swissporton

APPLICATION GUIDE

Clay interlocking roof tiles



swisspor Hungary SEE Kft.

Product management

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The informations provided in this documents, are textual guidelines, the datas in the form of technical drawnings correspond to the current technical knowledge at the time of publication and based to the experience of swisspor Hungary SEE Kft.. This application guide contains only a part of the product informations. The described applications, examples, do not take into account the special features that may arise in individual cases.

All datas and the suitability of the material for the intended use must always be checked on the construction site! swisspor Hungary SEE Kft. disclaims all warranties related the provided informations. This includes typographical errors and the subsequent changes to the specifications.

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PART I.
General rules and informations



More informations:: swissporTON.hu

I. Standards and regulations

General design and construction rules and regulations for the swissporTON interlocking clay tiles. Compliance with regulations and rules is important because warranty claims can only be enforced if the regulations are complied and the original accessories are installed.

EN 1304 Clay roofing tiles and fittings. Product definitions and specifications

ÉMSZ* Cserépfedések tervezési és kivitelezési szabályai.

ÉMSZ* Bádogos munkák tervezési és kivitelezési szabályai.

ÉMSZ* Alátéthéjazatok tervezési és kivitelezési szabályai.

ZVDH Zentralverband des Deutschen Dachdeckerhandwerks.

** Épületszigetelők, Tetőfedők és Bádogosok Magyarországi Szövetsége (Hungarian Association of Building Insulators, Roofers and Tinsmiths)*

The most importants are:

- DIN 4108 Thermal insulation in buildings
- DIN 4109 Sound insulation in buildings
- DIN 18516 Cladding for external walls, ventilated at rear
- DIN 68800 Wood preservation
- VOB/C DIN 18338 General technical specifications in construction contracts (ATV) - Roofing work
- VOB/C DIN 18351 General technical specifications in construction contracts (ATV) - Work on back-ventilated curtain walling

II. From clay to tile

1. Main properties of clay:

The clay were formed by the wheathering of feldspar-rich magmatic rocks. It is a multi-component colloidal system, so:

- the particle sizes of the components are very small, less then 2mμ,
- does not crystallize,
- the proportion of each component varies depending on the place and circumstances of origin.

2. Components of clay mineral:

- clay minerals formed during rock erosion: kaolinites, illites, montmorillonites, (aluminosilicates)
- fragmented but not transformed weathering residue corresponding to the original rocks (mica, quartz)
- other minerals formed during rock deposition (gypsum, dolomite)
- impurities (organic matter, iron oxide)

Of the individual components, clay minerals are the predominant, usually more than 85%.

3. The clay tile:



Clay as a building material has had a very special relationship with humanity from the very beginning.

Tile, as the first building material shaped by human hands, dates back nearly 10,000 years. From quality clay, people created their first information-bearing objects that have survived to this day in the form of cuneiform pots.

Thanks to its excellent building physical and natural properties, it has been and still is one of the most popular building materials: its unique synthesis provides optimal protection against moisture and frost, while being diffusible and fireproof, UV-resistant and extremely durable. All of these are extras so that tile, as a popular building material, still retains its place today, precisely in terms of durability and is therefore so indispensable for swissporTON.

It is millions of years old and still relevant today

The unique raw material has always proved its worth since time immemorial. Using state-of-the-art technologies, swissporTON 's clay specialists have been working for decades to shape clay into a special brand product that plays a key role throughout Europe.

III. The interlocking tile:

1. Color and coating:

„Natural" original surface:

Natural ceramic roof tiles do not have any coating, their color is determined by the clay used for production and the production technology. Each roof tile can be considered unique and with this variety it impresses the viewer that with slight fluctuations it first boasts a natural hue and then forms the desired natural "tarnish". It is made from living, moisture-regulating, natural clay, without the addition of chemical additives, in the spirit of swissporTON 's ecological responsibility. In the case of natural tiles, it should be taken into account that there may be a difference in the color of tiles made of clay mined in the same mine but at a different place or time.

Engobe:

The main components of the clay are the silicate minerals and metal oxides. The engobe is a natural coloring material called clay sludge, which containing clay minerals and the main components are the same minerals and oxides like clay tiles have, so the two materials have the same properties. This procedure has been used by potters for thousands of years to make their pots more beautiful, colorful, finer looking, and last but not least, more durable. The surface treatment and engobing of the tiles is carried out in a similar way today, although we have already called on the help of science to determine exactly what engobic composition we need to achieve the desired effect. Therefore, it is possible that, after leaving the drying oven, the shaped and dried raw clay tiles may receive the engob, which is absorbed into the material through the surface poles of the tile. With the firing process, the engob

becomes chemically one with the tile, this relationship can be perfect and inseparable if the two materials are not unknown to each other, so they have the same chemical composition with the same properties. Thus, in this case, this means that the engob is not a coating that does form a separate layer of paint on the surface of the tile, but it is part of the ceramic tile. This creates a highly resistant surface.

The engobing creates the opportunity to enrich the various tiles in a very special way and at the same time do something for surface durability and lasting color retention. Natural earth paint from clay deposits specially selected for this purpose is applied to the unburned tiles and fused with it at a temperature above 1000ºC using a non-contact firing process. This demanding process gives swissporTON ceramic tiles a particularly aesthetic appearance and a wide range of colors.

2. Manufacturing Technology

Raw material mining

The first and most important step in tile production is to provide the right raw material. Based on preliminary raw material research, swissporTON found this near the town of Lenti in the western half of the country.



The raw material is extracted by opencast mining, during which the top soil layer (up to a depth of about 25 - 40 cm) is removed, followed by a barren layer unsuitable for product production (up to a further depth of about 40 - 120 cm). Both layer will be deposited separately in the area of the mining plot. After the removal of the top layers, the extraction of the utility material (clay suitable for tile production) can start. The pre-depot is built by mixing different amounts of materials from different parts of the mine. Upon completion of the mining process, recultivation is carried out using the previously extracted soil layers, and the mine is returned to the nature.

Extraction, depot built-up

As a first step, a pre-depot will be built on the mine site. The desired goal, to produce the best possible (homogenized) clay mixture, can be achieved by taking into account the preliminary test data of each layer. In the second phase of the extraction, a service depot (Halde) is built from the pre-depot material next to the preparation plant (thus the feedstock is further mixed and homogenized). These processes are repeated according to the raw material requirements of the manufacturing plants

Clay preparation



The depot described above will be dismantled by a front loader by dismantling in a vertical plane. The raw material thus obtained is stored in the box feeder of the preparation plant. From here it is passed on a conveyor belt to a pan mill, in which it is further mixed, and the appropriate plasticity is set by the controlled addition of water. In the next operation, the raw material is ground between 2 rows of rollers. For the first time, crushing of larger particles is ensured with cylinder distances of 1.2 and then 0.8 mm. The clay thus processed is conveyed by means of a conveyor belt to a round store where it is stored for approximately 2 weeks. In this way, the clay can be properly rested and homogenized before use. In addition to frequent sampling, the raw material used is subjected to laboratory tests, where it is examined for its color, shrinkage, water uptake and sedimentation. The latter operation is intended to determine the particle size distribution of the clay. With the help of a bucket-row excavator, we can extract the amount of raw material needed for production from the round storage. It is transported and distributed between the two factories on underground belts.

Forming the tile

Properly prepared and then rested raw material enters the plant from the cellar using a vertical strip. The raw material is transferred to a roller crusher, from which it is transferred to a double-shaft mixer by a collecting plate. Here we compact first with mixing paddles and then with an auger axle to achieve the most compressed material possible. From this it is then shredded into a vacuum chamber with a slicing knife. Vacuuming the chamber is necessary, because any air bubbles that may remain inside of the clay has to be removed from the it with absolute certainty. From here, the auger transports the raw material to the opening. The continuous clay is extruded and cutted to a suitable length with a thin steel wire. This cutted, homogeneous preform will form the basis of the pressed tiles, which are compressed between gypsum molds to obtain the final raw tile format.

Gypsum mold making

Unlike the shaping of the plain tiles, more complex shapes can be achieved with pressing technology. For this process, we need the negative of the tile, an important feature of which is its ability to absorb and drain the water displaced during pressing. It is a perfectly suitable form made of gypsum mixture that adapts to the quality factors of the clay.

The manufacturing process of the tiles



The preforms are transported to the “Rieter DR6” revolver press on conveyor belts and then automatically applied to the lower mold. Due to the design of the machine, it can form 4 tiles next to each other at the same time. The unit has 4 upper molds in operation, and 6x4 lower molds on a rotating 6-sided drum. The pressed tiles are picked up from the bottom with vacuum suction heads and placed on the drying trays. The trays are stacked on top of each other and then placed on drying cart.

Drying

Moving on rails, the cars enter a counter-current (the direction of air movement is opposite to the direction of product movement) tunnel dryer, where the tiles begin to dry. In the first step, they are placed in a medium with a relative humidity of 40°C, close to 100%, so that the drying starts gently. By continuously increasing the temperature and decreasing the humidity, we reach 90°C and 0% relative humidity in 1 day. At that time, there is an additional 2-3% moisture in the tile, which will only be lost during the firing process. There are 66,000 products in the dryer at the same time.

Engobing process

The final color of the tile is determined by the so-called engobe applied after drying. Its composition is made up of metal oxides varying in color and other natural materials. The aqueous mixture of these is applied evenly to the surface of the tile with the help of different spray equipment. The most important physical parameter of engobe paint is its coefficient of thermal expansion, which must be the same as that of its tile. The existence of this is constantly checked during production. In this way, we can guarantee that the engob and the tile will not live "separate lives" even after years.

Firing

After engobing, the tiles are placed in so-called “H-Cassettes” of their type, with millimeter-accurate Fanuc robots. The individual types of tiles (base, verge, ridge etc.) are supported in this case at several points, thus guaranteeing a perfect, deformation-free finished product. The accuracy of the combustion curve is guaranteed by PLC-controlled, automatic combustion zones. This guarantees that high-quality ceramic roof tiles can leave our factory any day of the year.

Finished goods classification and packaging

After firing in the tunnel kiln, each finished product is visually inspected and acoustically tested with the help of a hammer. The latter is needed to filter out hairline cracks that are not visible to the naked eye. After that, small bundles are formed from the product, then they are arranged on EUR pallets, strapped to each other and to the pallet. The resulting unit stack is stored in the warehouse area with six forklifts capable of moving three pallets at a time, from where it is transported to the customer by trucks.

IV. The roof:

The roof not only determines the aesthetic of our house, but also has many other functions, it has to perform many different tasks. It should provide the fullest possible protection against the various weather effects. It is exposed to high loads due to constantly changing weather conditions. A good roof should therefore be frost, storm, and rain resistant. The swissporTON 's roof system offers a timeless and aesthetic solution for every need.

1. Layers of the general roof structure:

- Rafter
- Underlayment
- Counter-batten
- Roof batten
- Interlocking tiles

2. Rafter:

The roofing plane and the slope of the roof structure is determined by the rafters. In addition to their own weight, the rafters and the supporting elements carry the weight of the roof and other elements of the roof, as well as the wind and snow load. The cross-section and distribution of the rafters in the roof structure must be designed for these loads.

3. Underlayment:

When higher than normal requirements are expected, additional protection must be provided during design and construction. The underlayment will be installed under the roof covering as an additional measure to increase the watertightness of the roof structure.

Functions of the underlayment:

- Protects against powder snow
- Protects against rainfall even with higher wind pressure
- Lead out the condensation water
- Helps to remove vapors from the thermal insulation
- Lead out the moisture from the melting of the accumulated snow
- Temporarily takes over the role of the tiles when the cover is damaged, until the roofing is repaired.

Underlayment groups and their characteristics:

Main group	Variations	Overlaps	Materials	Position	Support
1./ underlay insulation	**waterproof underlayment**	welded or glued joints and overlaps	bituminous or plastic sheets	above the counter-batten	complete formwork (decking or walkable thermal insulation)
	watertight underlayment			under the counter-batten	
2./ supported underlays	**windproof underlayment**	welded or glued joints and overlaps or sealed groove	insulating sheets, membranes or plates		
	free overlapping underlayment	without glued or sealed joints, boards with groove splicing or with overlaps			
3./ unsupported underlayment	**free laid underlayment**	without glued or sealed joints, boards with groove splicing or with overlaps	membranes, sheets		none

Standpoints for selecting the underlayment:

- The **standard roof pitch** of the roof tile model used
- **Designed pitch of the roof** (if there are several different pitch in one roof surface, then the lowest one must always be taken into account and the corresponding underlayment applied on the complete roof plane)
- When there is a **living space in the attic**, it is always necessary to install an underlayment.
- **Roof shape, complexity of roof structure**: Rafter length longer than average (more than 10 m), complex roof profile, snow-trap roof sections, etc.
- **Special weather conditions**: In areas with above-average rainfall, snow, and wind conditions, as well as in areas above 600 m above sea level, the cover is subject to increased requirement.
- **Other conditions**: Local building regulations, historical protection, or a higher level of requirements due to the special usage of the interiors

Several aspects need to be considered when determining the appropriate underlay for a given roof structure. These aspects called as "stress factors" during selection. All stress factors must be taken into account! For each type of tile, the underlayment specified in the table are the lightest additional measures required, for which a higher rated underlay can always be selected.

Choosing the underlayment for interlocking tiles:

The planned roof pitch "α"	-	One additional requirement	Two additional requirement	Tree additional requirement
$\alpha \geq \alpha_k$		**free laid underlayment**	**free laid underlayment**	**free laid underlayment**
$\alpha < \alpha_k$ $\alpha \geq \alpha_k - 6°$	**free laid underlayment**	**free laid underlayment**	**free overlapping underlayment**	**windproof underlayment**
$\alpha < \alpha_k - 6°$ $\alpha \geq \alpha_k - 10°$	**watertight underlayment**	**watertight underlayment**	**watertight underlayment**	**watertight underlayment**
$\alpha < \alpha_k - 10°$	**watertight underlayment**	**waterproof underlayment**	**waterproof underlayment**	**waterproof underlayment**
$\alpha < 10°$	**Interlocking roof tile cover can't be made!**			

**α_k (standard roof pitch): is the angle where the specific roof tile model met the watertightness requirement without any additional measure.*

When using the table, the following must be taken into account:

Among the criteria determining the selection, the standard roof pitch of the tile model and the utilization of the attic space are of the greatest importance. The other factors are given equal weight but somewhat lighter weight, so this is shown in the selection table not item by item but as the number of requirement factors.

Grouping the swissporTON roof tiles by roof pitch:

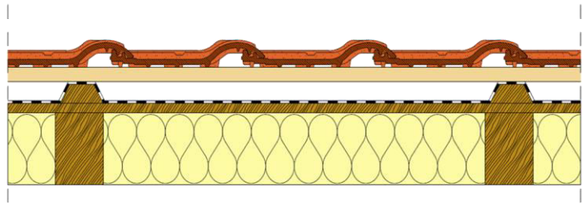
Model	DIN*	swisspor TON **	Free laid underlayment	Windproof underlayment	Watertight underlayment	Waterproof underlayment
			"CORE"	"BASIC"	"PRO"	"ULTRA"
"AVIREL"	22°		≥ 16°	≥ 14°	≥ 12°	≥ 10°
"BALANCE"	22°		≥ 16°	≥ 14°	≥ 12°	≥ 10°
"TITANIA"	22°		≥ 16°	≥ 14°	≥ 12°	≥ 10°
"GENEVO"	25°		≥ 18°	≥ 16°	≥ 14°	≥ 10°
"NOMINA"	25°		≥ 18°	≥ 16°	≥ 14°	≥ 10°
"NIVELO"	25°		≥ 18°	≥ 16°	≥ 14°	≥ 10°
"SIMPLA"	25°		≥ 18°	≥ 16°	≥ 14°	≥ 10°
"RAPIDO"	25°		≥ 18°	≥ 16°	≥ 14°	≥ 10°
"RAVELO"	25°		≥ 18°	≥ 16°	≥ 14°	≥ 10°
"MAXIMA PRO"	25°		≥ 18°	≥ 16°	≥ 14°	≥ 10°
"CLASSIC"	30°	30°	≥ 24°	≥ 22°	≥ 18°	≥ 10°
"AUSTRIAN BIBER"	30°	30°	≥ 24°	≥ 22°	≥ 18°	≥ 10°
"CASTA"	30°	30°	≥ 24°	≥ 22°	≥ 18°	≥ 10°
"PROFIL"	35°	30°	≥ 24°	≥ 22°	≥ 18°	≥ 10°
"RÓNA"	35°	30°	≥ 24°	≥ 22°	≥ 18°	≥ 10°
"KERKA"	35°	30°	≥ 24°	≥ 22°	≥ 18°	≥ 10°

***DIN**: Standard roof pitch defined by DIN (the lowest roof pitch where the roof tile cover considered rainproof on its own)*

***swissporTON**: Standard roof pitch defined by the experience of swissporTON (the lowest roof pitch where the roof tile cover considered rainproof on its own)*

3.1. Supported underlays

3.1.1. Waterproof underlayment:

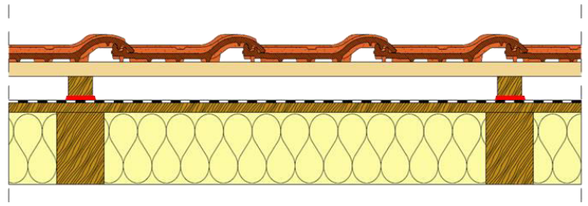


The waterproof underlayment is supported with a rigid formwork. The underlay covers the counter-battens, so the holes caused their nail fastenings are elevated from the level of the possible waterflow. Waterproof underlayment can only be made with qualified bituminous, plastic or synthetic rubber insulation plates. Overlaps and all breakthroughs on the roof shall be designed to be waterproof as well. An air layer below (double-ventilated roof) can only be made with roofs where there are no ridge ventilations, valleys and hips and also with roof structure where the breakthroughs are not exceeding the width of the rafter distances.

swissporTON "ULTRA, waterproof underlayment

Property	Test method	Datas			
Length	**EN 1848-2**	25 m			
Width	**EN 1848-2**	1,5 m			
Weight	**EN 1849-2**	360 g/m^2			
Fire resistance	**EN 13501-1**	E-d2			
Surface area		37,5 m^2			
Vapor permeability (sd)	**EN ISO 12572**	0,2 m			
Tensile strength	**EN 12311-1**	longitudinal:	420 N / 50 mm	cross direction:	490 N / 50 mm
Expansion	**EN 12311-1**	longitudinal:	50%	cross direction:	65%
Tearing resistance	**EN 12310-1**	longitudinal:	310 N	cross direction:	280 N
UV resistance		16 week			
Water proofness	**EN 1928**	W1			
Cold bending	**EN 1109**	-30 °C			

3.1.2. Watertight (rainproof) underlayment:

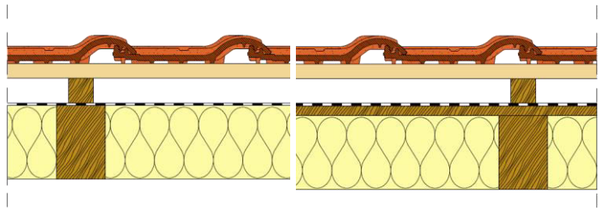


The watertight underlayment is supported with a rigid formwork., laid under the counter-battens and perforated by the fastenings of the counter-battens. These perforations has to be sealed under the counter battens. Watertight underlayment may only be made with certified bituminous, plastic or synthetic rubber insulation plates, or with a sheet or foil specially developed for this purpose and certified for this grade. Overlaps and all breakthroughs on the roof must be watertight.

swissporTON "PRO", watertight underlayment

Property	Test method	Datas			
Length	**EN 1848-2**	50 m			
Width	**EN 1848-2**	1,5 m			
Weight	**EN 1849-2**	210 g/m^2			
Fire resistance	**EN 13501-1**	E-d2			
Surface area		75,0 m^2			
Vapor permeability (sd)	**EN ISO 12572**	0,03 m			
Tensile strength	**EN 12311-1**	longitudinal:	490 N / 50 mm	cross direction:	460 N / 50 mm
Expansion	**EN 12311-1**	longitudinal:	45%	cross direction:	70%
Tearing resistance	**EN 12310-1**	longitudinal:	500 N	cross direction:	450 N
UV resistance		16 week			
Water proofness	**EN 1928**	W1			
Cold bending	**EN 1109**	-40 °C			

3.1.3. Windproof underlayment



The windproof underlayment is supported with a rigid formwork (eg. decking or walkable thermal insulation) and all of the joints and connections are welded, sealed or glued. The underlayment is laid under the counter-battens and perforated by the fastening of the counter-battens. It can be made with certified insulation plates, or with a sheet or foil developed for this purpose and certified for this grade. The overlaps and every breakthrough on the roof must be designed to be watertight!

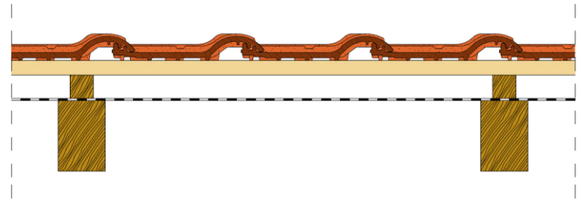
3.1.4. Free overlapping underlayment:

Overlapping sheets, foils, and / or grooved boards which are laid on a full surface, rigid formwork. The underlayment laid below the counter-battens, and perforated by the fastening of the counter-batttens.

swissporTON „BASIC", windproof underlayment**:**

Property	Test method	Datas			
Length	**EN 1848-2**	50 m			
Width	**EN 1848-2**	1,5 m			
Weight	**EN 1849-2**	150 g/m^2			
Fire resistance	**EN 13501-1**	E-d2			
Surface area		75,0 m^2			
Vapor permeability (sd)	**EN ISO 12572**	0,02 m			
Tensile strength	**EN 12311-1**	longitudinal:	310 N / 50 mm	cross direction:	240 N / 50 mm
Expansion	**EN 12311-1**	longitudinal:	70%	cross direction:	80%
Tearing resistance	**EN 12310-1**	longitudinal:	180 N	cross direction:	210 N
UV resistance		12 week			
Water proofness	**EN 1928**	W1			
Cold bending	**EN 1109**	-20 °C			

3.2. Free laid underlayment:



Made without any support, laid above the rafter with loose overlaps or made with unsealed grooved boards. The underlayment laid below the counter-battens, and perforated by the fastening of the counter-batttens. In the case of a thermally insulated structure, a free laid underlayment can only be made as a double-ventilated roof. The required thickness of the air layer formed above the thermal insulation must be ensured regardless of the degree of overhang! Free-laid underlayment must not be used below a roof pitch of 20°!

swissporTON „CORE", free laid underlayment:

Property	Test method	Datas			
Length	**EN 1848-2**	50 m			
Width	**EN 1848-2**	1,5 m			
Weight	**EN 1849-2**	120 g/m^2			
Fire resistance	**EN 13501-1**	E-d2			
Surface area		75,0 m^2			
Vapor permeability (sd)	**EN ISO 12572**	0,02 m			
Tensile strength	**EN 12311-1**	longitudinal:	260 N / 50 mm	cross direction:	180 N / 50 mm
Expansion	**EN 12311-1**	longitudinal:	50%	cross direction:	80%
Tearing resistance	**EN 12310-1**	longitudinal:	120 N	cross direction:	140 N
UV resistance		12 week			
Water proofness	**EN 1928**	W1			
Cold bending	**EN 1109**	-20 °C			

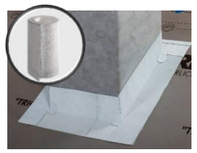


Underlay accessories:



"SKL" adhesive
For foil seams and for other connections
- cc. 19 lm adhesion

"UAB" connection tape
For sealing connections (e.g. wall edges).
- 25 cm width
- 5 m / roll

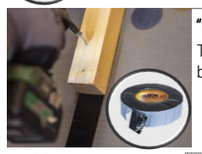




"NKS" seam adhesive tape
To seal longitudinal and transverse seams.
- 50 mm width
- 25 m / roll

"QSM" welding liquid & bottle
For welding the longitudinal and transverse joints of ULTRA
- 1 000 ml / canister
- 1 liter per cc. 200 m^2 roof surface





"NDS" nail sealing tape
To seal nail holes below the counter battens.
- Butyl raw material
- 50 mm width
- 10 m / roll

Hot air gun
For welding the longitudinal and transverse joints of ULTRA.





