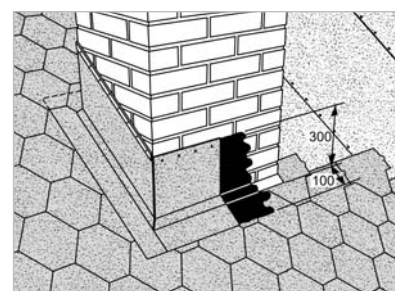
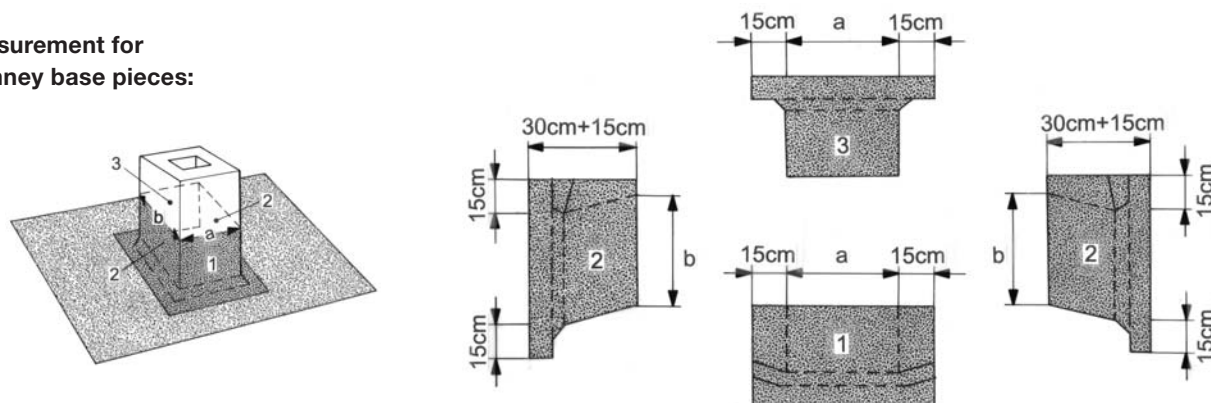


Ducts and risers:

Roofing shingles end at the base of ducts, at the upper edge of fastened triangular blocks. The shingles are nailed in rows at the triangular strip's crest so that the nail heads will be covered by the following shingle. Icopal PintaUltra, coloured to match the roofing shingles, is used on the risers. The riser extends from the surface of the roof by at least 300 mm. Riser pieces are glued at least 100 mm over the surface of the roof panes. The riser strip at the lower half of the duct (e.g. pipe) base is positioned so that it will remain under the row of shingles Icopal roofing adhesive guarantees the adhesion of the shingle rows. The riser strips are uniformly glued to the pipe and base with Icopal rubberised bitumen adhesive. The fastening is mechanically reinforced at the upper edge, by, for example, nailing them to the pipe seam. Risers are protected with a plastic-coated flashing (in picture) or a sheet moulding.



Measurement for chimney base pieces:



Plano shingle

You need	Amount
Roofing shingle (3 m ² /pckg)	roof area +10%
Plano underlayment (10 m ² /roll)	roof area +15%
Flashing sheet for gable moulding (2m/piece)	
Flashing sheet for gable end (2 m/piece)	
Combi ridge / flashing sheet (10 m ridge, 16 m eaves/pckg)	total length of ridges and gable ends
Ventilating ridge piece (1.22m/piece)	total length of the ridges
PintaUltra (10x0,7 m)	total length of the valleys + ducts of the flues
Duct seals	depends on the number of ducts
Low pressure fans	as needed
*Felt nails, with heads (25...35 mm)	1 kg/10m ²
Roofing adhesive	eaves: 0.1 l/m + valley: 0.4 l/m + flues 3l/flue

*) Fasteners: Felt roof fasteners with an adjustable setting depth can also be used for general fastening applications. The fastener backing width must be at least 25 mm and the wire thickness 1,6 mm. The length of the fastener is determined according to the base thickness. The use of fasteners requires special precision.

