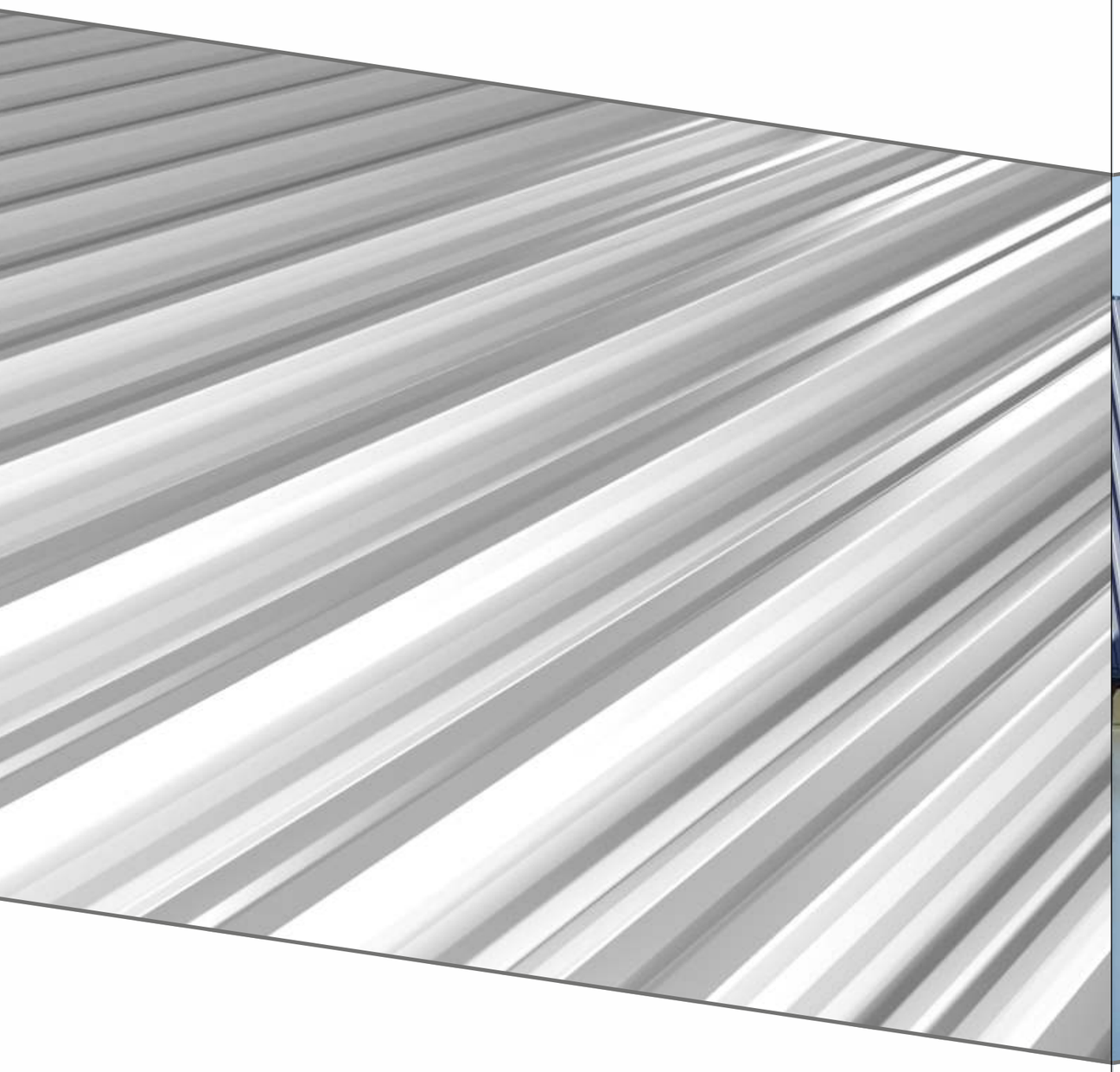
BLACHY PRUSZYŃSKI

FIRMA RODZINNA

TERAZ POLSKA



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ASSEMBLY INSTRUCTION

of Trapezoidal Sheets

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01

SUBJECT OF INSTRUCTION. TYPES OF RAW MATERIALS.

Subject of this instruction are assembly guidelines of trapezoidal sheet which are produced by Blachy Pruszynski Sp. z o.o Company, drawing 1. In denotation code of trapezoidal sheets approved by producer number after „T" means height of profile and letters after numbers mean type of covering. Letter „P" – coated sheets with zinc and organic covering, „OC" – galvanised sheets, „AZ" – sheets coated only with aluzinc.
Trapezoidal sheets coated with protective covering and aluzinc:
Profiles: T6, T7, T8, T14, T18, T20, T35E, T35EL, T40, T45, T50P, T55P, T60P, T80, T92P, T135P, T150 and T160.
Trapezoidal sheets galvanised:
Profiles: T6, T7, T8, T14, T16, T18, T35E, T35EL, T40, T45, T50P, T55P, T60P, T80, T92P, T135P, T150 and T160
They are produced from flat sheets with cold bending method in steel grade:
-for profile of height from T6 to T45 – S250GD
- for profiles of height from T50 to T160 – S320GD or 350GD in thickness 0,5-150mm.
Surface of steel sheets is covered with: organic layer P (polyester gloss PS 15, PS 25, polyester matt PS 35, polyurethane PU, PUREX, Colorcoat HPS200R Ultra) and metallic OC – zinc 200 or 275 g/m2 and AZ 150g/m2, 185 g/m2.

Mentioned above products are approved to use in construction due to norm PN-EN 14782:2008. Producer of each part of material gives declarations of performance. All these trapezoidal sheets are signed with CE sign.