"NDB" nail sealing tape
To seal nail holes below the counter battens.
- PE raw material
- 60 mm width
- 30 m / roll

"KKS" counter-batten tape
To cover the counter batten for welded waterproof underlays
- 30 cm width
- 20 m / roll





"NDM" nail sealing mastic
To seal nail holes below the counter battens.
- 1 000 ml / tube
- cc. 50 lm counter-battens

"ULTRA" external corner
For waterproof wall corner joint.



Accessory	„CORE"	„BASIC"	„PRO"	„ULTRA"
"SKL" adhesive	✓	✓	✓	✓
"NKS" seam adhesive tape	✓	✓	✘	✘
"NDS" nail sealing tape	✓	✓	✓	✓
"NDB" nail sealing tape	✓	✓	✓	✘
"NDM" nail sealing mastic	✓	✓	✓	✘
"UAB" connection tape	✓	✓	✓	✘
"QSM" welding liquid & bottle	✘	✘	✘	✓
Hot air gun	✘	✘	✘	✓
"KKS" counter-batten tape	✘	✘	✘	✓
"ULTRA" external corner	✘	✘	✘	✓

4. Counter-batten:

The counter-battens must have a nominal thickness of at least 30 mm. Depending on the roof pitch, the length of the rafters and the location of the building, the size (height) of the counter-batten may should be increased. The tile covers belong to the group of the watertight coverings, so small amounts of moisture are allowed to enter below them. However, this moisture must be able to escape from the attic or the roof structure, so ventilation must be provided in all such cases!

Role of the air-gap:

One of the functions of the air-gap is to vent-out the moisture that has entered through the gaps in the roofing and the moisture that condenses on the bottom surface of the roof tiles, but this air layer also allows the moisture that drips from the tiles to escape from the roof. Another function of the air layer is to cool the back of the tile covering. Reducing the surface temperature of the roofing significantly relieves the thermal insulation and reduces its summer heat load. In the case of a single ventilated roof, the function of both air layers is performed by the outer air layer. In order to safely drain the steam built into the layers of the structure and escaping from the interior, the underlayment must have a vapor permeability (Sd < 0.3 m). In winter conditions, the cold air flowing in the air layer delays the melting of the snow, thus reducing the formation of ice rinks and the possibility of the gutter freezing. The counter-batten must comply at least with the requirement of the S 10 class according to the DIN 4074-1 (Strength grading of wood - Part 1: Coniferous sawn timber) standard.

Recommended counter-batten heights:

Rafter length	Roof pitch:				
	10° - 15°	15° - 20°	20° - 25°	25° - 30°	30° felett
up to 10 m	7,5 cm	5 cm	5 cm	5 cm	5 cm
10-15 m	10 cm	7,5 cm	5 cm	5 cm	5 cm
15-20 m	10 cm	10 cm	7,5 cm	5 cm	5 cm

Based on the Hungarian experience, in all cases the min. 5 cm counter-batten height is recommended!

In order to allocate the roof battens, we need to know the actual covering length. The length increase caused by the counter batten can be determined using the table below:

Height of the counter-batten	The increment of the counter-batten length (mm) if the roof pitch is:									
	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°
30 mm	8,0	10,9	14,0	17,3	21,0	25,2	30,0	35,8	42,9	52,0
50 mm	13,4	18,2	23,3	28,9	35,0	41,9	50,0	59,6	71,4	86,7
65 mm	17,4	23,7	30,3	37,5	45,5	54,5	65,0	77,5	92,9	112,7
100 mm	26,8	36,4	46,6	57,7	70,0	83,9	100,0	119,2	142,9	173,3

5. Roof batten:

The supporting structure of the roof tile is the batten. The design and the quality of the roof battens greatly influence the plane of the roof and, consequently, the appearance of the roof covering, so it is especially important to pay attention to the flatness of all of the roof surfaces.

The roof battens must be fastened to the counter batten! Their distance from each other depends on the selected roofing material and the type of covering.

The recommended cross-sectional dimensions of the batten, depending on the rafter distance (distance between the counter-battens), can be found in the attached table. The cross section of the roof battens must comply with the static requirements! Increased load due to self-weight, wind and snow, and local roofing habits may require larger batten dimensions.

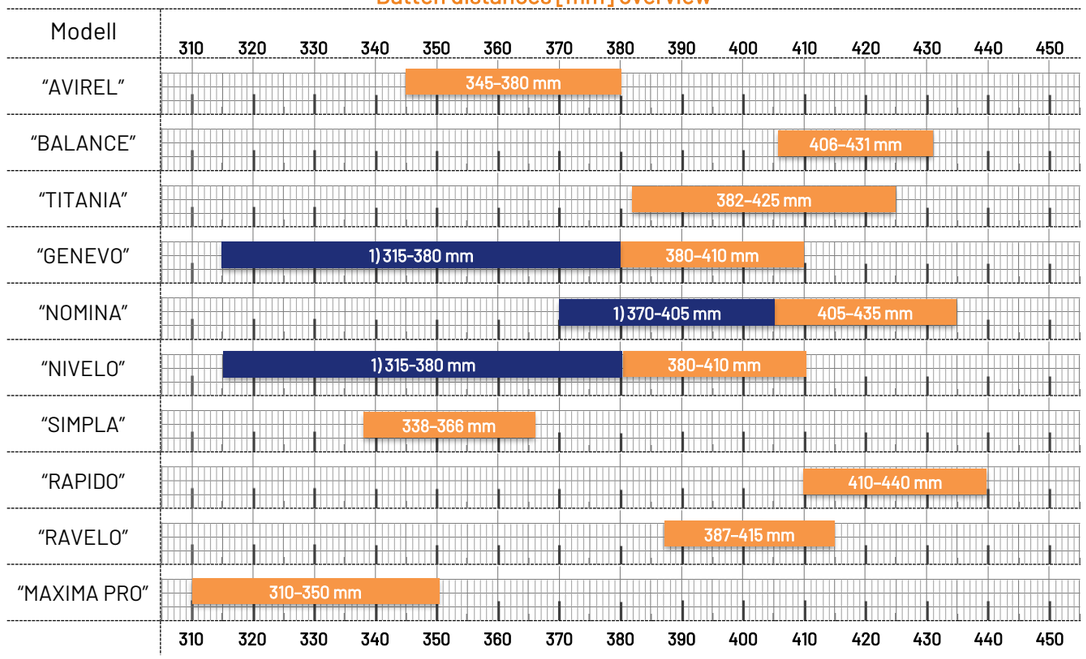
The counter-batten must comply at least with the requirement of the S 10 class according to the DIN 4074-1 (Strength grading of wood - Part 1: Coniferous sawn timber) standard.

Recommended sizes of roof battens:

Rafter distance*	Batten dimensions
up to 70 cm	30 x 50 mm
70 – 80 cm	30 x 50 mm
80 – 90 cm	30 x 50 mm
90 - 100 cm	40 x 60 mm

** Distance between adjacent rafters (not the axis distance). The location of the counter-battens must also be taken into account!*

Batten distances [mm] overview



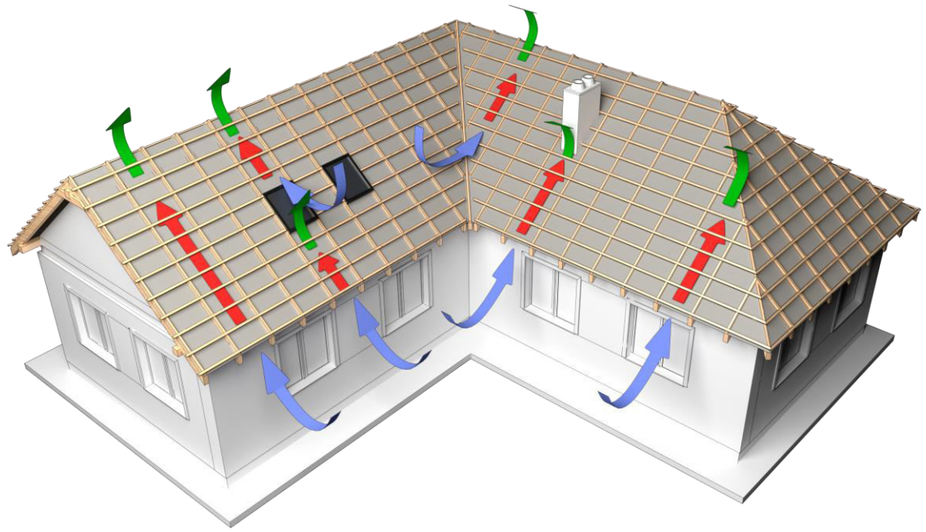
1.) The corner of the verge tile must be cut in the highlighted range!



V. Ventillation:

1. Main principles:

The air layer under the tile covering must be ventilated according to the building's physical aspects! Ventilation occurs when an upward flow begins in an air layer or air space of appropriate cross-section (due to a difference in temperature or pressure). In a ventilated roof structure, the air movement depends on the roof pitch, the cross section of the air layer, the size and design of the air space, the free air permeability of the ventilation and ventilation openings and their placement on the roof. The greater the roof pitch and, consequently, the height difference between the in-ventilation and out-ventilation openings, the greater the driving force and thus the flow rate and the amount of air flushing the air layer / air space.



2. The size of the in and out-ventilation air gap:

There are no national regulations for the appropriate cross-section of the above-mentioned air layer and the size of the in-ventilation and out-ventilation openings, therefore we use the requirements of the proven DIN 4108-3 standard. According to the requirements of the standard, for roofs with a pitch angle of more than 10 °, the detailed vapor diffusion calculation can be dispensed with if the following minimum requirements are met:

- The free ventilation cross-section at the eaves must be at least 0.2% of the ventilated roof area, but at least 200 cm^2 / eaves meter!
- The minimum free ventilation cross-section to be formed on the general parts of the roof must be at least 200 cm^2 / meter!
- The free cross-section of the ventilation openings along the ridges and the hips must be at least 0.05% of the associated roof area!

- The following chart shows the necessary combined vapor diffusion equivalent air layer thickness (sd) of the building layers below the ventilation cross-section, depending on the length of the rafter:

Rafter length*	Required vapor diffusion equivalent air layer thickness (Sd)
0-10 m	≥ 2 m
10 – 15 m	≥ 5 m
>15 m	≥ 10 m

Along the eaves and ridges, the narrowing effect of the installed ventilation meshes, ventilation strips and other profiles has to be considered. The size of the required ventilation openings must be increased accordingly!

In the case of warm, humid spaces, individual sizing is required!

The vapor diffusion calculation can be performed according to DIN 4108-5.

The calculation is not necessary, if the following conditions are met:

In the case of ventilated and insulated roofs, if

- the above minimum ventilation cross-sections are provided,
- thickness of the diffusion-equivalent air layer of the structure under the ventilation air gap: Sdi> 2m

In the case of thermal-insulated roofs without ventilation, if ventilation of the roof covering is ensured (eg small roofing elements)

- Sde ≤ 0,1 m and Sdi ≥ 10 m, or
- Sde ≤ 0,3 m and Sdi ≥ 20 m, or
- Sde ≥ 0,3 m and Sdi ≥ 6*Sde

In the case of thermal-insulated roofs without ventilation, if ventilation of the roof covering is not ensured (eg large roofing elements)

- Sdi ≥ 100,0 m

swissporTON ventilation system elements

Ventilation element	Ventilation cross-section	Application field
Aluminium ventilation mesh	540 cm²/lm for 10 cm width	eave, shed roof ridge
Ventilation batten with comb	200 cm²/m	eave
Aluminium eave comb	Depends on the height of the tile profile	eave, valley
Ventilation tile	See in the charts later	ridge, hip, valley, eave
Ridge connection ventilation tile	230 cm²/lm 115 cm²/lm per ridge side	ridge
Aluminium ridge and hip roll	150 cm²/lm for 300 mm width	ridge, hip
Ridge and hip roll, PP	165 cm²/lm for 310 mm widthl	ridge, hip

In the event of the combined appearance of several weather factors (eg strong winds and long rain), the entry of powder snow and rainfall into the roof structure, cannot be avoided.

VI. Snow guard:

1. Concept, purpose, and task of snow guards:

The purpose of using snow guards is to prevent the snow mass from slipping on the roof surface and falling off the roof surface. According to § 60 (2) of the OTÉK in Hungary, all roofs between 25° and 75° must be covered with snow if the eave edge bordered with the area of traffic. Based on experience, it may also be necessary to create a snow guard at a roof pitch less than 25°, and the purpose of the snow guard is not only to avoid personal injury, but also to protect the connecting building structures. For this purpose, linear and / or point-like snow stopper which built into the roof surface can be used.

The two systems (linear and surface) can be used together for greater efficiency. When designing and constructing complex roof forms, the formation of snow traps between the roof profiles must be avoided, and care must be taken to prevent the formation of snow barriers between some roof profiles.

2. Surface snow guard

The point-like snow stop noses should be evenly distributed over the entire surface to prevent the snow on the roof from slipping. The base value of the snow load (which can be used to determine the required quantity of the snow stop noses) can be calculated by the *"EN 1991-1-3 Actions on structures, Part 1-3: General actions, Snow loads"* standard. During the calculation, the National Annex of the specific country has to be taken into account.

$$s_d = \gamma_s * \mu * C_e * C_t * s_k$$

- *"γ_s"*: safety coeffficient (equals to 1,5)
- *"μ"*: snow load shape coefficient, the value is at least 0,8 but for complex roofs it is equal to 1,6
- *"C_e"*: Exposure coefficient (equal to 1)
- *"C_t"*: Thermal coefficient (for safety, equal to 1)
- *"s_k"*: Characteristic value of snow on the ground at the relevant site (can be found in the National Anex)

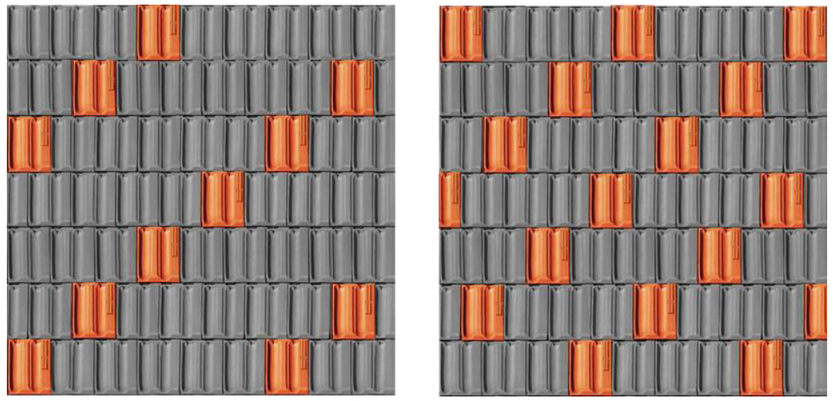
The amount of snow noses can be determined from the following tables.

Base value of the snow load (kN/m²)

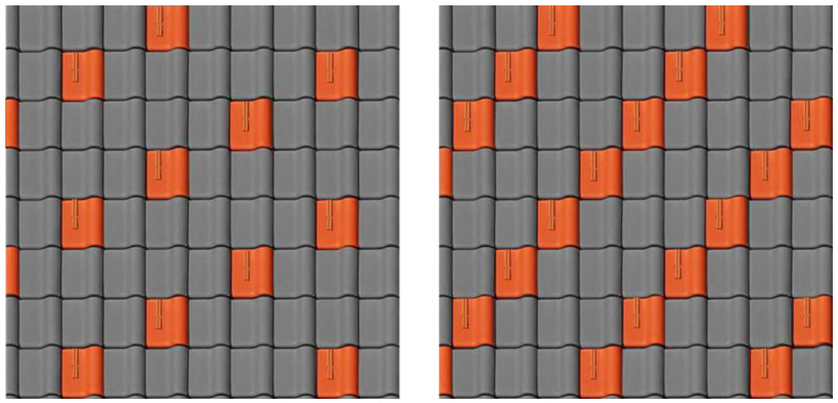
α*	1,00	2,00	3,00	4,00	5,00	6,00	7,00	8,00	9,00	10,00	12,00
20°	3,0	3,0	3,0	3,0	3,0	3,1	3,4	4,0	4,2	4,6	5,6
25°	3,0	3,0	3,0	3,0	3,2	3,3	3,8	4,2	4,8	5,3	6,3
30°	3,0	3,0	3,0	3,0	3,4	3,9	4,6	5,1	5,6	5,9	6,6
35°	3,0	3,0	3,1	3,1	3,5	4,	4,7	5,3	5,6	6,3	7,5
40°	3,1	3,1	3,2	3,2	3,6	4,1	5,1	5,4	6,0	6,4	8,2
45°	3,2	3,2	3,3	3,4	3,8	4,4	5,3	5,9	6,3	6,6	8,4
50°	4,0	4,0	4,4	4,8	5,2	5,7	6,3	6,8	7,1	7,4	8,6
55°	4,1	4,1	4,5	5,0	5,3	5,8	6,5	7,0	7,2	7,6	8,7
60°	4,6	4,6	5,1	5,3	5,7	6,2	6,5	7,2	7,7	8,2	8,9

α: roof pitch*

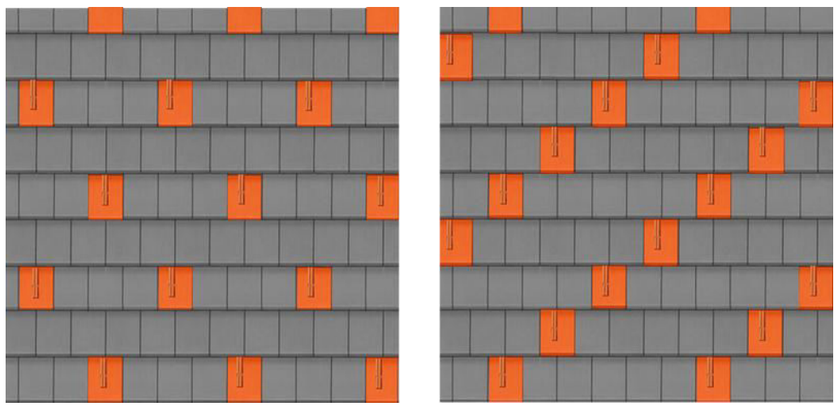
Placement of the snow stop noses for different tile models in quantities of 3,0 pcs/m² and 4,0 pcs/m²



swissporTON RAPIDO, with 8,5 pcs/m² covering capacity



swissporTON BALANCE, with 8,7 pcs/m² covering capacity



swissporTON NIVELO, with 9,8 pcs/m² covering capacity

3. Linear snow guard

The purpose of using linear snow guard is to prevent the snow mass from slipping on the roof surface and to tear off the gutter. In the swissporTON product range, there are two kind of linear snow guard system:

Aluminium snow guard system



- Available in snow guard grid, tube and log support variants
- The supports are installed into the aluminium base tiles
- The distance between the supports can't exceed 80 cm
- There is no need for additional support below the aluminium base tiles

Universal snow guard grid



- Only in snow guard grid vartiant
- The supports are covered with ventilation tiles
- The distance between the supports can't exceed 90 cm
- Additional support battens required for the grid supporting brackets

The most suitable place for the linear snow guard is the 2nd row of tiles from the eave in case of single covering and the 3rd row in case of double covering.

For rafter lengths higher than 10 m, they must be placed in at least two rows.

In the case of a large eave overhang, it must be pulled close to the plane of the wall to reduce the torque acting on the rafters.

VII. Walking on the roof:

The safety regulations must be compliance during the construction and maintenance of the roof which is covered with swissporTON tiles. It is not permitted to enter tile covered roofs without the necessary measures (eg. roof ladders or walkways). If a roof part requires maintenance (eg solar or ventilation equipment), it is essential to use a walking grid that complies with the safety regulations. In the swissporTON product range, there are two groups of the walking systems:

Aluminium walking grid system

- Available in 4 sizes (single step, 46, 80 and 150 cm), of which the 150 cm length is connectable
- The walking grid supports are installed into the aluminium base tiles
- There is no need for additional support below the aluminium base tiles



Universal walking grid system

- Available in 5 sizes (40, 60, 80, 100 and 250 cm), all of them are connectable
- The supports are covered with ventilation tiles
- •Additional support battens required for the grid supporting brackets



Walking grids, ladders and other accessories of the swissporTON system shall not be considered as an anchoring point for safety harnesses.

For this purpose, only the specificly designed safety hook should be used. The hook has to be installed into the steel beam which can be found in the package.



The distance between the safety hook can't exceed:

- 4 meter in the direction of the roof pitch
- 1,4 meter sidewise

VIII. Fixing the tiles:

1. Mechanical fastening along the edges of roof surfaces:

Irrespective of the angle of inclination of the roof, additional fastening shall be applied along the edges, eaves, valleys, hips and the ridge or shed roof ridge. In this case, the fastening is done by screwing with a self-tapping screw with a sealing ring. Traditional nailing is not recommended as it does not provide proper fastening in the long run! These screws must be used through the pre-formed nail hole (in the case of cutted tiles, a new hole must be made) using a hand drill. When the screw is in place, the sealing ring fills the gap between the hole and the screw, thus sealing the drilled tile against any moisture.



This additional fastening must be carried out for each tile along the listed edges (edge zones) as well as for the fastening of each ridge tile (eg. ridge clip)!

Along the hips and valleys, the cutted tiles can be fixed with a wire. A specially developed product for this purpose is the "Stainless steel clip with wire for cutted tiles", which can be found in the system accessories (see product data sheets) group. In this case, there is no need for a new hole in the tile (so no screw with a sealing head is needed).



2. Mechanical fastening against the falling of the tile

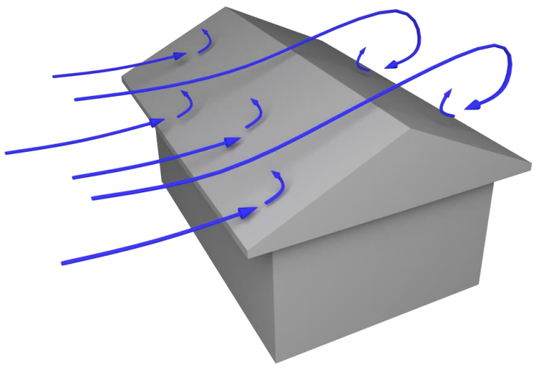
The protection against the falling tile is crucial, because any falling tiles present a significant risk to human life and our valuables (eg. parked cars). This risk should be considered to determine how many tiles will be fixed in certain cases. The main factors which should be considered are: the height of the building, the angle of the roof and the function / location of the building.

The table below is a guideline for the amount of additional fixings to be used depending on the roof pitch angle. The values in the table must be increased when the earlier mentioned reasons require it!

