



ASSEMBLY INSTRUCTION OF STEEL ROOF TILES



TYPES OF STEEL ROOF TILES

Subject of this instruction are assembly guidelines of steel roof tiles produced by Pruszyński Sp. z o.o. company.

Steel roof tiles:

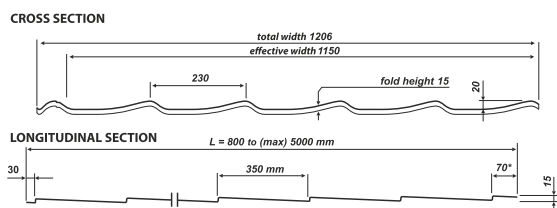
- RUBIN Plus
- SZAFIR
- KRON
- OPTIMA ARAD
- GRYF

In colours of RAL and RR pallets.

Following steel roof tiles are permitted to use in engineering according to PN-EN 14782 norm. Producer issue declaration of conformity for each batch of materials.

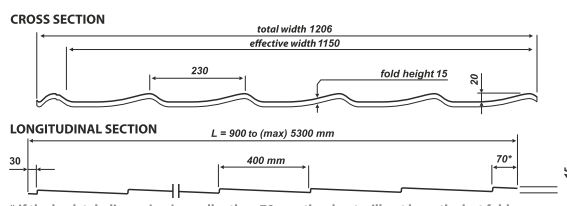


RUBIN Plus 350/15



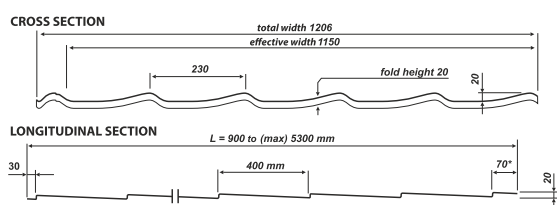
* if the back tab dimension is smaller than 70mm, the sheet will not have the last fold

RUBIN Plus 400/15



* if the back tab dimension is smaller than 70mm, the sheet will not have the last fold

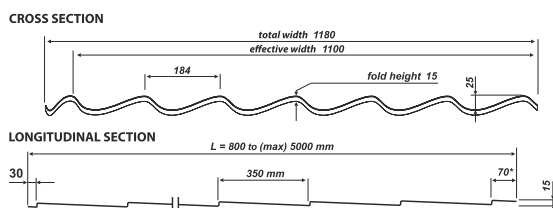
RUBIN Plus 400/20



* if the back tab dimension is smaller than 70mm, the sheet will not have the last fold

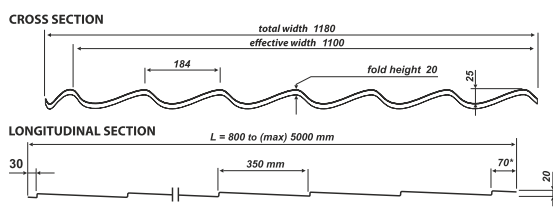


SZAFIR 350/15



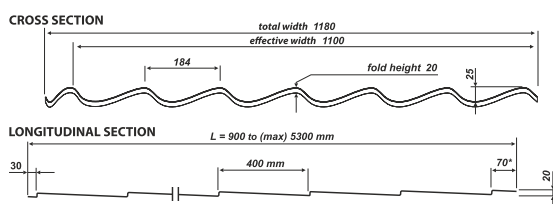
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SZAFIR 350/20



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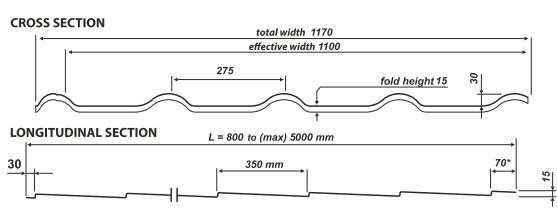
SZAFIR 400/20



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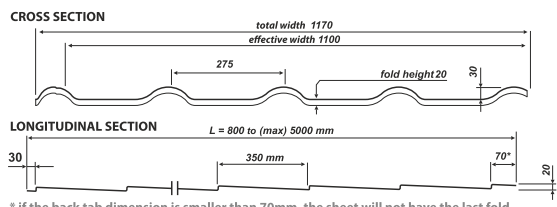


KRON 350/15



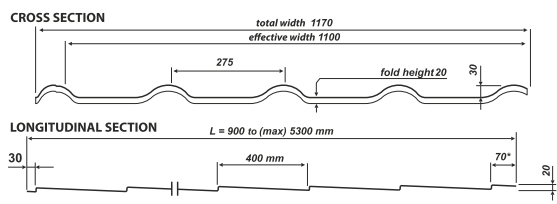
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KRON 350/20



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KRON 400/20



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PURPOSE, SCOPE AND REQUIREMENTS OF USE

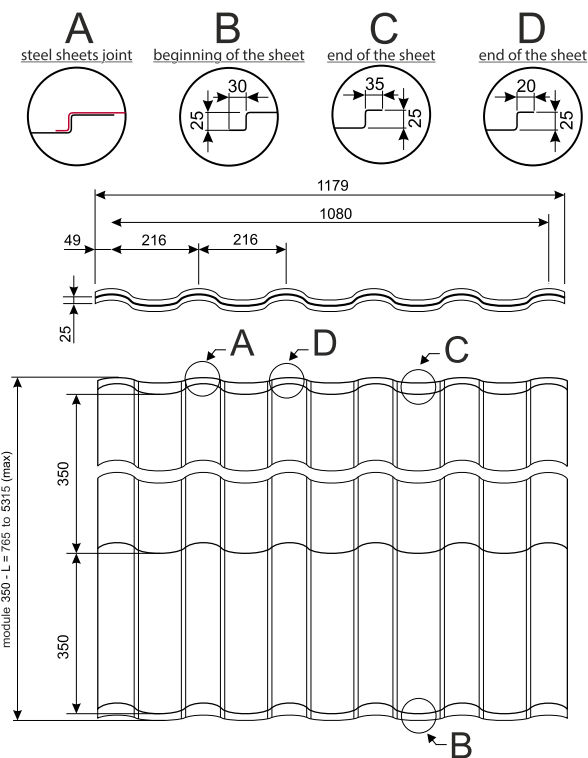
Steel roof tiles are modern, durable and aesthetic roof cover for single- and multi-family houses, outbuildings, sacral buildings and other monumental buildings. Steel tile is cambered of sheets galvanised on both sides and covered with several layers of varnish, which guarantees longevity. Wide range of colours and possibility of adjusting steel tile to various surfaces allows fitting the roof to elevation and surrounding. Due to fact that sheets are produced with defined length, the quantity of wasted material is cut down to minimum. Weight of steel tile is about 5kg/m², which means it is 10times lighter than traditional roof tiles.