02

PURPOSE, SCOPE AND REQUIREMENTS OF USE

Profiled coated steel sheets can be used to make roof covering and elevation covering. Due to requirements of protection against corrosion steel sheets depending of type of coating can be used:

a) Steel sheets with zinc coating of mass 200 and 275 g/m2, Aluzinc 150 and 185 g/m2 – coated with polyester coating of thickness 25 um and 35um or polyurethane coating of thickness 50 um – in corrosion environment category C1, C2 and C3 due to PN-EN ISO 12944-2:2001

b) Steel sheets with zinc coating of mass 200 and 275 g/m2, Aluzinc 150 and 185 g/m2 without organic coating in closed rooms in corrosion environment C1, C2 due to norm PN-EN ISO 12944-2:2001

c) Steel sheets with zinc coating of mass 200 and 275 g/m2, Aluzinc 150 and 185 g/m2 and painting coating approved to use and sell due to range of use painting coating in polish norm and technical approval,
d) Perforated sheets, despite of coating – in closed rooms in corrosion environment C1, C2 due to norm PN-EN ISO 12944-2:2001.

Use and way of building elements of construction with mentioned above trapezoidal sheets should be compatible with technical project of buildings, prepared with account of legal norm and laws of technical-construction, norm PN-EN 14782:2008 and guidelines of this instruction.

02.1

TRANSPORT AND STORING

Transport of steel roof tiles should be done with special vehicle which shall have an open loading platform allowing easy loading and unloading, with the length suitable for ordered sheets. The sheets shall not extend beyond the platform otherwise it may cause damage and in consequence loss of the guarantee . The steel sheets must be protected against drifting and soaking. Unloading shall be carried out by the proper number of people, that is in the case of long sheets (ca. 6 linear metre) the sheets shall be unloaded by 6 people, three on each side. Special attention shall be paid not to friction one sheet against the other, bend the side edges or stretch the sheet. Steel sheet deformation during the unloading and moving can result in problems with proper installation (chinks in clamps). It is of course the best to unload in original manufacturer packaging , using mechanical unloading equipment. Special carefulness should be maintained during unloading in winter and during storing in heated warehouses.

Sheets should be stored in dry and airy rooms. Packages should be put on the ground, but on hardwood plug with height about 20cm. Steel sheets to be stored for a long time shall be inspected and separated with washers allowing free air circulation.

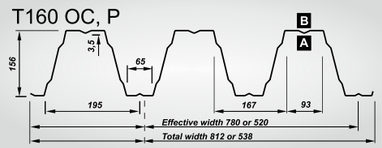
Attention!
The maximum period of storage shall not exceed 6 months from the date of manufacturing under the pain of loss of guarantee.

PRUSZYŃSKI Sp. z o.o. is not responsible for corrosion of sheets stored not in compliance with the above rules. Before the assembly please check tones of varnish.