Roof pitch	Amount of the fastened tiles in the general roof surface
up to 45°	no need for additional fixing
45°- 60°	every third and every second tile
above 60°	every one of the tiles

3. Mechanical fastening against wind loads

An additional fastening shall be applied if the amount of wind suction due to wind load exceeds the self-weight of the tiles which act as a resisting force (or torque). The wind pressure on one side of the roof always causes wind suction on the opposite side of the roof! In addition, the effect of turbulent wind flow due to the geometric design of the roof must be taken into account.



The determination of the wind load must be determined based on the Eurocode standard (EN 1991-1-4) and calculated by a structural engineer. The standard is valid for all European Member States, and the geographical and meteorological differences (and the resulting data) for each country are included in the national annexes.

This standard provides a so-called simplified procedure, which can be used when the following conditions are met:

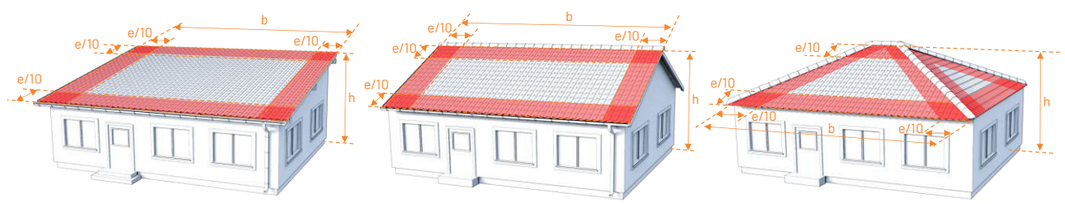
- • The height of the building does not exceed 200 m
- • On the windward side of the building, the average slope of the terrain is less than 3 °
- • There is no building or other object in the vicinity of the building that has at least twice its average height
- • If the air space under the tile roof is not closed, the building must not have two or more sides with a ratio of opening surfaces of more than 30%

The simplified procedure takes into account the reference pressure depending on the height above ground level and the installation category, as well as the shape factors depending on the geometric design of the roof.

$$w_d = \gamma_w * q_p(z) * c_{pe} * c_{eq}$$

- *"γ_s"*: safety coefficient (equals to 1,5)
- *"$q_p(z)$"*: peak velocity pressure
- *"c_{pe}"*: external pressure coefficient (see later)
- *"c_{eq}"*: pressure equalizing factor (depend on the roof layers)

The value of the external pressure coefficient is determined by the simplified procedure for three roof forms: shed roof, gabble roof and hip roof.

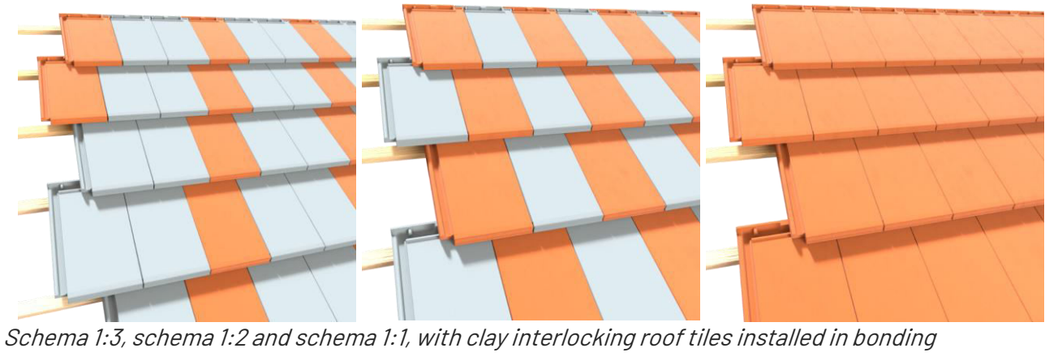


In each case, the roof surfaces are divided into zones, so different values are determined for the eaves, edges, hips, ridges and the remaining roof surfaces. The width of the zones ("e/10") can be calculated from the building height ("h") and from the building width ("b"), where "e" is the smaller of the building's width or twice its height.

Stormclips must be used on surfaces where the wind load exceeds the resisting weight load! The density of stormclips is determined from the ratio of these two effects, so it may be necessary to fix each tile (1: 1), every second tile (1: 2), or every third tile (1: 3).



Schema 1:3, schema 1:2 and schema 1:1, with clay interlocking roof tiles installed in mesh



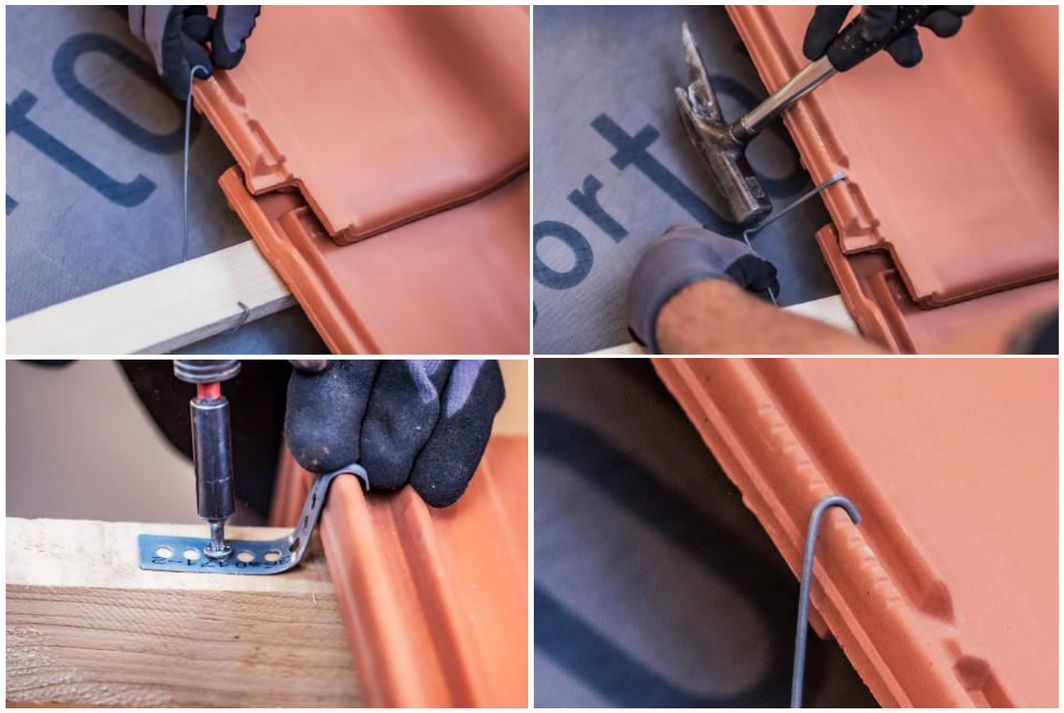
Schema 1:3, schema 1:2 and schema 1:1, with clay interlocking roof tiles installed in bonding

Turbulent air flow is a major risk in the vicinity of roof breakthroughs (dormers, chimneys etc.). The use of stormclips around them is recommended for all tiles (in the previously determined width)!

The amount of stormclips calculated using the simplified procedure must always be checked and, if it is neccessary by the local conditions (eg prevailing wind direction or the highest wind pressure that has occurred in the past), it must be adjusted! The exact windload values must be determined by the roofer or the structural engineer!

In the design and use of stormclips, we consider that they are placed as far away from the turning axel as possible (usually in the lower half of the sidelock of the tile), so that we can increase the resisting "moment arm" (thus obtaining a higher counterbalancing torque).

We use stormclips of different sizes for different products, and you can also choose between nail-in and mount-on stormclips.



Nail-in, mount-on and the universal stormclip installation, and the grooves in the side lock where the mount-on stormclip can be hooked

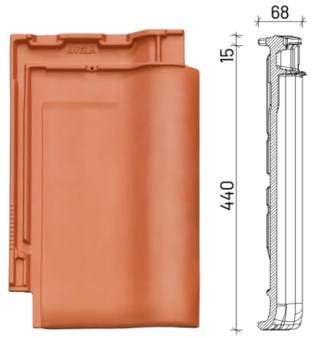
More informations:: swissporTON.hu

PART II.
Technical specifications



More informations:: swissporTON.hu

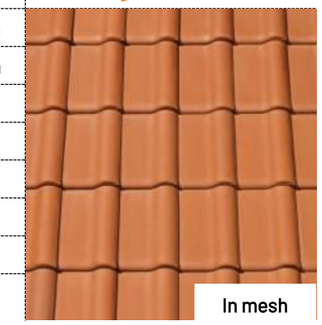
AVIREL®



Product datas

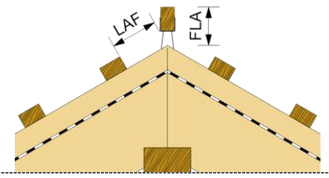
Size	width:	285 mm
	length:	455 mm
	height:	68 mm
	thickness:	11 mm
Weight:		3,9 kg
Packaging	bundle:	4 pcs
	pallet:	256 pcs
Standrad roof pitch:		22°

Covering method



Technical specification of the roof cover

	minimum	average	maximum
Batten distance	345 mm	363 mm	380 mm
Covering width	237 mm	240 mm	242 mm
Consumption	12,2 pcs/m²	11,5 pcs/m²	10,9 pcs/m²
Covering type		single cover	
Covering weight		44,85 kg/m²	



LAF: distance of the upper batten

FLA: height of the ridge batten

LB ridge tile and 30x50 batten

Roof pitch	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°
LAF [mm]	65	60	60	50	45	45	40	40	40	25	✖
FLA [mm]	125	115	105	100	95	80	70	60	50	50	✖

LB ridge tile and 40x60 batten

LAF [mm]	65	60	50	45	40	35	35	30	30	20	✖
FLA [mm]	135	125	115	110	100	90	80	75	65	65	✖

LR ridge tile and 30x50 batten

LAF [mm]	75	65	60	60	55	55	50	40	30	✖	✖
FLA [mm]	120	110	100	90	80	70	60	55	55	✖	✖

LR ridge tile and 40x60 batten

LAF [mm]	70	65	60	55	50	40	35	30	25	✖	✖
FLA [mm]	130	120	110	100	90	85	75	70	65	✖	✖

Underlayment requirement

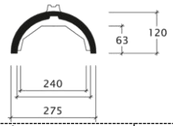
Unsupported underlayment	"CORE"	≥ 16°
Windproof underlayment	"BASIC"	≥ 14°
Watertight underlayment	"PRO"	≥ 12°
Waterproof underlayment	"ULTRA"	≥ 10°

Required batten dimensions

Rafter distance	Batten dimension
≤ 800 mm	30 x 50 mm
810 – 900 mm	30 x 50 mm
910 – 1000 mm	40 x 60 mm

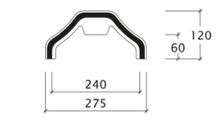
"LB" ridge tile 2,5 pcs/m

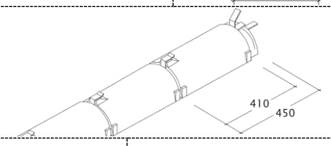




"LR" ridge tile 2,5 pcs/m

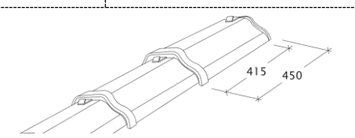


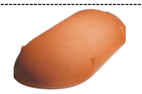
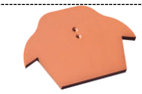




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"LB" hip starter	"LB" hip starter, shell shape	3 axis hip cap	"LR" hip starter	"LR" hip starter, shell shape
				
„LB" hip starter, rounded	„LB" closing plate	4 axis hip cap	"LR" closing plate	
				

Clay accessories	Size	Quantity
Verge tile - left	367x455	2,8 pcs/m
Verge tile - right	285x455	2,8 pcs/m
Double wave tile	367x455	2,8 pcs/m
Ventilation tile LQ 25	285x455	as required
Ridge connection ventilation tile	285x455	4,2 pcs/m
Ridge conn. vent. verge tl. left	367x455	as needed
Ridge conn. vent. verge tl. right	285x455	as needed
Double wave ridge connection tile	367x455	as needed

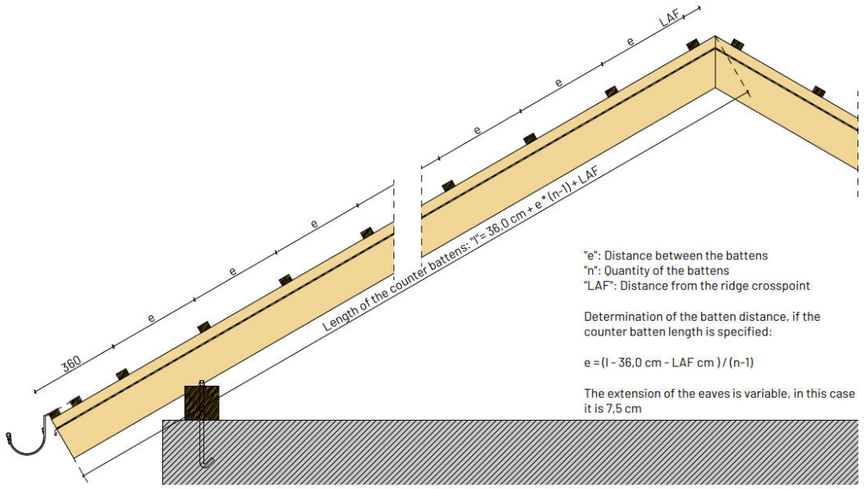
Clay accessories	Size	Quantity
Shed roof tile	-	4,2 pcs/m
Shed roof verge tile – left	-	as needed
Shed roof verge tile – right	-	as needed
Mansard tile	-	4,2 pcs/m
Mansard verge tile – left/right	-	as needed

Clay outlets

Clay outlets	Package content	Outlet type
Ø110 outlet vent tile with "A" type unscrewable cap	outlet tile, underlay connection bush	waste pipe ventilation room ventilation kitchen ventilation
Ø125 outlet vent tile with "A" type unscrewable cap	outlet tile, underlay connection bush	waste pipe ventilation room ventilation kitchen ventilation
Ø150 outlet vent tile	outlet tile, underlay connection bush	room ventilation kitchen ventilation
Ø200 outlet vent tile	outlet tile, underlay connection bush,	room ventilation kitchen ventilation
Antenna outlet tile Ø60 mm	outlet tile, underlay connection bush,	antenna and telecommunication tubes
Solar outlet tile Ø70 mm	outlet tile, underlay connection bush,	solar and photovoltaic cables
Flue gas outlet tile Ø 110 mm or Ø 125 mm	outlet tile, underlay connection bush,	flue pipe of the condensation boilers

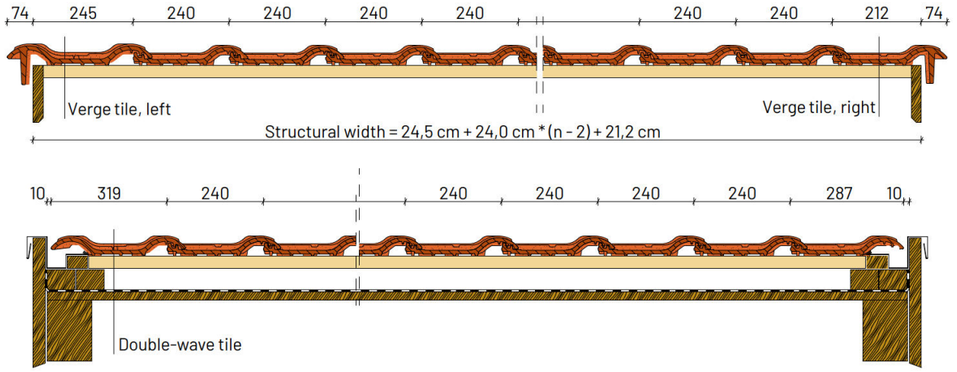
Fixing products

Name	Material	Application field
Mount-on stromclip for 30x50 mm battens	zinc-aluminium	Fixing against the wind in the edge zones and some cases in the genereal roof surface .
Mount-on stromclip for 40x50 mm battens	zinc-aluminium	
Mount-on stromclip for 40x60 mm battens	zinc-aluminium	
Nail-in stormclip	zinc-aluminium	
Fixing screw with EPDM sealing ring, 50 mm length	stainless steel	Fixing against loosed tiles along the edges and some cases in the average roof surfaces.
Clip with wire, 7-22 mm	stainless steel	Fixing cutted tiles along the hips and valleys
Universal stormclip	zinc-aluminium	Fixing shed roof tiles and tiles along the eaves



Roof batten alignement for "AVIREL" clay roof tile

Specification:	7,5 cm eave overhang and 30° roof pitch "LB" ridge tile and 30x50 mm roof battens, LAF = 45 mm		
Number of battens (n)	**min. batten dist.(e)**	**avg. batten dist.(e)**	**max. batten dist.(e)**
	345 mm	363 mm	380 mm
10	3 510	3 672	3 825
11	3 855	4 035	4 205
12	4 200	4 398	4 585
13	4 545	4 761	4 965
14	4 890	5 124	5 345
15	5 235	5 487	5 725
16	5 580	5 850	6 105
17	5 925	6 213	6 485
18	6 270	6 576	6 865
19	6 615	6 939	7 245
20	6 960	7 302	7 625
21	7 305	7 665	8 005
22	7 650	8 028	8 385
23	7 995	8 391	8 765
24	8 340	8 754	9 145
25	8 685	9 117	9 525
26	9 030	9 480	9 905
27	9 375	9 843	10 285
28	9 720	10 206	10 665
29	10 065	10 569	11 045
30	10 410	10 932	11 425
31	10 755	11 295	11 805
32	11 100	11 658	12 185
33	11 445	12 021	12 565
34	11 790	12 384	12 945
35	12 135	12 747	13 325
36	12 480	13 110	13 705
37	12 825	13 473	14 085
38	13 170	13 836	14 465
39	13 515	14 199	14 845
40	13 860	14 562	15 225



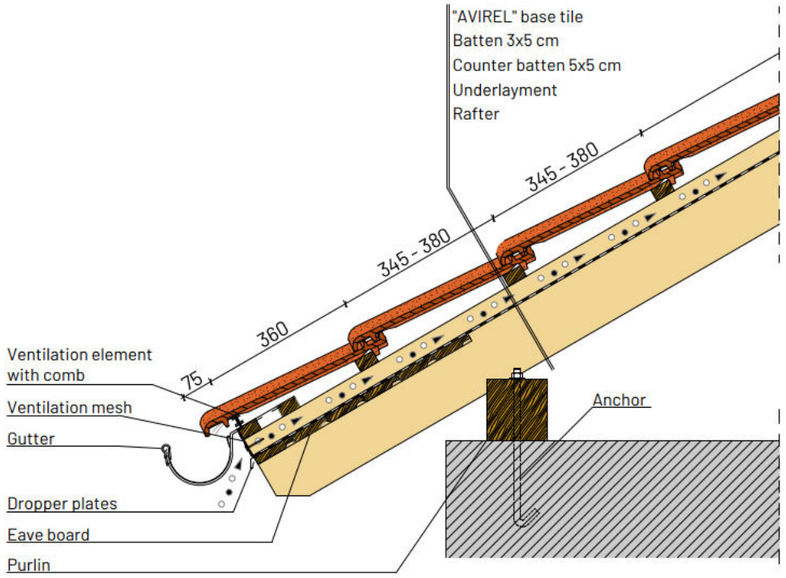
Structural width between the verge boards

	0	**1/2**	**1**	**1 1/2**	**2**	**2 1/2**	**3**	**3 1/2**	**4**	**4 1/2**
0	-	-	240	-	457	-	697	-	937	-
10	2 377	-	2 617	-	2 857	-	3 097	-	3 337	-
20	4 777	-	5 017	-	5 257	-	5 497	-	5 737	-
30	7 177	-	7 417	-	7 657	-	7 897	-	8 137	-
40	9 577	-	9 817	-	10 057	-	10 297	-	10 537	-
50	11 977	-	12 217	-	12 457	-	12 697	-	12 937	-
60	14 377	-	14 617	-	14 857	-	15 097	-	15 337	-
70	16 777	-	17 017	-	17 257	-	17 497	-	17 737	-
80	19 177	-	19 417	-	19 657	-	19 897	-	20 137	-
90	21 577	-	21 817	-	22 057	-	22 297	-	22 537	-
100	23 977	-	24 217	-	24 457	-	24 697	-	24 937	-

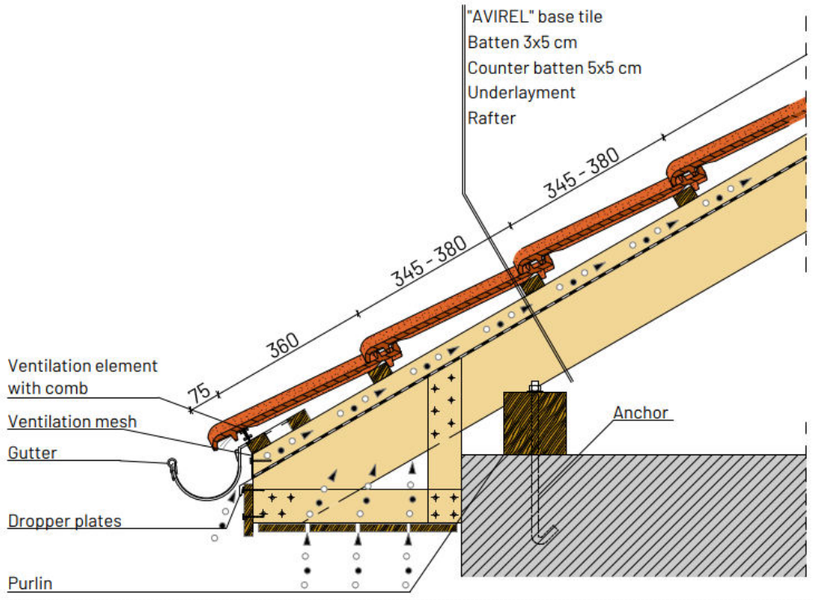
Structural width between the verge boards

	5	**5 1/2**	**6**	**6 1/2**	**7**	**7 1/2**	**8**	**8 1/2**	**9**	**9 1/2**
0	1 177	-	1 417	-	1 657	-	1 897	-	2 137	-
10	3 577	-	3 817	-	4 057	-	4 297	-	4 537	-
20	5 977	-	6 217	-	6 457	-	6 697	-	6 937	-
30	8 377	-	8 617	-	8 857	-	9 097	-	9 337	-
40	10 777	-	11 017	-	11 257	-	11 497	-	11 737	-
50	13 177	-	13 417	-	13 657	-	13 897	-	14 137	-
60	15 577	-	15 817	-	16 057	-	16 297	-	16 537	-
70	17 977	-	18 217	-	18 457	-	18 697	-	18 937	-
80	20 377	-	20 617	-	20 857	-	21 097	-	21 337	-
90	22 777	-	23 017	-	23 257	-	23 497	-	23 737	-
100	25 177	-	25 417	-	25 657	-	25 897	-	26 137	-

The structural widths below are calculated with 1-1 cm gap between the side plate of the verge tiles and the verge board!

