If it is not, it must be be cleaned! Care should be taken to ensure that the sealing tape already installed does not get damaged.

Fig. 15: Checking of trapezoidal panel section.



Mineral wool is protected by a self-adhesive tape which is placed on the longitudinal sides of the panel (Fig. 16). The tape does not need to be removed before the assembly.

Fig. 16: Self-adhesive tape on longitudinal edges.

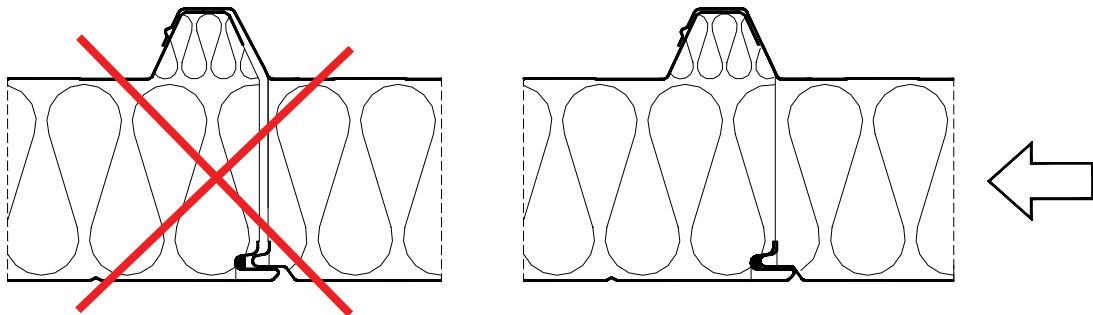


3.2 Sealing

3.2.1 Sealing the Longitudinal Joint Between Panels

During assembly special attention should be paid to ensure the tight fitting of panels. There should be no space in the longitudinal joint between the neighbouring panels (Fig. 17).

Fig. 17: Tight fitting of panels.



If butyl or silicone mastic seal is to be placed into the longitudinal joint it should be applied in a way presented in Fig. 18 and 19. Mastic seal is placed in an individual joint before the assembly of the following panel.

Fig. 18: Putting mastic seal in a panel.

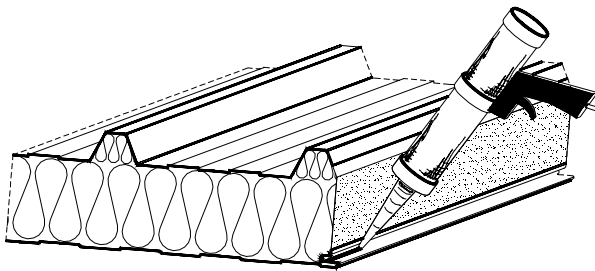
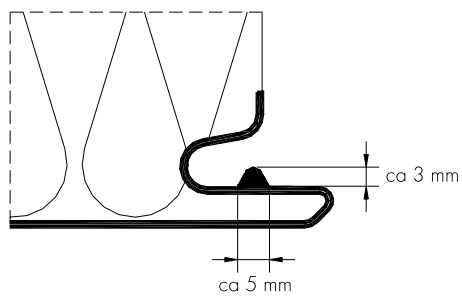


Fig. 19: Detail of applying the mastic seal in a panel.



Installation position for other sealing materials is shown in TRIMO Standard details.

3.2.2 Assurance of Roof Water-tightness

The limiting of roof slope and the measures required in case of such slope are presented in Table 4.

Table 4: Roof slope and measures required.


