



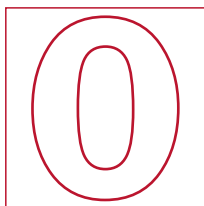
TECHNONICOL

ARCHITECT



Roofing shingles installation instructions

KNOWLEDGE. EXPERIENCE. CRAFTSMANSHIP.



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General Recommendations

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1

General Recommendations

- The specified roof temperature and humidity can be ensured only if its structure includes solid vapor sealant, insulation thickness required for this region, a diffusive layer, and ventilated sub-roof space.
 - Do not use bundles with different production codes for the same roof. Possible slight difference in color hues is not a defect.
 - To avoid undesired color unbalance that could appear in visible color spots on a roof, it is recommended to mix shingles from 5 or 6 random bundles.
 - Under outside temperature of + 5°C or colder please store roofing shingles in a warm, dry place and take them out by batches of 5 or 6 bundles prior to installation.
 - Under outside temperature of + 5°C or colder a hand-held hot air welding gun must be used to warm the adhesive strip on a shingle in order to improve adhesion.
 - To prevent damaging the roof's integrity, the material must be cut on the roof on a special board placed underneath.
 - Pallets of shingles should be stored in a covered, ventilated space where temperatures will not exceed 40°C. To avoid sticking of shingles inside the bundle do not expose them to direct sunlight. Transportation and storage of pallets in two or more rows is possible only when using the racks and special shelving units.
 - In order to ensure unobstructed separation of roofing shingles from one another, it is recommended to slightly bend and shake the bundle before opening.
- ! ATTENTION! In order to avoid the appearance of stains and shoe marks, it is not recommended to walk on the roof in sunny or cold and moist weather. Special tracks shall be used to move at the roof slope.**

1 Applied materials

– Roofing shingles



- TECHNINICOL roofing shingles

Roofing shingles are a construction material for residential roofing application that is used on roof slopes of 12° or greater. It consists of three main elements: the fiberglass base, improved bitumen, and granules of volcanic rock basalt.

– Hip & ridge & starter shingles



- TECHNINICOL hip & ridge & starter shingles

represent rectangular sheets with basalt dressing without carved edges. The rear side is coated with a frost resistant adhesive layer. Used for quick and easy installation of a starter row along eaves. These pre-cut shingles can be separated into smaller pieces for further application on hips and ridges to add the aesthetic finish to your roof. Maximum protection against wind, rain and snow is provided.

– Valley roll material



- Valley roofing and waterproofing bitumen roll material

Used as waterproofing underlayment in roof valleys that are prone to leakages under snow and rain loads, and thus require extra protection. This material is also good to seal joints between roofing and piping or vertical walls.

– Thermal insulation layer*



- TECHNINICOL stone wool

– are nonflammable, waterproofing, heat- and sound- insulating slabs made of stone wool based on basalt stones. It is applied for the heating of a mansard roof or floors of a cold attic.

– Diffusion membrane



- TECHNINICOL superdiffusion membranes

A membrane, thanks to its unique properties, ensures the diffusion of water vapor, but prevents the passage of water. It is used for vented insulated roof or facades assemblies.

– Vapor barrier

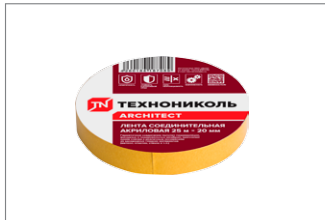


- TECHNINICOL vapor barrier membrane

for pitched roofs and walls has a three-layer structure. The upper and lower layers are made of nonwoven polypropylene fabric that provides a solid framework for the “operational” layer in the middle. A polypropylene film with a vapor permeability monitoring function acts as a middle layer. It is applied for vapor sealing of heat insulated attic roofs.

*Or any other materials with the same specifications. For specifications of TECHNINICOL materials see datasheets at www.nav.tn.ru.

– Connecting strips



- **TECHNONICOL connecting strip** is a waterproofing tape with a double sided functional surface. It serves for making tight connections between vapor sealants, and for connections of sealant film edges to roof structures (manholes, chimneys, etc.).

– Self-adhesive underlayment*



- **ANDEREP ULTRA**** – polyester based adhesive material. On the front side, the material is protected with fine grain sand, and with anti-adhesive film underneath.

The material is intended for efficient waterproofing of a roof covered with flexible shingles and for installation of vapor sealant in roof structures with a metallic rafter system or with a load bearing concrete base.

– Underlayment with mechanical fixation



- **ANDEREP PROF** is a superlight (0.4 kg/m² only) and strong polyester based underlayment material. The small weight of the coil and non-slipping PE coating (Spunbond) ensure installation convenience and safety.

*For specifications of **TECHNONICOL** materials see datasheets at www.nav.tn.ru.

Or any other materials with the same specifications. For specifications of **ANDEREP series underlayment materials see datasheets for **TECHNONICOL** materials at www.nav.tn.ru.



- **ANDEREP GL** is a mechanically fixed underlayment with a fiberglass mat base and fine-grained sand dressing on both sides. It has thermally active longitudinal strips requiring no application of bitumen compound for making longitudinal overlap joints. It is applied in roofs made of flexible shingles.

– Eaves and fronton flashings



- **Eaves and fronton flashings** is made of metal with a special coating.

They are intended for reinforcement of eaves and fronton edges and ensure efficient water disposal.

– Roofing nails



- **Special corrosion resistant roofing nails by TECHNICOL**, 30 and 45 mm long. Nail head diameter is 9 mm minimum. Nail rod diameter is 3 mm minimum.

Applied for reliable fixation of roofing shingles and all its components.

– Fixing mastic



- **TECHNICOL FIXER №23 mastic** is a multicomponent material consisting of bitumen, butadiene-styrene thermoplastic elastomer or its modifications, filler, solvent, and technological additives. The compound is intended for sealing of roofing shingle joints, gluing of valley membrane, gluing of underlayment joints and abutments to brick chimneys and walls.

– Ventilation systems



- **TECHNICOL continuous ridge vent** is applied for removal of excessive sub-roof moisture. It contains a special barrier (a foam filter) that protects against insects and atmospheric precipitation. It is used on gable roofs. The hip & ridge & starter shingles matching the basic color of the roof are installed on the gable vent.



- **TECHNICOL KTV ventilation componen** is applied for removal of excessive sub-roof moisture on slopes where ventilation outlet through the ridge cannot be established. The ventilation component creates a pressure drop in the sub-roof space, causing the moisture evaporating from the heater to be discharged by the motion of air currents.

One ventilation component ensures ventilation of 10 m². The outlet diameter is 110 mm.



- **TECHNICOL PILOT ventilation component** is applied for removal of excessive sub-roof moisture on slopes where ventilation outlet through the ridge cannot be established. The ventilation component creates a pressure drop in the sub-roof space, causing the moisture evaporating from the heater to be discharged by the motion of air currents. One ventilation component ensures ventilation of 10 m².

Stack height provides additional guarantee against ingress under the snow cap and a special cap is fitted with protection against atmospheric precipitation. The outlet diameter is 110 mm.



- **TECHNICOL SKAT valve** is applied directly on the roofing surface, i.e. on already installed pitched roofs. It has sealant applied to the lower surface that ensures tightness of the roof joint during element fixation. The outlet diameter is 110 mm.

Accessories and penetration flashing



- **TECHNICOL cap** is used to provide an aesthetic appearance to roofing penetration flashing elements, and it prevents precipitation from seeping in case it is applied in roofing penetrations that are used for roof space ventilation. It is available for two pipe diameters, 110 and 160 mm.



- **TECHNONICOL adapter** is used for connecting air ducts with the TECHNONICOL KTV ventilation component. The diameter is from 110 to 130 mm.



- **SKAT TECHNONICOL penetration flashing element** serves as a base for installation of ventilation or sewage outlets. It has a sealant of special durable rubber applied to the lower surface that ensures the leak resistance of the roof joint during element fixation.



- **TECHNONICOL penetration flashing element** serves as a base for installation of ventilation or sewage outlets on roofs made of roofing shingles.



- **TECHNONICOL universal sealant** is intended for reliable abutment to protruding round elements on the roof (pipes, antennas, posts, legs). The diameter of these products ranges from 90 to 175 mm and from 10 to 70 mm.

Indoor ventilation



- **TECHNONICOL ventilation outlet** is recommended for application in summer houses to ensure ventilation of the sewage system, and for removal of all smells and vapors formed during cooking. It has a skirt in the bottom for setting onto penetration flashing element and thread on top for cap fixation. It is installed on any roof using a penetration element suitable for this type of roof. Outlet diameter is 110 mm, pipe height is 500 mm.



- **The insulated TECHNONICOL ventilation outlet** is recommended for installation on roofs of permanently attended houses to ensure ventilation of the sewage system and removal of all smells and vapors formed during cooking. It does not get covered with ice even during long-term frosts due to expanded polyurethane heat insulation. It has a skirt in the bottom for setting onto penetration flashing element and thread on top for cap fixation. Inner pipe diameter is 125 mm, outer pipe diameter is 160 mm, pipe height is 500 mm.

- Plastic gutter system



- **TECHNONICOL plastic gutter system** is a semi-circular system (\varnothing of the gutter is 125 mm, \varnothing of the pipe is 80 mm), made of high-quality PVC. Used in residential roofing construction to carry off rain and melt water. The plastic components demonstrate supreme performance in extreme temperatures, resists ultraviolet, corrosion and hostile environment.