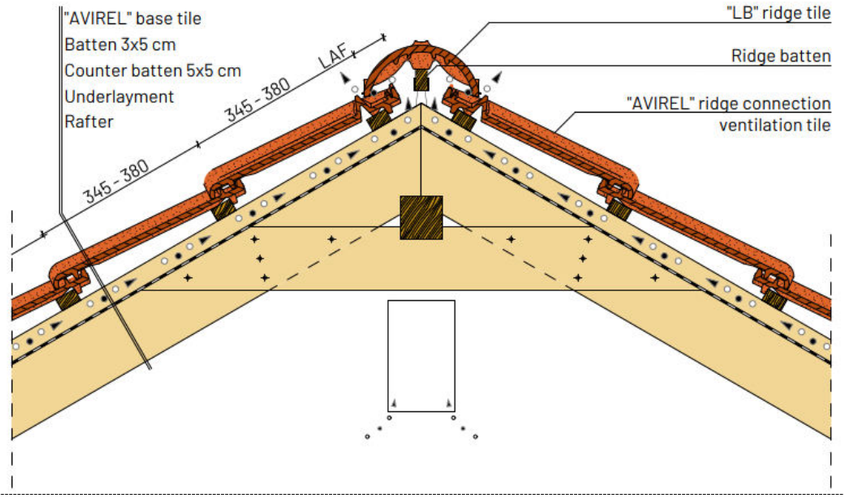


Eave detail

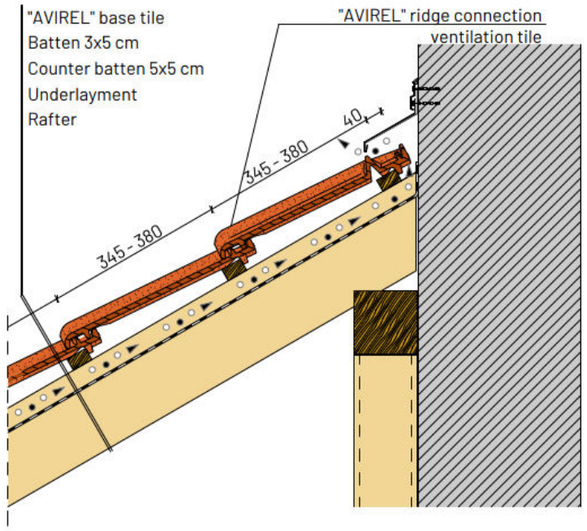


Closed eave detail

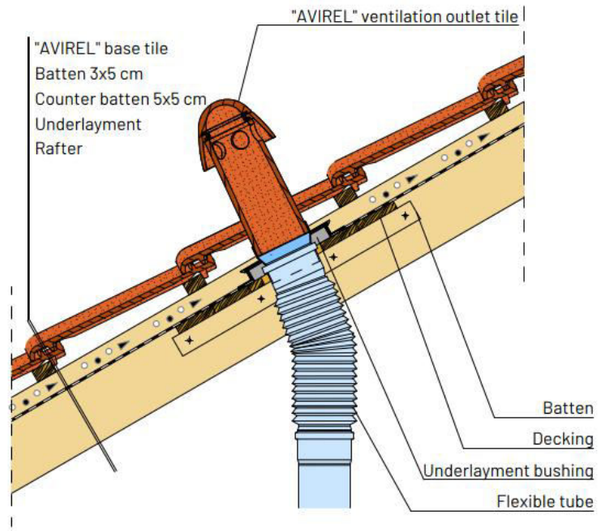
Ridge detail, with ventilation tile



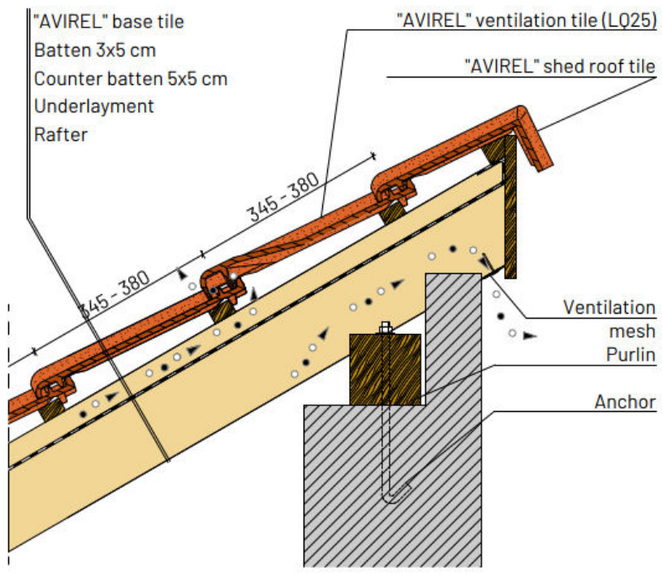
Ridge detail, with ridge connection ventilation tile



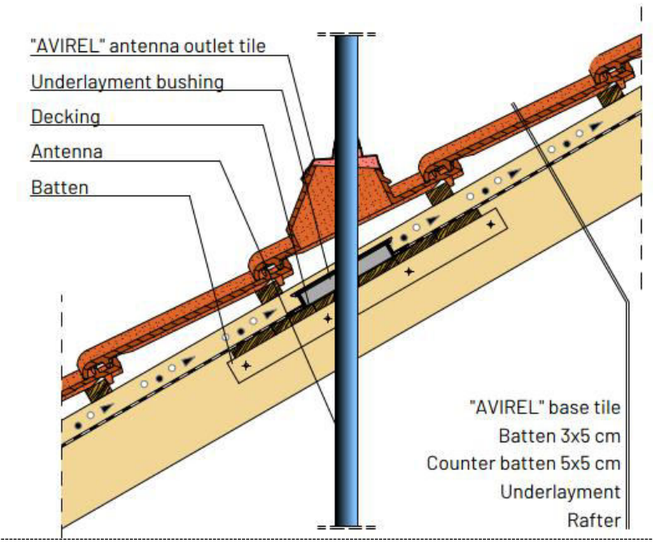
Wall connection detail



Clay ventilation outlet tile

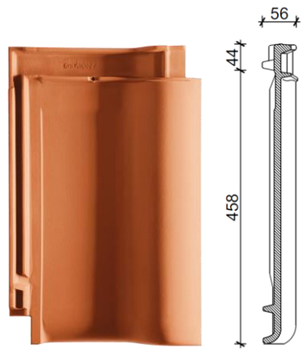


Shed ridge detail, with shad roof tile



Clay antenna outlet tile

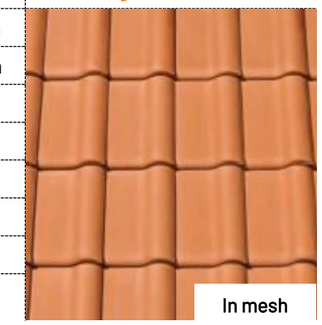
BALANCE®



Product datas

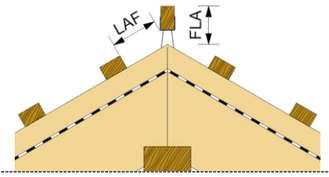
Size	width:	323 mm
	length:	502 mm
	height:	55 mm
	thickness:	10 mm
Weight:		4,9 kg
Packaging	bundle:	4 pcs
	pallet:	192 pcs
Standrad roof pitch:		22°

Covering method



Technical specification of the roof cover

	minimum	average	maximum
Batten distance	406 mm	419 mm	431 mm
Covering width	274 mm	275 mm	277 mm
Consumption	9,0 pcs/m²	8,7 pcs/m²	8,4 pcs/m²
Covering type		single cover	
Covering weight		42,63 kg/m²	



LAF: distance of the upper batten

FLA: height of the ridge batten

LB ridge tile and 30x50 batten

Roof pitch	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°
LAF [mm]	95	90	90	80	80	80	75	75	75	75	75
FLA [mm]	100	95	90	80	70	60	50	45	30	25	20

LB ridge tile and 40x60 batten

LAF [mm]	95	90	90	75	75	75	70	65	60	60	60
FLA [mm]	105	105	100	90	80	70	60	55	40	35	30

LR ridge tile and 30x50 batten

LAF [mm]	95	90	90	80	80	80	75	75	75	75	75
FLA [mm]	100	95	90	80	70	60	50	45	30	25	20

LR ridge tile and 40x60 batten

LAF [mm]	95	90	90	75	75	75	70	65	60	60	60
FLA [mm]	105	105	100	90	80	70	60	55	40	35	30

Underlayment requirement

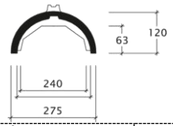
Unsupported underlayment	"CORE"	≥ 16°
Windproof underlayment	"BASIC"	≥ 14°
Watertight underlayment	"PRO"	≥ 12°
Waterproof underlayment	"ULTRA"	≥ 10°

Required batten dimensions

Rafter distance	Batten dimension
≤ 800 mm	30 x 50 mm
810 – 900 mm	30 x 50 mm
910 – 1000 mm	40 x 60 mm

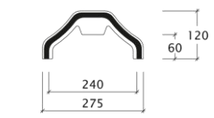
"LB" ridge tile 2,5 pcs/m

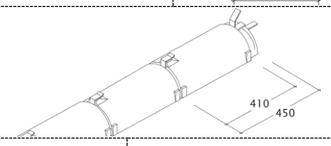




"LR" ridge tile 2,5 pcs/m

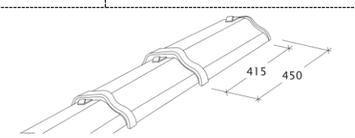


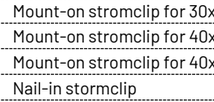
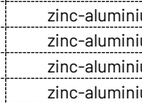
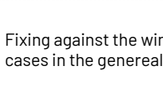
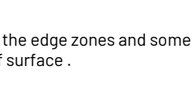
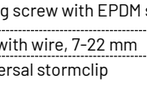
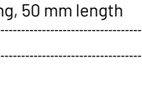
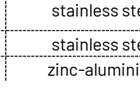
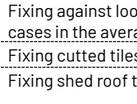




Funct.c.p.





"LB" hip starter	"LB" hip starter, shell shape	3 axis hip cap	"LR" hip starter	"LR" hip starter, shell shape
				
„LB" hip starter, rounded	„LB" closing plate	4 axis hip cap	"LR" closing plate	
				

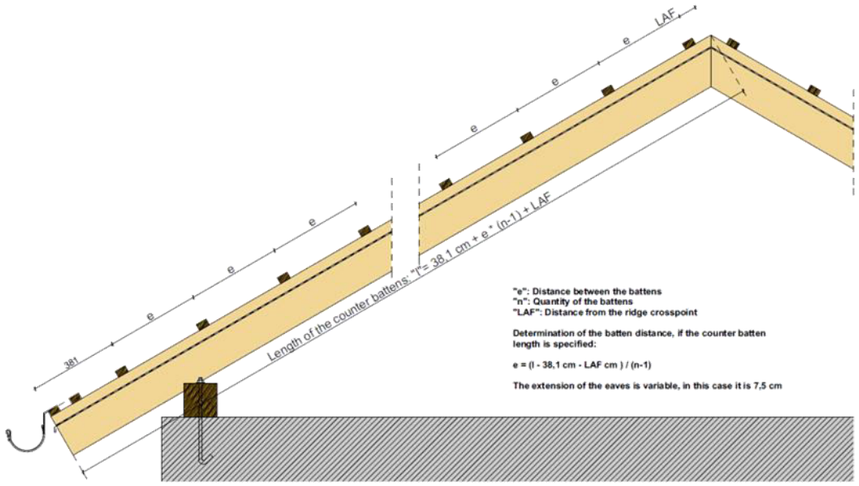
Clay accessories	Size	Quantity
Half tile	253x502	as needed
Verge tile - left	382x502	2,4 pcs/m
Verge tile - right	323x502	2,4 pcs/m
Double wave tile	382x502	2,4 pcs/m
Ventilation tile LQ 37,5	323x502	as required
Ridge connection ventilation tile	323x502	3,6 pcs/m
Ridge connection vent. half tile	253x502	as needed
Ridge conn. vent. verge tl. left	382x502	as needed

Clay accessories	Size	Quantity
Ridge conn. vent. verge tl. right	323x502	as needed
Double wave ridge connection tile	382x502	as needed
Shed roof tile	-	3,6 pcs/m
Shed roof half tile	-	as needed
Shed roof verge tile – left	-	as needed
Shed roof verge tile – right	-	as needed
Mansard tile	-	3,6 pcs/m
Mansard verge tile – left/right	-	as needed

Clay outlets	Package content	Outlet type
Ø110 outlet vent tile with "A" type unscrewable cap	outlet tile, underlay connection bush	waste pipe ventilation room ventilation kitchen ventilation
Ø125 outlet vent tile with "A" type unscrewable cap	outlet tile, underlay connection bush	waste pipe ventilation room ventilation kitchen ventilation
Ø150 outlet vent tile	outlet tile, underlay connection bush	room ventilation kitchen ventilation
Ø200 outlet vent tile	outlet tile, underlay connection bush,	room ventilation kitchen ventilation
Antenna outlet tile Ø60 mm	outlet tile, underlay connection bush,	antenna and telecommunication tubes
Solar outlet tile Ø70 mm	outlet tile, underlay connection bush,	solar and photovoltaic cables
Flue gas outlet tile Ø 110 mm or Ø 125 mm	outlet tile, underlay connection bush,	flue pipe of the condensation boilers

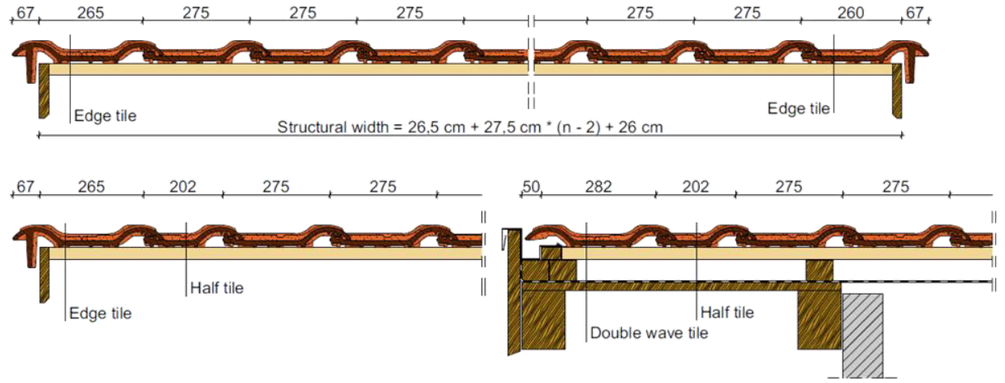
Fixing products

Name	Material	Application field
Mount-on stromclip for 30x50 mm battens	zinc-aluminium	Fixing against the wind in the edge zones and some cases in the genereal roof surface .
Mount-on stromclip for 40x50 mm battens	zinc-aluminium	
Mount-on stromclip for 40x60 mm battens	zinc-aluminium	
Nail-in stormclip	zinc-aluminium	
Fixing screw with EPDM sealing ring, 50 mm length	stainless steel	Fixing against loosed tiles along the edges and some cases in the average roof surfaces.
Clip with wire, 7-22 mm	stainless steel	Fixing cutted tiles along the hips and valleys
Universal stormclip	zinc-aluminium	Fixing shed roof tiles and tiles along the eaves



Roof batten alignement for "BALANCE" clay roof tile

Specification:	7,5 cm eave overhang and 30° roof pitch "LB" ridge tile and 30x50 mm roof battens, LAF = 80 mm		
Number of battens (n)	**min. batten dist.(e)**	**avg. batten dist.(e)**	**max. batten dist.(e)**
	406 mm	419 mm	431 mm
10	4 115	4 232	4 340
11	4 521	4 651	4 771
12	4 927	5 070	5 202
13	5 333	5 489	5 633
14	5 739	5 908	6 064
15	6 145	6 327	6 495
16	6 551	6 746	6 926
17	6 957	7 165	7 357
18	7 363	7 584	7 788
19	7 769	8 003	8 219
20	8 175	8 422	8 650
21	8 581	8 841	9 081
22	8 987	9 260	9 512
23	9 393	9 679	9 943
24	9 799	10 098	10 374
25	10 205	10 517	10 805
26	10 611	10 936	11 236
27	11 017	11 355	11 667
28	11 423	11 774	12 098
29	11 829	12 193	12 529
30	12 235	12 612	12 960
31	12 641	13 031	13 391
32	13 047	13 450	13 822
33	13 453	13 869	14 253
34	13 859	14 288	14 684
35	14 265	14 707	15 115
36	14 671	15 126	15 546
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38	15 483	15 964	16 408
39	15 889	16 383	16 839
40	16 295	16 802	17 270



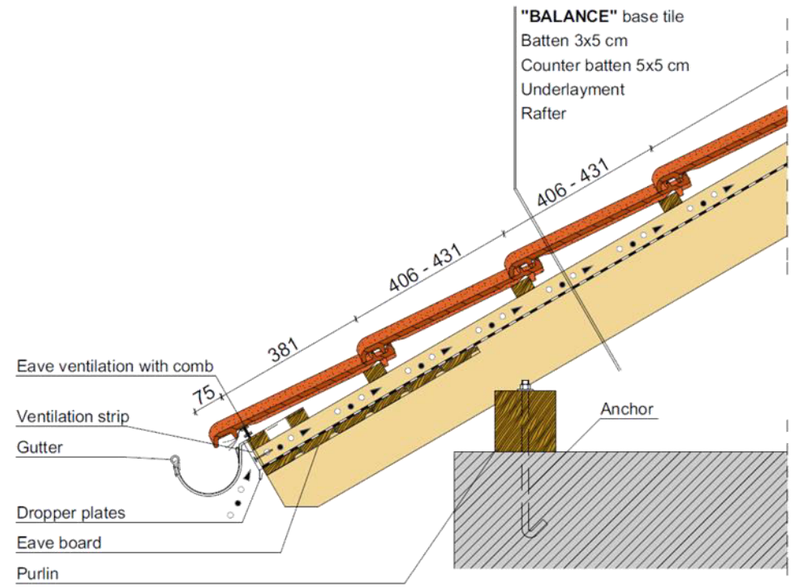
Structural width between the verge boards

	0	**1/2**	**1**	**1 1/2**	**2**	**2 1/2**	**3**	**3 1/2**	**4**	**4 1/2**
0	-	202	275	477	525	727	800	1 002	1 075	1 277
10	2 725	2 927	3 000	3 202	3 275	3 477	3 550	3 752	3 825	4 027
20	5 475	5 677	5 750	5 952	6 025	6 227	6 300	6 502	6 575	6 777
30	8 225	8 427	8 500	8 702	8 775	8 977	9 050	9 252	9 325	9 527
40	10 975	11 177	11 250	11 452	11 525	11 727	11 800	12 002	12 075	12 277
50	13 725	13 927	14 000	14 202	14 275	14 477	14 550	14 752	14 825	15 027
60	16 475	16 677	16 750	16 952	17 025	17 227	17 300	17 502	17 575	17 777
70	19 225	19 427	19 500	19 702	19 775	19 977	20 050	20 252	20 325	20 527
80	21 975	22 177	22 250	22 452	22 525	22 727	22 800	23 002	23 075	23 277
90	24 725	24 927	25 000	25 202	25 275	25 477	25 550	25 752	25 825	26 027
100	27 475	27 677	27 750	27 952	28 025	28 227	28 300	28 502	28 575	28 777

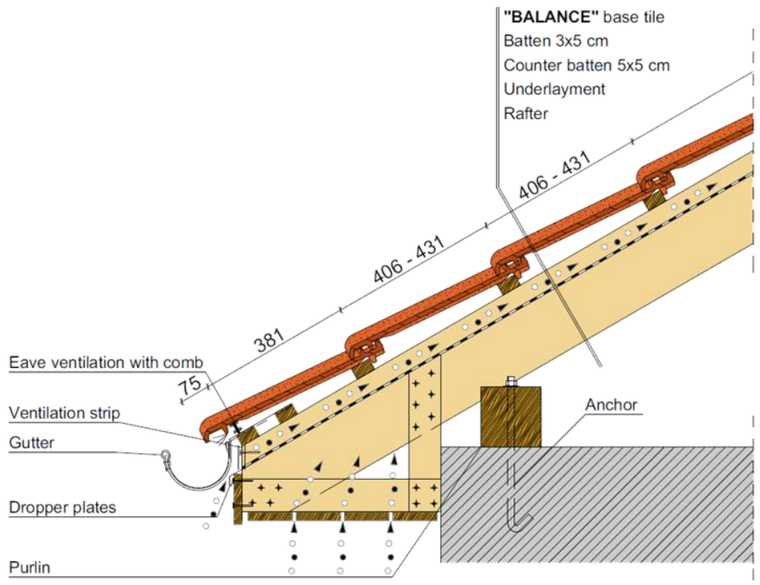
Structural width between the verge boards

	5	**5 1/2**	**6**	**6 1/2**	**7**	**7 1/2**	**8**	**8 1/2**	**9**	**9 1/2**
0	1 350	1 552	1 625	1 827	1 900	2 102	2 175	2 377	2 450	2 652
10	4 100	4 302	4 375	4 577	4 650	4 852	4 925	5 127	5 200	5 402
20	6 850	7 052	7 125	7 327	7 400	7 602	7 675	7 877	7 950	8 152
30	9 600	9 802	9 875	10 077	10 150	10 352	10 425	10 627	10 700	10 902
40	12 350	12 552	12 625	12 827	12 900	13 102	13 175	13 377	13 450	13 652
50	15 100	15 302	15 375	15 577	15 650	15 852	15 925	16 127	16 200	16 402
60	17 850	18 052	18 125	18 327	18 400	18 602	18 675	18 877	18 950	19 152
70	20 600	20 802	20 875	21 077	21 150	21 352	21 425	21 627	21 700	21 902
80	23 350	23 552	23 625	23 827	23 900	24 102	24 175	24 377	24 450	24 652
90	26 100	26 302	26 375	26 577	26 650	26 852	26 925	27 127	27 200	27 402
100	28 850	29 052	29 125	29 327	29 400	29 602	29 675	29 877	29 950	30 152

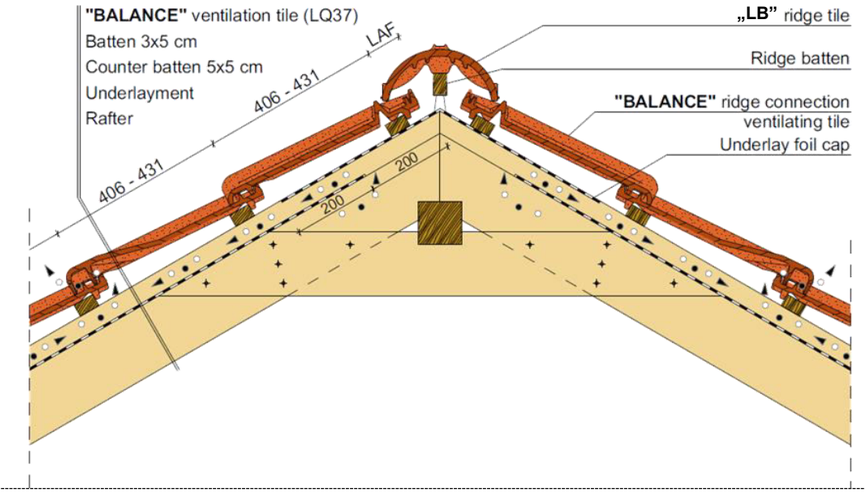
The structural widths below are calculated with 1-1 cm gap between the side plate of the verge tiles and the verge board!