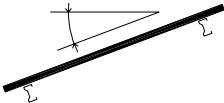
ROOF INCLINATION	REQUIRED MEASURES
<p>3°-5° (~5%-8.8%)</p> 	<ol style="list-style-type: none"> 1. As a standard SNV panels are equipped with seals (Fig. 20). 2. Putting up of additional connecting screws is needed at a distance of 0.5 m. 3. Sealing of panel prolongation by means of pre-compressed expansion sealing tape 20x2/10 mm in two lines is shown in Fig. 22. Exact performance is shown in a detail of roof prolongation AA4/1 and in the assembly instructions. 4. Bending of sheet metal on a low level between trapezoids, in the eaves and in the ridge (Fig. 23). 5. For inclines of 3-5°, it is necessary to create openings with coatings over the openings (e.g. Thortex). 6. Maximal length of a roof surface is 30 m.
<p>>5° (>8.8%)</p> 	<ol style="list-style-type: none"> 1. As a standard SNV panels are equipped with seals (Fig. 20). 2. Putting up of additional connecting screws is shown in Fig. 21. The number and arrangement are defined in the instructions for screwing and in the assembly instructions. 3. Sealing of panel prolongation by means of pre-compressed expansion sealing tape 20x2/10 mm in two lines is shown in Fig. 22. Exact performance is shown in a detail of roof prolongation AA4/1 and in the assembly instructions. 4. Bending of sheet metal on the low level between trapezoids, in the eaves and in the ridge (Fig. 23). 5. Performance of openings by sheet metal over an opening is allowed up to the ridge (Fig. 24) in compliance with details AB1/1 and AB2/1 or by Thortex coat. 6. The maximum allowed length of the roof slope is 30.0 m. For longer roof slopes, confirmation from the Trimo technical services is required.

Fig. 20: Panel laying.

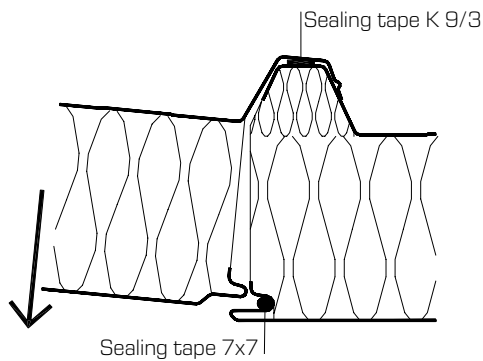


Fig. 21: Stitching screws on a longitudinal joint.

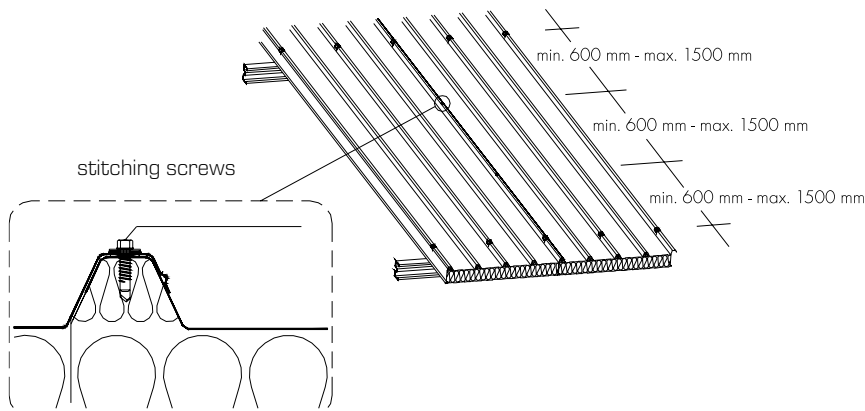


Fig. 22: Sealing of panel extension.

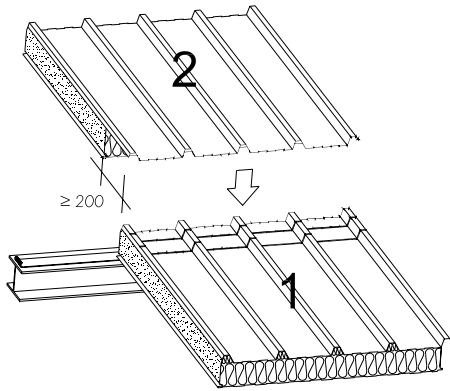
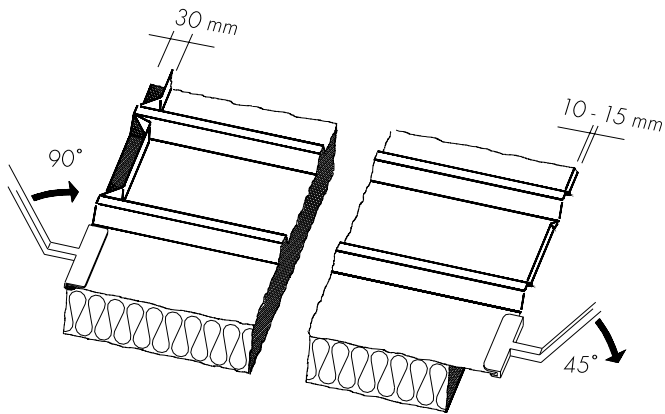
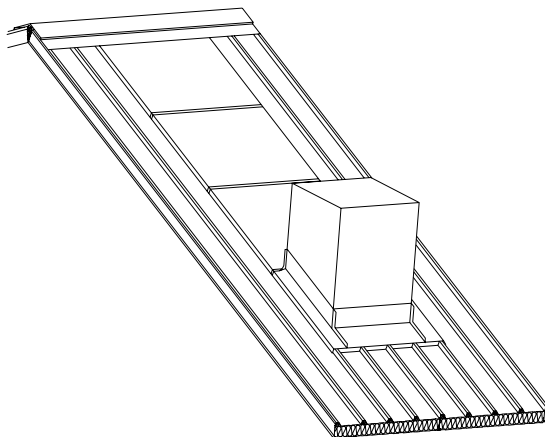