Blachodachówki:

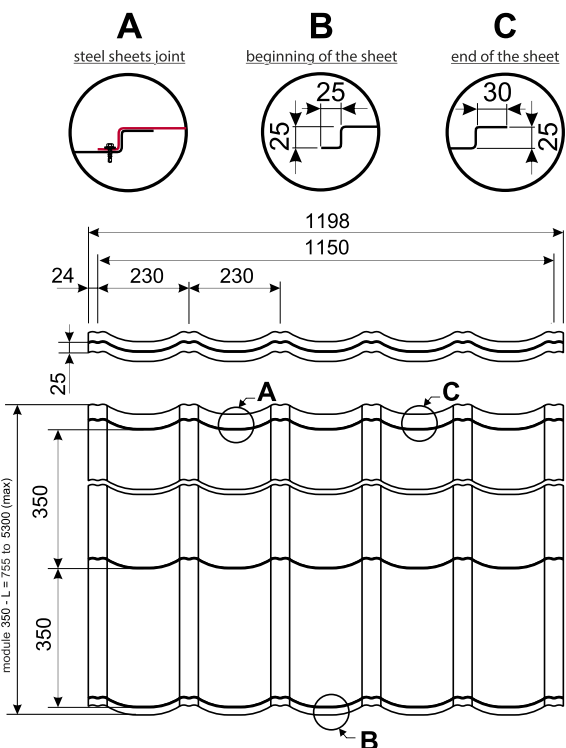
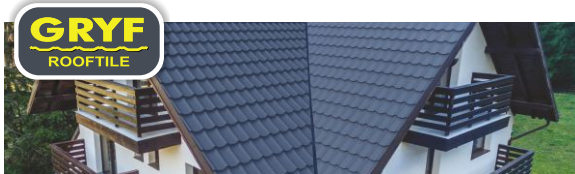
- RUBIN Plus
- SZAFIR
- KRON
- OPTIMA ARAD
- GRYF

Can be used to covering roofs which slope is not smaller than 9°(15%), in building located in atmospheric corrosiveness area c1, c2 and c3 due to PN-EN ISO 12944-2:2001

Usage and way of compliance covering with following steel roof tiles should be compatible with engineering design of building, set with consideration of engineering norm and law, PN-EN 14782 norms and assembly guidelines of producer of steel roof tiles.

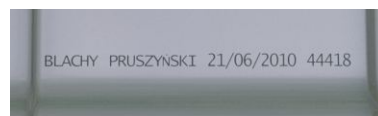


*to join the sheets along their length, it is necessary to consider folds – 30mm in the front and 35mm in the back. Total of folds in a sheet with full back crease is 65mm.



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Original steel sheet labelling



Label on primer:

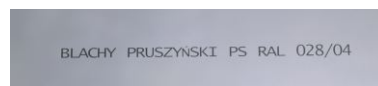
- OPTIMA ARAD
- GRYF

Label on top(on the tab of the sheet):

- KRON
- SZAFIR
- RUBIN Plus

The label contains:

- the manufacturer's name
- the date of manufacturing
- the number of the production order, BLACHY PRUSZYŃSKI 21/06/2010 44418



Flat sheet

The label contains:

- the manufacturer's name
- the colour code

BLACHY PRUSZYŃSKI PS RAL 028/04



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. Proper anchoring of the sheet packages for the transport will reduce the damage of the sheet paint coat due to abrasion.

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 pluck 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.



BASE FOR STEEL ROOF TILES

1. Timber roof truss:

- counter battens with size: 25x50 or 40x50 (depend on angle of roof pitch and length of sweeps).
- battens with size: 40x50 or 40x60 (depend on spacing of battens).

Timber should be impregnated, min class II.

2. Steel roof truss:

- counter battens and battens mostly made of steel, galvanised Z, C, Ω profiles with thickness bigger than 0,7mm

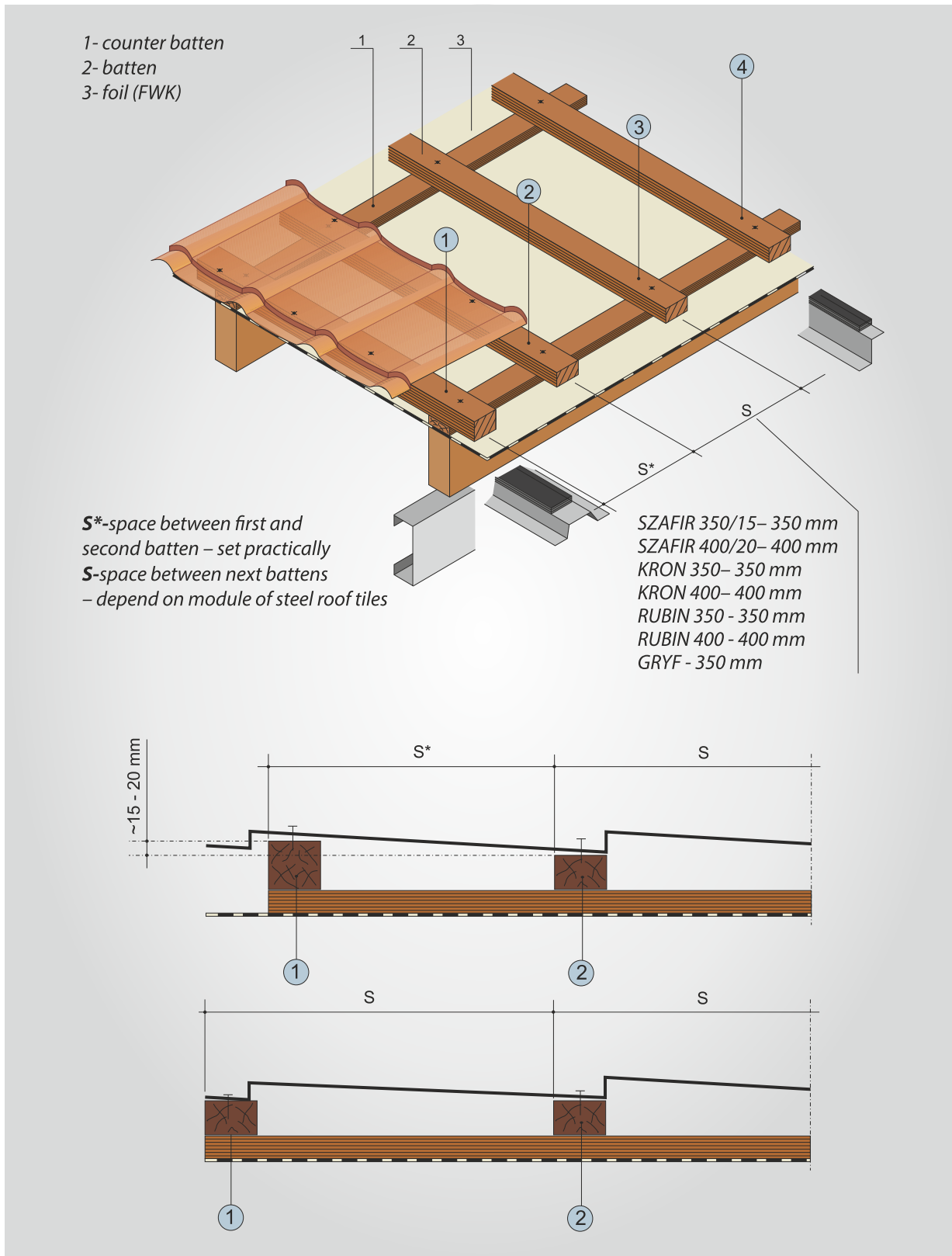
Counter battens are to fastening roof foil (precover foil) to rafters. Steel roof tiles are fastened to battens.