– Decoration of extending elements



- **PVC soffits** are applied for boarding of frontons, eaves and other architectural elements. Roof soffits provide protection against atmospheric precipitation and perforation enables inlet ventilation.

– Safety systems



- **Adjustable TECHNICAL bracket for scaffolding** is intended for the safe and more efficient installation of roofing shingles. Made of steel with a powder paint coating. Maximum weight load is 140 kg.

– Roof Care

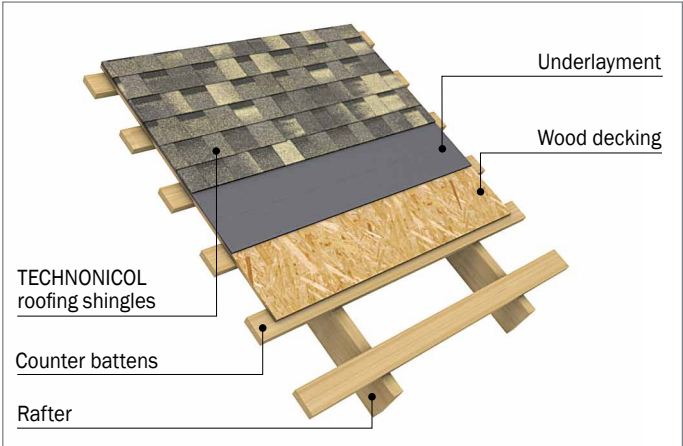


- **TECHNICAL roof care** is a modern, highly efficient, multi-component system, non-toxic for people and animals. It is applied for indoor and outdoor operations – processing of roof, downpipes, terraces, balconies, sheds, facades and residential areas. It prevents growth of mold, fungus, moss, seaweed, and prevents initiating adverse biological effect after the first application, 1 liter of concentrated preservative per 30 m² of roof.

2 Roofing systems

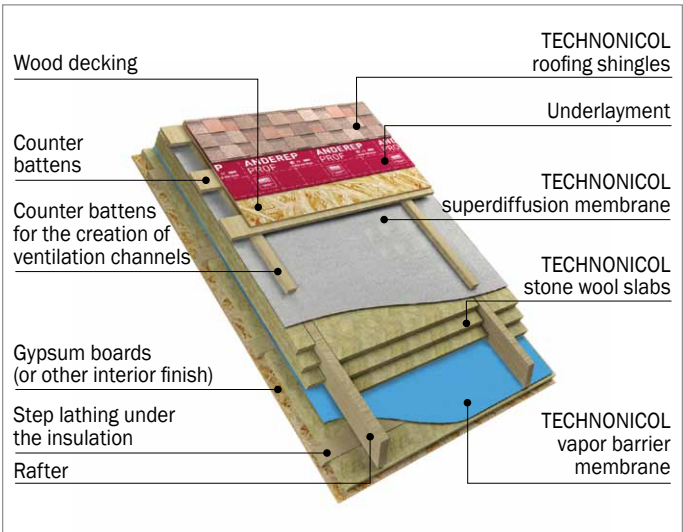
TN-SHINGLAS Classic

TN-SHINGLAS Classic system is intended for construction of roofs of residential and administrative buildings with a cold attic.



TECHNICONIC SHINGLAS Attic

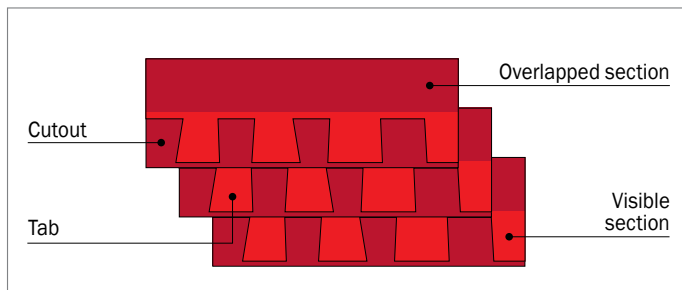
TN-SHINGLAS Attic system is applied for construction of roofs of residential and administrative buildings with a insulated attic.



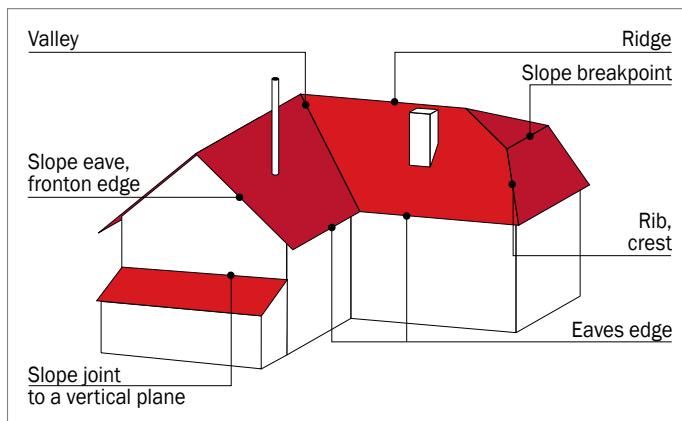
For details on systems using roofing shingles resting on metallic rafters and a reinforced concrete bearing base see www.shinglas.com and www.nav.tn.ru.

3 Terminology

Elements of TECHNOMICOL multilayer roofing shingles.



Building structure elements.





Preparations

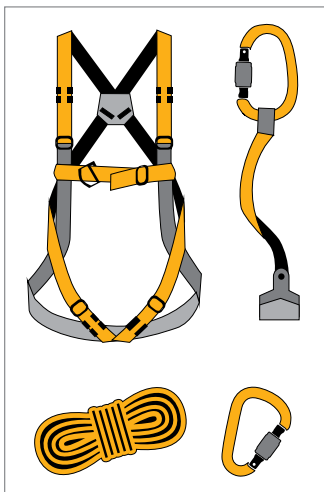
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2

Preparations

1 Safety precautions

- Roofing works are classified as highly hazardous works that may only be performed by persons at least 18 years old who are trained in safe work practices and having successfully passed exams and received relevant certificates.
- All roofers must pass a medical examination, orientation, and safety briefing. The briefing shall be held each time a work place or work type is changed.



- Roofers shall be provided with work wear and personal protection equipment – harness, rope, connector, and arrestor.

The rope is tied to reliable roof elements.

1. Harness
2. Arrestor
3. Rope
4. Connector

- Roof works are prohibited in rain or wind stronger than 6 scores and in the case of poor visibility.
- In the case of work interruptions and in the end of work shift, the remaining materials and devices must be properly fixed.
- Before starting the works, make sure scaffolding and temporary guardrails are reliable, check the functionality of tools and reliability of walkways to be used during work.

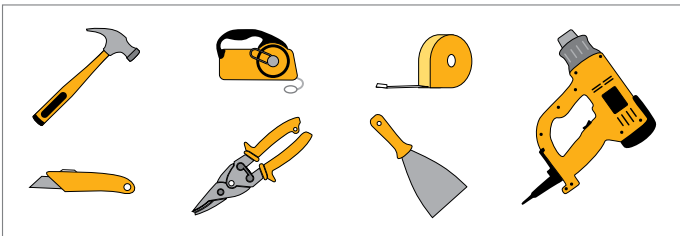


- Adjustable TECHNOMICOL brackets shall be used for the movement of people and convenience of work with materials during installation of roofing.

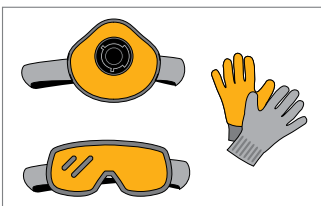
- When installing roofs of flammable and combustible materials, fire extinguishers and other fire fighting tools must be in place at the construction site and work place.
- If paint and plaster is applied, put a respirator on, goggles, and gloves to avoid material penetration into the respiratory tract, eyes, and exposed body parts.
- If electrical tools are used, the tool manual and operation rules must be studied, along with main troubleshooting practices and safety measures.

2 Recommendations on tools selection

- Required materials and tools for installation:



Hammer, chalkline, measuring tape, roofer's knife, snip cutters, pallet knife, hot air gun.



- The following personal protection equipment must be used when working with stone wool slabs material: gloves, respirator, goggles.

3 Construction material storage rules

In order to ensure storage convenience, all products in a warehouse must be grouped by type of materials and sizes and free access must be provided.

– Storage of TECHNINICOL SHINGLAS roofing shingles

The products are stored on pallets sorted by production codes in a dry indoor area under the conditions ensuring preservation of the package and its protection against direct sunlight exposure.

Pallets with TECHNINICOL SHINGLAS roofing shingles shall be transported and stored at a temperature not exceeding 40°C, without stacking.

Pallets may be transported and stacked in two or more layers if racks and specially equipped risers are used.

Guaranteed storage life before installation of single layer roofing shingles – 18 months from the date of manufacture, that of double-layer roofing shingles – 24 months from the date of manufacture, three-layer (architectural) shingles – 36 months from the date of manufacture.

– Storage of TECHNINICOL underlay roll materials

Rolls must be stored indoor or under shed at a temperature of plus 30°C maximum, sorted by grades, at a distance of 1 m minimum from heaters, under the conditions ensuring protection against exposure to moisture and the sun. Rolls should be stored upright on pallets in a 1-row height. Storage of rolls in a horizontal position is prohibited.