Fig. 23: Bending of steel sheet on the ridge and eaves.



Sealing a panel extension with pre-compressed sealing tape 20x2/10 mm arranged in two lines is shown in standard detail AA4/1 and in the chapter 3.5 Installation details.

Fig. 24: Installation of an opening on a roof using a steel sheet

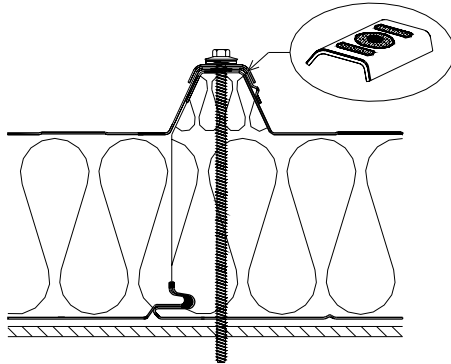


3.3 Panel Fixing

Only screws made of stainless steel and washers with a diameter of 19 mm (also of stainless steel) and EPDM sealing tape may be used for fixing the panels. Minimal thickness of a screw is 6.3 mm for selftapping and 5.5 mm for selfdrilling fixings.

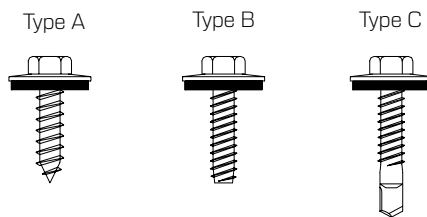
Panels are fixed through the trapezoidal sections by means of mandatory use of saddle washers with seals (Fig. 26).

Fig. 26: Fixing method of Trimoterm SNV roof panels.



Self-tapping screws of type A are used for fixing to wooden and thin steel purlins (steel thickness up to 3 mm). If steel purlins are 3 mm thick or greater, self-tapping screws of type B should be used. The use of self-drilling screws of type C is also allowed for steel purlins. All screw types are presented in Fig. 27.

Fig. 27: Screw types



A borehole of a suitable diameter should be drilled through a panel and purlin according to instructions of the fixing manufacturer if panels are fixed to a steel sub-structure with A or B type screws. Table 6 presents all required sizes of boreholes of producer "SFS Stadler". No preliminary drilling of holes is allowed for type C fixings.

Table 6: Diameter of a borehole for a screw regarding thickness of a sub-structure.

Thickness of a sub-structure [mm]	Diameter of a borehole [mm]
2.0 - 3.0 (Type A)	5.00
3.0 - 3.9	5.05
4.0 - 4.9	5.35
5.0 - 5.9	5.65
6.0 - 10.0	5.80
>10.0	5.85

Screw length depends on thickness of Trimoterm panels and sub-structure type in accordance with the instructions of the fixing manufacturer. Care should be taken to tightening screws correctly to ensure they are not too tight or too loose. Correct fixing method is presented in Fig. 28. The protective foil should be removed in places before fixing (Fig. 29). The foil is finally removed after the works on the roof have been completed.

Fig. 28: Correct fixing of screws.