Attention!

Space between battens depends on pressing that imitates tiles (draw. 2), except space between first and second batten, which is set practically from construction of eave, roof pitch and gutter system.

Drawing 2

Direct roof structure under steel roof tiles



Generally batten nr 1 must be higher than others for about 1,5 to 2cm, because steel roof tiles have higher pressing in that place.

In case of fastening sheet before first pressing, first batten should be the same as others.

Use of counter battens and battens guarantees gaining air blank which is necessary for out taking steam (humidity) from interior of the building.

Aperture next to eave and ridge should have min. 200cm²/linear metre



ROOF TRUSS CONSTRUCTION

On drawing 3. are presented mostly used roof truss. Choose of each material and taking specific construction solution leads to:

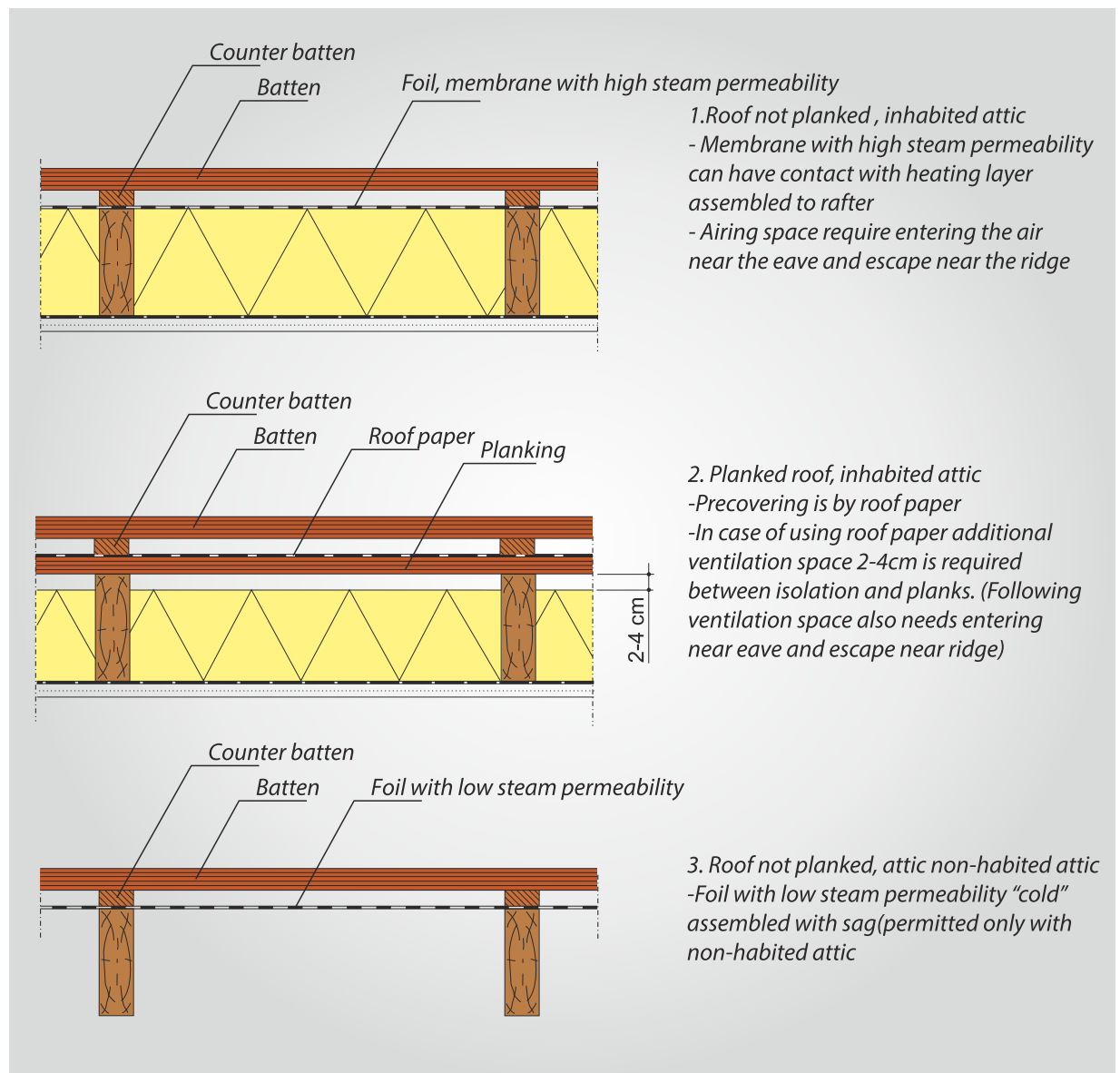
- simplicity of construction,
- maximum use of properties of used materials,
- gaining expected use effect.

In case of new solutions, where roof is not planked, and foil with high steam permeability is used (higher than $1000\text{g}/\text{m}^2/24\text{h}$ or S_d lower than $0,3\text{m}$) layer of warming assembled between rafters, can have contact with foil. Roof breathes with whole surface. Air blank 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.

Planking the roof with layer of roof paper impose use of additional "bottom" air blank (between planks and thermos insulation). In this case line of ridge shouldn't be closed with roof paper but keep the aperture about 5-10 cm or use chimneys to ventilate near the ridge (1 with diameter 10cm per 30-40m² of roof sweep). Same effect can be obtained with use of ventilation grate in top of the building, bottom air blank should have 2-4cm.

Drawing 3.