– Construction films

The material must be stored in a dry warehouse fitted with fire fighting system at a temperature not less than -60°C. The material must be protected against direct exposure to sunlight. Rolls at the storage site must be placed vertically. When material is stored in transport pallets, storage in two layers is allowed. Materials must be packed and sorted by types and grades.

– Storage of TECHNINICOL stone wool

The material may be stored without a shed provided that pallet transport packing is preserved (stretch hood and pallet integrity is not damaged). In this case, select a place for pallet not tending to formation of puddles and bogging. Otherwise, the material must be stored in indoor warehouses, with slabs positioned horizontally.

- **Additional accessories** are stored in dry conditions on pallets in original undamaged packing. All elements must be protected against UV exposure.



Thermal insulation layer

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Thermal insulation layer

1 General information and rules of handling stone wool material

- When working with materials, use personal protection equipment, afterwards – properly wash your hands.
- During performance of insulation works and during suspension of these works, heat insulation must be protected against atmospheric precipitation.



- Open the package with material at installation site only.
- Use a jigsaw or knife to cut TECHNOMICOL stone wool materials. Do not break the heat insulation slabs.

2 Thermal insulation layer installation rules

|3.2.1| Preparation



- Before commencing thermal insulation works, install the rafter system. Recommended internal distance between rafters is 580 to 590 mm. Wooden structures must be treated with protective compounds.

! **NOTE!** If the internal distance between rafters does not correspond to the stone wool slab width, cut the material to the width equal to measured distance between rafters +10–20 mm.

[3.2.2] Installation of thermal insulation layer



- Heat insulation slabs shall be installed to tightly fit between rafters. If several insulation layers are installed, the slabs must overlap each other.

- If the required thermal insulation thickness exceeds the thickness of the rafters, or if an installation shield must be installed, an additional frame must be installed and further heat insulated.



- Additional wooden or metallic lathing of required thickness must be installed from the side of room. Guides for the frame are installed transversal to rafters in order to cover possible cold bridges. The second layer of thermal insulation shall be installed into the resultant additional frame. Afterwards, insulated electric wiring shall be installed, if required.

- After thermal insulation slabs are installed, provide for the diffusion membrane and vapor sealant layer. Similar installation of these materials is covered in Sections 4 and 5, respectively.



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Diffusion membrane

1 General information and rules of handling diffusion membranes

The material may be installed with either side and left exposed to sunlight for more than 4 months.

Do not install the material in direct the vicinity of open flame sources.

In the case of chemical treatment of wooden structure elements, use of materials is allowed only after their complete drying, not earlier than 24 hours after treatment.

2 Diffusion membrane installation rules

[2.1] General rules



- The membrane shall be unrolled perpendicular to rafters at the inner roof side.

It is recommended to install the membrane on a heat insulation surface without a gap.

[2.2] Installation of diffusion membrane



- The membrane must be fixed to counter lathing to rafters using nails.

! **IMPORTANT!** Do not use clevises or nails without an installed wooden plank upon the membrane in fixation points.



- When the membrane is laid, the fabric must overlap by at least 100 mm horizontally and vertically.

- ❗ **IMPORTANT!** Points of **TECHNONICOL** membrane connection to elements of civil structures must always be glued with adhesive tape. In case of fabric rupture, gluing with similar adhesive tapes is possible.
- ❗ **IMPORTANT!** In order to ensure normal roof functioning, proper ventilation must be ensured. The system of sub-roof ventilation includes three main elements: an opening for fresh air inflow, a ventilated gap (duct over thermal ventilation layer) for air circulation, and exhaust openings in the top part of the roof.
- ❗ **IMPORTANT!** The ventilation duct above the thermal insulation and diffusion membrane must have an airway height of 50 mm with a roof slope of more than 20°. If the slope of the angle decreases (less than 20°), the air way height must be increased to 80 mm. Free air flow must be ensured in the ventilation gap by the installation of counter lathing; covering of air movement areas is not allowed.
- ❗ **IMPORTANT!** Air must freely penetrate the ventilation gap and come out of it. Airways must be also provided in the eaves area for this purpose. Exhaust ventilation systems are presented by ready-made ridge and point ventilation elements.



Vapor sealant layer

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Vapor sealant layer

Vapor sealant layer protects structural layers (the wooden frame and thermal insulation) against impregnation with moisture from inner rooms.

1 General information and rules of work with vapor sealant film

- Vapor sealant layer must be tight.
- Linear thermal expansion must be taken into account; therefore, do not stretch the film during installation and provide a margin and make folds as required.

2 Vapor sealant film installation rules



- TECHNONICOL vapor sealant film shall be placed with either side and fixed both horizontally and vertically at the inner side of the thermal insulation.



- Original (temporary) fixation of the film to wood shall be made using clevises of stainless steel or galvanized nails with a flat head.

! **IMPORTANT!** Fixation points shall overlap at joints where further membrane sealing is performed.



- **The fabrics must overlap by 100–200 mm. Seams and points of film fixation with a stapler are sealed using double sided mating tape.**
- Membrane damage shall be removed by gluing the damaged section with tape followed by applying a patch of TECHNINICOL vapor sealant film to the section with a minimum overlap of 100 mm in all directions.

- ❗ **IMPORTANT!** The number of holes must be minimized, the holes must be sealed to ensure the leak resistance of the layer.
- ❗ **IMPORTANT!** Fixation to metallic and concrete surfaces shall be made using mating tape.
- Individual strips of film must be tightly connected to each other, as well as to adjacent structures or to protruding construction elements (antenna posts, ventilation stacks, chimney, attic windows, etc.).
- Placing an installation shield is recommended for installation of film for boarding, plasterboard, or decorative material – wooden planks or other profiles – to make sure that holes from fasteners are formed in these materials rather in the vapor barrier.
- ❗ **IMPORTANT!** If the above rules are not met, water vapor penetrates through joints, which causes problems associated with moisture condensation in heat insulation, biological exposure of rafter system, formation of icicles and icing of roof cladding, and other troubles associated with undesired condensation.
- ❗ **IMPORTANT!** ANDEREP ULTRA, a bitumen polymer material on a polyester base having vapor barrier properties stable against possible mechanical damages during installation is recommended for use as vapor sealant placed on a concrete base.



Preparation of roof base

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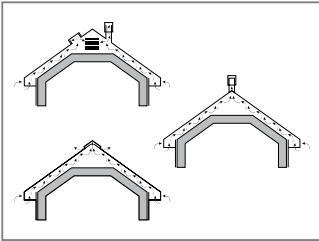
Preparation of roof base

1 Construction of the base for roofing shingles placement

1.1 Creating effective sub-roof ventilation

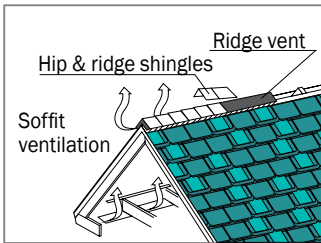
Ventilation

Proper engineering of ventilation system along with right materials and accessories extend service life of the whole construction and of the roof, in particular. This considered investment will be paid back by reduced energy expenses.



In order to ensure normal roof functioning, proper ventilation must be ensured. The system of sub-roof ventilation includes three main elements: an opening for fresh air inflow, a ventilated gap (duct over thermal ventilation layer) for air circulation, and exhaust openings in the top part of the roof. The area of the ventilation openings in a

roof structure should make up $1/300$ – $1/500$ of the attic thermal insulation area. Pressure in the attic should be lower, therefore the area of exhaust openings should exceed that of the intake ones by 10–15%. Such location of vents will ensure intensive air circulation in the entire space of the attic.



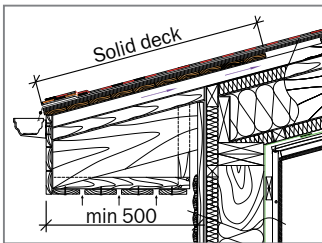
Air must freely penetrate the ventilation gap and come out of it. If wooden wind boards are nailed to slope edges, use special ventilation elements – soffit strips. Exhaust ventilation systems are presented by ready-made ridge and point ventilation elements.



The ventilation gap between the windproof layer and the roofing deck must have an airway height of 50 mm with a roof slope of more than 20°. If the slope of the angle decreases (less than 20°), the air way height must be increased to 80 mm.

The ventilated gap is made using a wooden beam of counter lathing. The beam is mechanically fixed using notched nails or self-tapping screws for wood.

[1.2] Sparse lathing



When selecting material for sparse lathing, apply mostly coniferous wood of grade 2 or higher with a relative humidity of 20% maximum.

Clear distance between lathing:

- in rows: according to calculation;
- on eaves overhang: solid base of boards having a width equal to the distance from the eaves extension to the inner wall surface;

The material shall be fixed with nails or self-tapping screws for wood, 2 each per connection.

The transversal connection of two elements of sparse lathing in the same row shall be made so as to ensure that the connection of boards matches a rafter leg mechanically fixed with 2 fasteners per each board edge.



Joints of sparse lathing in adjacent horizontal rows must be displaced by one run of rafters minimum. The length of the boards must not be less than two spans of rafters.

[1.3] Solid base

Base for roofing shingles laying must be solid, rigid, and flat. Elevation drops shall not exceed 1–2 mm.