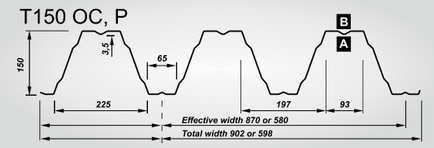
Drawing 1

Trapezoidal sheets profiles

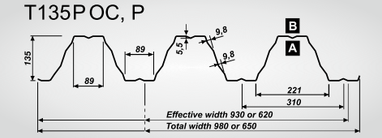
T160 OC, P



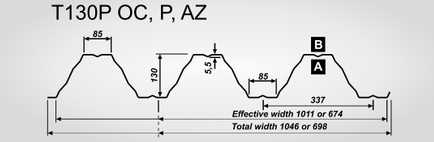
T150 OC, P



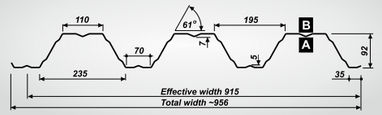
T135P OC, P



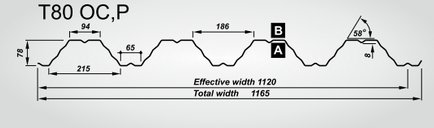
T130P OC, P, AZ



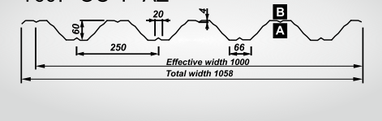
T92P OC, P, AZ



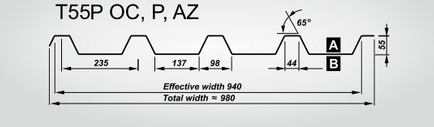
T80 OC,P



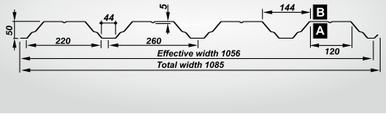
T60P OC P AZ



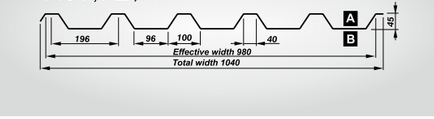
T55P OC, P, AZ



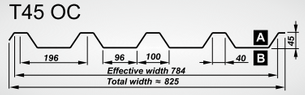
T50P OC, P, AZ



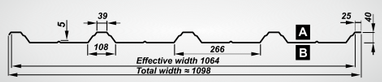
T45 P, AZ ,OC



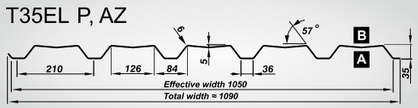
T45 OC



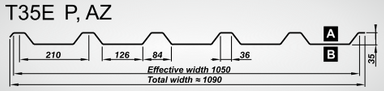
T40 OC, P, AZ



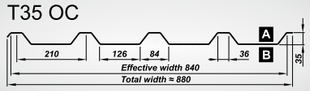
T35EL P, AZ



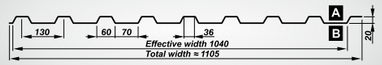
T35E P, AZ



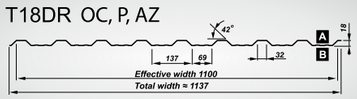
T35 OC



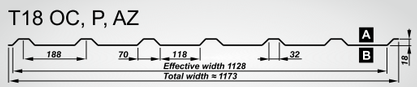
T20 P, AZ



T18DR OC, P, AZ

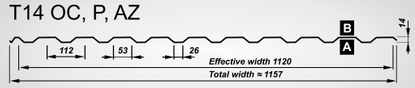


T18 OC, P, AZ

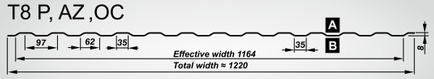


T18 OC

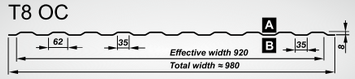
T14 OC, P, AZ



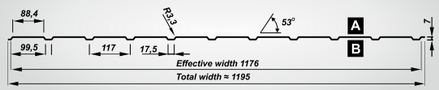
T8 P, AZ ,OC



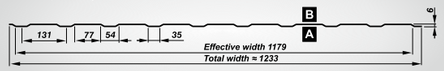
T8 OC



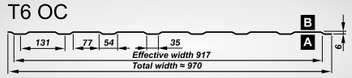
T7 OC, P, AZ



T6 P, AZ ,OC



T6 OC



Explanation of symbols:
P *- coated sheets*
AZ *- aluzinc*
OC *- galvanised*

A T T E N T I O N :
Roof profile is obtained when:

A *side is decorative coating*

B *side is protective – primer coating*

In other case elevation profile is obtained.

03

ROOF COVERINGS IN RESIDENTIAL AND COMMERCIAL BUILDINGS

1. Wooden roof truss.
Drawing 2 (full planked)
– counter battens – usually of size 19x40mm (fastened in about 60cm distance from rafter, remembering that every other counter batten should be overlapped with rafter)
– batten – usually of size 30x40mm with distance between rafter 70cm, 40x60 with distance between rafters 80-120cm.
Timber should be impregnated and minimum class II.
Battens are fastened to rafter through counter battens with nails 3,5x80 or 4x120.

2. Steel roof truss:
– Counter battens,
– Battens,
They are usually made of galvanised z or c profiles of thickness 0,7mm

ATTENTION! Distance between battens (direct support of trapezoidal sheets) should ensue from technical projects.

If project don't specify this length there is possibility to calculate it from expression as in drawing 2.
Use of counter battens and battens guarantees gain of air space which is required to proper function of steel cladding to lead off steam(humidity) from exterior of building.

Size of gap under the eave and ridge should be 200cm^2 for each long meter of eave and ridge.

3. Non-direct foundation is roof truss - drawing 3, on which impact has type of use of FWK and potential planking of roof, and also use or not of heating. On drawing 3 are presented mostly used solution of roof trusses.

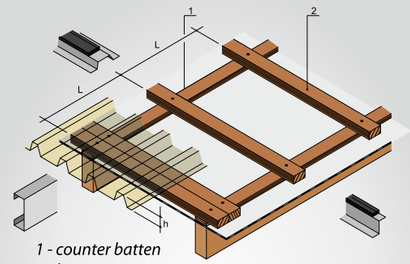
In case of new solutions, where roof is not planked, and foil with high steam permeability is used (higher than 1000g/m2/24h or Sd lower than 0,3m) layer of warming assembled between rafters, can have contact with foil. Roof breathes with whole surface. Dead space is not needed. Whole height of rafter is used to heat. Foil can be assembled by shuffling it through rafter, which eliminates use of seals.

FWK – precovering foil (roof, steam permeable)

Planking the roof with layer of roof paper impose use of additional "bottom" air blank (between planks and term isolation). In this case line of ridge shouldn't be closed with roof paper but the aperture should be kept about 5-10cm.Other solution is to use chimneys to ventilate near the ridge (1 with diameter 10cm per 30-40m2 of roof sweep).

Rys. 2

Direct foundation



1 - counter batten
2 - batten

Distance between battens "L" should be specified by technical project. However if project doesn't consist them there is possibility to use following formula or use load tables prepared by Pruszynski company.

$$L=0{,}21\times\sqrt[3]{\frac{t\times h}{p}}$$

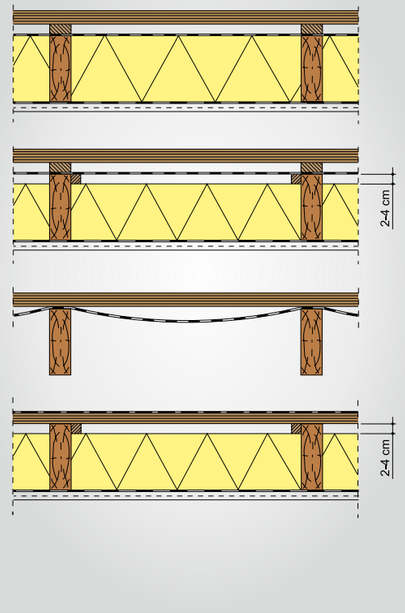
L - distance between battens
P - load of roof (kN/m^2)
t - thickness of trapezoidal sheet (mm)
h - height of trapezoidal sheet (mm)

Height of needed trapezoidal sheet can be calculated from this formula:

$$h=9{,}77\times\sqrt{\frac{p\times L^3}{t}}$$

Drawing 3

Use of solutions of roof truss in residential buildings



Same effect can be obtained with use of ventilation grate in top of the building, bottom dead space should have 2-4cm.
Cons of this solution are:
-lowering isolation of heated layer due to air flow
-worse use of height of rafter under thickness of isolation,
-necessity of using ventilation chimneys or grates (in solutions, where attic is inhabited)
- necessity of using vapour barrier with additional layer of aluminium foil for "warm" side.
- difficulties in gaining gap under the eave.