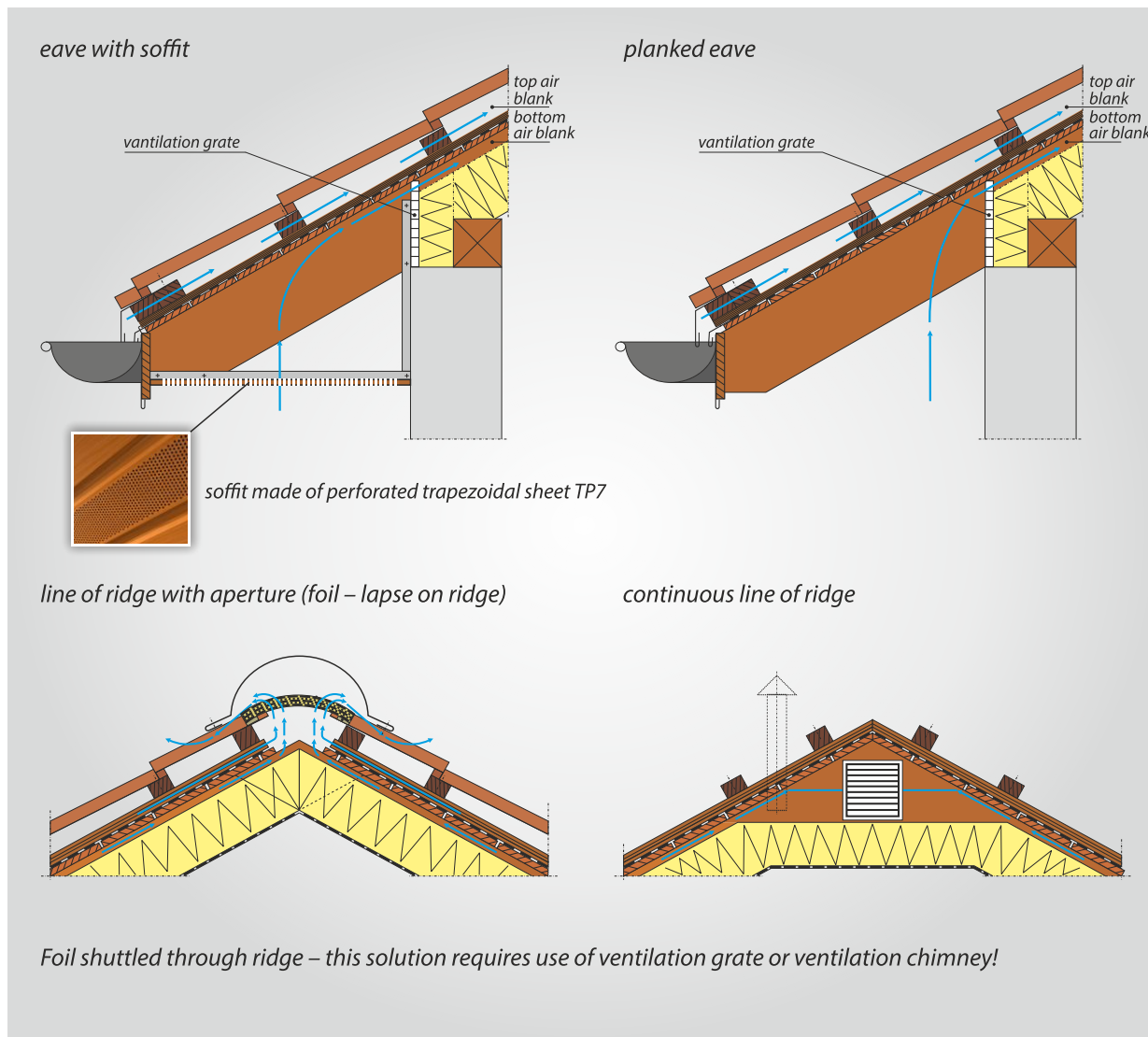
Use of roof truss in dwelling houses



Drawing 4.

Examples of solution line of eave and ridge

– planked roof with roof paper



05

ASSEMBLY OF STEEL ROOF TILES

05.1

ASSEMBLY OF ROOF FOILS DRAWING 5/5A

During assembly of roof foils it is necessary to obey producer's guidelines with special attention to holes for roof windows and chimneys

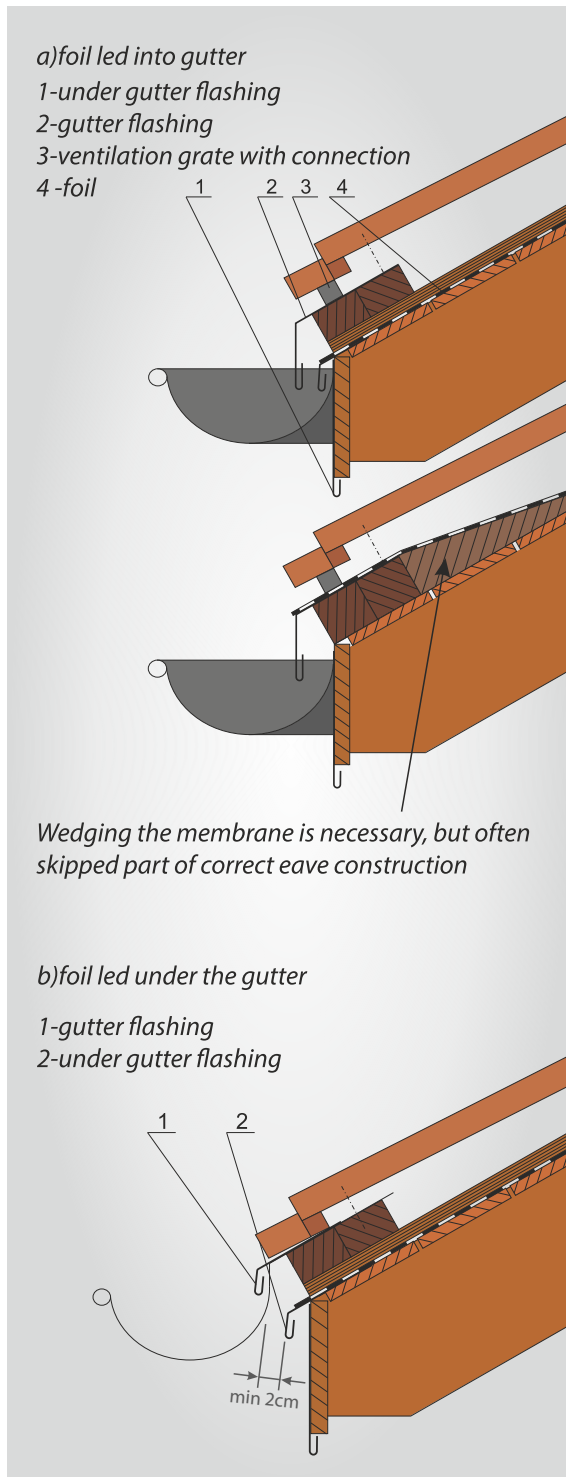
Membrane with high steam permeability or roof paper can be installed in 2 ways:

1. To gutter – with use of anchors with special flashing, where possible condensate can flow down to gutter
2. Under the gutter – with use of anchor under the rafter, where condensate flow down under the gutter, but snow or ice capes doesn't trap ventilation aperture near eave. This system is more expensive and harder in execution but it guarantees right ventilation of the roof during winter and limits dropping condensate water into mineral wool. That made eave drops down expenses in maintenance of building because it guarantees right humidity of heating(drawing 5b on page 7).

Attention!
Foil should be stick to gutter flashing with double-side tape, so it won't be pulled with wind.