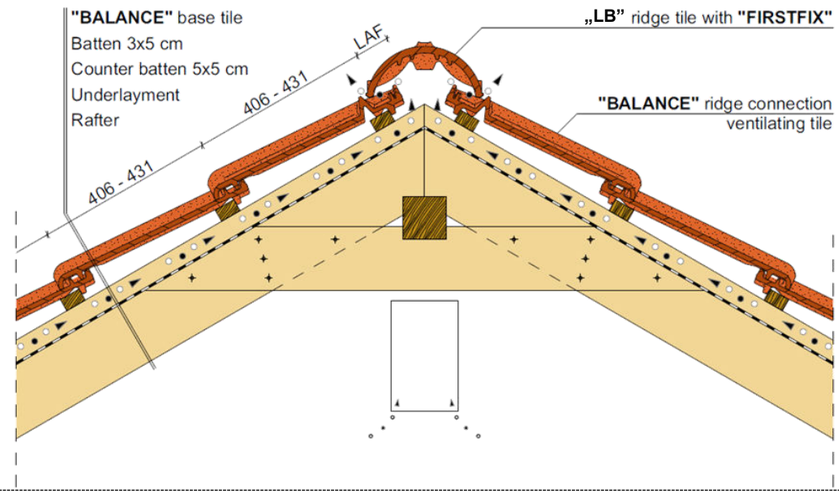
Eave detail



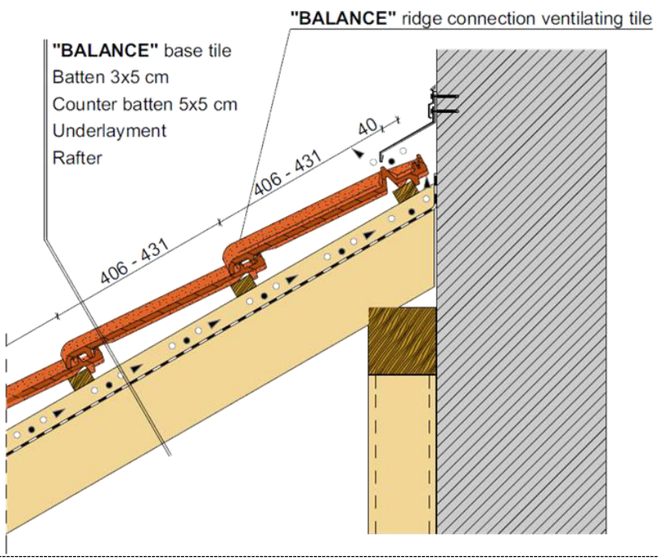
Closed eave detail



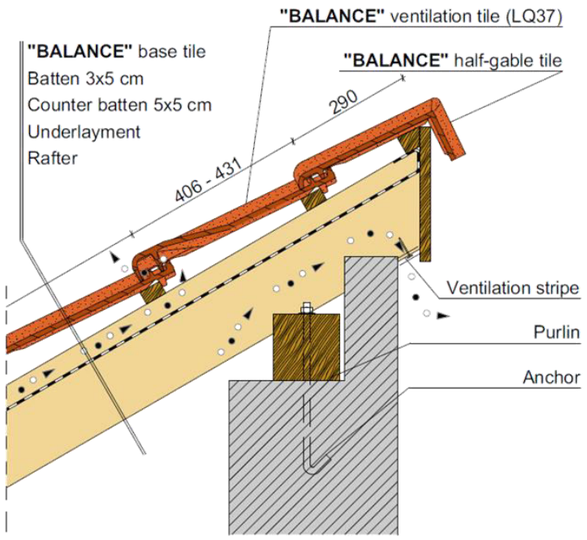
Ridge detail, with ventilation tile



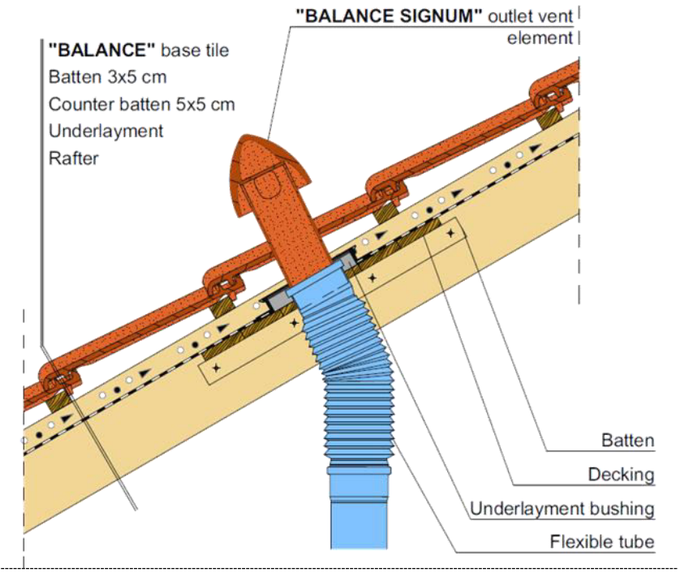
Ridge detail, with ridge connection ventilation tile



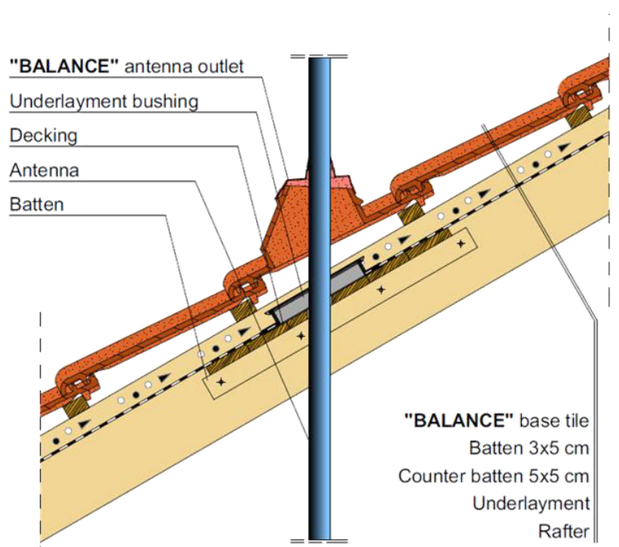
Wall connection detail



Shed ridge detail, with shad roof tile

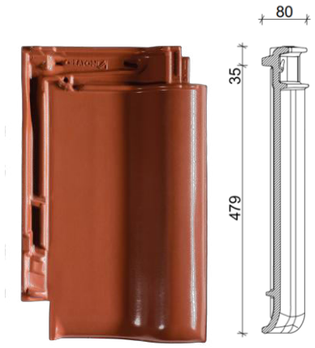


Clay ventilation outlet tile



Clay antenna outlet tile

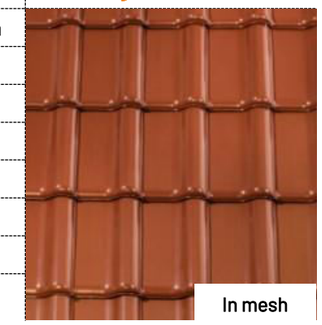
TITANIA®



Product datas

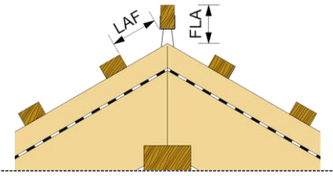
Size	width:	324 mm
	length:	514 mm
	height:	80 mm
	thickness:	11 mm
Weight:		5,2 kg
Packaging	bundle:	4 pcs
	pallet:	192 pcs
Standrad roof pitch:		22°

Covering method



Technical specification of the roof cover

	minimum	average	maximum
Batten distance	380 mm	400 mm	420 mm
Covering width	260 mm	262 mm	263 mm
Consumption	10,1 pcs/m²	9,5 pcs/m²	9,1pcs/m²
Covering type		single cover	
Covering weight		44,70 kg/m²	



LAF: distance of the upper batten

FLA: height of the ridge batten

PT ridge tile and 30x50 batten

Roof pitch	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°
LAF [mm]	90	90	90	90	90	85	80	80	80	75	75
FLA [mm]	110	110	100	80	70	70	65	55	45	35	30

PT ridge tile and 40x60 batten

LAF [mm]	90	90	90	85	85	80	75	70	65	60	60
FLA [mm]	120	120	110	90	80	80	75	65	55	45	40

PT ridge tile and 50x50 batten

LAF [mm]	85	85	85	80	80	70	65	60	55	50	45
FLA [mm]	130	130	120	100	90	95	90	80	75	65	70

Underlayment requirement

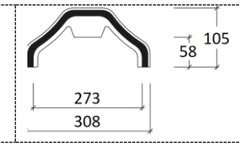
Unsupported underlayment	"CORE"	≥ 16°
Windproof underlayment	"BASIC"	≥ 14°
Watertight underlayment	"PRO"	≥ 12°
Waterproof underlayment	"ULTRA"	≥ 10°

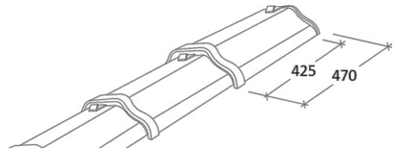
Required batten dimensions

Rafter distance	Batten dimension
≤ 800 mm	30 x 50 mm
810 – 900 mm	30 x 50 mm
910 – 1000 mm	40 x 60 mm

"PT" ridge tile 2,5 pcs/m







Rounded hip starter	Closing plate	Funct.c.p.	3 axis hip cap
			

Hip starter	Shell shapedhip starter	4 axis hip cap
		

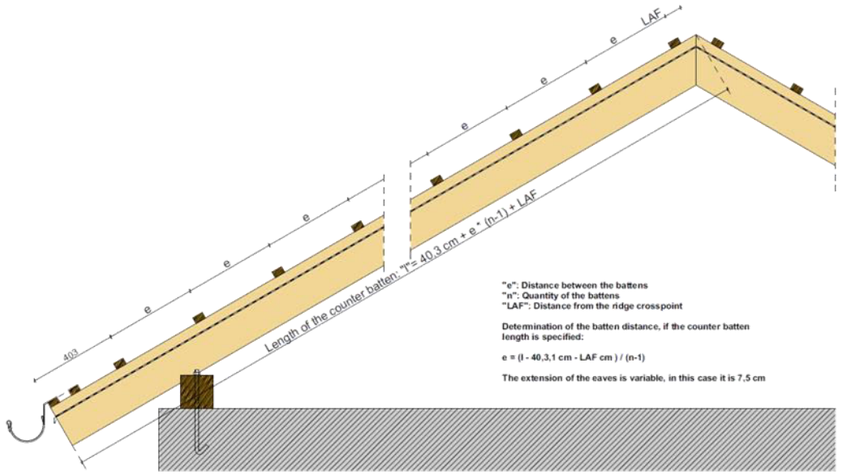
Clay accessories	Size	Quantity
Verge tile - left	366x514	2,5 pcs/m
Verge tile - right	324x514	2,5 pcs/m
Double wave tile	366x514	2,5 pcs/m
Ventilation tile LQ 32	324x514	as required
Ridge connection ventilation tile	324x514	3,8 pcs/m
Ridge conn. vent. verge tl. left	366x514	as needed
Ridge conn. vent. verge tl. right	324x514	as needed
Double wave ridge connection tile	366x514	as needed

Clay accessories	Size	Quantity
Shed roof tile	324x400	3,8 pcs/m
Shed roof verge tile – left	366x400	as needed
Shed roof verge tile – right	324x400	as needed
Mansard tile	-	3,8 pcs/m
Mansard verge tile – left/right	-	as needed

Clay outlets	Package content	Outlet type
Ø110 outlet vent tile with "A" type unscrewable cap	outlet tile, underlay connection bush	waste pipe ventilation room ventilation kitchen ventilation
Ø125 outlet vent tile with "A" type unscrewable cap	outlet tile, underlay connection bush	waste pipe ventilation room ventilation kitchen ventilation
Antenna outlet tile Ø60 mm	outlet tile, underlay connection bush,	antenna and telecommunication tubes
Solar outlet tile Ø70 mm	outlet tile, underlay connection bush,	solar and photovoltaic cables
Flue gas outlet tile Ø 110 mm or Ø 125 mm	outlet tile, underlay connection bush,	flue pipe of the condensation boilers

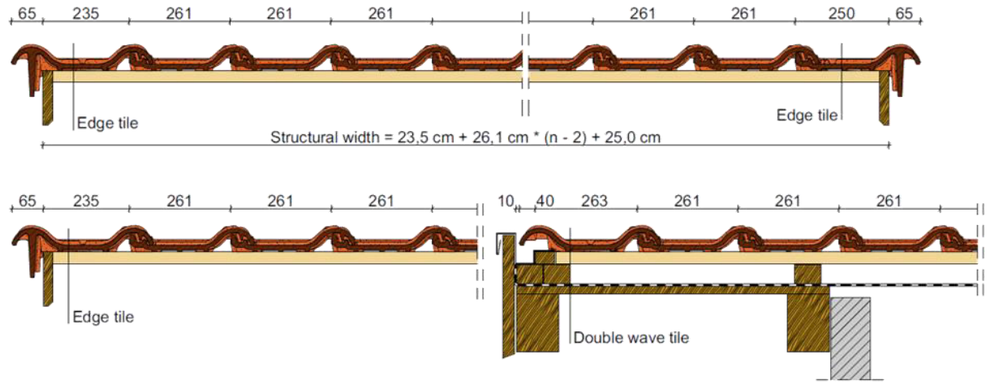
Fixing products

Name	Material	Application field
Mount-on stromclip for 30x50 mm battens	zinc-aluminium	Fixing against the wind in the edge zones and some cases in the genereal roof surface .
Mount-on stromclip for 40x50 mm battens	zinc-aluminium	
Mount-on stromclip for 40x60 mm battens	zinc-aluminium	
Nail-in stormclip	zinc-aluminium	
Fixing screw with EPDM sealing ring, 50 mm length	stainless steel	Fixing against loosed tiles along the edges and some cases in the average roof surfaces.
Clip with wire, 7-22 mm	stainless steel	Fixing cutted tiles along the hips and valleys
Universal stormclip	zinc-aluminium	Fixing shed roof tiles and tiles along the eaves



Roof batten alignement for "TITANIA" clay roof tile

Specification:	7,5 cm eave overhang and 30° roof pitch "PT" ridge tile and 30x50 mm roof battens, LAF = 90 mm		
Number of battens (n)	**min. batten dist.(e)**	**avg. batten dist.(e)**	**max. batten dist.(e)**
10	380 mm	400 mm	420 mm
	3 913	4 093	4 273
11	4 293	4 493	4 693
12	4 673	4 893	5 113
13	5 053	5 293	5 533
14	5 433	5 693	5 953
15	5 813	6 093	6 373
16	6 193	6 493	6 793
17	6 573	6 893	7 213
18	6 953	7 293	7 633
19	7 333	7 693	8 053
20	7 713	8 093	8 473
21	8 093	8 493	8 893
22	8 473	8 893	9 313
23	8 853	9 293	9 733
24	9 233	9 693	10 153
25	9 613	10 093	10 573
26	9 993	10 493	10 993
27	10 373	10 893	11 413
28	10 753	11 293	11 833
29	11 133	11 693	12 253
30	11 513	12 093	12 673
31	11 893	12 493	13 093
32	12 273	12 893	13 513
33	12 653	13 293	13 933
34	13 033	13 693	14 353
35	13 413	14 093	14 773
36	13 793	14 493	15 193
37	14 173	14 893	15 613
38	14 553	15 293	16 033
39	14 933	15 693	16 453
40	15 313	16 093	16 873



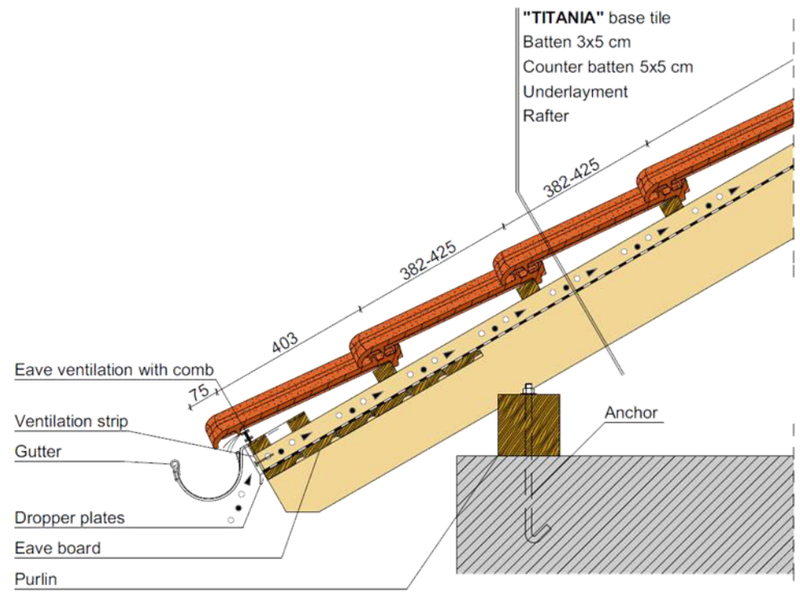
Structural width between the verge boards

	0	**1/2**	**1**	**1 1/2**	**2**	**2 1/2**	**3**	**3 1/2**	**4**	**4 1/2**
0	-	-	262	-	485	-	747	-	1 009	-
10	2 581	-	2 843	-	3 105	-	3 367	-	3 629	-
20	5 201	-	5 463	-	5 725	-	5 987	-	6 249	-
30	7 821	-	8 083	-	8 345	-	8 607	-	8 869	-
40	10 441	-	10 703	-	10 965	-	11 227	-	11 489	-
50	13 061	-	13 323	-	13 585	-	13 847	-	14 109	-
60	15 681	-	15 943	-	16 205	-	16 467	-	16 729	-
70	18 301	-	18 563	-	18 825	-	19 087	-	19 349	-
80	20 921	-	21 183	-	21 445	-	21 707	-	21 969	-
90	23 541	-	23 803	-	24 065	-	24 327	-	24 589	-
100	26 161	-	26 423	-	26 685	-	26 947	-	27 209	-

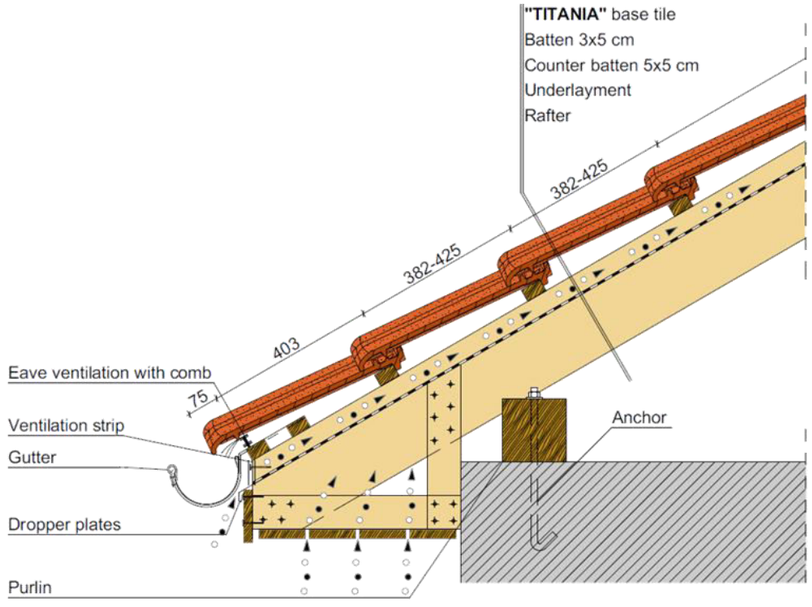
Structural width between the verge boards

	5	**5 1/2**	**6**	**6 1/2**	**7**	**7 1/2**	**8**	**8 1/2**	**9**	**9 1/2**
0	1 271	-	1 533	-	1 795	-	2 057	-	2 319	-
10	3 891	-	4 153	-	4 415	-	4 677	-	4 939	-
20	6 511	-	6 773	-	7 035	-	7 297	-	7 559	-
30	9 131	-	9 393	-	9 655	-	9 917	-	10 179	-
40	11 751	-	12 013	-	12 275	-	12 537	-	12 799	-
50	14 371	-	14 633	-	14 895	-	15 157	-	15 419	-
60	16 991	-	17 253	-	17 515	-	17 777	-	18 039	-
70	19 611	-	19 873	-	20 135	-	20 397	-	20 659	-
80	22 231	-	22 493	-	22 755	-	23 017	-	23 279	-
90	24 851	-	25 113	-	25 375	-	25 637	-	25 899	-
100	27 471	-	27 733	-	27 995	-	28 257	-	28 519	-

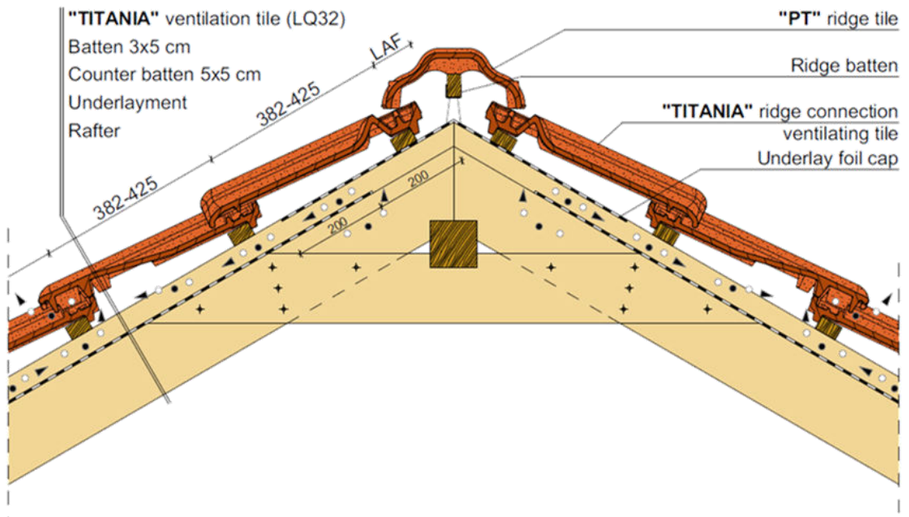
The structural widths below are calculated with 1-1 cm gap between the side plate of the verge tiles and the verge board!