The solid planking of the base must be made of the following materials:

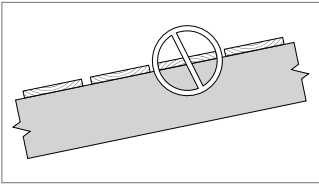
- tongue-and-groove or straight edged boards of coniferous woods of grade 2 or higher with relative humidity not exceeding 20%, sorted by thickness;

- oriented strand boards with increased moisture resistance (OSB-3) or exterior plywood with increased moisture resistance placed upon sparse lathing.

Recommended thickness of OSB-3 boarding for laying of roofing shingles is 15 (min 12) mm for WESTERN and CONTINENT collections, and 12 (min 9) mm for other collections.

! IMPORTANT! Solid base thickness depends on rafter spacing, cross section and spacing of wooden lathing. Selection of the roof construction must be performed based on calculation of permanent and temporary loads, as well as on the roof shape and materials weight. Always follow the technical requirements set out in the National Building Codes.

|1.3.1| Tongue-and-groove or straight edge board



During installation of solid wooden cladding, make sure that fragments of annual rings are oriented with their convexities downwards.

To place shingles, make a selection of boards in terms of thickness, so as to make sure that thickness varies gradually with thicker boards installed closer to the eaves overhang. Board length joints shall be located on supports, 4 nails minimum shall be driven into the joint spots.

When using moist wood, ends of tongue-and-groove or straight edge boards shall be fixed with two self-tapping screws on each side.

|1.3.2| OSB-3 or exterior plywood

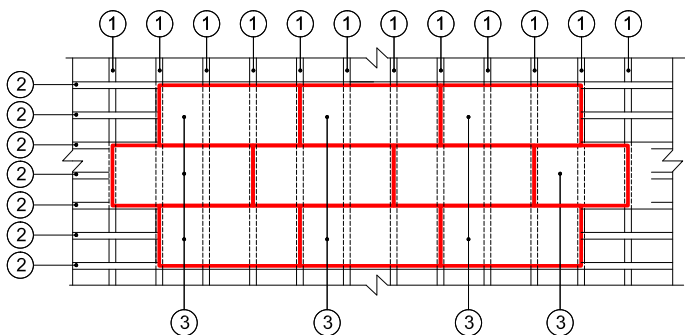


Solid boarding with alternating joints. The minimum alteration value must correspond to rafter spacing.



A gap of 3 to 5 mm must be left between sheets.

Fixation must be made using notched nails or self-tapping screws.



1 – rafter leg; **2** – sparse lathin; **3** – solid boarding of OSB-3.

Sheets of solid boarding are placed with the main axis (long side) perpendicular to the rafter legs. Horizontal joints (long edges) must rest on the auxiliary support (sparse lathing).

Nails for mechanical fixation are placed along the whole perimeter of the sheet with spacing according to the calculation.

2 Eaves overhang reinforcement



- The roof eaves overhang is reinforced with metallic eaves planks.



- Eaves planks shall be laid with the rib on the edge of the solid base before installing the underlayment. Fixation shall be made with nails alternately every 120–150 mm.

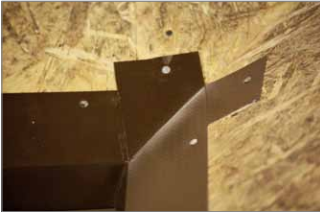
! **IMPORTANT!** Eaves planks must be interconnected with an overlap of 30–50 mm.



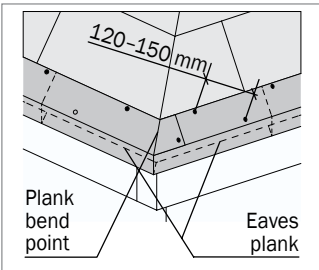
- Before constructing a valley or rib, the eaves plank shall be cut on site leaving part of the plank for protrusion to the counter slope.



- Set the pre-cutted plank in the valley.

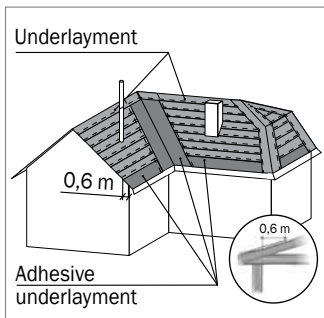


- Fix the eaves plank in the valley using roofing nails.



- Fixation of eaves plank in rib.

3 Installation of underlayment



- Underlayment must be installed in the whole roof with any roof slope:
 - ANDEREP ULTRA self-adhesive underlayment or any other material with the same specifications* is installed in valleys and eaves overhangs;
 - ANDEREP PROF underlayment with a mechanical fixation or any other material with the same specifications* is installed on the remaining surface of the roof.

! **NOTE!** for cutting shapes "accord", "beaver "tail", bricks", "sonata" and "trio", underlayment may be used in the points of most probable leaks only (along roof perimeter – 50 cm wide strips of underlayment, in roof penetrations – 100 x 100 cm, along perimeter of attic windows – 50 cm, along eaves overhang – extend adhesive layer by 60 cm + t (t is the thickness of outer house wall, cm) from facade wall, in valley – width of adhesive layer is 100 cm), which affects completion period and guarantee conditions. For more details see TECHNOMICOL roofing shingles guarantee certificate.

[3.1] ANDEREP ULTRA self-adhesive underlayment

- ANDEREP ULTRA underlayment is first laid in the valley.



- ANDEREP ULTRA laid in the valley shall be 1 m wide (500 mm for each slope).

! **IMPORTANT!** If possible, try to ensure solid underlayment (without overlaps) along the whole length of the valley. Otherwise, underlayment shall overlap and the joints must be thoroughly glued on the top part of the roof. The width of overlap is 300 mm.

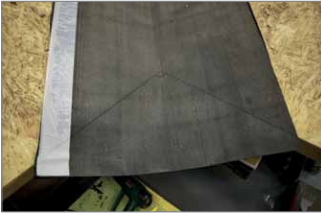
*Or any other materials with the same specifications. For specifications of ANDEREP series underlayment materials see datasheets for TECHNOMICOL materials at www.nav.tn.ru.



- Try underlayment on site.



- Mark and cut off excess material of underlayment.



- Position the material exactly in the center of the valley.



- Cut the underlayment along the earlier marked line.



- Place the material parallel to the eaves overhang with a step-out of 10–20 mm to the eaves plank bend.

- !** **IMPORTANT!** Underlayment at the lower edge of the valley must be cut off with a slight rounding (tab) to cover the joints of the eaves planks in the valley.



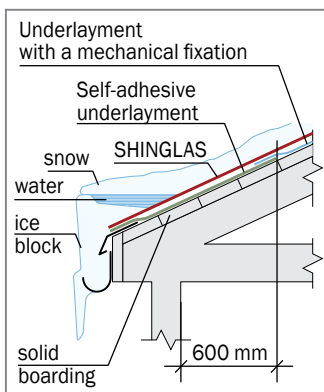
- Remove the protective film and fully glue the fabric to the base.

- !** **IMPORTANT!** During gluing carefully stretch the fabric in order to avoid folds and uneven surfaces.



- Under outside temperature of +5°C or colder, it is recommended to additionally fix the underlayment with roofing nails with a wide head every 300 mm.

- After ANDEREP ULTRA underlayment is laid in the valley, it must be installed in the eaves overhang.



- The underlayment is laid at the eaves overhang equivalent to the size of the eaves overhang plus 600 mm from the inner wall surface towards the inner side of the building*.

- !** **IMPORTANT!** This solution prevents the appearance of undesirable leaks in the eaves area of the building or facilities due to disturbance of temperature and humidity conditions in the sub-roof space, or rapid ambient temperature changes.

* This rule covers the roofs with a slope up to 60°; if the slope is more than 60°, the underlayment shall be installed with a width of 1 meter from the eaves edge.



- Cut the underlayment on the earlier marked lines.

! **IMPORTANT!** Place a rigid base (piece of wood, plywood, etc.) under the top fabric during cutting to avoid damaging the underlying fabric.



- Place the material parallel to the eaves overhang with a step-out of 10–20 mm to the eaves plank bend.



- Material shall be laid with a transversal overlap of 150 mm in points of connection of underlayment at the eaves overhang and valley, points of overlaps shall be covered with the bitumen mastic TECHNOMICOL FIXER max. thickness 1 mm.



- After trying the size of underlayment on the eaves, remove the protective film from one fabric section.



- Glue part of the fabric to the base and roll the remaining part up to the gluing spot.



- Glue the remaining part of fabric to the base, at the same time unrolling and removing the protective film from the coil.



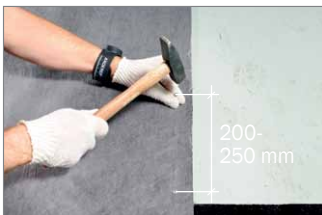
- If the temperature is below +5°C, additionally fix the underlayment along the top horizontal edge using roofing nails with a 50 mm step-out from the edge of underlayment every 300 mm.

[3.2] ANDEREP PROF, ANDEREP GL underlayment material with mechanical fixation

- Place ANDEREP underlayment (with mechanical fixation) on the remaining part of slope: ANDEREP PROF, ANDEREP GL.



- Same as during installation of adhesive underlayment, the fabric must be tried on site.



- Fix the material along the perimeter, including the points of overlaps with lower fabric, with roofing nails with a step-out from the underlayment edge of 50 mm every 200–250 mm.

IMPORTANT! ANDEREP GL must be additionally fixed according to layout on the material.