Drawing 5

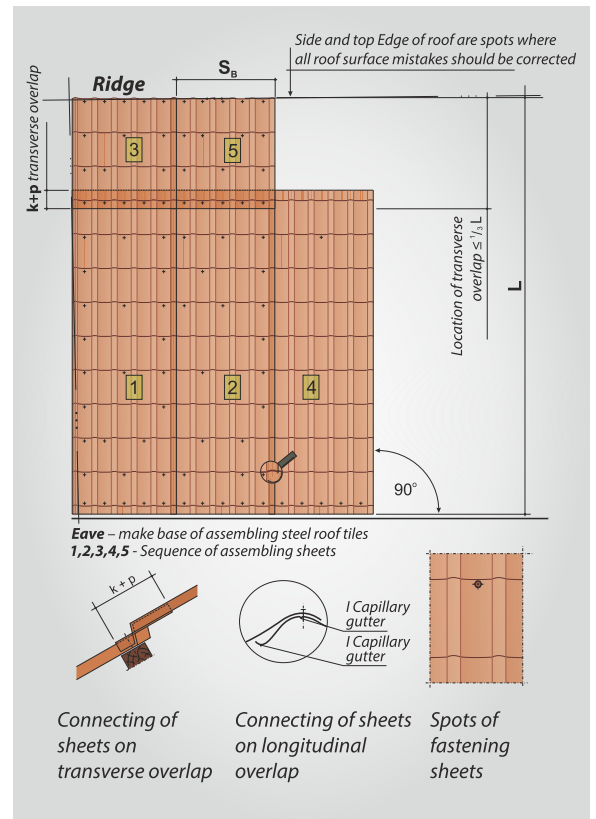
Ways of fastening foil on eave and installation of gutter flashing and under gutter flashing.



Despite the way of installation the heating, from the "warm" side should be installed para insulating foil, and her connection should be stucked with pre-pasted tapes

Drawing 6

Assembly of steel roof tiles



05.2

ASSEMBLY OF STEEL ROOF TILES DRAWING 6

Before starting the assembly works, roof geometries should be inspected. In case of rectangular sweep it is necessary to measure diagonals, which should be equal. All mistakes of sweep should be localized near side edge of roof and ridge, because they will be covered with flashings. Groundwork of assembly steel roof tiles is always line of eave. Special diligence should be indicated during assembly of base - especially battens. They must be assembled (twisted nails - galvanized) parallel to eave with proper space between them. Direction of assembly is optional but technically it is easier to make assembly from the left side to the right. Then after the preliminary installation of first sheet you put second one under the first and check position to eave. perfect connection of them on ZAKŁADZIE WZDŁUŻNYM and pressings occurs which imitates shape of roof tiles. Sheet doesn't fall down from roof. After the preliminary installation of next sheet you can assembly previous one. It is permitted to make assembly from the right side. Choice depends generally on roof truss and habit of assembler.

To assembly the sheets use screws which are 4,8x35mm with seal of rubber EPDM which is resistance to change of temperatures and solar beam, which guarantees tightness of fastening. To coverings with higher durability(PURMAT and PURLAK) screws PREMIUM should be used. Sheets are fastened one to another with screws of 4,8x20(staples). Screws should be assembled with drill-driver with flow regulation of power in the bottom-most space of wave of tiles. Approximate use of screws is 6-10/m² of sweep and depends on shape of the roof and quantity of flashings.

We assembly steel sheets on each wave in places like:

- next to eave,
- next to ridge,
- next longitudinal work,
- next to side edges of roof,
- on deep box gutter.

Attention!

Sheets of steel roof tiles in spots of chimneys, roof windows, deep box gutters should be longer than others for min. height of one pressing imitating roof tile.

05.3

ASSEMBLY OF FLASHINGS

On drawing 7 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 sheets of flat sheets directly on building site by assembler of covering.

Attention!

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

Flashing have to:

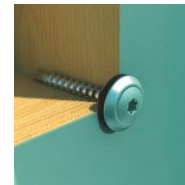
1. Provide tightness of covering in place of connections or edges of roof sweeps,
2. Provide aesthetic of covering. We get best results when using screws TORX to fasten flashings.



PREMIUM screw



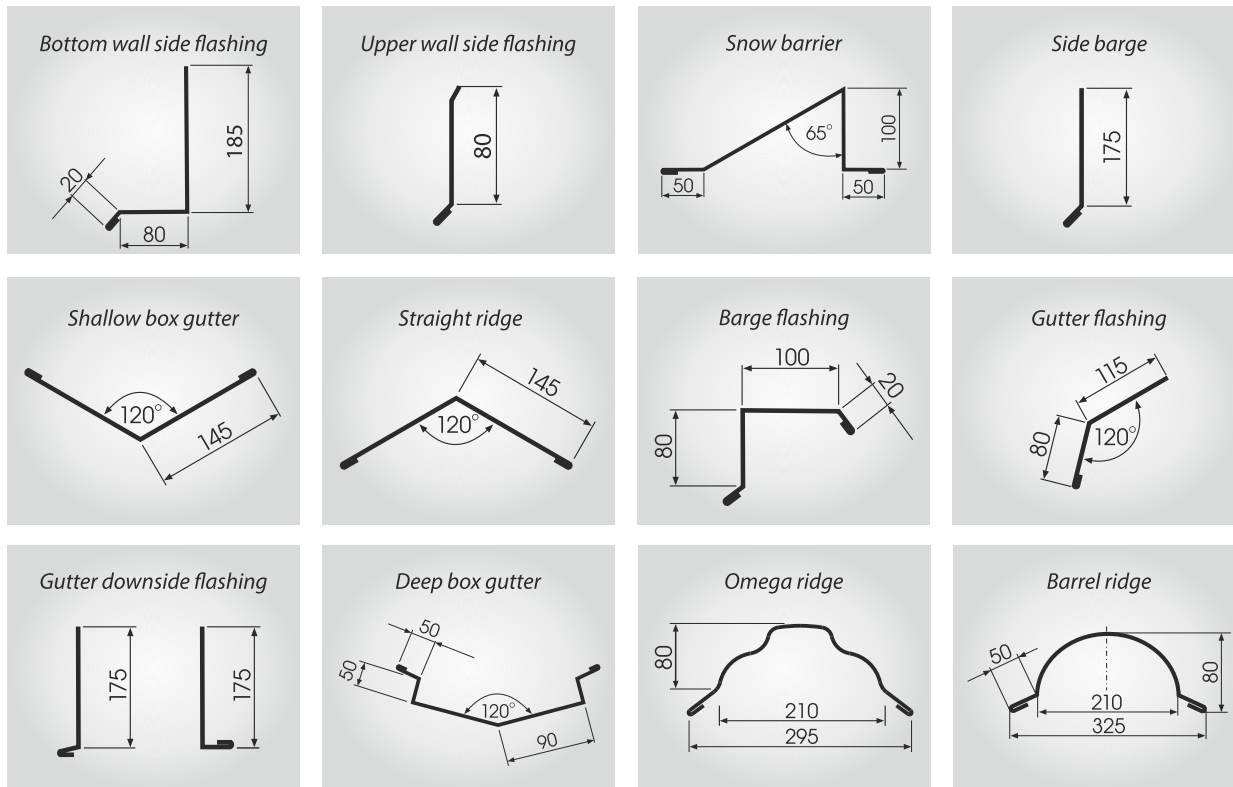
staple



TORX screw

Drawing 7

Standard flashings



05.3.1

GUTTER FLASHINGS DRAWING 5/5A

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.

05.3.2

GUTTER DOWNSIDE FLASHING DRAWING 5/5A

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.