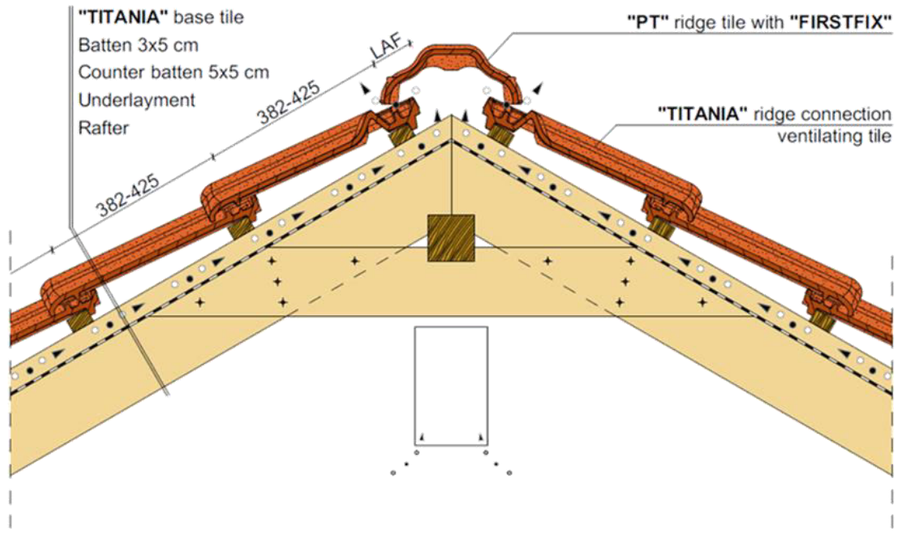
Eave detail



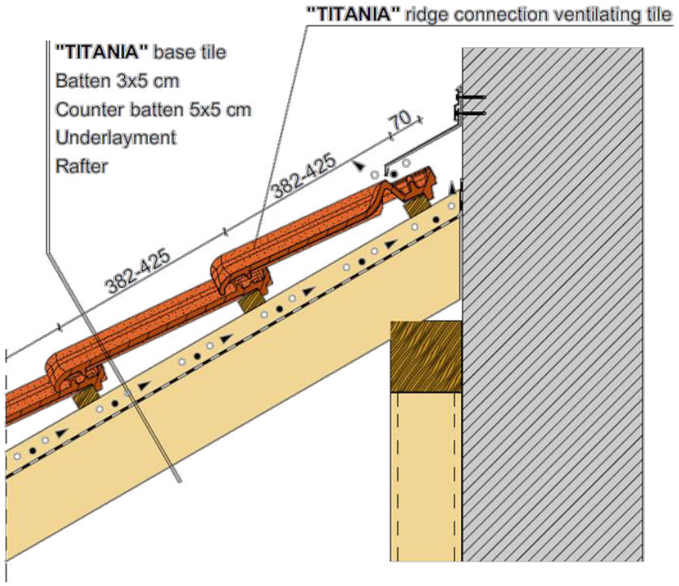
Closed eave detail



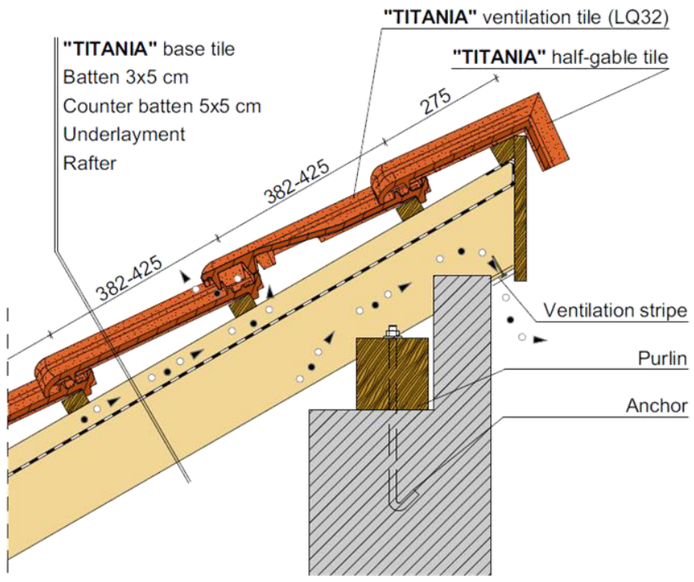
Ridge detail, with ventilation tile



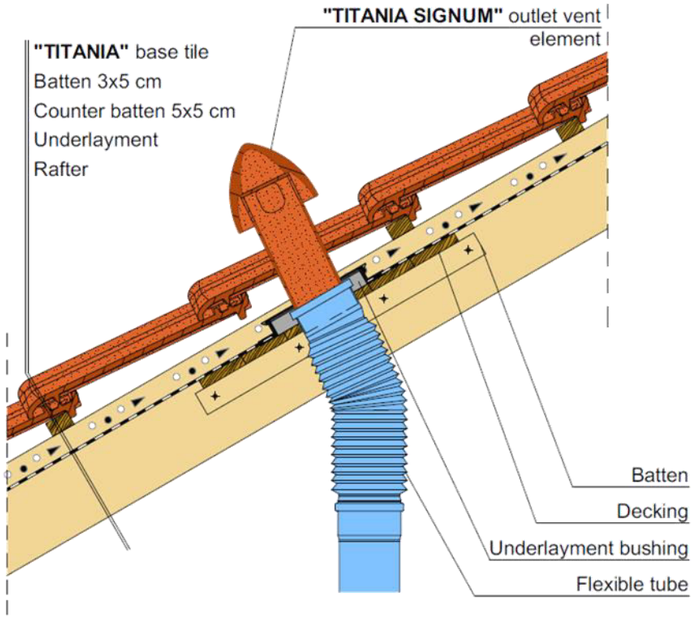
Ridge detail, with ridge connection ventilation tile



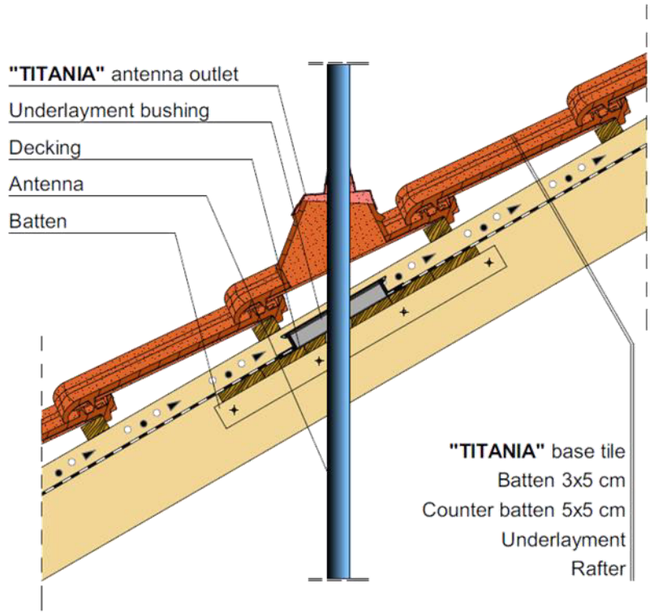
Wall connection detail



Shed ridge detail, with shad roof tile

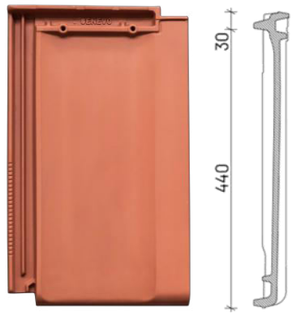


Clay ventilation outlet tile



Clay antenna outlet tile

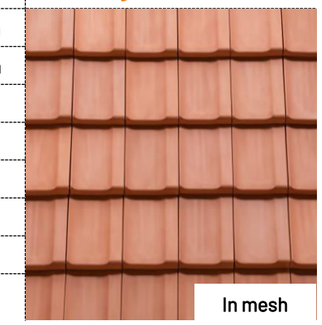
GENEVO®



Product datas

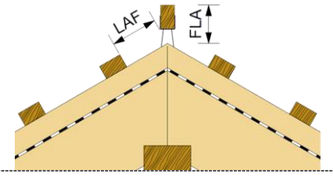
Size	width:	285 mm
	length:	470 mm
	height:	40 mm
	thickness:	9 mm
Weight:		3,98 kg
Packaging	bundle:	4 pcs
	pallet:	256 pcs
Standrad roof pitch:		25°

Covering method



Technical specification of the roof cover

	minimum	average	maximum
Batten distance[(1)]	315 mm	362 mm	410 mm
Covering width	246 mm	247 mm	249 mm
Consumption	12,9 pcs/m²	11,2 pcs/m²	9,8 pcs/m²
Covering type		single cover	
Covering weight		44,6 kg/m²	



LAF: distance of the upper batten

FLA: height of the ridge batten

LB ridge tile and 30x50 batten

Roof pitch	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°
LAF [mm]	70	65	60	55	55	50	50	50	45	30	✘
FLA [mm]	125	115	105	95	85	80	65	55	50	50	✘

LB ridge tile and 40x60 batten

LAF [mm]	70	65	55	50	50	45	40	40	35	15	10
FLA [mm]	135	125	115	110	100	90	80	70	65	70	70

LR ridge tile and 30x50 batten

LAF [mm]	70	65	60	55	55	50	50	45	40	✘	✘
FLA [mm]	120	110	105	90	80	75	65	55	50	✘	✘

LR ridge tile and 40x60 batten

LAF [mm]	70	65	55	50	50	45	40	35	30	10	✘
FLA [mm]	130	120	115	105	95	85	75	70	65	70	✘

Underlayment requirement

Unsupported underlayment	"CORE"	≥ 18°
Windproof underlayment	"BASIC"	≥ 16°
Watertight underlayment	"PRO"	≥ 14°
Waterproof underlayment	"ULTRA"	≥ 10°

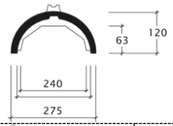
Required batten dimensions

Rafter distance	Batten dimension
≤ 800 mm	30 x 50 mm
810 – 900 mm	30 x 50 mm
910 – 1000 mm	40 x 60 mm

(1) The corner of the verge tile must be cut between 315-380 mm batten distances!

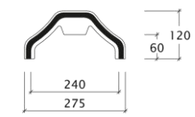
"LB" ridge tile 2,5 pcs/m

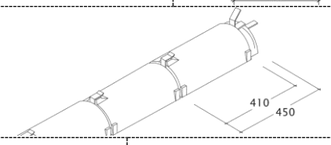




"LR" ridge tile 2,5 pcs/m

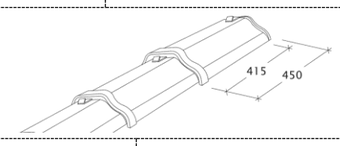


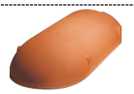




Funct.c.p.





"LB" hip starter	"LB" hip starter, shell shape	3 axis hip cap	"LR" hip starter	"LR" hip starter, shell shape
				
„LB" hip starter, rounded	„LB" closing plate	4 axis hip cap	"LR" closing plate	
				

Clay accessories

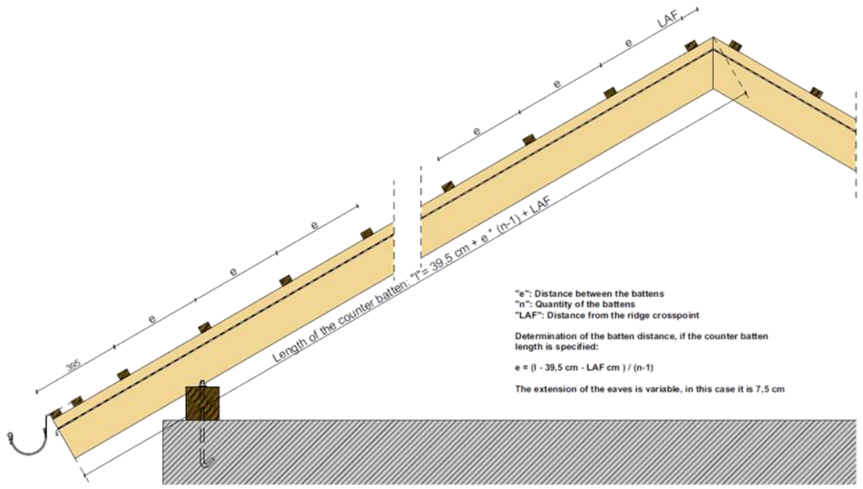
	Size	Quantity
Verge tile - left	285x470	2,8 pcs/m
Verge tile - right	285x470	2,8 pcs/m
Double wave tile	285x470	2,8 pcs/m
Ventilation tile LQ 34	285x470	as required
Ridge connection ventilation tile	285x470	4,0 pcs/m
Ridge conn. vent. verge tl. left	285x470	as needed
Ridge conn. vent. verge tl. right	285x470	as needed

Clay outlets

Clay outlets	Package content	Outlet type
Ø110 outlet vent tile with "A" type unscrewable cap	outlet tile, underlay connection bush	waste pipe ventilation room ventilation kitchen ventilation
Ø125 outlet vent tile with "A" type unscrewable cap	outlet tile, underlay connection bush	waste pipe ventilation room ventilation kitchen ventilation
Ø150 outlet vent tile	outlet tile, underlay connection bush	room ventilation kitchen ventilation
Ø200 outlet vent tile	outlet tile, underlay connection bush,	room ventilation kitchen ventilation
Antenna outlet tile Ø60 mm	outlet tile, underlay connection bush,	antenna and telecommunication tubes
Solar outlet tile Ø70 mm	outlet tile, underlay connection bush,	solar and photovoltaic cables
Flue gas outlet tile Ø 110 mm or Ø 125 mm	outlet tile, underlay connection bush,	flue pipe of the condensation boilers

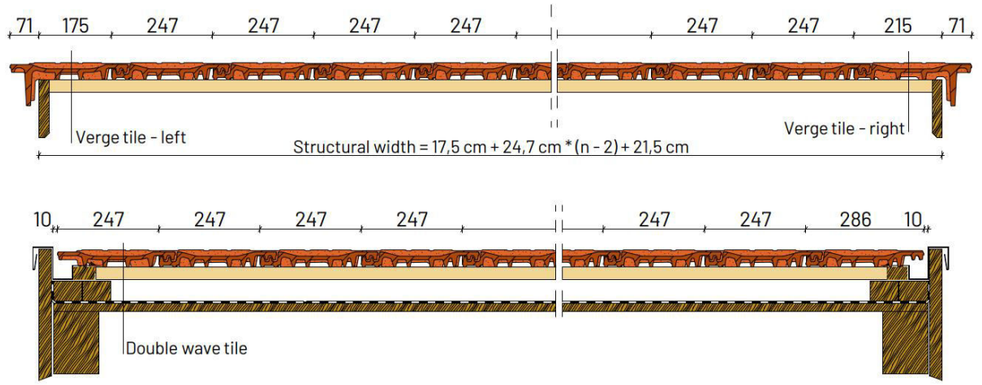
Fixing products

Name	Material	Application field
Mount-on stromclip for 30x50 mm battens	zinc-aluminium	Fixing against the wind in the edge zones and some cases in the genereal roof surface .
Mount-on stromclip for 40x50 mm battens	zinc-aluminium	
Nail-in stormclip	zinc-aluminium	
Fixing screw with EPDM sealing ring, 70 mm length	stainless steel	Fixing against loosed tiles along the edges and some cases in the average roof surfaces.
Clip with wire, 7-22 mm	stainless steel	Fixing cutted tiles along the hips and valleys
Universal stormclip	zinc-aluminium	Fixing shed roof tiles and tiles along the eaves



Roof batten alignement for "GENEVO" clay roof tile

Specification:	7,5 cm eave overhang and 30° roof pitch "LB" ridge tile and 30x50 mm roof battens, LAF = 55 mm		
Number of battens (n)	**min. batten dist.(e)** 315 mm	**avg. batten dist.(e)** 362 mm	**max. batten dist.(e)** 410 mm
10	3 243	3 666	4 098
11	3 558	4 028	4 508
12	3 873	4 390	4 918
13	4 188	4 752	5 328
14	4 503	5 114	5 738
15	4 818	5 476	6 148
16	5 133	5 838	6 558
17	5 448	6 200	6 968
18	5 763	6 562	7 378
19	6 078	6 924	7 788
20	6 393	7 286	8 198
21	6 708	7 648	8 608
22	7 023	8 010	9 018
23	7 338	8 372	9 428
24	7 653	8 734	9 838
25	7 968	9 096	10 248
26	8 283	9 458	10 658
27	8 598	9 820	11 068
28	8 913	10 182	11 478
29	9 228	10 544	11 888
30	9 543	10 906	12 298
31	9 858	11 268	12 708
32	10 173	11 630	13 118
33	10 488	11 992	13 528
34	10 803	12 354	13 938
35	11 118	12 716	14 348
36	11 433	13 078	14 758
37	11 748	13 440	15 168
38	12 063	13 802	15 578
39	12 378	14 164	15 988
40	12 693	14 526	16 398



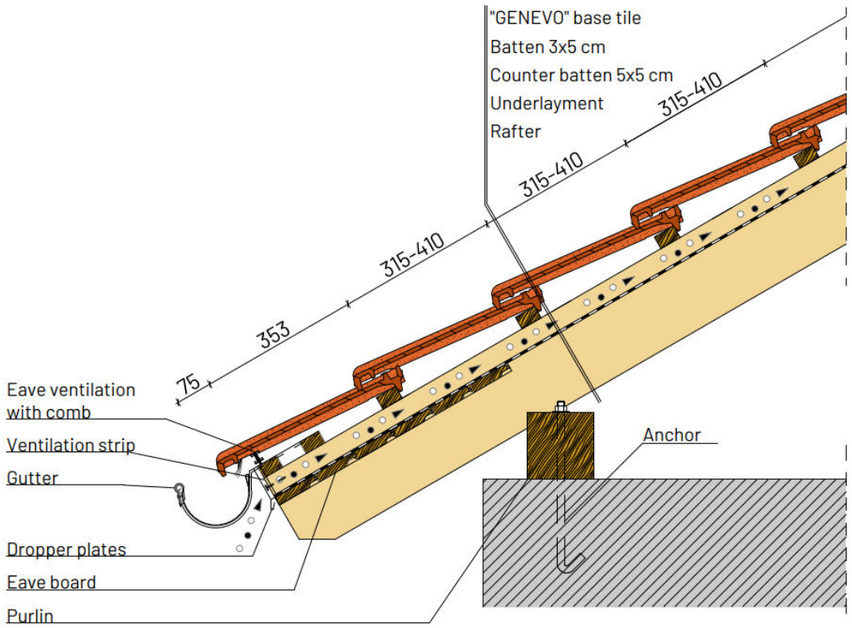
Structural width between the verge boards

	0	**1/2**	**1**	**1 1/2**	**2**	**2 1/2**	**3**	**3 1/2**	**4**	**4 1/2**
0	-	0	247	-	390	-	637	-	884	-
10	2 366	-	2 613	-	2 860	-	3 107	-	3 354	-
20	4 836	-	5 083	-	5 330	-	5 577	-	5 824	-
30	7 306	-	7 553	-	7 800	-	8 047	-	8 294	-
40	9 776	-	10 023	-	10 270	-	10 517	-	10 764	-
50	12 246	-	12 493	-	12 740	-	12 987	-	13 234	-
60	14 716	-	14 963	-	15 210	-	15 457	-	15 704	-
70	17 186	-	17 433	-	17 680	-	17 927	-	18 174	-
80	19 656	-	19 903	-	20 150	-	20 397	-	20 644	-
90	22 126	-	22 373	-	22 620	-	22 867	-	23 114	-
100	24 596	-	24 843	-	25 090	-	25 337	-	25 584	-

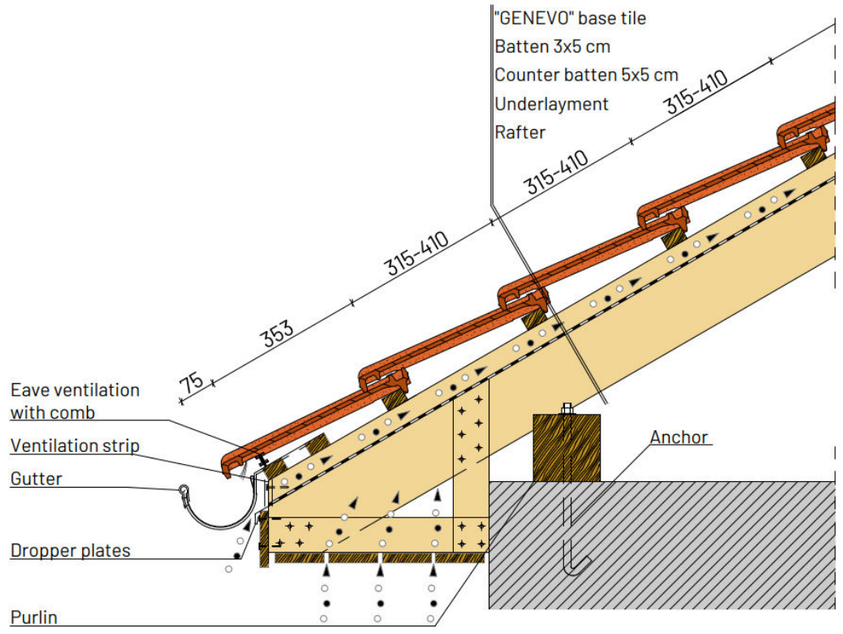
Structural width between the verge boards

	5	**5 1/2**	**6**	**6 1/2**	**7**	**7 1/2**	**8**	**8 1/2**	**9**	**9 1/2**
0	1 131	-	1 378	-	1 625	-	1 872	-	2 119	-
10	3 601	-	3 848	-	4 095	-	4 342	-	4 589	-
20	6 071	-	6 318	-	6 565	-	6 812	-	7 059	-
30	8 541	-	8 788	-	9 035	-	9 282	-	9 529	-
40	11 011	-	11 258	-	11 505	-	11 752	-	11 999	-
50	13 481	-	13 728	-	13 975	-	14 222	-	14 469	-
60	15 951	-	16 198	-	16 445	-	16 692	-	16 939	-
70	18 421	-	18 668	-	18 915	-	19 162	-	19 409	-
80	20 891	-	21 138	-	21 385	-	21 632	-	21 879	-
90	23 361	-	23 608	-	23 855	-	24 102	-	24 349	-
100	25 831	-	26 078	-	26 325	-	26 572	-	26 819	-

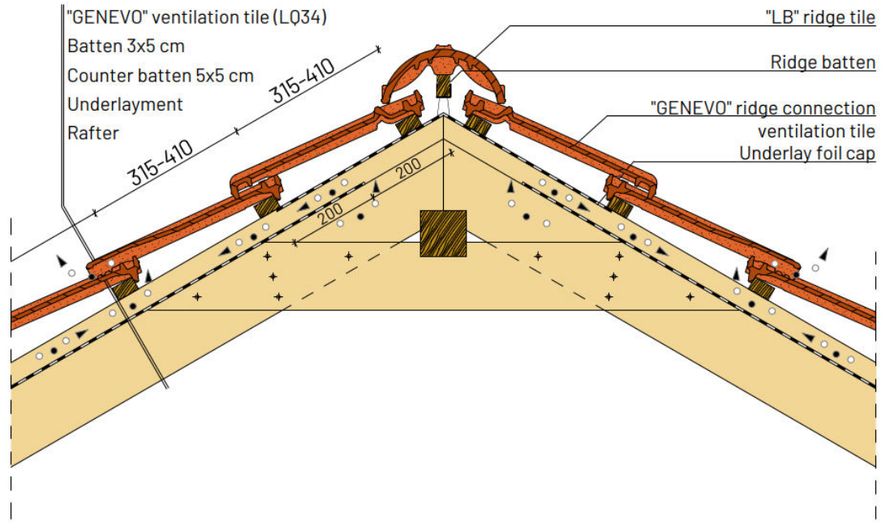
The structural widths below are calculated with 1-1 cm gap between the side plate of the verge tiles and the verge board!