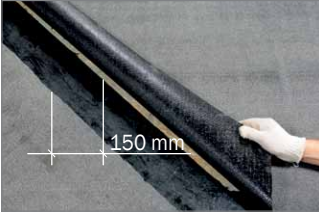
- ANDEREP PROF/GL underlayment shall be fixed to the base with special galvanized roofing nails with a wide head.



- !** **IMPORTANT!** The nail head shall not pierce through the underlayment – it must firmly press it against the base. Before actual fixation of underlayment with a nail, straighten the material to avoid forming any folds and uneven surfaces.



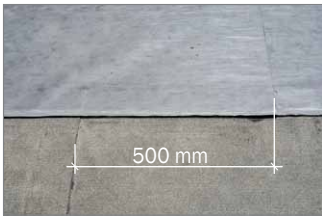
- Cover the overlap points with TECHNOMICOL FIXER bitumen mastic in a 100 mm wide strip.



- The transversal overlap width is 150 mm.



- The longitudinal overlap width is 100 mm.



- Please note the distance between edges of adjacent fabrics. End overlaps of adjacent material fabrics must be located at a distance of 500 mm minimum.

4 Reinforcement of fronton overhang

- The roof fronton overhang is reinforced with metallic fronton planks.



- The fronton plank shall be placed on top of the underlayment with a 30–50 mm overlap, having cut the plank on site in advance.



- Fix the plank with special roofing nails alternately every 120–150 mm.

5 Valley preparation

- Roofing shingles can be installed in the valley using two methods: open method and "undercut" method. Valley preparation depends on the selected method.

[5.1] "Open valley" method



- The valley roll material is placed along the valley centerline upon the self-adhesive underlayment.

! **IMPORTANT!** The valley roll material at the lower edge must be cut with a slight rounding (tab).



- Valley roll material must be folded in half along the whole length of the valley and the bend line must be pressed.



- Next lay down the valley roll material.

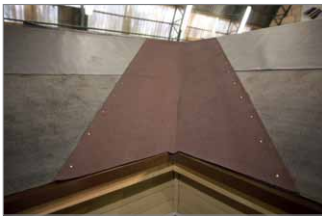
! **IMPORTANT!** Carefully stretch the fabric in order to avoid folds and uneven surfaces.



- Cover the valley roll material along the perimeter of the rear side with TECHNOMICOL FIXER bitumen mastic to a width of 100 mm.



- Fix the valley roll material with special roofing nails on the front side with a 20–30 mm step-out from the edge every 200–250 mm.



- Fixed valley roll material.

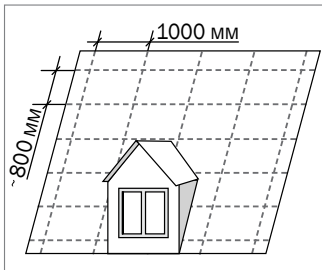
! **IMPORTANT!** If possible, try to ensure solid underlayment (without overlaps) along the whole length of the valley. Otherwise, the valley roll material shall overlap and the joints must be thoroughly glued in the top part of the roof. The width of overlap is 300 mm.

! **IMPORTANT!** If the valley is arranged using the open method, a metallic sheet with corrosion resistant coating may be used instead of valley roll material (recommended for regions with a hot climate).

[5.2] "Close valley" method

- This method of roofing shingles installation does not require valley arrangement. For more details on installation see par. 7.5.

6 Slope marking



- Marking lines play the role of guides and help align TECHNICAL SHINGLAS roofing shingles horizontally and vertically. They also align roofing shingles, if any roof element is cut into the slope or if the roof slope geometry is disturbed. The spacing of vertical lines corresponds to the width of the course shingles, while the spacing of the horizontal lines is marked for every 5 rows of shingles (~800 mm).

! **IMPORTANT!** Marking lines are for reference only. They do not serve as a guide for nailing the shingles.



Installation of roofing shingles

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7

Installation of roofing shingles

1 General recommendations for roofing shingles installation

- Do not use bundles with different production codes for the same roof. Possible slight difference in color hues is not a defect.
- To avoid undesired color unbalance that could appear in visible color spots.

Under outside temperature of + 5°C or colder please store roofing shingles in a warm, dry place with air temperature of +18°C minimum for at least 24 hours. Then take them out by batches of 5 or 6 bundles prior to installation.



- Under outside temperature of +5°C or colder a hand-held hot air welding gun must be used to warm the adhesive strip on a shingle in order to improve adhesion.

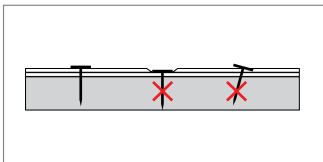


- To prevent damaging the roof's integrity, the material must be cut on the roof on a special board placed underneath.

! **ATTENTION:** In order to avoid the appearance of stains and shoe marks, it is not recommended to walk on the roof in sunny or cold and moist weather. Use roof ladders and walkover bridges to move on the roof slope.

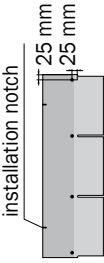
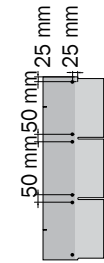
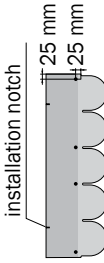
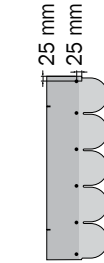
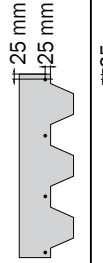
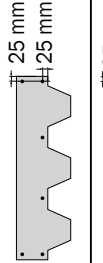
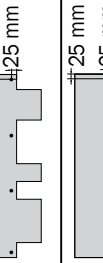
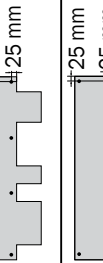


2 Course shingles fixation

- Each course shingle is fixed to the roof base using special galvanized TECHNOMICOL nails with wide heads in the amount depending on the slope angle.



- Correct nailing is critical. Nails must be driven so as to make sure that the head is in the same plane with the roofing shingles surface and does not cut through it.

- ⓘ **ATTENTION!** If the "dragon tooth" cutting pattern is used, place roofing nails exactly at painted guide line to ensure you fasten through a shingle double layer area. The manufacturer applies the special guide line to the front surface of multilayer shingles for reference.
- ⓘ **IMPORTANT!** Triple-layer "Continent" cutting pattern requires nails of at least 45 mm long.

Type of cutting pattern	Slope angle		Amount of fasteners	Length of fasteners
	12°-44°	45°-90°		
"trio"			4 pieces	6 pieces
			4 pieces	6 pieces
"beaver tail"			4 pieces	6 pieces
			4 pieces	6 pieces
"sonata"			4 pieces	6 pieces
			4 pieces	6 pieces
"accord"			4 pieces	6 pieces
			5 pieces	10 pieces
"bricks"			5 pieces	10 pieces
			5 pieces	10 pieces

Type of cutting pattern	Slope angle		Amount of fasteners		Length of fasteners
	12°-44°	45°-90°	12°-44°	45°-90°	
"dragon tooth"	<p>mounting strip for nails</p> <p>25 mm</p> <p>50 mm 50 mm 25 mm</p>	<p>25 mm</p> <p>25 mm</p> <p>25 mm</p>	5 pieces	8 pieces	30 mm
	<p>25 mm</p> <p>25 mm</p>	<p>25 mm</p> <p>25 mm</p>	4 pieces	8 pieces	
"continent"	<p>100 mm 50 mm</p> <p>179 mm</p>	<p>100 mm 50 mm</p> <p>179 mm</p> <p>Bitumen mastic diameter of the point is 20 mm</p>	10 pieces	10 pieces + bitumen compound spreading	45 mm
	<p>25 mm</p> <p>25 mm</p>	<p>25 mm</p> <p>25 mm</p>	12 pieces		
TECHNICOL hip & ridge & starter shingles	<p>25 mm</p> <p>25 mm</p>		12 pieces		30 mm



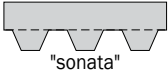
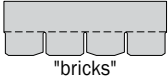
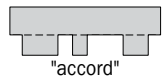

3 Starter strip fixation

- Universal hip & ridge & starter TECHNOMICOL shingles, cutout piece of course shingles or course shingles are used as a starter strip. Options of starter strip construction depending on the shingles cutting pattern:

Type of cutting pattern	Starter at eaves
"sonata"	Hip & ridge & starter shingles / Cutout piece of course shingles
"accord"	Hip & ridge & starter shingles / Cutout piece of course shingles
"trio"	Cutout piece of course shingles
"beaver tail"	Hip & ridge & starter shingles / Cutout piece of course shingles
"bricks"	Hip & ridge & starter shingles / Cutout piece of course shingles
"dragon tooth"	Course flexible shingles
"western"	Hip & ridge & starter shingles
"continent"	Hip & ridge & starter shingles

Cutout piece of course shingles – shingle with cut off tabs separated according to cutting pattern.

Starter strip for "sonata", "accord", "trio" beaver tail", and "bricks" cutout patterns may be cut out from course shingles.

Cutout piece of course flexible shingles	Hip & ridge & starter shingles
 <p>"trio"</p>  <p>"beaver tail"</p>  <p>"sonata"</p>  <p>"bricks"</p>  <p>"accord"</p>	 <p>Hip & ridge & starter shingles</p>

The dashed line shows where to cut the shingles.

- The starter strip for the "dragon tooth" pattern shall be laid with course shingles without preliminary cutting.