05.3.3

CHIMNEY FLASHINGS DRAWING 8/9

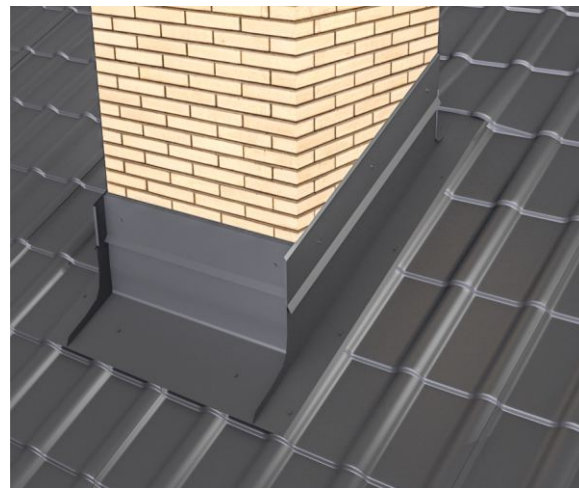
Their significance is crucial due to fact that defective make of them mostly cause lack of tightness of roof.

Sides of flashing should overlap full ridge of steel roof tile.

For flashing of chimneys also self-adhesive roofing tapes are used. Than steel flashing of chimney performs decorative and masking function.

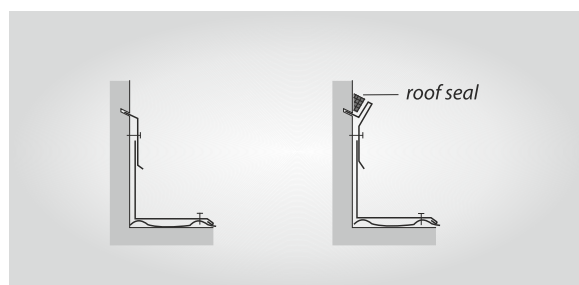
Drawing 8

Example of chimney flashing



Drawing 9

Example of chimney flashing



05.3.4

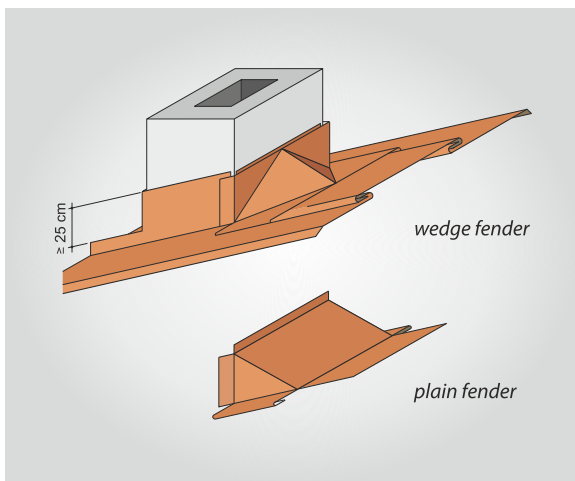
CHIMNEY FLASHING (crickets) DRAWING 10

On sweeps that are sloped over 30° behind chimneys fenders should be installed. They protect back of the chimney from water rain and force it to pass chimney.

Flashing – very important, but rarely used by rafter due to amount of work needed to make it.

Drawing 10

Example of using fenders (crickets)



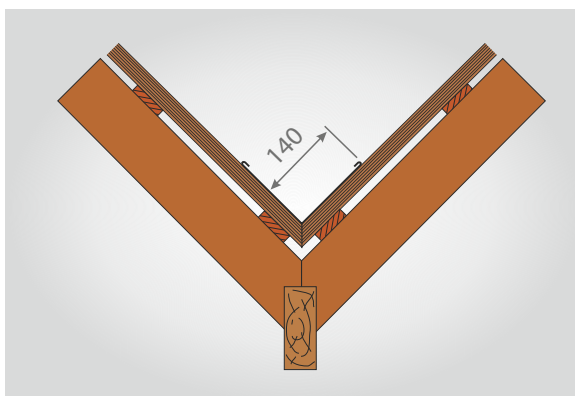
05.3.5

BOX GUTTER DRAWING 11

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

Drawing 11

Example of use of box gutter



05.3.6

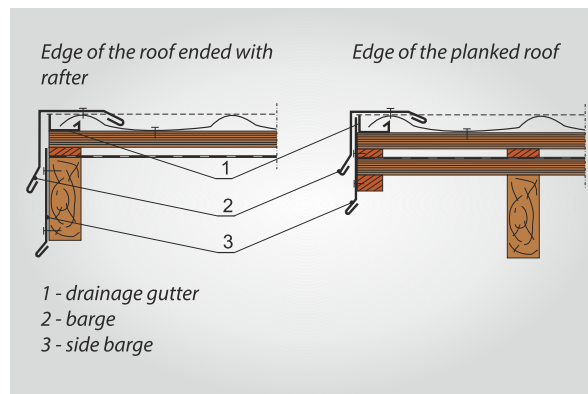
BARGE. SIDE BARGE.

Barges protects side edges of roof.

On drawing 12 are presented examples of installation both barges on the edge finished with rafter and flashing of edge of planked roof. Barges are assembled after installation of sheets of steel tiles.

Drawing 12

Example of using barge and side barge.



05.3.7

RIDGES DRAWING 13

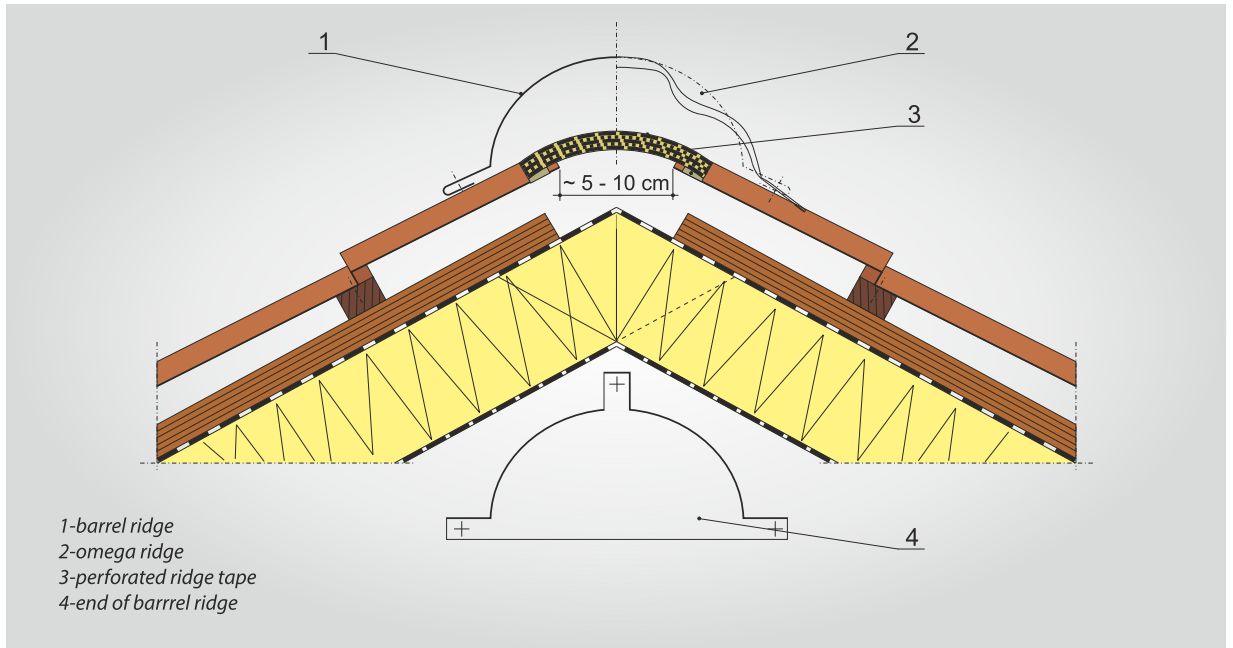
Barrel ridge protects ridge of the roof and edges, where 2 sweeps connect under obtuse angle. Fastening of ridge must be made that way to enable roof cover and heating "breathing" through one or 2 air blanks.