Maintenance instructions:

- the roof must be inspected at least every spring and autumn
- all litter, branches and leaves are to be removed from the roof using, for instance, a broom
- sharp-edged litter and articles are to be picked with hands.
- avoid the use of sharp articles when removing litter, moss, etc.
- unobstructed drainage of water from the roof must be ensured
- snow must be removed from the roof, if it shows signs of falling, causing harm or if its weight is too great for the support structures
- when removing snow, leave a thin layer to protect the roofing
- ducts, sheets, etc. are to be inspected and, if necessary, repaired.
- any holes or cracks are to be repaired immediately.



PLANO ROOFING SHINGLES

Installation guide 2006

Product description:

Icopal Plano roofing is bitumen roofing material intended for use on hard and even bases. Plano roofing is suitable for application on both new sites and in the replacement of old "felt" roofs and roofing shingles. The minimum roof gradient is 1:5 (11°), i.e. a decline of 20 cm for every metre.

Storage:

Roofing shingles and supplies should be stored in the shade, in stacks no more than 12 packages high. When the weather is hot, bitumen products should be stored in the shade, in a place from which they can be easily brought to the installation site when required. This allows for easy removal of the protective plastic from the shingle adhesive surfaces.

Installation temperature:

The minimum temperature of the standard installation is +6°C. Roofing shingles should not be installed when it is raining or snowing.

Installation under demanding conditions and during the winter:

Under demanding conditions, such as in windy locations and in cold temperatures, the fastening of shingles as well as Combi ridge and eaves flashing sheets is further reinforced by heating the adhesive surfaces with a hot air blower. The bending points are heated in the same manner. When installing roofing shingles in temperatures lower than +6°C, the shingles and supplies should be stored in a warm place (approx. +20°C) for 2-3 days prior to installation. The shingles are brought to the installation site as required. The base should be free of snow and ice, clean and dry.

Roofing base:

The roofing base of the roofing shingles should be firm, even and rigid. A moisture and water vapour resistant tongue-and-groove wall board, suitable for use as a nailing surface due to its hardness, serves as a roofing base. There must be no cracks or sharp-edged protrusions in the roofing base. A rough tongue-and-groove board (max. width 95 mm, min. thickness 21 mm) is also suitable for a roofing base. The wood moisture level must not be higher than 20% of the dry weight. The seams of dry decking should be given 2-3 mm scope for play. The decking should extend at least over the width of two support intervals, with extensions made at the roof trusses.

When renovating, the condition of the decking is examined and, if necessary, repaired. Felt roof folds etc. are cut open, glued and nailed to the base. The old felt, formed into a drip, is cut loose and removed along with the nails. If the old bitumen roofing is removed, always use Plano underlayment membranes. Plano underlayment membranes are used in the renovation of triangular blocking or shingled roofs. The length of the nails used in the installation of new roofing should be at least 35 mm, so that they reach the lower surface of the decking.

Underlayment membrane:

On new sites, underlayment membrane is used under the roofing shingle. As underlayment membrane, we recommend Plano Underlayment Membrane.

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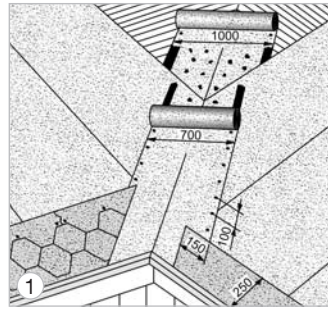
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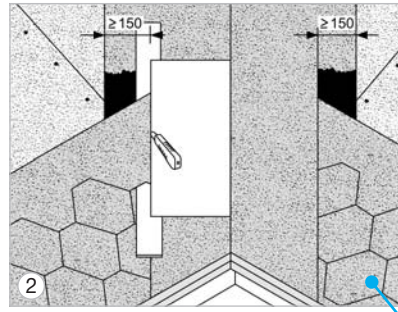




Installation of underlayment membrane and valley:

The installation of the underlayment starts from the valley. The underlayment membranes are installed on the base of the valley along the gradient. The underlayment strips running from the roof panes are extended to the valley base and cut along the gradient.