- If the cutout piece is made of course shingles, shingle tabs must be cut along the earlier marked line.



- If required, remove the film from the cut off shingles.

! **NOTE! DO NOT REMOVE** the anti-adhesive film with the "Do Not Remove" message on it from the "dragon tooth" shaped shingles.



- If course shingles are cut to a certain pattern or if course shingles are used as a starter strip, cover the rear side with TECHNOCOL FIXER mastic where no adhesive layer is present.



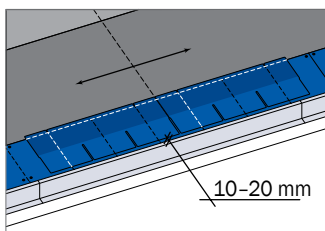
- Hip & ridge & starter shingles, the cutout piece of course shingles or course shingles are glued on top of underlayment with a step-out of 10–20 mm from the eaves plank bend point.
- Step-out value depends on slope length and angle, and it increases if they are increased.



- Hip & ridge & starter shingles and cutout pieces of course shingles are fixed with roofing nails in the amount of 12 nails minimum per shingle. Course shingles shall be fixed according to the table on pages 59–60.

4 Fixation of the first and following rows of shingles

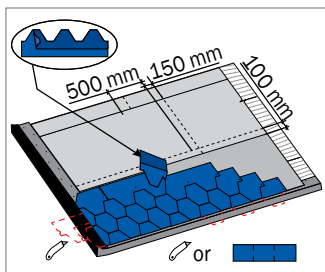
- It is recommended to place the first row on long slopes from the slope center to ensure the convenience of horizontal leveling.



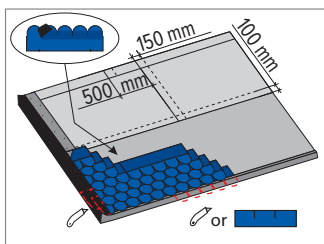
- The first row is laid with a step-out of 10–20 mm from the starter strip.

! **IMPORTANT!** The first row of shingles must cover the points of the starter strip's mechanical fixation.

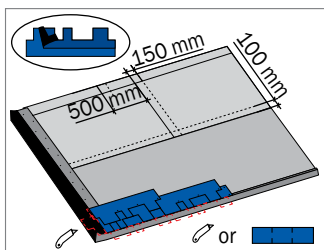
- The installation shall be performed in diagonal strips.



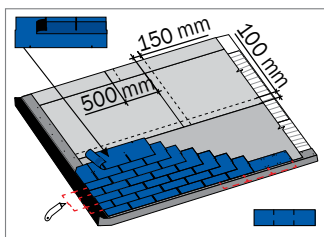
- "sonata" cutting pattern.



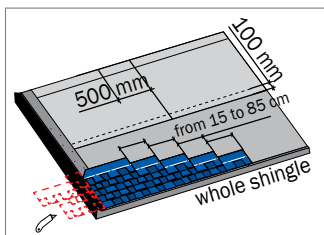
– "beaver tail" cutting pattern.



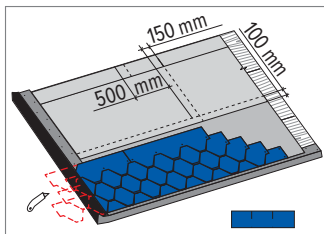
– "accord" cutting pattern.



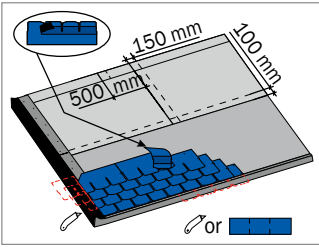
– "trio" cutting pattern.



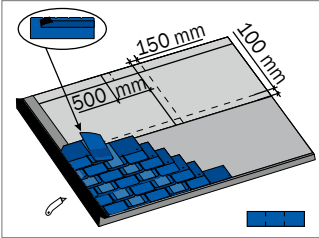
– "dragon tooth" cutting pattern.



– "western" cutting pattern.

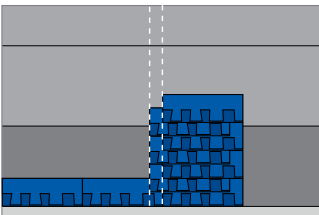


- "bricks" cutting pattern

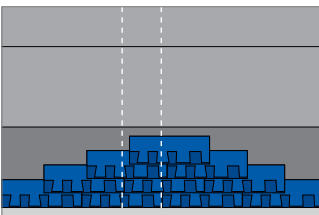


- "continent" cutting pattern.

- The second row is installed from the slope center, alternating to the left and to the right by half the tab. Flexible shingles must be nailed so that the bottom edge of the tabs is flush with the top edge of the cutouts in the first row.
- The third row is laid with a displacement relative to the second one by half the tab to the right or to the left depending on the originally selected direction.
- Shingles installation must be started from the slope center in the form of strip or pyramid.



- laying in the form of a strip.

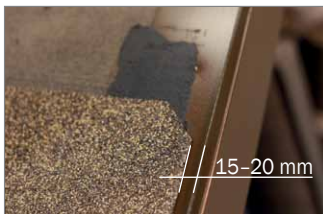


- laying in the form of pyramid.

- To ensure maximum efficient protection against slanted rain, cover the course shingles in the fronton area with TECHNINICOL FIXER mastic:



- Apply a 100 mm wide strip of TECHNINICOL FIXER mastic.

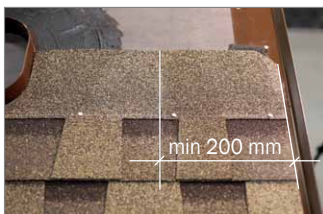


- Roofing shingles must be installed with a 15-20 mm step-out from the inner bend of the fronton plank.

! **IMPORTANT!** The top corners of shingles approaching the metallic fronton plank must be cut by 20-30 mm to divert water.



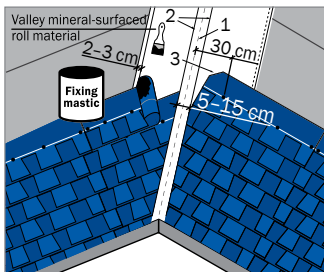
- The minimum distance between the fronton and fixed shingles must be at least 200 mm.



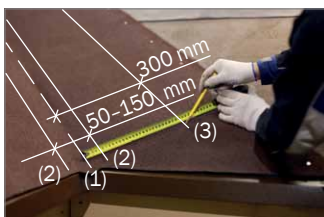
- The cutout of the course shingles with a width less than 200 mm must be fixed with two roofing nails minimum.

5 Valley arrangement

5.1 "Open valley" method



- General view and designations:
 - 1 - valley centerline;
 - 2 - cut line;
 - 3 - shingle undercut for water diverting;



- Mark out the valley roll material:
 - 1. Undercut lines (2)** towards the valley centerline (1). Valley gutter width varies from 50 to 150 mm*.
 - 2. Flexible shingles fixation line (3)** at a distance of 300 mm minimum from the valley centerline.



- Mark out chalk lines for cutting and fixation using a chalkline.

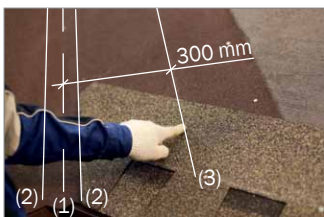


- Lay course shingles to the cut line towards the valley centerline and mark out the cut line.

*Width depends on building or facility location. If the construction site is located in the forest, gutter width must be increased to ensure free removal of leaves. Recommended gutter width is 70 mm.



- Cut the course shingles along the cut line using a special wooden pad to prevent damaging the integrity of waterproofing layer.



- Fix each shingle on each slope surface using roofing nails along fixation line **(3)** (at a distance of 300 mm minimum from valley centerline **(1)**).



- Cut each shingle by 20–30 mm to divert water in the valley.



- Cover the shingles with TECHNINICOL FIXER mastic on the rear side by 100 mm in points without an adhesive layer.



- Shingles must be covered with TECHNINICOL FIXER mastic at each slope surface.

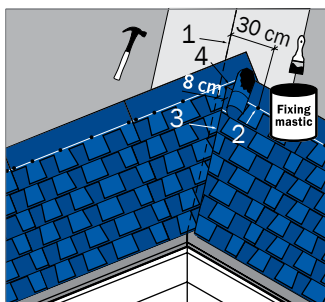
! **IMPORTANT!** The bitumen mastic must be applied not only to the valley roll material but also to the underlying shingle as well to ensure more reliable insulation.



- Valley completed by open method.

! **NOTE!** If the slope water drainage system differs significantly, the valley gutter must be displaced towards the lower water flow to offset flushing of the valley roll material with water.

|5.2| "Close valley"



- General view and designations:
 - (1) – valley centerline;
 - (2) – roofing shingles fixation line (distance of 300 mm minimum from the valley's centerline);
 - (3) – cut line (distance of 80 mm minimum from the valley centerline);
 - (4) – shingle undercut for water diverting;



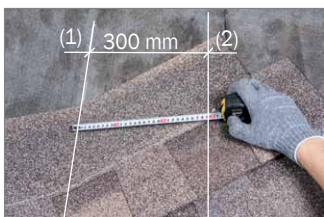
- Mark out the underlayment with **fixation lines (2)** of flexible shingles at a distance of 300 mm minimum from the valley **center-line (1)**.