It's worth to make solution presented on drawing 14, where foil of high steam permeability was sticked do edge of the steel roof sheets. Both edges of ridge ale closed with ends. Fastening of ridge is on every other top of steel roof tiles.

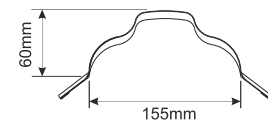
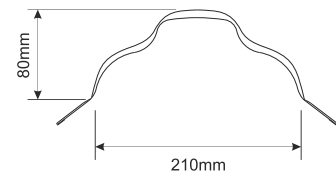
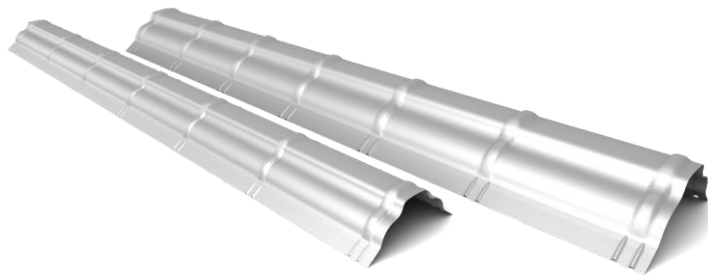


Drawing 13

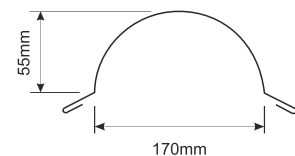
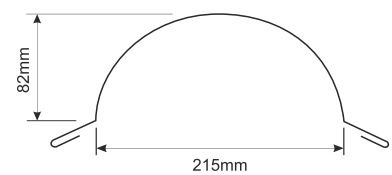
Example of use barrel ridge and omega ridge.
Roof with inhabited attic, precovering with membrane with high steam permeability



Omega ridge



Barrel ridge



05.3.8

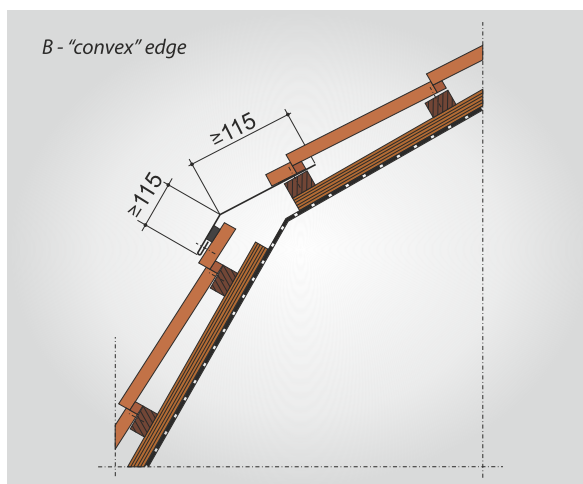
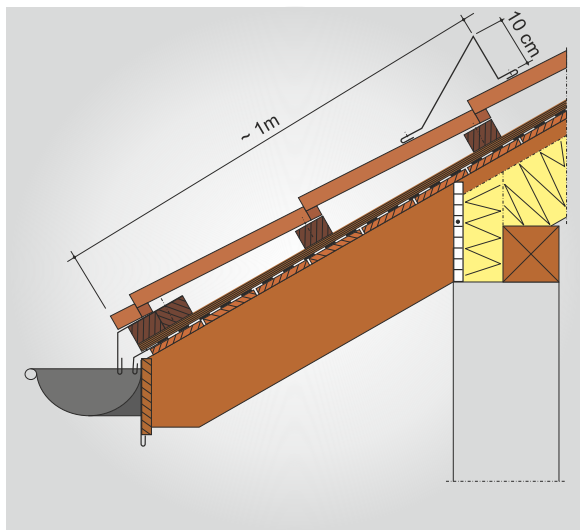
SNOW BARRIER DRAWING 14

Installation of snow barrier depends 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.

Drawing 14

Example of installation snow barrier



Attention!
All flashing which protects edges of the roof are located in "edges panes" of roof, where are biggest loads from wind activity – because of that they have to fastened minimum every 33cm.

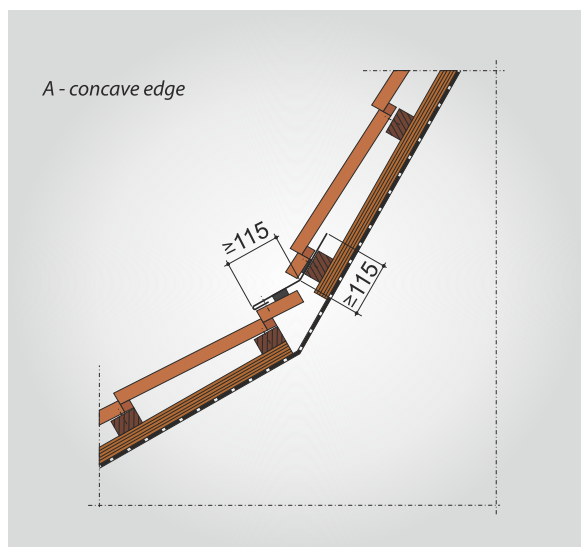
05.3.9

FLASHING OF EDGES OF DIFFERENT SLOPE SWEEPS, WALLSIDE AND FIRE BLOCKADE FLASHINGS DRAWING 15/16

This flashings are usually made on building site due to high architectonic diversity of buildings in Poland.

Drawing 15

Example of edge flashing on roof with various slopes of sweeps.