During installation of roof foil all guidelines of the producer should be occurred, paying special attention to way of behaving near holes for roof windows and chimneys. Despite of way of installation of heating from "warm" side should be installed vapour barriers, and their connectors stuck with self-adhesive tape.

Rule is that polyethylene vapour barriers use there, where installed is FWK with high steam permeability, on the contrary there where installed is FWK with low steam permeability for vapour barrier use foil with additional layer of metal (Al).

List of solutions of roof truss in residential buildings.
1. Roof not planked, non-habited attic
   - FWK with high steam permeability, which can touch with heating layer, assembled to rafters,
   - counter battens,
   - battens.
2. Roof not planked, habited attic.
   - FWK with low steam permeability – force necessity of use air gap above layer of heating,
   - counter battens,
   -battens.
3. Planked roof, habited attic.
   - As fwk can be used roof paper or "cold" foil
   - between planks and heating air gap in necessary
   - counter battens
   - battens
4. Roof not planked, non-habited attic.
   - FWK with low steam permeability "cold" fastened with sag
   - this solution is permitted only when heating is on the ceiling,
   - no counter battens,
   - battens.

03.2

SLOPE OF ROOF SURFACES (PN-B-02361:2010)

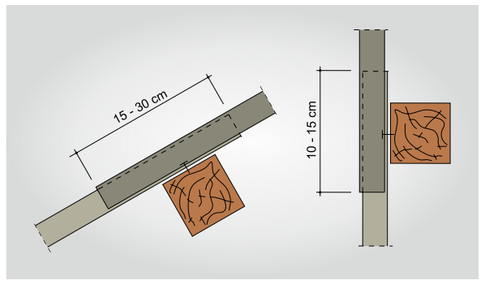
TYPE OF COVERING	VALUE OF SLOPE OF ROOF SURFACES			RECOMMENDED SLOPE
	h:a	$\alpha°$	%	%
Galvanised and coated trapezoidal sheets of height of profile >35mm(*1)	**0,07**	**4**	**7**	**> 10**
Sheets as above of height of profile <35mm (*1)	**0,10**	**6**	**10**	**> 10**
Aluminum trapezoidal sheets of height of profile ≥ 35mm(*2)	**0,10**	**6**	**10**	**> 15**
Sheets as above but of height of profil < 35mm (*2)	**0,15**	**9**	**15**	**> 15**

*1 This slope refer to coverings without longitudinal junctions or side laps not smaller than:
-300mm in case of slope to 10%,
-200mm in case of slope from 10-15%,
-150mm in case of slope higher than 15%

*2 This slope refer to coverings without longitudinal junctions or side laps not smaller than:
-300mm in case of slopes from 10-15%,
-200m in case of slope higher than 15%

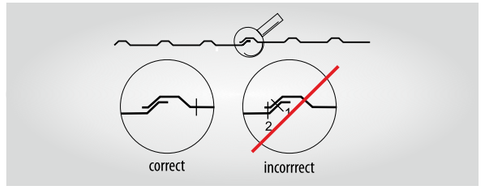
Drawing 4

Connecting sheets on length



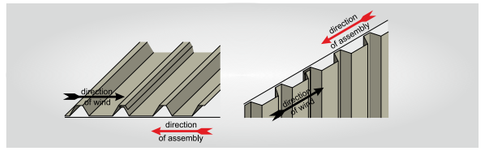
Drawing 4.1

Assembling sheets with side lap



Drawing 5

Direction of assembly



03.2

ASSEMBLY OF TRAPEZOIDAL SHEETS. DRAWINGS 4,5

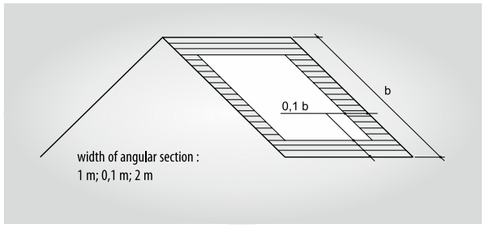
1. Trapezoidal sheets are assembled to battens (or steel bemas in steel constructions) with fixing (usually self-drilled screws) which are used in case of putting heating and watertight exterior layer on trapezoidal sheets. If technical project doesn't include it than on side parts – drawing 5.1 (which due to norm PN-77/B-02011 are 1-2m) number of fixings should be min 8/m2 and in central parts 5/m2.

2. Direction of assembly should be always opposite to usual wind direction in area of buildings.

3. Assembling of trapezoidal sheets with side lap should be on every 'bottom wave" on 2-3/5 of length of lap.

4. As above fastening on every wave should be also on battens next to eave and ridge.

Drawing 5.1



5. Trapezoidal sheets of height of profile equal or higher than 35mm should be connected on "top wave" on longitudinal connections minimum every 60cm.
6. Trapezoidal sheets are assembled on roof that way, so they would make right angle with line of eave (90°). Line of eave, which we establish with help of resistance cables is always base to assembly next panels of sheets.

Every faults of roof sweeps should be eliminated by hiding every edge of roof with flashings.