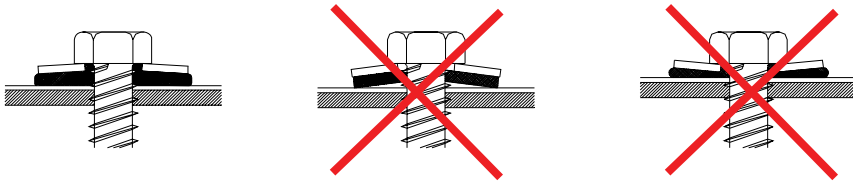
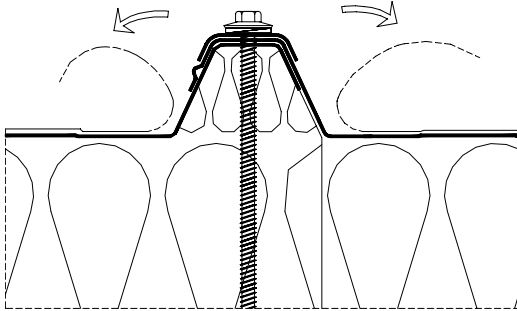


Fig. 29: Removal of the foil on a fixing place.

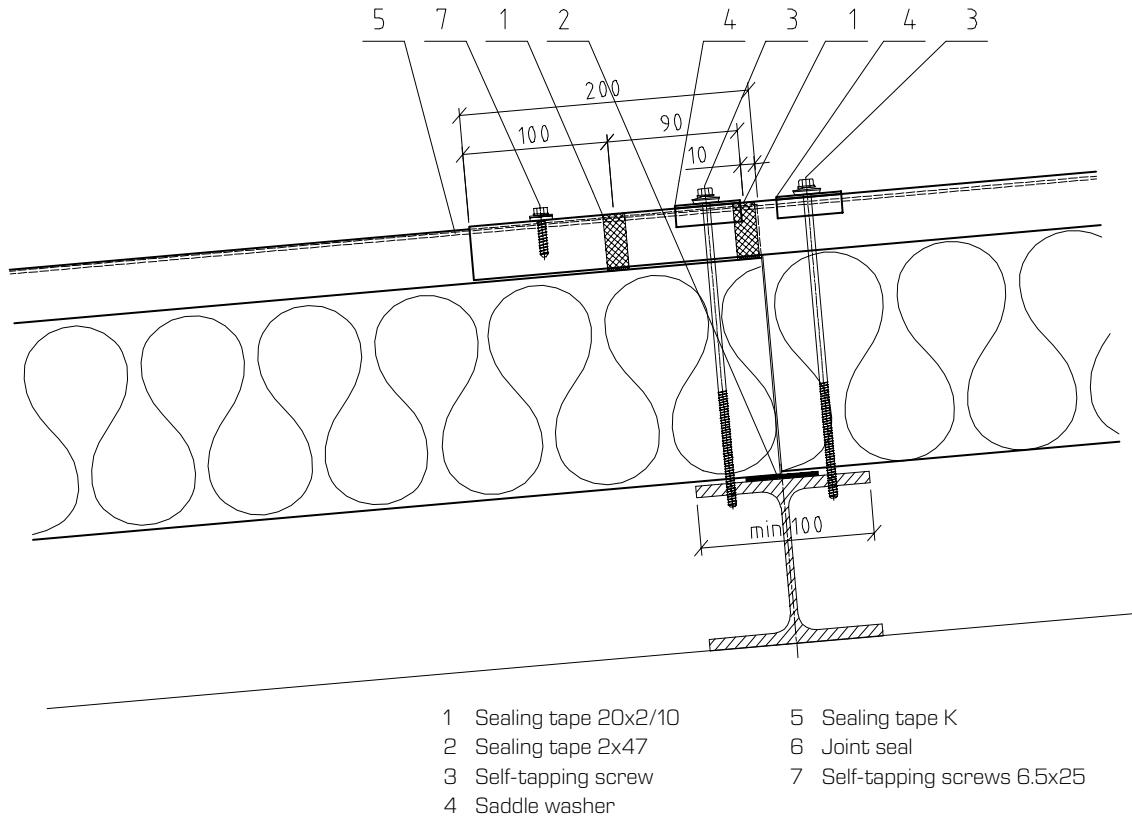


4 Installation Details

4.1 Roof Extension Detail

For long roof slopes (the maximum length of a panel is 14 m) longitudinal extension of panels is required. Therefore a longitudinal extension detail is shown in Fig. 33. Fig. 34 presents a system of panel extension on a large roof surface.