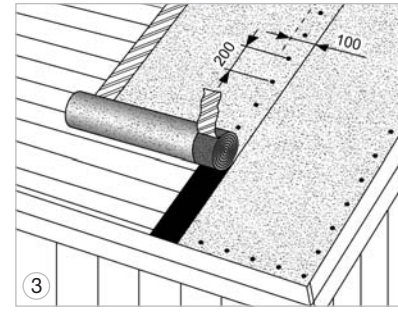
Plano Underlayment Membrane can be installed vertically or horizontally. The underlayment is placed according to eaves and nailed to the base with a few nails. The protective plastic on the membrane's lower half edge is removed and the membrane is nailed to the base edge at 200 mm intervals. The protective plastic on the membrane's upper half edge is removed and the membrane is nailed to the base with a few nails. The next underlayment is placed over the pre-



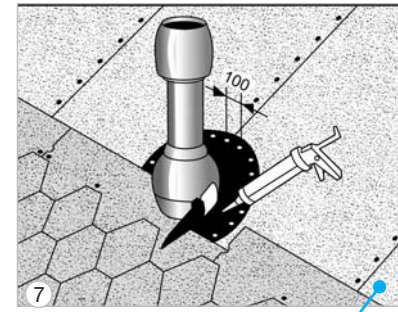
ceding membrane with a 100 mm offset, the protective plastic is removed from the membrane's lower half and the membrane is nailed to the base at 200 mm intervals. Further joints are offset by approximately 150 mm. If the roof is covered only by the underlayment during the winter, its fastening should be reinforced by nailing from the membrane centre at 200 mm intervals and by adding more nails to edge joints at 100 mm intervals.

Icopal K-EL or Icopal Fel'X Multi underlayments can also be used as underlayment membranes. Polar underlayment membrane is suitable for particularly demanding projects.

Icopal PintaUltra, in a colour matching the roofing shingles, is applied as a surface membrane



of the valley. The membrane is applied to the valley base and its adhesion is reinforced with the gluing points applied to its underside (pic. 1). PintaUltra is fastened by nailing the edging at 100 mm intervals. The roofing shingles should extend at least 150 mm over the PintaUltra edging and each shingle row is glued in successive layers to the base (pic. 2). Use only Icopal's roofing and rubberised bitumen adhesive when installing Icopal bitumen products!



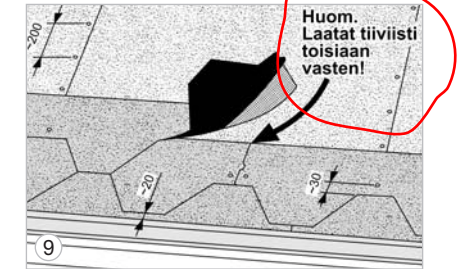
Duct seals and low pressure fans:

Antennae and duct piping bases are sealed with Icopal duct seal. In order to increase the effectiveness of upper base ventilation, Icopal low pressure fans can be added between the roof trusses near the ridge. The duct seals and low pressure fans are glued to the underlayments at their flange collars. The low pressure fan flange collar is nailed to the base at 100 mm intervals. The shingle rows that will cover the flange collars are cut and glued to them row by row with Icopal rubberised bitumen adhesive. The duct seal is tightened with a fastener ring around the duct. In order to ensure the adhesion of duct seals or low pressure fans on old bitumen roofs, the flange collar base is treated with Icopal bitumen solution (BIL 20/85).

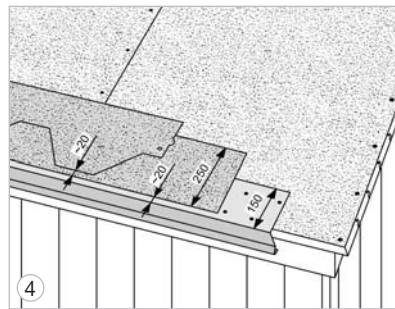


Installation of roofing shingles:

Prior to installation, mix the shingles of several different packages to avoid minor colour variations. Before installation, remove also the protective plastic from the roofing shingle (picture 8). The first row of shingles should be positioned so that the shingle edges are approx. 20 mm from the edge of the gable end, and the joints of the flashing sheets are covered by shingles. Each roofing shingle is nailed to the base approx. 30 mm above the cuts and from the shingle edge (i.e. four nails / shingle). Fastening on steep gradient roofs (1:1 or steeper) or in windy locations (such as in a maritime environment) is reinforced by nailing each upper corner of the shingle with one nail (i.e. 6 nails / shingle).