05.3.10

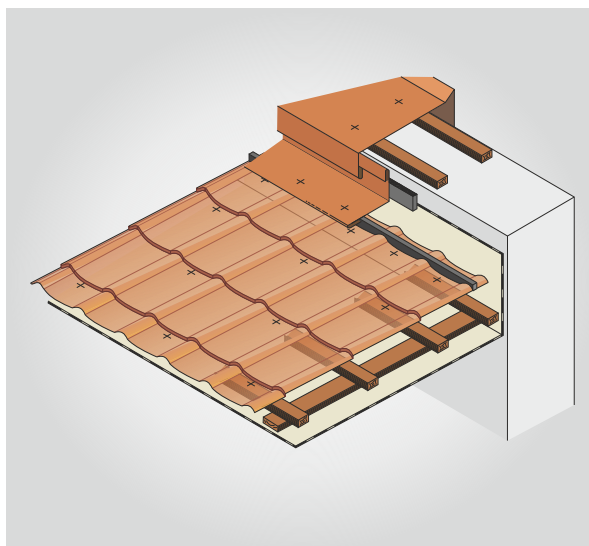
FLASHINGS OF PIPES, VENTS, ANTHENS, ETC.

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.

Drawing 16

Example of fire blockade flashing and use of side wall flashing and fire blockade



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 are many ways of making ventilations, for example - 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.

07

MAINTENANCE

Roofs with steel roof tiles 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 conservative 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

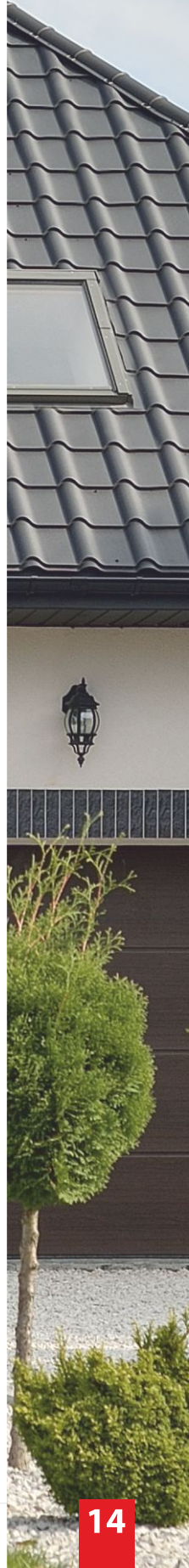
Roof and elevation made of steel sheets require cleaning at least once a year. Stratifying dirt on steel sheet may cause uneven discoloration of lacquer (because of uneven impact of UV beams), and lower protection to corrosion(dust traps humidity on steel sheets which causes damage).

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.



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 naphtha 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.



CLOSING REMARKS

1. For cutting steel sheets should be used nibler or roofing scissors

It's forbidden to use tools which damage varnish layer during cutting due to heat emission, f. ex. angle grinder.

2. On roof it's permitted only to move in shoes of soft sole putting foots down in the bottom waves of tiles.

Before walking on roof surface all fasteners should be mounted.

3. Small scratches of varnish can be restored with special paint. Surface should be cleaned from dust and fats. Surface next to scratched spots should be covered during painting.

4. Steel shavings from cutting and drilling has to be removed with soft brush. In other case they may cause damages for surfaces of steel sheets.

5. Dirt, which occurs during work of assemblers and during exploitation of roof should be removed with standard cleaning detergents.

6. It's recommended to indemnify cut edges with clear varnish.



ATTACHMENT

If in technical documents there are no specify solutions – please use following notes:

1. Roof boarding:

1. Thickness of planks in span of rafters:
600mm – thickness of planks 20mm,
900mm – thickness of planks 23mm,
1200mm – thickness of planks 28mm.
2. Thickness of OSB boards in span of rafters:
700mm – thickness of OSB board 12mm,
800mm – thickness of OSB board 15mm,
1000mm – thickness of OSB board 18mm,
3. Size of battens in span of rafters:
700mm – size of battens 24x48mm
800mm – size of battens 30x50mm
1200mm – size of battens 40x60mm.

2. Minimal length of nails.

1. $L = \text{thickness of nails} \times 12 + \text{thickness of counter batten}$
2. $L = \text{thickness (batten + counter batten)} \times 2,5,$

3. Practical choose of gutter system:

1cm² of intersection of gutter or down pipe “collect” rain water from 1m² of roof surface.

4. Lighting conductor.

Due to PN-92/E-05003/01-04 in lighting conductor should be equipped:

- Roofs of height above 15m or above 500m² surface,
- Public facilities (above 500 peoples)
- Hospitals, sanatoriums, nursery schools,
- Facilities of high historical value,
- Facilities made from flammable materials,
- Facilities for storage flammable materials,
- Facilities with lighting danger coefficient above 10-4.

5. Minimal thickness of building insulation

- Steep roofs – 22cm
- Celiing above non-warmed rooms – 18cm

6. Use of seals

Sealing line of eave and ridge, used primary against insects and birds, have negative impact on humidity situation of roof cover. Seals limit, and non-professionally used can even eliminate necessary ventilation gaps in eave and next to gutter. However protecting eave and gutter against birds and insect is also necessary.

7. Holes and ventilation gaps.

1. Recommended surface F_e of suction gaps for ventilated roofs of slope up to 50° in calculation for 1m² of F_d - roof surface:

- Surface of entering of air next to eave:

$F_e = 0,002 \times F_s$ – but not less than 200cm²/m of eave,

- Surface of entering of air next to ridge:

$F_e = 0,005 \times F_d$ – but not less than 200cm²/m of ridge.

2. Ventilation of non-habited attic:

$F_e = 1/300 \times F_p$ – through system of ventilation holes in roof

$F_e = 1/150 F_p$ – through ventilation placed in top walls.

F_p – area of attic.

8. Use of roof foils.

Experience of last year and made research proofed, that even in best psycho-chemist conditions there should be used para insulation with FWK of high steam permeability. So is rather not used anymore of foils of low steam ability. Additional 2 arguments for using FWK of high steam permeability and waterproof at the same time is fact that using this foil, both investor and assembler has sureness that there is nothing to make wrong. There is no need to make additional ventilation system or “bottom vacuity”, it's very important in case of roofs of complicated architectonic plan (f. ex. roof “envelope roof”). Second argument is fact that roof cover made with such foil and without full boarding is cheaper and warmer, which has specify impact on heat bills.

9. Self-adhesive tapes.

1. One-side adhesive tapes:

- TOP – Tape4 – sealing roof communication (ventilation chimneys, aerals, roof exits)
- FASET from Fulgurit – as above.
- Top Tape6 – sealing of roof cover (holes, losses),
- Clever Top Repair – connecting of roof foil,
- Dorken tape – as above
- RISSAN from SIGA AG – universal
- TOP FLEX MAGE – tape for chimney flashing,
- Insulation tape from INTERCHEMAL for:
 - *sealing connections of trapezoidal sheets, cassetons, elevation panels with constructional base,
 - *acoustic insulation under plasticboards
 - *spaces between wall and floor.

2. Double - sided adhesive tapes:

- TOP – Tape3 – assembling foil on gutter, wall flashings etc.; foils with steam permeability.
- Clever Top Connect – as above



BLACHY PRUSZYŃSKI



www.pruszynski.com.pl

Sokołów, 05-806 Komorów, ul. Sokołowska 32B

☎ (48) 22 738 60 00 ✉ pruszynski@pruszynski.com.pl