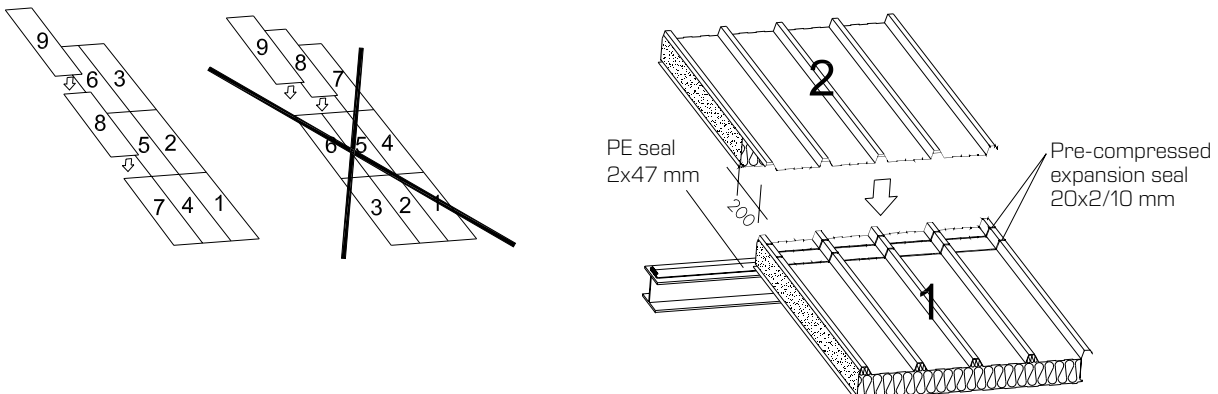
Fig. 33: Roof extension detail.



Assembly sequence:

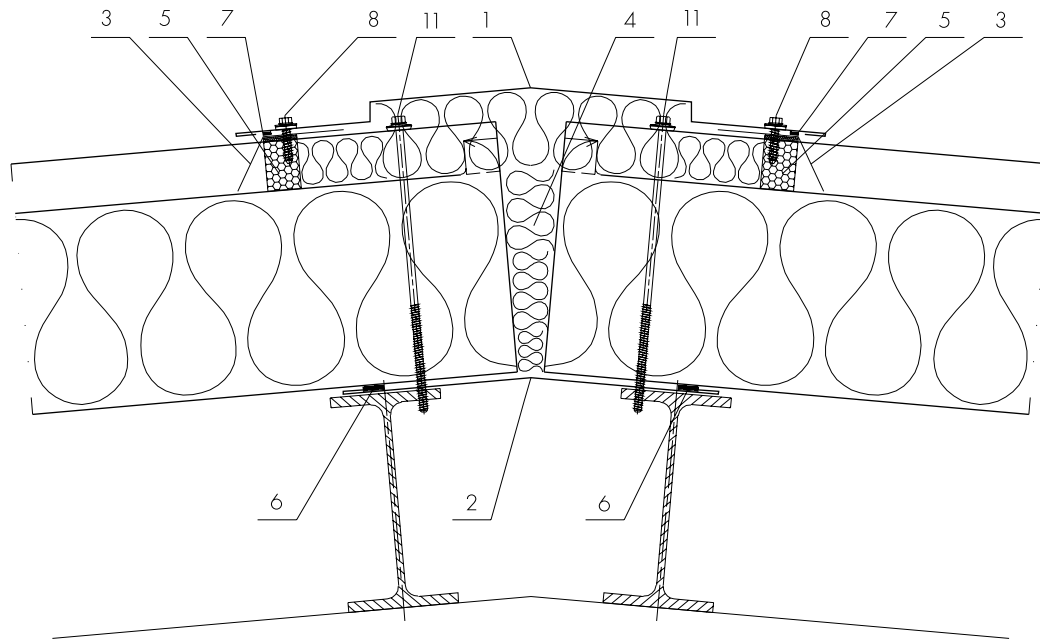
- Before assembling an individual panel a seal has to be inserted on a double or expanded single purlin (purlin width min. 100 mm) (Item 2).
- A pre-compressed 20x2/10 mm expansion sealing tape is to be applied to a panel in two lines (Fig. 35), on an overlap in a length of 200 mm.
- The overlapping part should be cleaned thoroughly before the assembly.
- Mineral wool of the top panel has to fit tightly to the bottom panel in the joint.
- Structural engineer calculates the number and arrangement of self-tapping screws (Item 3) over the purlin or a panel is fixed at least into each second rib.