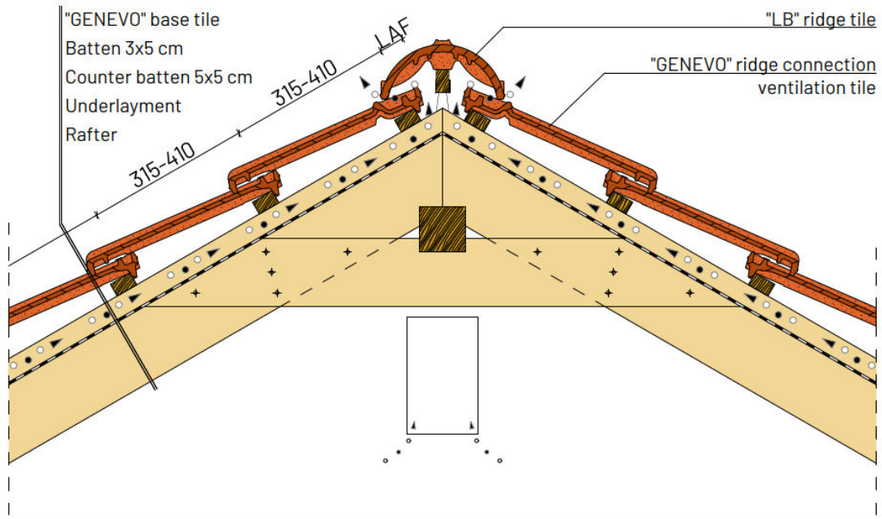
Eave detail



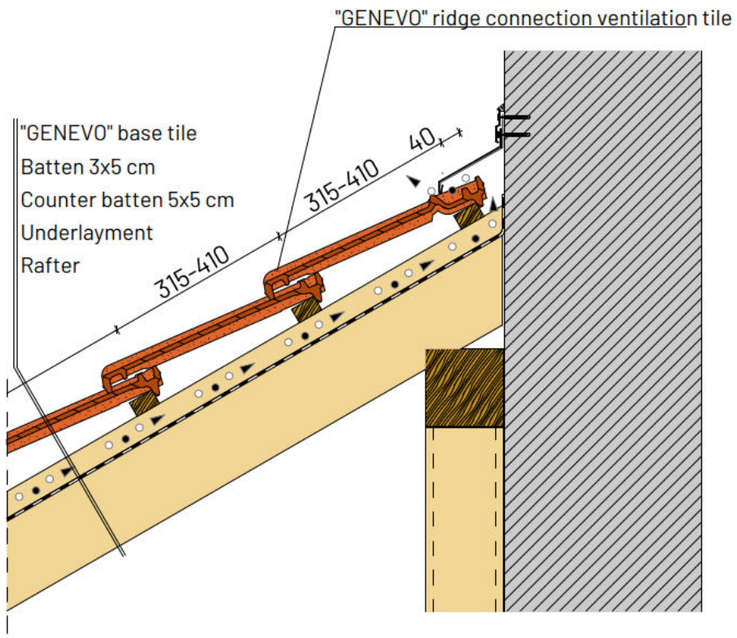
Closed eave detail



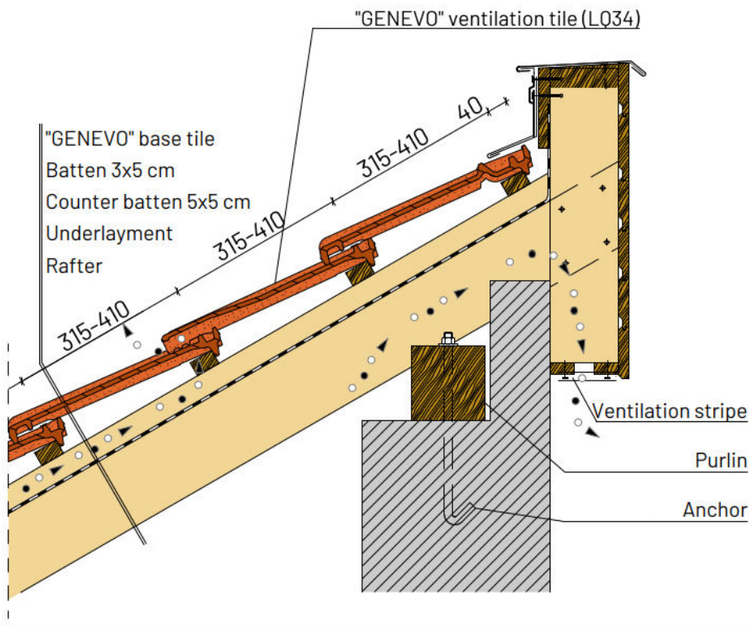
Ridge detail, with ventilation tile



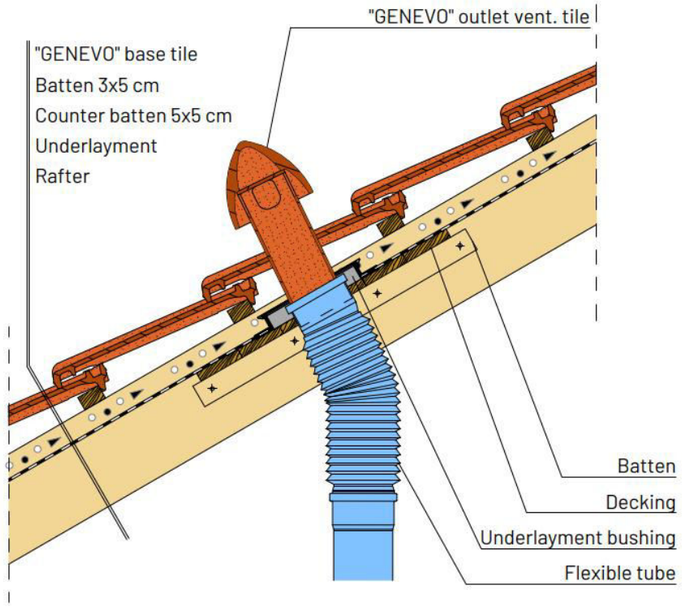
Ridge detail, with ridge connection ventilation tile



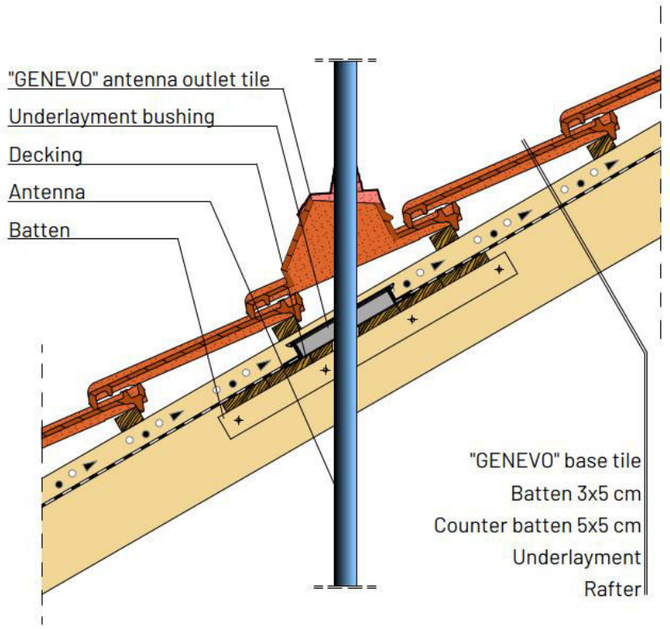
Wall connection detail



Shed ridge detail



Clay ventilation outlet tile



Clay antenna outlet tile

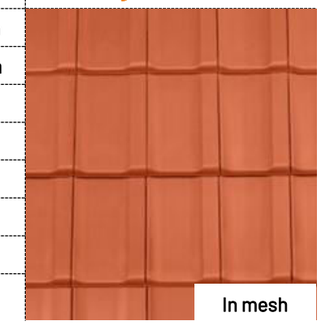
NOMINA®



Product datas

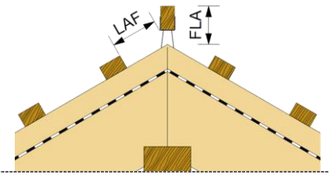
Size	width:	323 mm
	length:	500 mm
	height:	42 mm
	thickness:	9 mm
Weight:		5,9 kg
Packaging	bundle:	4 pcs
	pallet:	192 pcs
Standrad roof pitch:		25°

Covering method



Technical specification of the roof cover

	minimum	average	maximum
Batten distance*	370 mm	402 mm	435 mm
Covering width	278 mm	280 mm	281 mm
Consumption	9,7 pcs/m²	8,9 pcs/m²	8,2 pcs/m²
Covering type		single cover	
Covering weight		53,1 kg/m²	



LAF: distance of the upper batten

FLA: height of the ridge batten

LB ridge tile and 30x50 batten

Roof pitch	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°
LAF [mm]	80	75	70	65	60	60	60	60	50	✖	✖
FLA [mm]	120	110	100	90	80	70	60	50	45	✖	✖

LB ridge tile and 40x60 batten

LAF [mm]	75	70	65	60	55	50	50	45	35	✖	✖
FLA [mm]	125	120	110	100	95	85	75	65	60	✖	✖

LR ridge tile and 30x50 batten

LAF [mm]	80	75	70	65	60	60	60	60	50	✖	✖
FLA [mm]	120	110	100	90	80	70	60	50	45	✖	✖

LR ridge tile and 40x60 batten

LAF [mm]	75	70	65	60	55	50	50	45	35	✖	✖
FLA [mm]	125	120	110	100	95	85	75	65	60	✖	✖

Underlayment requirement

Unsupported underlayment	"CORE"	≥ 18°
Windproof underlayment	"BASIC"	≥ 16°
Watertight underlayment	"PRO"	≥ 14°
Waterproof underlayment	"ULTRA"	≥ 10°

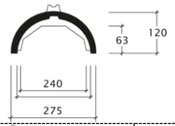
Required batten dimensions

Rafter distance	Batten dimension
≤ 800 mm	30 x 50 mm
810 – 900 mm	30 x 50 mm
910 – 1000 mm	40 60 mm

**The corner of the verge tile must be cut between 370 – 405 mm batten distances!*

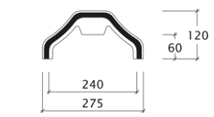
"LB" ridge tile 2,5 pcs/m

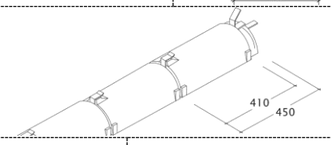




"LR" ridge tile 2,5 pcs/m

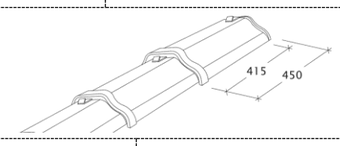


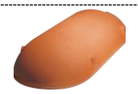




Funct.c.p.





"LB" hip starter	"LB" hip starter, shell shape	3 axis hip cap	"LR" hip starter	"LR" hip starter, shell shape
				
„LB" hip starter, rounded	„LB" closing plate	4 axis hip cap	"LR" closing plate	
				

Clay accessories

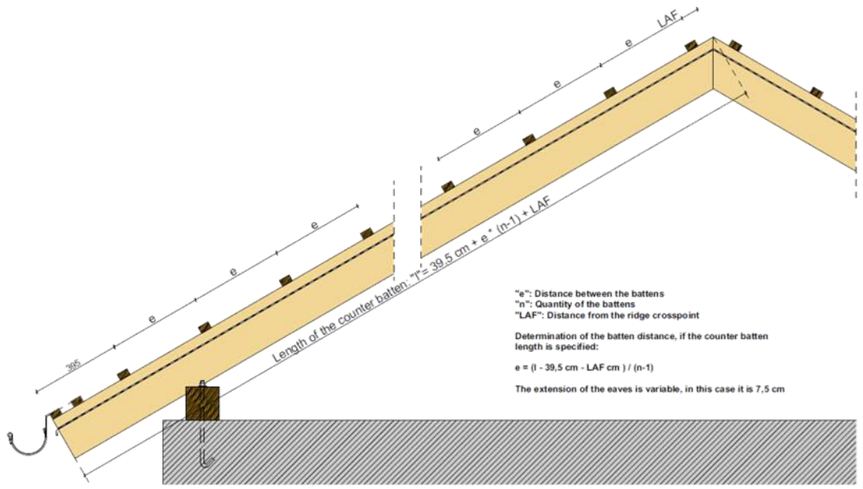
Clay accessories	Size	Quantity
Verge tile - left	323x500	2,5 pcs/m
Verge tile - right	323x500	2,5 pcs/m
Double wave tile	323x500	2,5 pcs/m
Ventilation tile LQ 37,5	323x500	as required
Ridge connection ventilation tile	323x500	3,6 pcs/m
Ridge conn. vent. verge tl. left	323x500	as needed
Ridge conn. vent. verge tl. right	323x500	as needed

Clay outlets

Clay outlets	Package content	Outlet type
Ø110 outlet vent tile with "A" type unscrewable cap	outlet tile, underlay connection bush	waste pipe ventilation room ventilation kitchen ventilation
Ø125 outlet vent tile with "A" type unscrewable cap	outlet tile, underlay connection bush	waste pipe ventilation room ventilation kitchen ventilation
Ø150 outlet vent tile	outlet tile, underlay connection bush	room ventilation kitchen ventilation
Ø200 outlet vent tile	outlet tile, underlay connection bush,	room ventilation kitchen ventilation
Antenna outlet tile Ø60 mm	outlet tile, underlay connection bush,	antenna and telecommunication tubes
Solar outlet tile Ø70 mm	outlet tile, underlay connection bush,	solar and photovoltaic cables
Flue gas outlet tile Ø 110 mm or Ø 125 mm	outlet tile, underlay connection bush,	flue pipe of the condensation boilers

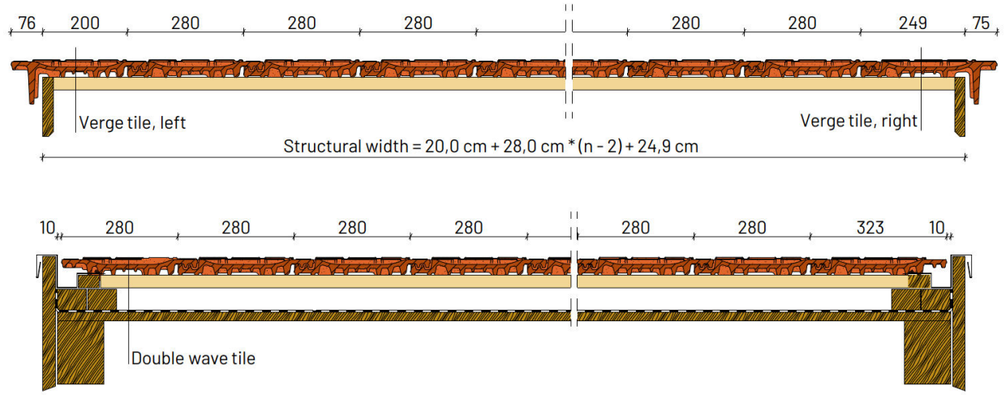
Fixing products

Name	Material	Application field
Mount-on stromclip for 30x50 mm battens	zinc-aluminium	Fixing against the wind in the edge zones and some cases in the genereal roof surface .
Mount-on stromclip for 40x50 mm battens	zinc-aluminium	
Mount-on stromclip for 40x60 mm battens	zinc-aluminium	
Nail-in stormclip	zinc-aluminium	
Fixing screw with EPDM sealing ring, 70 mm length	stainless steel	Fixing against loosed tiles along the edges and some cases in the average roof surfaces.
Clip with wire, 7-22 mm	stainless steel	Fixing cutted tiles along the hips and valleys
Universal stormclip	zinc-aluminium	Fixing shed roof tiles and tiles along the eaves



Roof batten alignement for "NOMINA" clay roof tile

Specification:	7,5 cm eave overhang and 30° roof pitch "LB" ridge tile and 30x50 mm roof battens, LAF = 60 mm		
Number of battens (n)	**min. batten dist.(e)**	**avg. batten dist.(e)**	**max. batten dist.(e)**
	370 mm	402 mm	435 mm
10	3 785	4 073	4 370
11	4 155	4 475	4 805
12	4 525	4 877	5 240
13	4 895	5 279	5 675
14	5 265	5 681	6 110
15	5 635	6 083	6 545
16	6 005	6 485	6 980
17	6 375	6 887	7 415
18	6 745	7 289	7 850
19	7 115	7 691	8 285
20	7 485	8 093	8 720
21	7 855	8 495	9 155
22	8 225	8 897	9 590
23	8 595	9 299	10 025
24	8 965	9 701	10 460
25	9 335	10 103	10 895
26	9 705	10 505	11 330
27	10 075	10 907	11 765
28	10 445	11 309	12 200
29	10 815	11 711	12 635
30	11 185	12 113	13 070
31	11 555	12 515	13 505
32	11 925	12 917	13 940
33	12 295	13 319	14 375
34	12 665	13 721	14 810
35	13 035	14 123	15 245
36	13 405	14 525	15 680
37	13 775	14 927	16 115
38	14 145	15 329	16 550
39	14 515	15 731	16 985
40	14 885	16 133	17 420



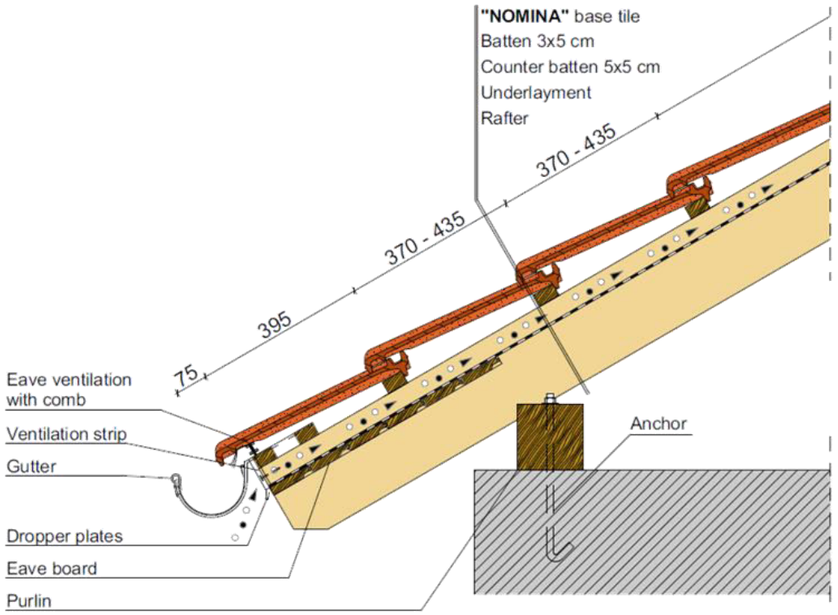
Structural width between the verge boards

	0	**1/2**	**1**	**1 1/2**	**2**	**2 1/2**	**3**	**3 1/2**	**4**	**4 1/2**
0	-	0	280	-	449	-	729	-	1 009	-
10	2 689	-	2 969	-	3 249	-	3 529	-	3 809	-
20	5 489	-	5 769	-	6 049	-	6 329	-	6 609	-
30	8 289	-	8 569	-	8 849	-	9 129	-	9 409	-
40	11 089	-	11 369	-	11 649	-	11 929	-	12 209	-
50	13 889	-	14 169	-	14 449	-	14 729	-	15 009	-
60	16 689	-	16 969	-	17 249	-	17 529	-	17 809	-
70	19 489	-	19 769	-	20 049	-	20 329	-	20 609	-
80	22 289	-	22 569	-	22 849	-	23 129	-	23 409	-
90	25 089	-	25 369	-	25 649	-	25 929	-	26 209	-
100	27 889	-	28 169	-	28 449	-	28 729	-	29 009	-

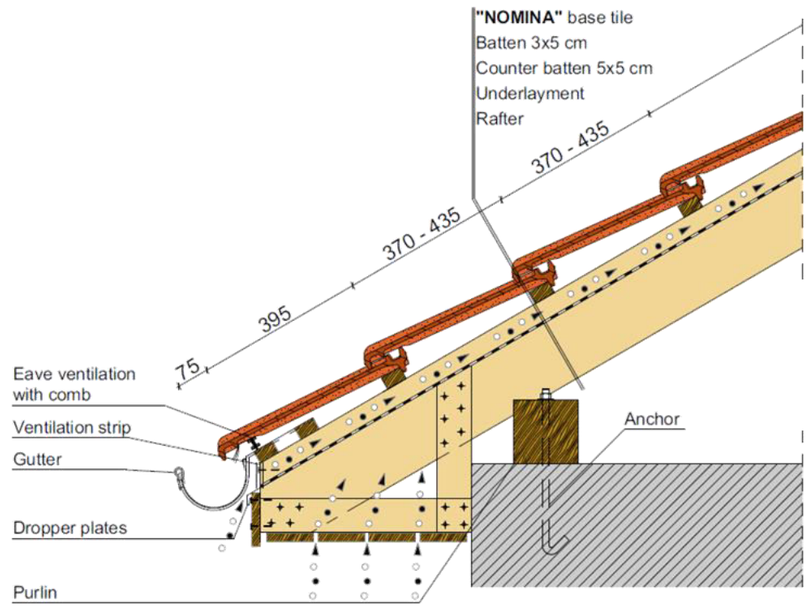
Structural width between the verge boards

	5	**5 1/2**	**6**	**6 1/2**	**7**	**7 1/2**	**8**	**8 1/2**	**9**	**9 1/2**
0	1 289	-	1 569	-	1 849	-	2 129	-	2 409	-
10	4 089	-	4 369	-	4 649	-	4 929	-	5 209	-
20	6 889	-	7 169	-	7 449	-	7 729	-	8 009	-
30	9 689	-	9 969	-	10 249	-	10 529	-	10 809	-
40	12 489	-	12 769	-	13 049	-	13 329	-	13 609	-
50	15 289	-	15 569	-	15 849	-	16 129	-	16 409	-
60	18 089	-	18 369	-	18 649	-	18 929	-	19 209	-
70	20 889	-	21 169	-	21 449	-	21 729	-	22 009	-
80	23 689	-	23 969	-	24 249	-	24 529	-	24 809	-
90	26 489	-	26 769	-	27 049	-	27 329	-	27 609	-
100	29 289	-	29 569	-	29 849	-	30 129	-	30 409	-

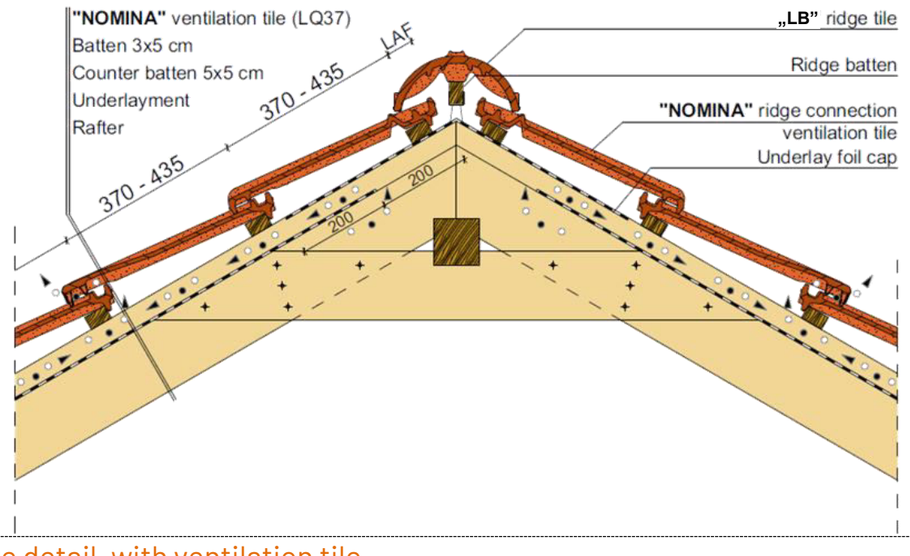
The structural widths below are calculated with 1-1 cm gap between the side plate of the verge tiles and the verge board!