03.4

ASSEMBLY OF FLASHINGS

On drawing 6 are presented types of flashings which are offered from steel sheets of the same kind, colour and covering as sheets of steel roof tiles are presented. Flashings are also made from flat sheets directly on building site by assembler of covering.

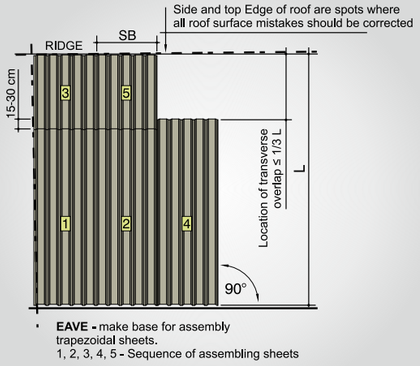
ATTENTION! It is not permitted to use any flashing from copper sheets on roofs with galvanized or varnished coverings.

Flashing have to:

1. Provide tightness of covering in place of connections or edges of roof sweeps,
2. Provide aesthetic of covering. We get best results when using screws TORX to fasten flashings.

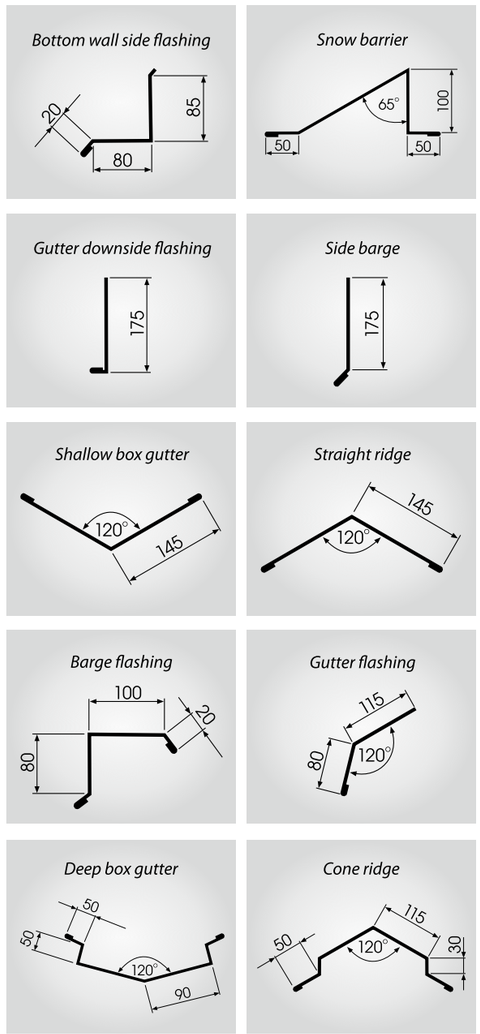
ATTENTION! Assembly of flashing in direct contact of fresh glues or mortars is forbidden. In case of messing up surface of sheets with fresh mortars, glues or plaster mortars they have to be immediately removed and spot of contact should be precisely cleaned. In other case due to chemical processes may occur damage of surface and in consequence corrosion of steel sheets. For potential sealing should be used only roofing silicones dedicated for coated sheets.

Drawing 5.2



Drawing 6

Standard flashings



03.4.1

GUTTER FLASHINGS, DRAWING 7

This flashing have to:

1. Turning water rains to gutter
2. Turning condensate to gutter from foil
3. Mask base (battens and counter battens)

Gutter flashing should came into gutter to 1/3 of their width and should be assembled after installation of gutter system. After fastening gutter flashing, may occur assembly of covering.

03.4.2

GUTTER DOWNSIDE FLASHING, DRAWING 7

This flashing have decorative functions – it protects horizontal plank which is base to assembly the gutter system. It is assembled before assembly of gutter system.

03.4.3

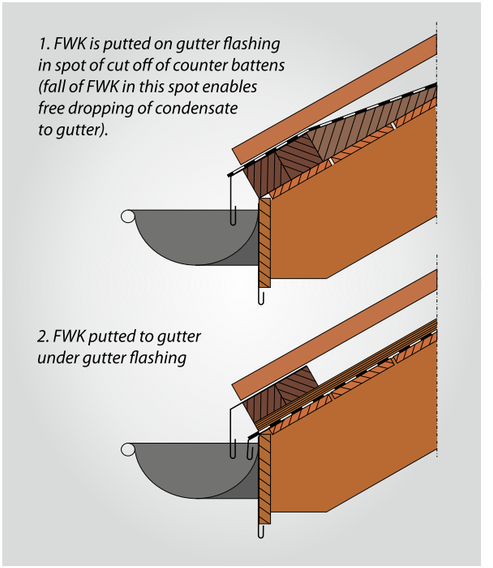
BARGE. SIDE BARGE, DRAWING 8

Barges protects side edges of roof. In case when side edge of planked roof doesn't end with ridge usually enough is to install barge. In case when side edge of roof end with rafter used are both barge and side barge.

Barges are assembled after trapezoidal sheets.