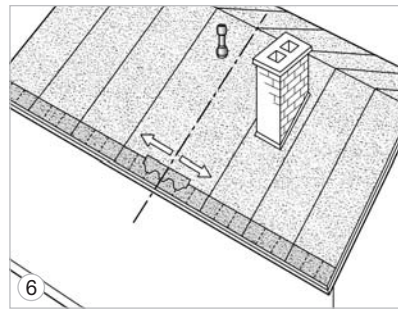


The following row of shingles is positioned so that the shingle edges are aligned with the cuts of the preceding row, thus covering the nails. The shingles are pressed tightly against one another.

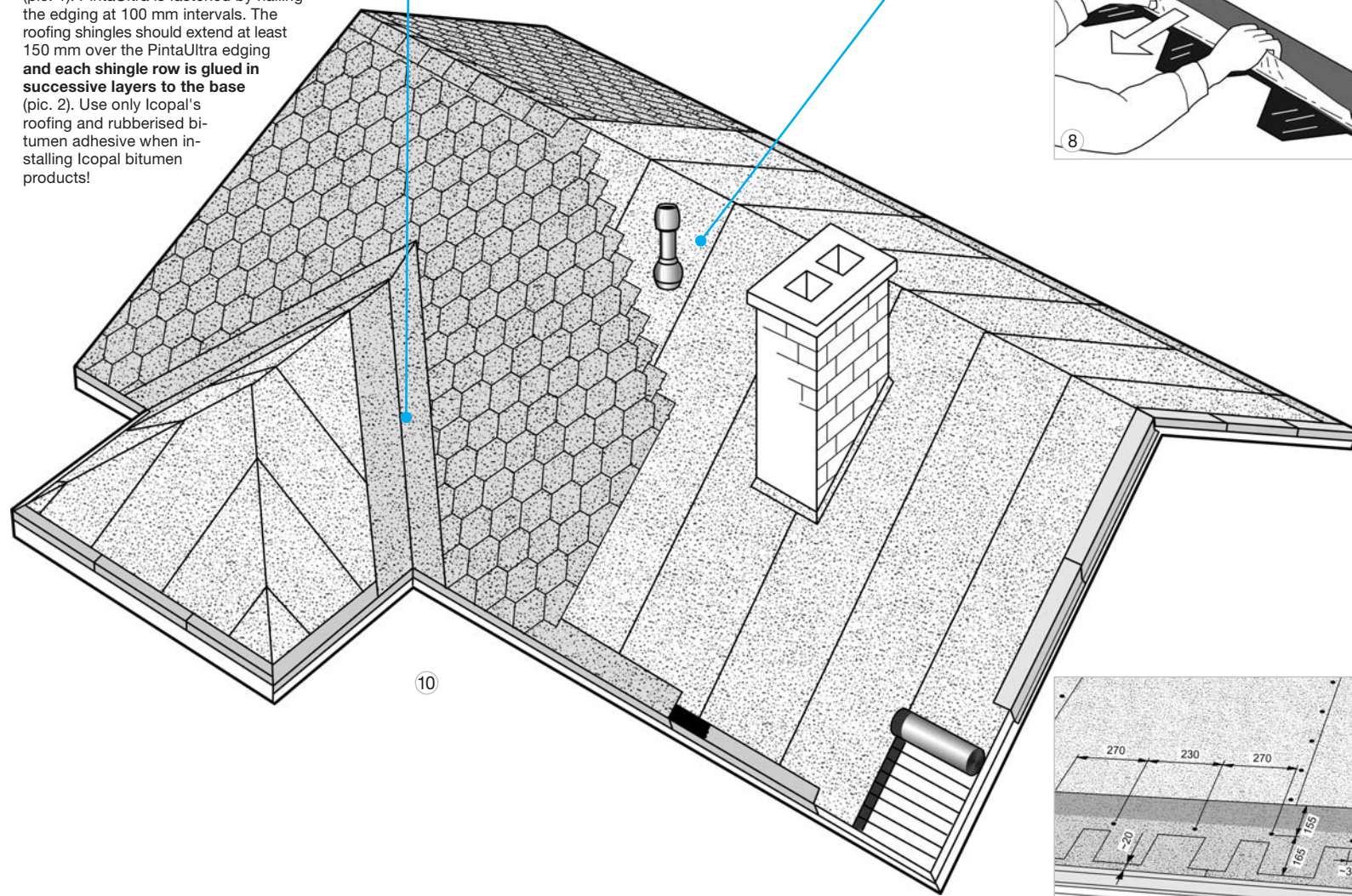


Gable ends:

We recommend the use of flanged Icopal flashing sheets on eaves, which protect the barge boarding and give the roof a finished appearance. The minimum width of a flashing sheet flange is 150 mm. The flashing sheet is installed above the underlayment membrane and is nailed to the base from its upper edge at 100 mm intervals applying the so-called "zigzag" pattern. The sheet



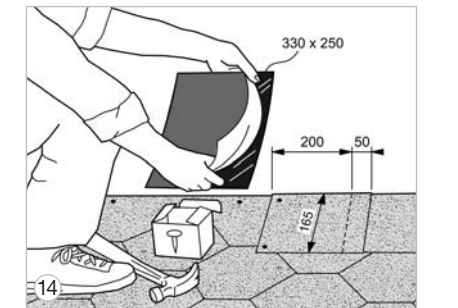
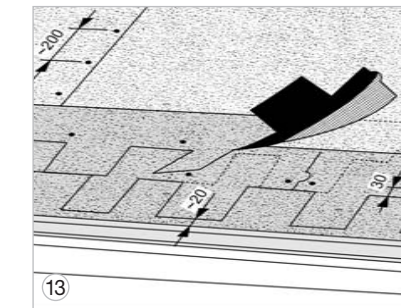
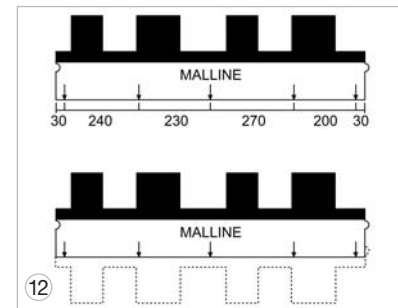
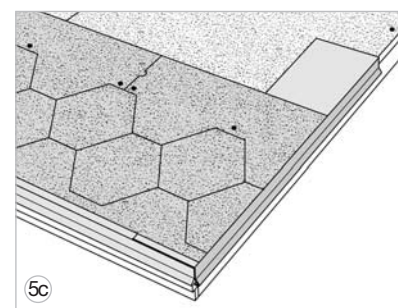
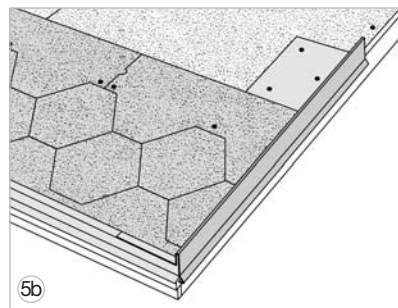
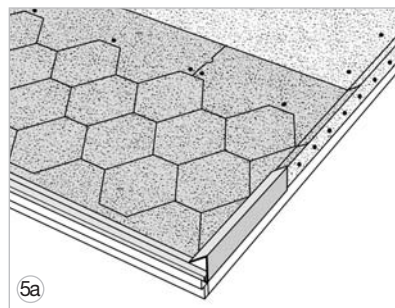
is folded approx. 15 mm over the edge of the board. To make the folding easier, the edge is cut from the corner (10 mm max.). Combi flashing sheets are installed at the gable end. The installation of the flashing sheets is to begin from the centre. The protective plastic is removed from the flashing sheet. With the strips running along the eaves, it is pressed firmly to the base.



Gable moulding:

In the gable moulding, the flashing strip and flashing sheet are fastened in the same manner as in the gable end. Pre-formed gable moulding

lists can also be used with gable mouldings (pictures 5a and 5b). The ends of cut roofing shingles are glued in 100 mm widths to the base.



Ridge and the outer ridges of hipped roofs:

Adhesive Combi ridge sheets are used on ridges and on the outer ridges of hipped roofs. On ridges, the shingle rows are brought up so that the last row's nails are covered at least 30 mm under the ridge sheet. In the outer ridges of hipped roofs the shingle rows are cut in the joint and the ends of the shingles are nailed at 100 mm intervals on both sides of the outer ridge.

The Combi sheets are folded in the bending points and the ridge sheets (3 pcs) are separated from one another. The protective plastic is removed from the underside of the ridge sheet and the sheet is bent 165 mm over both sides of the ridge and nailed with four nails. The next ridge sheet is placed over the preceding sheet with a 50 mm offset, covering the nails. The permanence of the last ridge sheet is ensured with Icopal roofing or rubberised bitumen adhesive.