Fig. 34, 35: Correct and incorrect panel assembly sequence; panel assembly panels in the overlap.



4.2 Ridge Detail

Fig. 36: Ridge detail on a saddle roof.



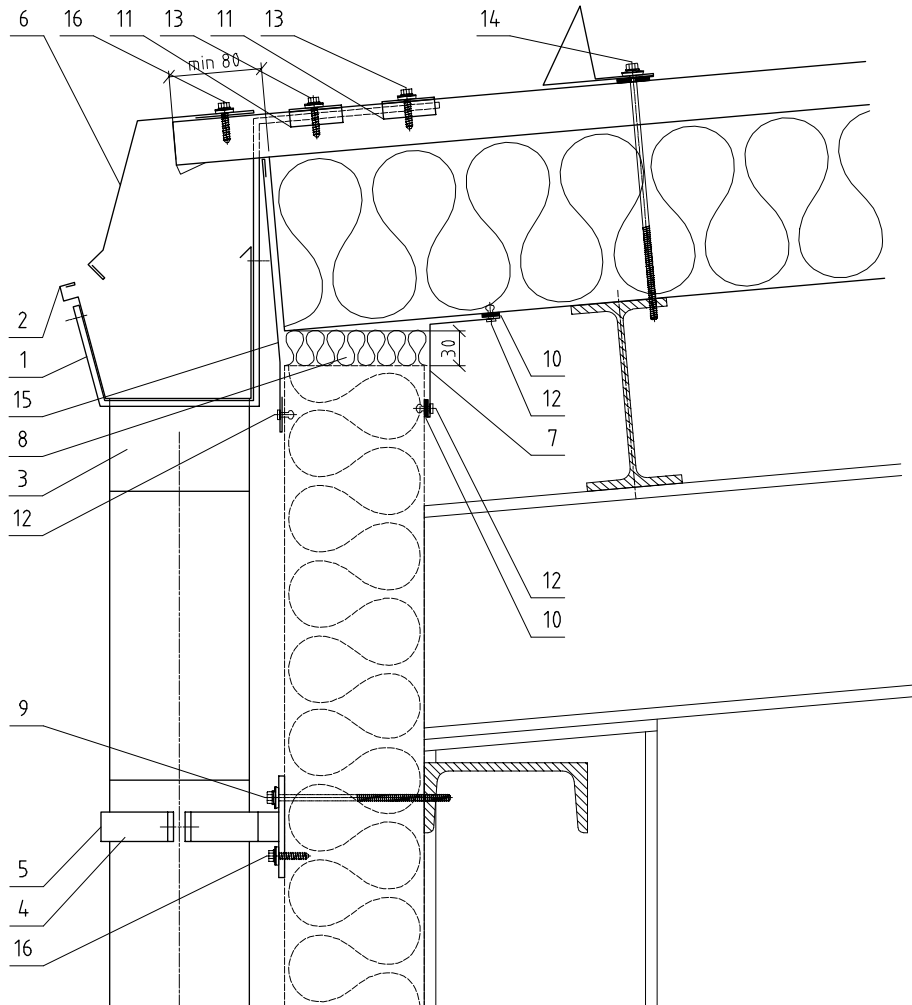
- | | |
|---------------------------------|-----------------------------|
| 1 External ridge flashing | 7 Butyl sealing tape 2x6 mm |
| 2 Internal ridge flashing | 8 Self-tapping screw 6.5x25 |
| 3 Covering flashing | 9 Blind rivet 4x10 |
| 4 Thermal insulation | 10 Saddle washer |
| 5 Profile filler SNV - negative | 11 Self-tapping screw |
| 6 Sealing tape 3x15 mm | |

Assembly sequence:

- An internal ridge flashing (Item 2) is placed on the ridge purlin; a sealing tape (Item 6) is previously applied to the purlin.
- Gradually Trimoterm SNV panels are placed on the left and the right side and they are fixed into the purlins.
- On the panel edge the top steel sheet is bent in a length of 30 mm by a suitable plumbing tool.
- SNV profile filler negative (Item 5) is placed on the panels.
- Panel masks (Item 3) are placed on it and then butyl tape (Item 7) is also applied.
- Empty space under a ridge tile is filled with low-density mineral wool (Item 4).
- At the end external ridge flashing (Item 1) is placed and is longitudinally prolonged by a plumbing joint or an overlap in a min. length of 200 mm and sealed by neutral silicone putty in at least three lines.
- The external ridge flashing is fixed to each second rib of the panel with screws ϕ 6.3 x 25 mm.

4.3 External Gutter Detail

Fig. 37: External gutter detail.



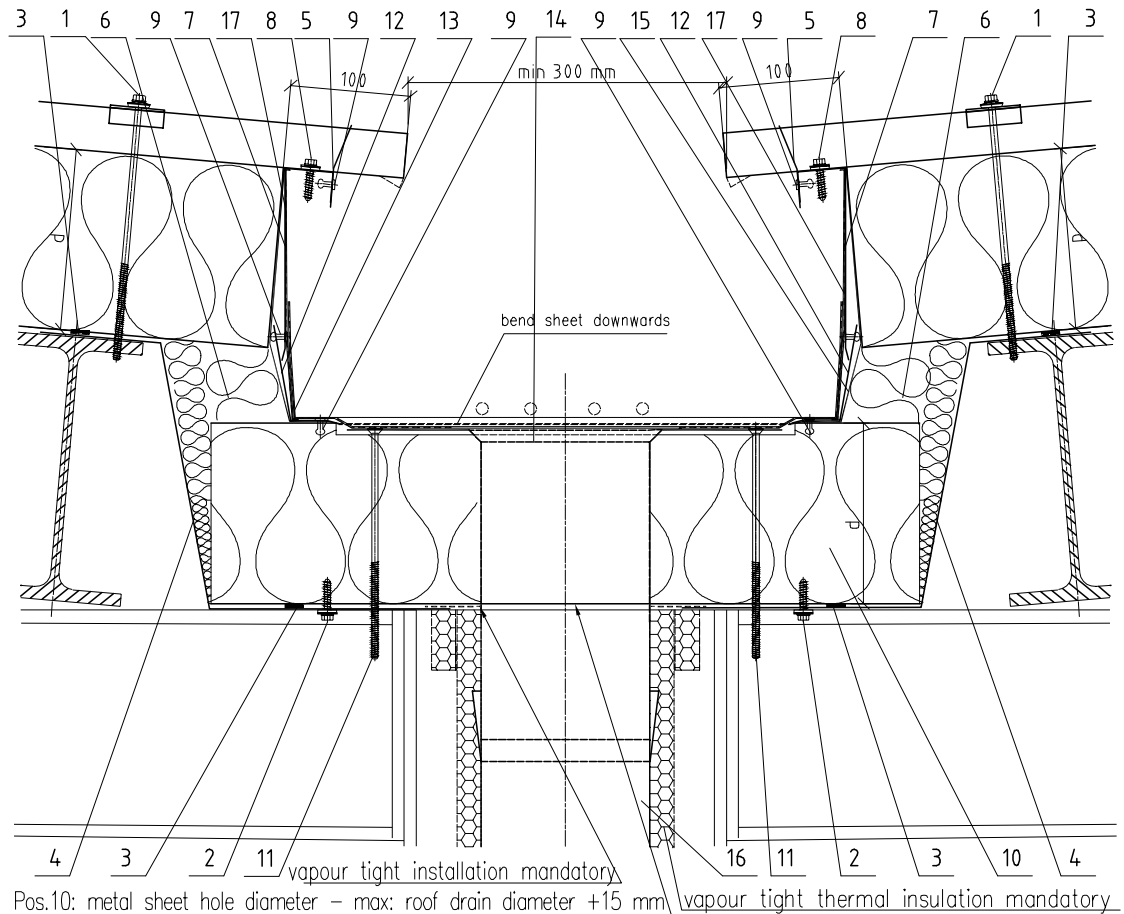
- | | | |
|------------------------|-------------------------|--------------------------------|
| 1 External gutter hook | 7 Internal eaves mask | 13 Self - tapping screw 6.3x25 |
| 2 External gutter | 8 Thermal insulation | 14 Self - tapping screw |
| 3 Outlet connection | 9 Self - tapping screw | 15 External eaves mask |
| 4 Down pipe | 10 Sealing tape 5x10 mm | 16 Self - tapping screw 6.5x25 |
| 5 Down pipe support | 11 Saddle washer | |
| 6 External gutter mask | 12 Blind rivet | |