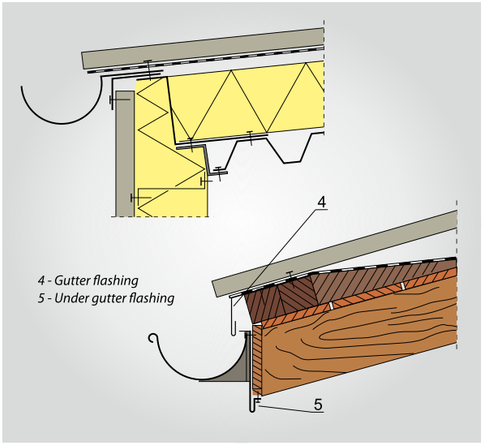
Drawing 7

Assembly of precover foil – FWK



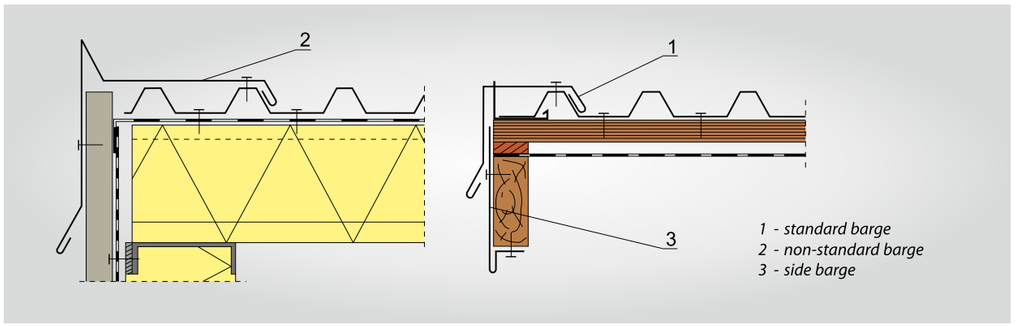
Drawing 7.1

Installation of gutter flashing and under gutter flashing



Drawing 8

Installation of barge and side barge



03.4.4

CHIMNEY FLASHINGS. DRAWINGS 9, 9.1

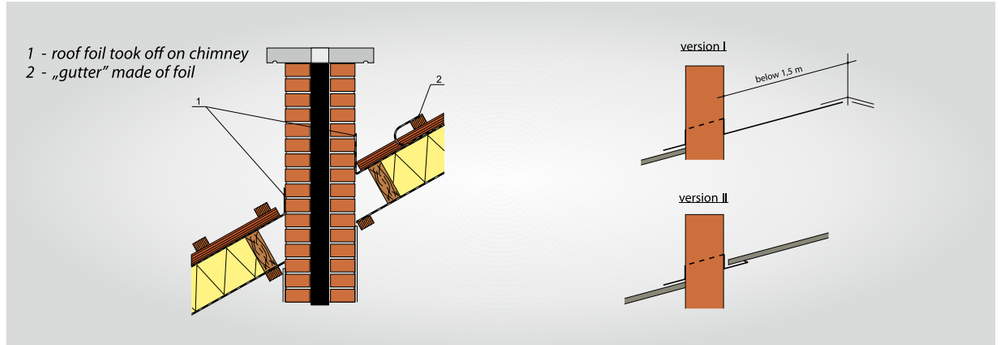
On drawing 9.1 are presented correct way of assembly foil through flashing. They are essential to make properly, because incorrectly assembly of them is source of most-common leakiness of roof covering.

Version 1- refer to flashing of chimney located not further than 1,5m from ridge. Than line of flashing behind the chimney is made from flat sheet and goes directly under ridge.

Version 2 – refer to flashing of chimney located further than 1,5m from ridge. Than flashing behind the chimney is covered with trapezoidal sheet. Side flashings of chimneys should came under 2 waves of trapezoidal sheets. To flashing of chimneys is used also roofing self-adhesive tape. In that case flashing of chimney have also decorative function to cover roofing tape.

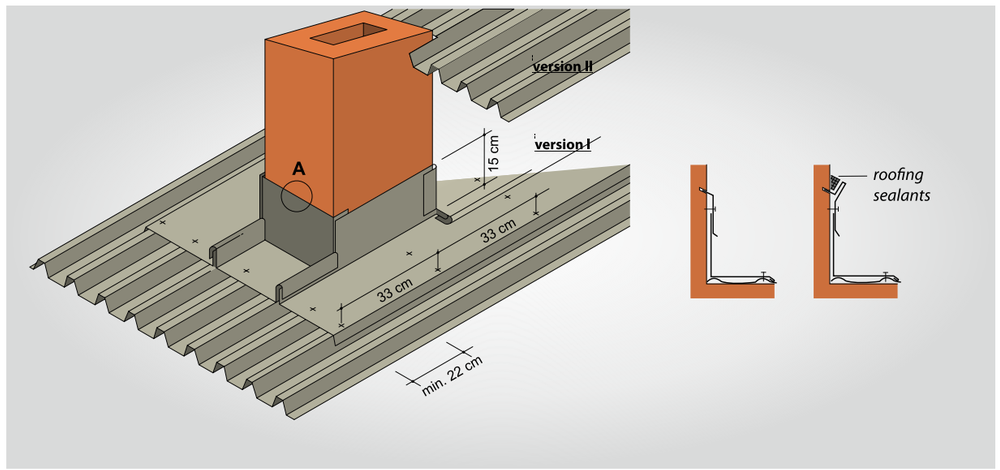
Drawing 9

Intersection of roof with chimney and properly assembled roof foil.



Drawing 9.1

Example of chimney flashing



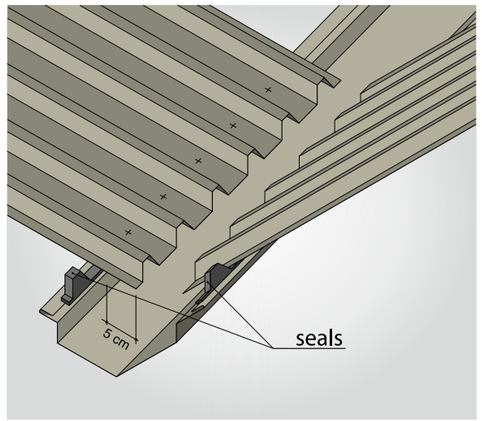
03.4.5

BOX GUTTER DRAWING 10

They occur on joint of 2 sweeps in place of so called boxes. They are responsible for transferring rain water from 2 sweeps to gutter. They are assembled before assembly of sheets of trapezoidal sheets.