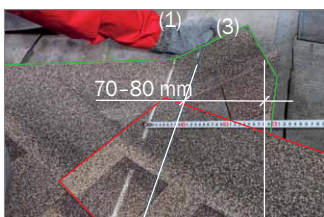
- Place shingles starting from the low pitched slope with an overlap to a steeper slope by at least 300 mm.
- Mark out the chalk line for fixation using a chalkline.



- Fix each shingle of shingles using roofing nails along the fixation line (at a distance of 300 mm minimum from the valley centerline).



- Do not drive special nails closer to the **fixation line (2)** (at a distance of 300 mm from the valley centerline **(1)**).



- Mark out the chalk line for **undercut (3)** at a steeper slope using a chalkline at a distance of 70–80 mm from the valley **centerline (1)**.

- Place shingles at a steeper slope (red outline) over earlier installed shingles on the low pitched slope (green outline), so as to make sure the shingle end protrudes beyond the **undercut line (3)**.



- Cut the course shingles from the steeper slope along the chalked cut line using the special wooden pad to prevent damaging the integrity of the waterproofing layer.



- Cut each shingle by 20–30 mm to divert water in the valley.



- Cover the shingles with TECHNOMICOL FIXER mastic on the rear side by 100 mm in points without an adhesive layer.



- !** **IMPORTANT!** The mastic must be applied not only to shingles of a low pitched slope, but to the underlying shingle from a steeper slope as well to ensure more reliable insulation.

6 Installation of slope ribs and ridges

Two methods are possible for installation of slope ribs and ridges:

Method 1 is based on the use of hip&ridge&starter shingles;

Method 2 is based on the use of the cutout of course shingles.

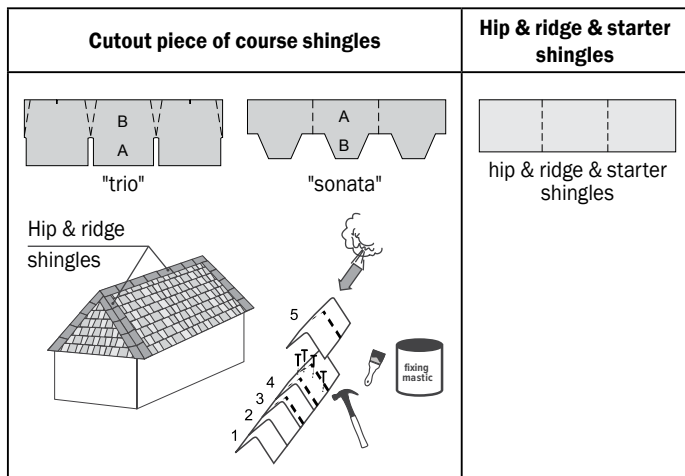
Table for selection of slope ribs and ridges installation method depending on cutting type:

Type of cutting pattern	Rib, ridge
"sonata"	Hip & ridge & starter shingles / Cutout piece of course shingles
"accord"	Hip & ridge & starter shingles
"trio"	Cutout piece of course shingles
"beaver tail"	Hip & ridge & starter shingles
"bricks"	Hip & ridge & starter shingles
"dragon tooth"	Hip & ridge & starter shingles
"western"	Hip & ridge & starter shingles
"continent"	Hip & ridge & starter shingles

The cutout piece of course shingles are the shingles separated according to cutout pattern.

- !** **IMPORTANT!** In order to prevent formation of fractures during the cold season (at temperatures below +5°C), it is recommended to make a bend on metallic preheated pipe with a diameter of about 100 mm on TECHNOMICOL Roofing shingles (Classic and Finnish series).

- Ridge shingles for "trio" and "sonata" cutting patterns may be cut out from course shingles. In this case, the top part of the TECHNOMICOL SHINGLAS flexible "sonata" shingles is visible and the lower part is covered:



The dashed line shows where to cut the shingles;

A – visible part; B – covered part.

- Material preparation.



- Before arranging slope rib and ridge, separate:
 1. Hip & ridge & starter shingles into 3 parts by the points of perforation;
 2. Course shingles into 3 parts according to cutout pattern.

- Hip&ridge&starter shingles.



- Remove the anti-adhesion film from the rear side of hip & ridge & starter shingles.

- Cutout piece of course shingles.



- Cut edges according to the cutout pattern on each shingle.



- Remove the anti-adhesion film from the rear side of the shingles cutout.



- Cover each cutout shingle piece with TECHNOCOL FIXER mastic on the rear side in points without an adhesive layer.

- Rib arrangement.



- Undercut course shingles extending to the rib so as to make sure the distance between the adjacent slopes equals 5 mm.



- Place shingles from the top down after marking the dimensions of the future rib (two strips along the rib) using a chalkline.
- Fix each piece of shingle with four nails (two on each side).

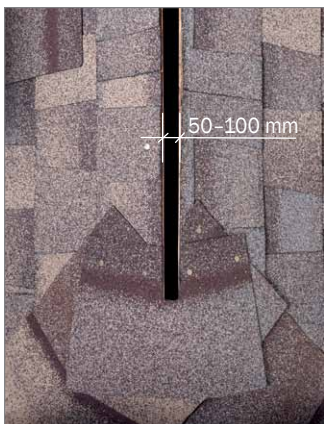


- Shingles shall be fixed with a 30–50 mm overlap with above shingles that must cover the nails fixing the underlying layer of shingles.

– Ridge arrangement.



- In order to arrange an exhaust hole in the roof's ridge, TECHNOMICOL continuous ridge vent element is used.



- A 50–100 mm wide slot shall be cut in the ridge solid base.



- The ventilation element is fixed with roofing nails or self-tapping screws in the points marked by the manufacturer.
- The length of the ridge ventilation element is 610 mm, and two or more ventilation elements may be connected if necessary.

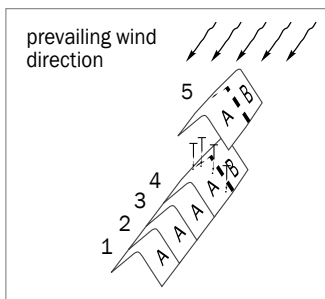


- Each piece of shingle must be fixed with two nails along the fixation line shown at the ventilation element.

! **IMPORTANT!** Ridge shingles must be fixed through the ventilation element with special roofing nails, at least 60 mm long.



- Shingles shall be fixed with a 30–50 mm overlap with above shingles that must cover the nails fixing the underlying layer of shingles.



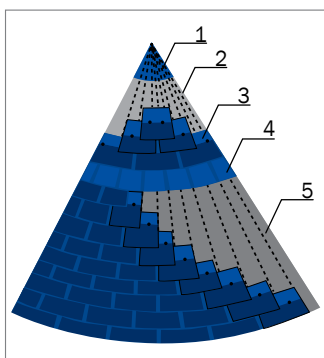
! **IMPORTANT!** The ridge shall be laid from the side opposite to prevailing winds in this area.



- Prefabricated ridge ventilation element.

7 Roofing shingles installing on dome shaped and conical structures

- There are two recommended methods for Roofing shingles installing on curved surfaces: segmental and seamless. In both cases, underlayment is placed first.
- The segmental method implies separation of the dome or cone surface into equal segments with chalkline. Course shingles are applied to each segment. Joints between segments are covered by ridge shingles, similar to roof ribs and ridge. The dimensions of the segments and the width of the ridge shingles must correspond to the size of the surface being covered.



1 Metallic tip (to be installed after roofing shingles are installed);

2 vertical cutting lines (slope mark out);

3 single-piece shingle tab;

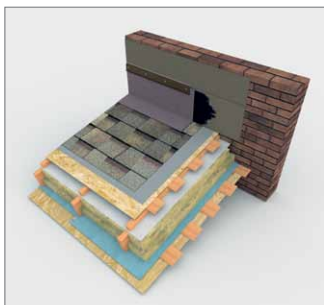
4 1/2 of a shingle tab;

5 Underlayment.

- The seamless laying method requires special attention to slope marking. Chalk dots must be applied to the roof base with distance between them equal to half of the flexible shingle tab size. Chalk lines get connected from the roof. Next, cut course shingles to separate tabs and install the first row. The above rows of pre-cut shingle tabs must be placed with a displacement by half of a tab size in the underlying row of shingles. Shingles shall be cut according to drawn chalk lines. As soon as the width of course shingle tabs in a row becomes two times smaller than the original one, the next row placing starts with shingle tabs of original dimensions. The installation is continued in this sequence up to the top of the roof. The roof vertex is decorated with a metallic cap.

8 Joints arrangement

8.1 Joint with vertical surface



- Straight joint
- General view of a joint with a slope angle over 135° :

! **IMPORTANT!**
If the straight joint angle is:
 – up to 135° inclusively, **moulding must be installed***;
 – over 135° , **moulding is not required.**

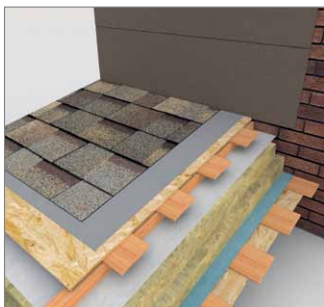


- If a vertical wall has a brick surface, it must be pre-plastered and primed with TECHNOMICOL No.1 primer.

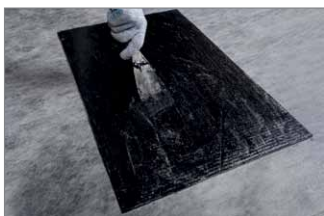


- Install tootthing at a height of 300 mm minimum from the horizontal section.