Assembly sequence:

- Trimoterm SNV panels are laid from the direction determined by the dripping edge of a panel. In case snow guards are installed on the roof, they are fixed to the final purlin (Item 14). The seal EPDM ϕ 28/3x3 has to be additionally applied between a snow guard and a panel.
- Additional bending of steel sheet at an angle of 45° in a length of 10 - 15 mm (Fig. 12) is required in the eaves.
- An external eaves mask (Item 15) is riveted from the external side to the façade. Under the top, external gutter hooks are pressed in the core of a Trimoterm SNV panel by using saddle washers (Item 11). Then they are fixed to the top steel sheet with two screws. When arranging hooks special attention is to be paid to their length since they ensure gutter inclination.
- External gutter (Item 2) is placed on these hooks and fixed by suitable bending of fixing steel sheet on the hooks.
- Low density mineral wool (Item 8) is inserted into the closing space between the façade and Trimoterm SNV roof panel from the inner side.
- Internal eaves mask (Item 7) onto which a sealing tape 3x15 mm (Item 10) is preliminarily applied is riveted from the inside to the panels.

4.4 Valley Gutter Detail

Fig. 38: Valley Gutter Detail.

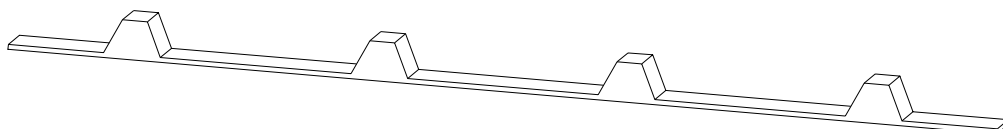


- | | | |
|--------------------------------|------------------------------|---------------------------------|
| 1 Self - tapping screw | 7 Drip flashing | 13 PVC foil 1,8 mm |
| 2 Self - tapping screw 6,5x25 | 8 Self -tapping screw 6.5x25 | 14 PVC outlet connection |
| 3 Sealing tape 5x10 mm | 9 Blind rivet | 15 Geotextiles |
| 4 Gutter mask | 10 Trimoterm FTV | 16 PVC outlet connection |
| 5 Covering flashing - positive | 11 Self – drilling screw | 17 PVC foil 1,8 mm (homogenous) |
| 6 Thermal insulation | 12 Flashing | |

Assembly sequence:

- Initially both gutter masks (Item 4) are placed on the load-bearing purlins and temporary fixed. A sealing tape 5x10 mm (Item 3) is applied onto both gutter masks.
- Trimoterm SNV panels are laid regarding orientation of the dripping edge of a panel. Panel steel sheet has to be bent at an angle of 45° in the eaves between trapezoids (Fig. 11).
- Through saddle washers Trimoterm SNV panels and gutter masks are fixed to load-bearing purlins by screws.
- Longitudinally cut Trimoterm FTV panel is laid on the gutter masks (Item 4) and fixed with self-tapping screws (Item 2).
- Soft thermal insulation (Item 6) is installed.
- Drip flashings (Item 7) and flashings (Item 12) made of steel sheet laminated with PVC (0,8 mm) are fixed with blind rivets and self-tapping screws.
- On the prolongation joints of drip flashings (Item 7) and flashings (item 12) homogenous PVC membrane is welded (item 12) to make the joints waterproof.
- PVC membrane (Item 13) is welded to drip flashings (Item 7) and flashings (Item 12).
- Finally covering flashing – positive is fixed.

Fig. 39: Profile filler SNV – positive





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