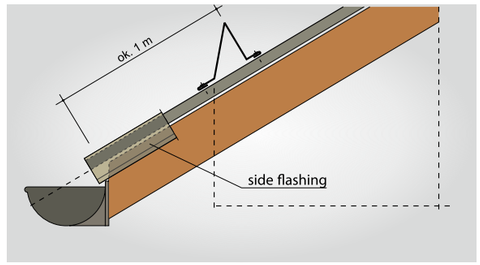
Drawing 10

Installation of box gutter



Drawing 11

Installation of snow barrier



03.4.6

SNOW BARRIER, DRAWING 11

Installation of snow barrier depend on local weather conditions and experience of exploitation building in surrounding area. Depending of heaviness of rain flows, weather changes and shape of the roof they can be assembled in one or few rows in distance about 1m from eave on the height of wall 12.plate. In case of assembling snow barrier you must deal with bigger load for sweep for 20 to 40% because of bigger amount of snow in area of barrier.

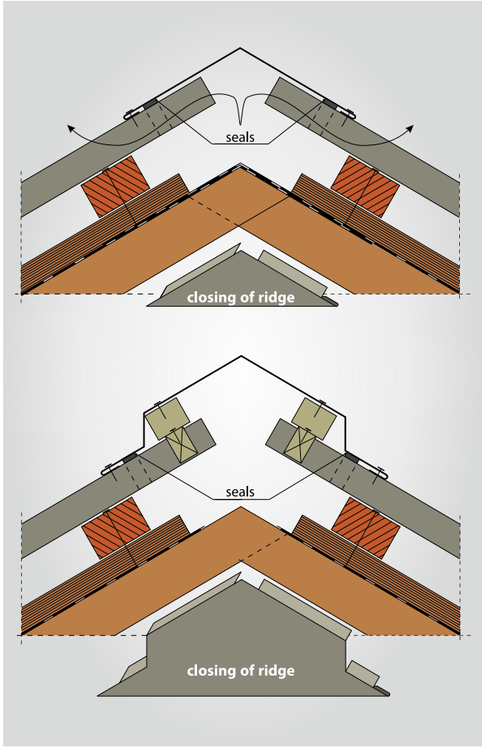
03.4.7

RIDGES. DRAWING 12

Ridge(straight and cone) protects ridge of the roof and edges, where 2 sweeps connect under obtuse angle. Fastening of ridge must be made that way to enable roof cover and heating "breathing" through one or 2 air blanks.

Drawing 12

Installation of ridge



03.4.9

FLASHINGS OF PIPES, VENTS, ANTHENS, ETC.

All elements with circular cross-section which comes out of roof should be isolated with sealing collars made of EPDM rubber.

Base of this collars enable to form to shape of steel sheet and are additionally isolated with silicon and fasten with screws.

Equal high variety of flashing is in steel systematic solutions. Each construction system has specifically documentations and solutions - in that flashings, mountings, use of specific materials.

ATTENTION!
All flashings covering edge of roof are located in "edge lines" of roof, where are the biggest loads of wind suction - because of that they should be fastened solidly, with span about 33 centimetres.

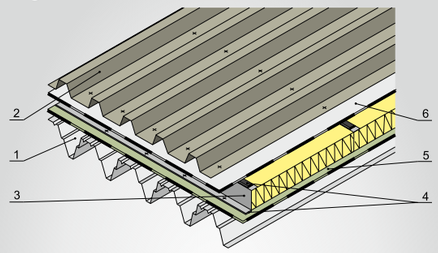
04

CONSTRUCTIONAL TRAPEZOIDAL SHEETS. DRAWING 13

Constructional trapezoidal sheets is different type of "trapezoidals". Use of them simplifies construction solutions of roof and ceilings, shortens time of construction and lower costs.
They are used mainly in system solutions approved with technical documents.

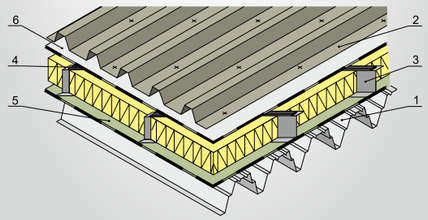
Drawing 13

Longitudinal scheme



1 - constructional trapezoidal sheet (for example T135)
2 - trapezoidal sheet in roof profile
3 - Z profile cold-bended
4 - Sealing tape
5 - Vapour barrier
6 - precover foil with high steam permeability

Transverse scheme



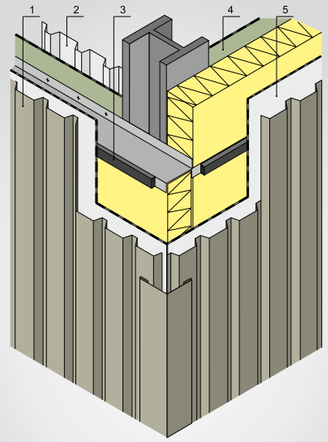
05

ELEVATION COVERING WITH TRAPEZOIDAL SHEETS DRAWING 14

Elevation covering with trapezoidal sheets are usually used in commercial building, halls with solutions containing heating wall and cold ones. They are usually fastened to wall girts or wall cassettes. On drawings 14, 15, 16, 17 are presented examples of flashing solutions.
Rules of assembly of particular layers and materials are similar as with assembly of roof coverings.