*A 50x50 mm diagonally split wooden beam or a regular wooden plinth may be used as moulding.



- Install underlayment and course shingles.



- Apply **TECHNONICOL FIXER** bitumen compound to the whole rear surface of the cutout **TECHNONICOL** valley roll material. A strip of valley roll material must be at least 500 mm wide.



- Install strips of **TECHNONICOL** valley roll material on top of the course shingles: the strip is extended to the primed surface by at least 300 mm*, and to the course shingles by 200 mm.



- Mechanically fix metallic shield. Seal the shield with silicone, thiokol, or polyurethane sealant.

* This value may be increased for climates with increased snow loads.

– Side joint



For a wall height over 1 meter



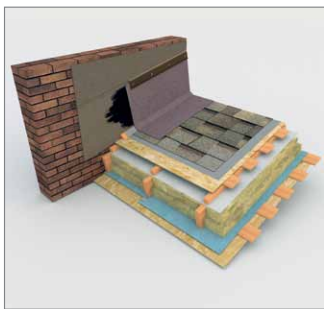
- Moulding is always required for a side joint.

- Underlayment must be brought over moulding to a primed vertical surface. Flexible shingles are installed up to the moulding.

- Valley roll material is glued with bitumen compound similar to the arrangement of straight joint: the strip is extended to the primed surface by at least 300 mm, and to course shingles by 200 mm.

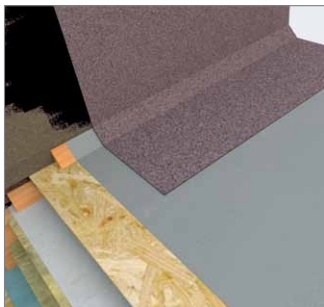


- Mechanically fix metallic shield. Seal the shield with silicone, thiokol, or polyurethane sealant.

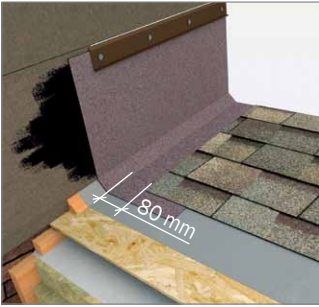


- General view of side joint for the wall with height over 1 meter.

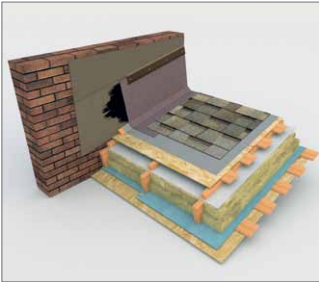
For wall height less than 1 meter



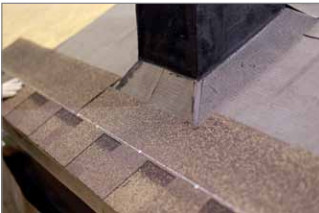
- Underlayment must be brought over moulding to a primed vertical surface.
- Valley roll material is glued with bitumen compound: The strip is extended to the primed surface by at least 300 mm, and to the underlayment by 200 mm.



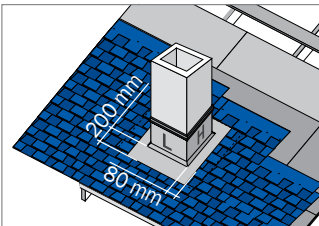
- Mechanically fix metallic shield. Seal the shield with silicone, thiokol, or polyurethane sealant.
- Flexible shingles are extended to the cutout piece from the valley roll material so as to make sure that the trough between the shingles and moulding is 80 mm wide. Cover the shingles with TECHNINCOL FIXER compound on the rear side by 100 mm in points without an adhesive layer.
- General view of side joint for the wall with a height less than 1 meter.



[8.2] Joints with chimneys and vents

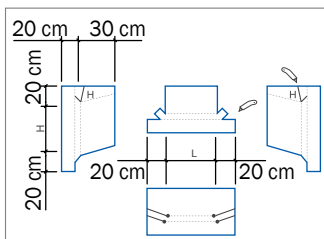


- Joints with chimneys must be made using moulding in the point of the roof slope contact with the vertical surface. Bring the underlayment to the moulding and cut on site.

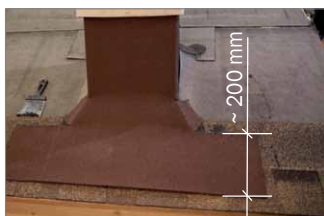


- Cut out a piece of valley roll material.
- The cutout piece is extended:
 - to the vertical surface: by at least 300 mm from the slope surface (the height may vary depending on snow region);
 - to the horizontal section: ~200 mm depending on the type of moulding applied.

- Bend or cut obtained cutout pieces in certain points according to the diagram.



- Valley roll material cutout pattern.



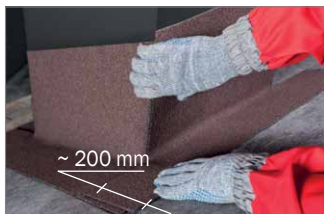
- Install front cutout with extension to course shingles of 200 mm minimum.



- Install left and right parts extending underneath shingles so as to make sure that an 80 mm wide gutter may be installed afterwards between the shingles and moulding.



- Lastly, install rear cutout piece extending underneath the shingles so as to make sure that an 80 mm wide gutter may be installed afterwards between the shingles and moulding.





- Install shingles. Shingles in the left and in the right parts are extended to the cutout piece from the valley roll material so as to make sure that the trough between the shingles and moulding is 80 mm wide.



- Cut each shingle by 20–30 mm to divert water in the valley.



- Cover the shingles with TECHNOMICOL FIXER mastic in points of cutout piece joint with course shingles on the rear side by 100 mm in points without an adhesive layer.



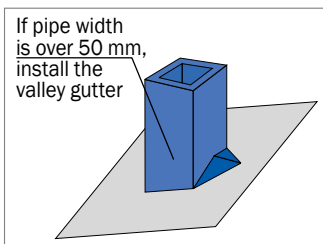
- Lay shingles on rear side. Make sure that the trough between the shingles and moulding is 80 mm wide.



- Mechanically fix metallic shield.



- Seal the shield with silicone, thiokol, or polyurethane sealant.



- ! **NOTE!** To prevent snow accumulation beyond chimneys and vents with cross section exceeding 500x500 mm and those located across the slope, it is recommended to install a valley gutter.

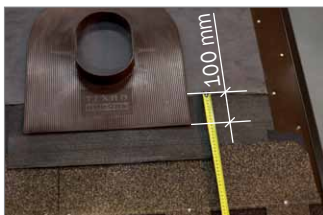
9 Arrangement of roof penetrations

- The bottom parts of roof penetrations, antennas, and utility pipes are sealed with special penetration elements.

[9.1] Sealing of TECHNOMICOL ventilation component



- Place the pass component so as to make sure that its bottom edge extends over shingles by at least 20 mm.



- If there is not a possibility for extension of the bottom edge of the pass component to shingles, a cutout piece of underlayment must be made to meet this requirements so as to make sure that the underlayment extends underneath the pass component by at least 100 mm.



- Mark the future location of penetration at the solid base and cut out a hole.



- Apply TECHNONICOL FIXER mastic to the base or bottom part of the pass component skirt and glue to the base.



- Mechanically fix the pass component using roofing nails along the perimeter.



- Apply bitumen mastic on the front face of the penetration element skirt.



- Install course shingles pre-cut to match the dimensions of the pass component.



- Fill the joint between the pass component and shingles with bitumen mastic.



- Cover the bitumen mastic with dressing to ensure protection against UV radiation.

! **INTERESTING FACT!** Dressing may be easily obtained by rubbing pieces of refuse cutoffs of course shingles against each other.



- Next, install the required roof outlet at the pass component.



- Install the KTV TECHNOMICOL ventilation component.

[9.2] Joint sealing using a rubber seal



- Apply TECHNONICOL FIXER bitumen mastic to the lower side of the rubber seal skirt.



- Glue rubber seal to the base.



- Apply bitumen mastic on the front face of the rubber seal skirt.



- Install course shingles pre-cut to match the dimensions of the seal.



- Fix metallic clamp.



- Seal the clamp with silicone, thiokol, or polyurethane sealant.



- Fill the joint between the seal and shingles with bitumen mastic. Next, cover the bitumen mastic with dressing to ensure protection against UV radiation.

! **INTERESTING FACT!** Dressing may be easily obtained by rubbing pieces of refuse cutoffs of course shingles against each other.



- Penetration installed with rubber seal.

Roof care recommendations

- Roof condition must be checked in spring and autumn.
- It is recommended to remove leaves, branches and other small debris from the roof with a soft brush. Use of sharp tools is unacceptable.
- If there is a threat of growth of moss or fungus on the surface of roofing materials with stone coating, it is recommended to apply the TECHNOMICOL roof care concentrated preservative or any other special treatment advisable for roofing shingles.
- Sharp edged objects must be removed from the roof by hand.
- To ensure free water drainage from the roof, clean water gutters and funnels as they get clogged.
- If there is a threat of formation of a large snow layer, it must be cleaned off using wooden shovels that are not sharp. Remove the snow from the roof in layers, leaving a protective layer of 100 mm on the roof.
- For preventive purposes, inspect and, if required, repair installation openings, holes, cracks, and parts of metallic sheets.



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