Drawing 14

Example of use of trapezoidals sheet in light steel housing



1 - elevation trapezoidal sheets
2 - interior trapezoidal sheet
3 - insulation tape
4 - vapour barrier
5 - precovering foil with high steam permeability and wind insulation

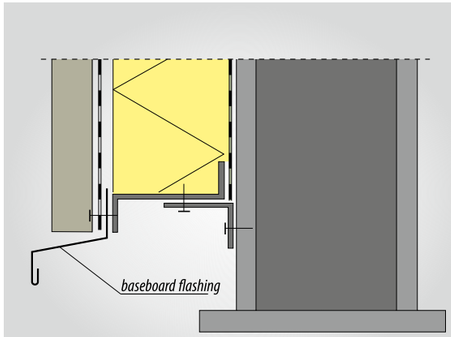
06

COVERING OF ROOFS OF LIVESTOCK

In livestock buildings, where animals are kept environment is very aggressive. Excrete gases from animal droppings (metan, ammoniac, sulphide of hydrite) in connection with steam make solutions with high corrosive actions. Because of that it is very important to make proper ventilation system. Not making that may cause losing durability of covering even to half. There may be used many ways of making ventilations, like making holes in top of the building, ventilation grates or tubes which goes over the roof – it is necessary to pay special attention to possible corrosion near the vents.

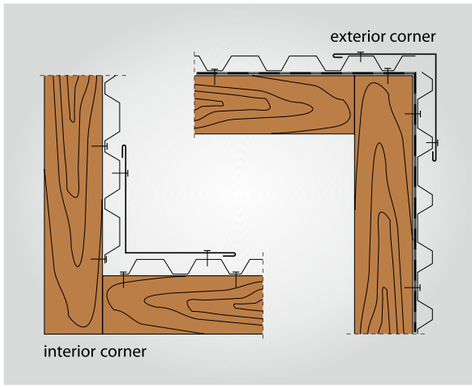
Drawing 15

Installation of flashing of baseboard



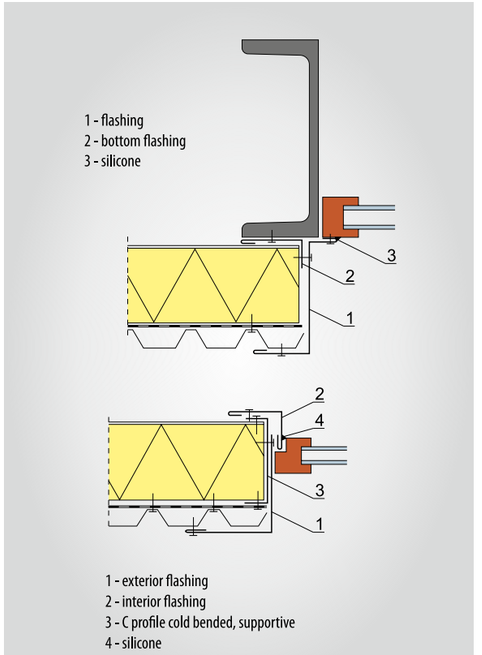
Drawing 16

Example of use of elevation flashings – look from top



Drawing 17

Flashing of window set between 2 constructional elements



07

MAINTENANCE

Roofs with trapezoidal sheets don't need any special maintenance treatment. However, it is necessary to:
-dispose from surface the leaves, which when rotten may cause discoloration of organic layer of steel
- dispose layer of industrial dust(for ex. from mines, steel plants, cement factory) which when came to reaction with water make damage to organic layer of steel sheet.

08

INSTRUCTION OF USING ROOF AND ELEVATION MADE OF STEEL SHEETS

In order to extend durability of roofs and elevations it's recommended to check and maintenance it.

08.1

INSPECTION

One time a year (it's best in spring) there should be inspection of roof/elevation in order to early detection of possible damage.

08.2

CLEANING OF STEEL SHEET

Roof and elevation made of steel sheets require cleaning at least once a year. Stratifying dirt on steel sheet may cause uneven discoloration of lacquer (because of uneven impact of UV beams), and lower protection to corrosion(dust traps humidity on steel sheets which causes damage).
Dirty and stained spots can be cleaned by soft brush and water (temp. max. 60c). If it is necessary it is permitted to use some light detergent (ph 6/7, max 10% solution).
There also can be used pressed water(max. 100bar) to cleaning, however the beam of water cannot be applicated too near of surface of sheets(min. 30 cm), also it shouldn't be perpendicularly to surface. Near the connections water beam should be directed to bottom, to avoid water of entering cracks near connections. With old surfaces of steel sheets we should deal with high cautiously.
Cleaning should be conducted from top to bottom, and cleaned spots should be rinsed out immediately.
It is not permitted to use scouring powders, nitro solvent, chlorine liquor, aromatised substances, substances with Amon chloride or sodium.

08.3

DAMAGES

Possible damages during guarantee should be consulted with Contractor of roof/elevation and can be repaired only with his written permission.
Repair of damages on small surfaces is done with quick-drying varnish. However painting big surfaces should be done with special industrial paints to renovating coverings. Painting should be limited only to special damaged spots (scratches to steel, centres of corrosion etc.)
Preparation of surface to painting should be done with generally accepted rules. It is necessary to precisely remove all signs of corrosion – best with special brush or close-grained sandpaper. Then that surface should be undusted, degreased and cleaned. To degrease extraction naptha or water with addition of surfactant(best with 1-2%solution of ammoniac) can be used. Repaired spots may be different in colour compared to original steel sheets because of natural impact of atmospheric phenomenon (ageing of varnish due to impact of UV radiation).

ATTENTION!
During inspecting, cleaning, conservation and repair all work safety regulations should be obeyed.
Pruszyński Sp. z o.o. is not in charge of possible accidents during carrying out all following actions.