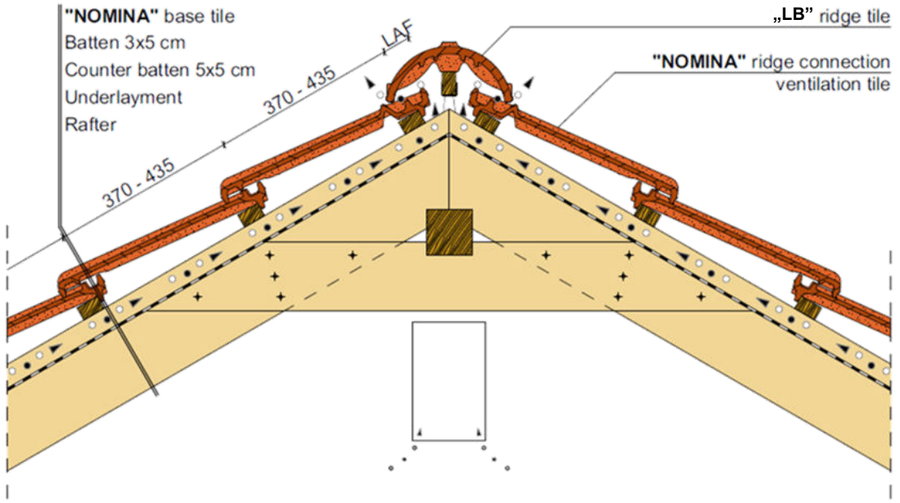
Eave detail



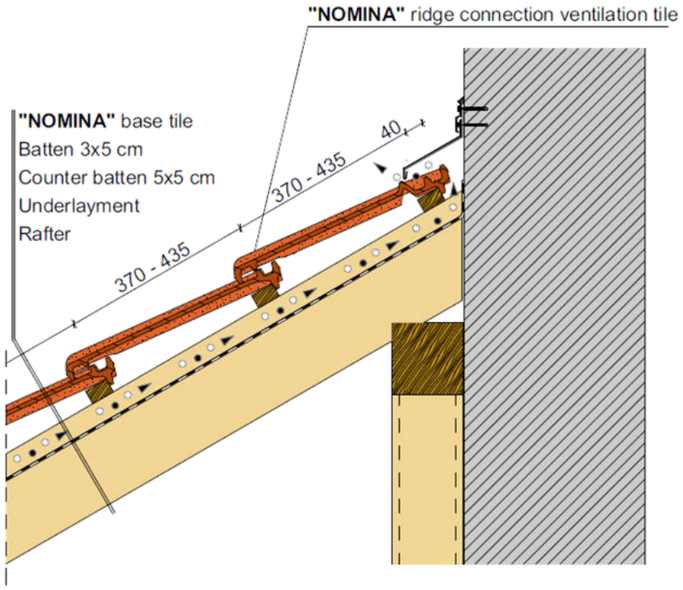
Closed eave detail



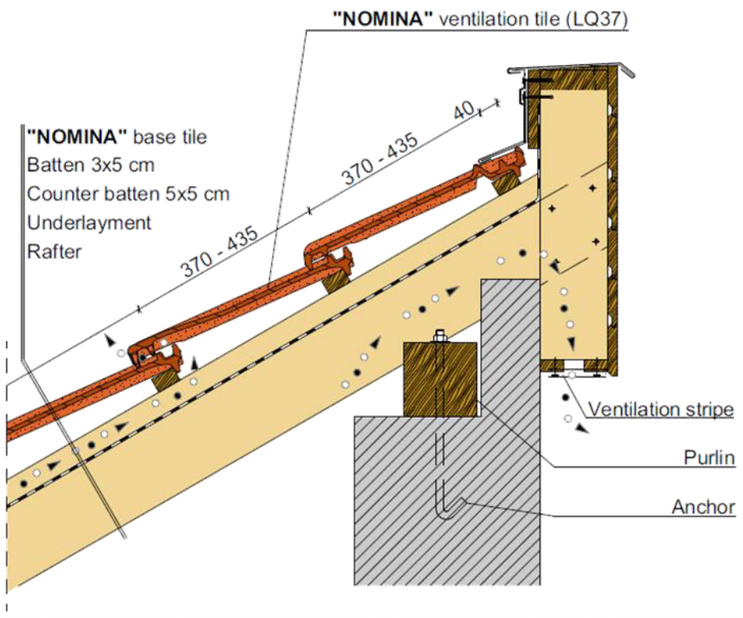
Ridge detail, with ventilation tile



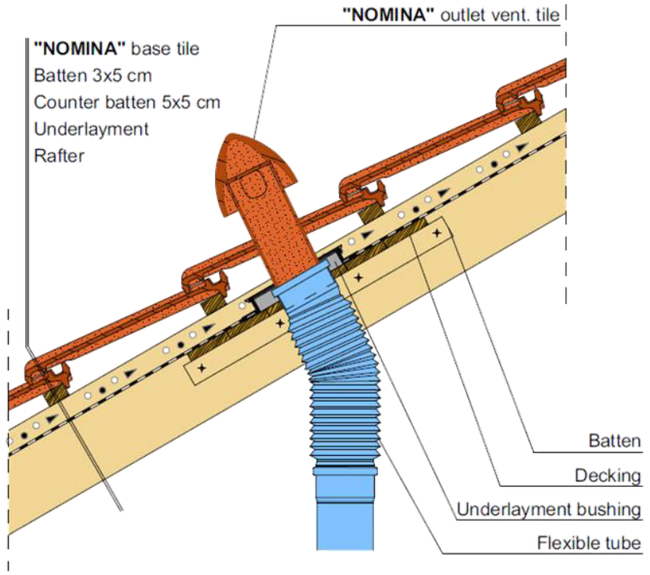
Ridge detail, with ridge connection ventilation tile



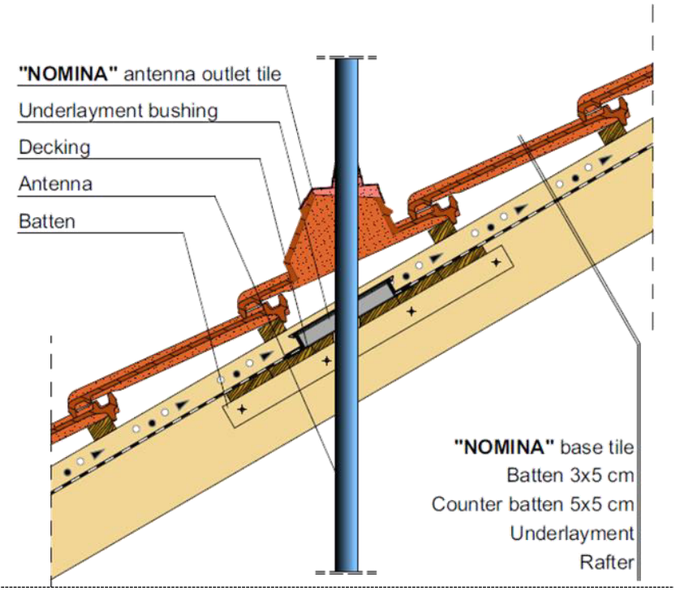
Wall connection detail



Shed ridge detail

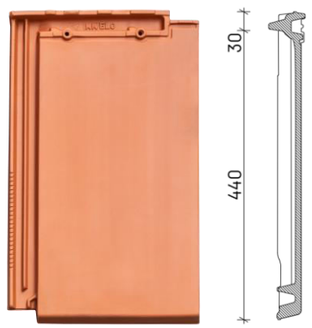


Clay ventilation outlet tile



Clay antenna outlet tile

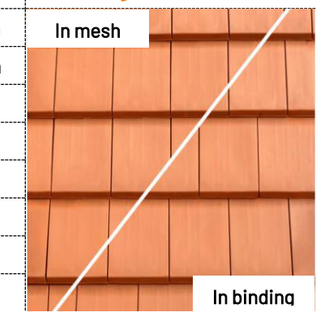
NIVELO®



Product datas

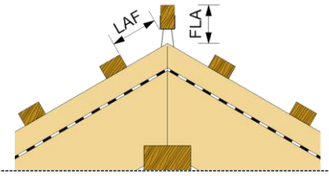
Size	width:	285 mm
	length:	470 mm
	height:	40 mm
	thickness:	9 mm
Weight:		3,98 kg
Packaging	bundle:	4 pcs
	pallet:	256 pcs
Standrad roof pitch:		25°

Covering method



Technical specification of the roof cover

	minimum	average	maximum
Batten distance*	315 mm	362 mm	410 mm
Covering width	246 mm	247 mm	249 mm
Consumption	12,9 pcs/m²	11,2 pcs/m²	9,8 pcs/m²
Covering type		single cover	
Covering weight		44,6 kg/m²	



LAF: distance of the upper batten

FLA: height of the ridge batten

LN ridge tile and 30x50 batten

Hajlásszög	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°
LAF [mm]	65	60	55	55	50	50	50	50	50	45	✘
FLA [mm]	120	110	100	90	80	70	60	50	40	40	✘

LN ridge tile and 40x60 batten

LAF [mm]	65	60	50	50	45	45	40	40	40	35	✘
FLA [mm]	130	115	110	100	90	80	70	65	50	55	✘

LR ridge tile and 30x50 batten

LAF [mm]	60	55	50	55	50	50	45	45	40	✘	✘
FLA [mm]	115	105	95	80	70	65	55	50	40	✘	✘

LR ridge tile and 40x60 batten

LAF [mm]	65	60	50	50	45	45	40	35	35	✘	✘
FLA [mm]	120	110	105	95	80	70	65	60	50	✘	✘

Underlayment requirement

Unsupported underlayment	"CORE"	≥ 18°
Windproof underlayment	"BASIC"	≥ 16°
Watertight underlayment	"PRO"	≥ 14°
Waterproof underlayment	"ULTRA"	≥ 10°

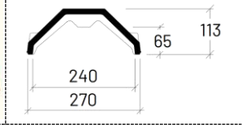
Required batten dimensions

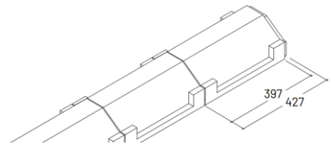
Rafter distance	Batten dimension
≤ 800 mm	30 x 50 mm
810 – 900 mm	30 x 50 mm
910 – 1000 mm	40 60 mm

**Between 315 – 380 mm batten distance, the corner of the verge tile should be cut down!*

"LN" ridge tile 2,5 pcs/m







Hip starter	Closing plate	3 way hip cap
		

Functional closing plate	3 way hip cap
	

Clay accessories

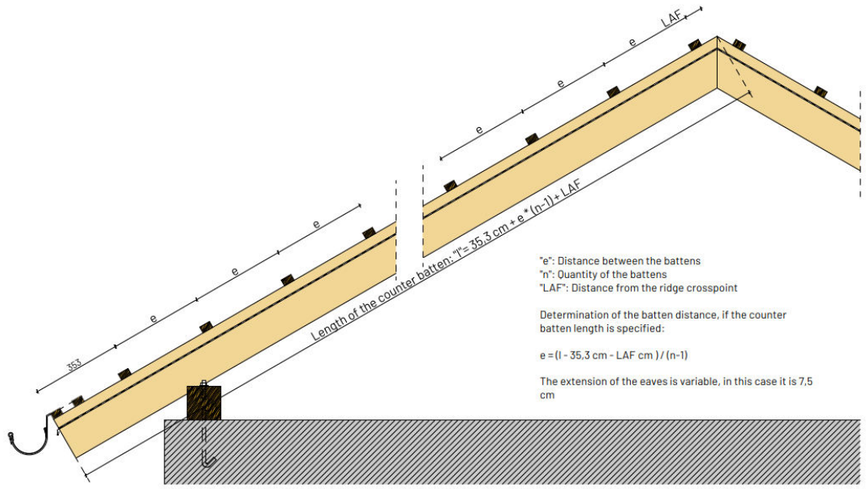
Clay accessories	Size	Quantity
Half tile	164x470	as needed
Verge tile - left	285x470	2,8 pcs/m
Verge tile - right	285x470	2,8 pcs/m
Double wave tile	285x470	2,8 pcs/m
Ventilation tile LQ 34	285x470	as required
Ridge connection ventilation tile	285x470	4,0 pcs/m
Ridge conn. vent. verge tl. left	285x470	as needed
Ridge conn. vent. verge tl. right	285x470	as needed

Clay outlets

Clay outlets	Package content	Outlet type
Ø110 outlet vent tile with "A" type unscrewable cap	outlet tile, underlay connection bush	waste pipe ventilation room ventilation kitchen ventilation
Ø125 outlet vent tile with "A" type unscrewable cap	outlet tile, underlay connection bush	waste pipe ventilation room ventilation kitchen ventilation
Ø150 outlet vent tile	outlet tile, underlay connection bush	room ventilation kitchen ventilation
Ø200 outlet vent tile	outlet tile, underlay connection bush,	room ventilation kitchen ventilation
Antenna outlet tile Ø60 mm	outlet tile, underlay connection bush,	antenna and telecommunication tubes
Solar outlet tile Ø70 mm	outlet tile, underlay connection bush,	solar and photovoltaic cables
Flue gas outlet tile Ø 110 mm or Ø 125 mm	outlet tile, underlay connection bush,	flue pipe of the condensation boilers

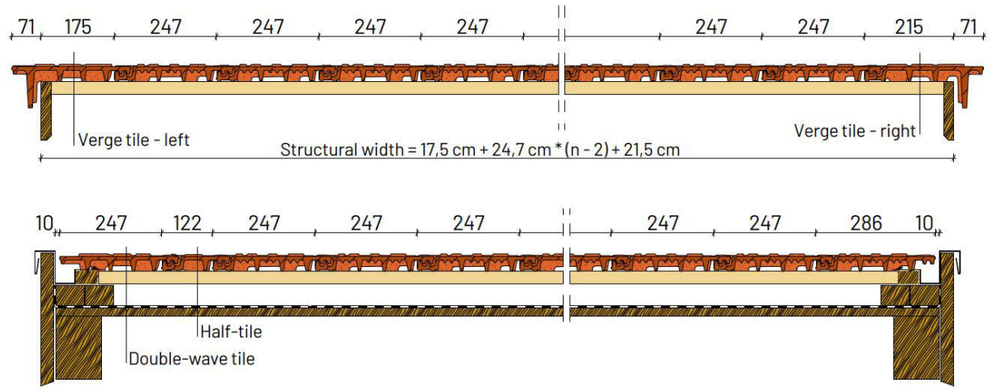
Fixing products

Name	Material	Application field
Mount-on stromclip for 30x50 mm battens	zinc-aluminium	Fixing against the wind in the edge zones and some cases in the genereal roof surface .
Mount-on stromclip for 40x50 mm battens	zinc-aluminium	
Mount-on stromclip for 40x60 mm battens	zinc-aluminium	
Nail-in stormclip	zinc-aluminium	
Fixing screw with EPDM sealing ring, 70 mm length	stainless steel	Fixing against loosed tiles along the edges and some cases in the average roof surfaces.
Clip with wire, 7-22 mm	stainless steel	Fixing cutted tiles along the hips and valleys
Universal stormclip	zinc-aluminium	Fixing shed roof tiles and tiles along the eaves



Roof batten alignement for "NIVELO" clay roof tile

Specification:	7,5 cm eave overhang and 30° roof pitch "LN" ridge tile and 30x50 mm roof battens, LAF = 55 mm		
Number of battens (n)	**min. batten dist.(e)**	**avg. batten dist.(e)**	**max. batten dist.(e)**
10	315 mm	362 mm	410 mm
11	3 243	3 666	4 098
12	3 558	4 028	4 508
13	3 873	4 390	4 918
14	4 188	4 752	5 328
15	4 503	5 114	5 738
16	4 818	5 476	6 148
17	5 133	5 838	6 558
18	5 448	6 200	6 968
19	5 763	6 562	7 378
20	6 078	6 924	7 788
21	6 393	7 286	8 198
22	6 708	7 648	8 608
23	7 023	8 010	9 018
24	7 338	8 372	9 428
25	7 653	8 734	9 838
26	7 968	9 096	10 248
27	8 283	9 458	10 658
28	8 598	9 820	11 068
29	8 913	10 182	11 478
30	9 228	10 544	11 888
31	9 543	10 906	12 298
32	9 858	11 268	12 708
33	10 173	11 630	13 118
34	10 488	11 992	13 528
35	10 803	12 354	13 938
36	11 118	12 716	14 348
37	11 433	13 078	14 758
38	11 748	13 440	15 168
39	12 063	13 802	15 578
40	12 378	14 164	15 988
	12 693	14 526	16 398



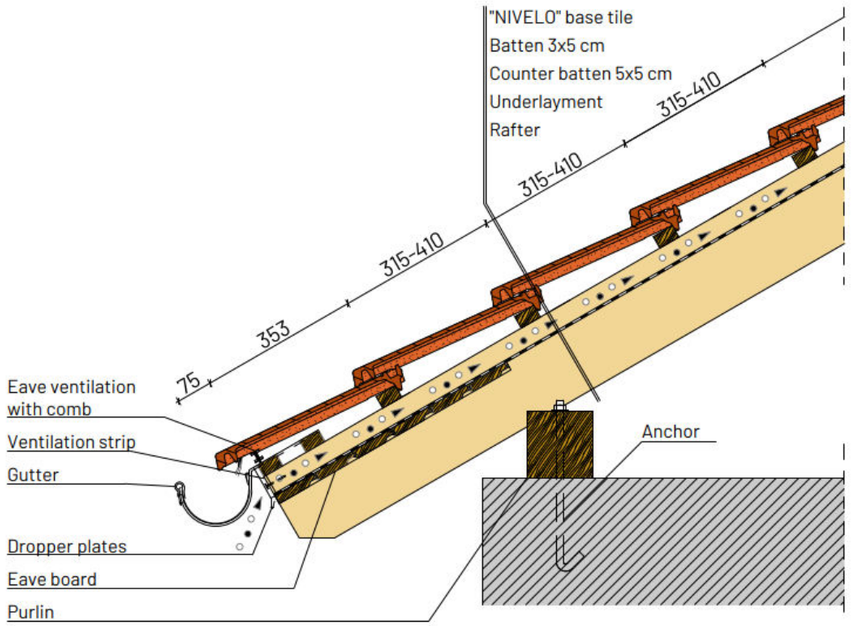
Structural width between the verge boards

	0	**1/2**	**1**	**1 1/2**	**2**	**2 1/2**	**3**	**3 1/2**	**4**	**4 1/2**
0	-	122	247	369	390	512	637	759	884	1 006
10	2 366	2 488	2 613	2 735	2 860	2 982	3 107	3 229	3 354	3 476
20	4 836	4 958	5 083	5 205	5 330	5 452	5 577	5 699	5 824	5 946
30	7 306	7 428	7 553	7 675	7 800	7 922	8 047	8 169	8 294	8 416
40	9 776	9 898	10 023	10 145	10 270	10 392	10 517	10 639	10 764	10 886
50	12 246	12 368	12 493	12 615	12 740	12 862	12 987	13 109	13 234	13 356
60	14 716	14 838	14 963	15 085	15 210	15 332	15 457	15 579	15 704	15 826
70	17 186	17 308	17 433	17 555	17 680	17 802	17 927	18 049	18 174	18 296
80	19 656	19 778	19 903	20 025	20 150	20 272	20 397	20 519	20 644	20 766
90	22 126	22 248	22 373	22 495	22 620	22 742	22 867	22 989	23 114	23 236
100	24 596	24 718	24 843	24 965	25 090	25 212	25 337	25 459	25 584	25 706

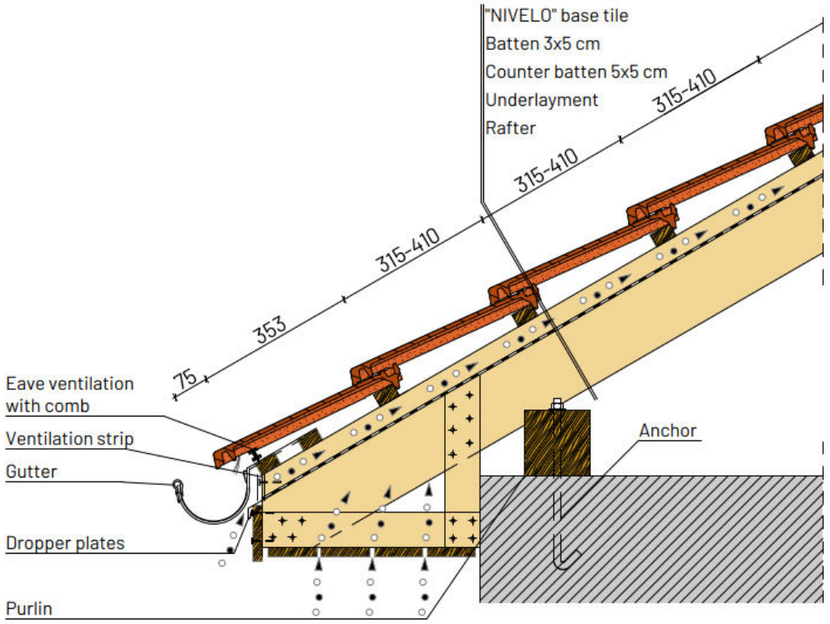
Structural width between the verge boards

	5	**5 1/2**	**6**	**6 1/2**	**7**	**7 1/2**	**8**	**8 1/2**	**9**	**9 1/2**
0	1 131	1 253	1 378	1 500	1 625	1 747	1 872	1 994	2 119	2 241
10	3 601	3 723	3 848	3 970	4 095	4 217	4 342	4 464	4 589	4 711
20	6 071	6 193	6 318	6 440	6 565	6 687	6 812	6 934	7 059	7 181
30	8 541	8 663	8 788	8 910	9 035	9 157	9 282	9 404	9 529	9 651
40	11 011	11 133	11 258	11 380	11 505	11 627	11 752	11 874	11 999	12 121
50	13 481	13 603	13 728	13 850	13 975	14 097	14 222	14 344	14 469	14 591
60	15 951	16 073	16 198	16 320	16 445	16 567	16 692	16 814	16 939	17 061
70	18 421	18 543	18 668	18 790	18 915	19 037	19 162	19 284	19 409	19 531
80	20 891	21 013	21 138	21 260	21 385	21 507	21 632	21 754	21 879	22 001
90	23 361	23 483	23 608	23 730	23 855	23 977	24 102	24 224	24 349	24 471
100	25 831	25 953	26 078	26 200	26 325	26 447	26 572	26 694	26 819	26 941

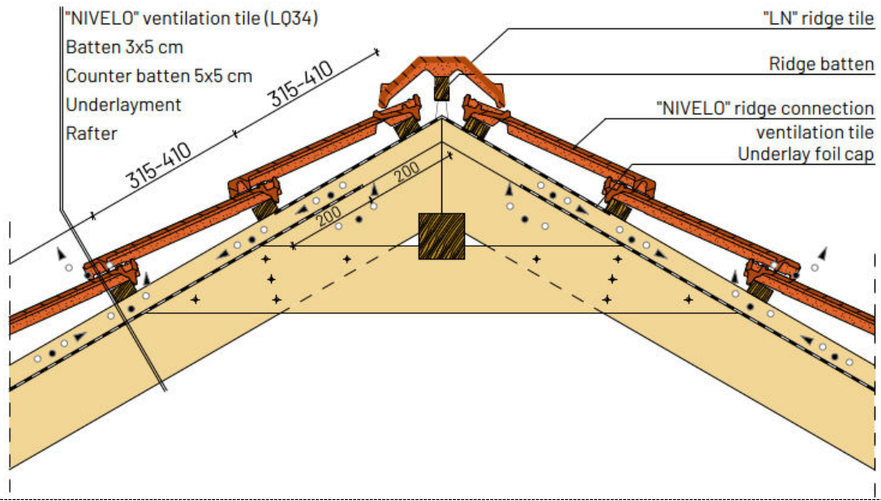
The structural widths below are calculated with 1-1 cm gap between the side plate of the verge tiles and the verge board!



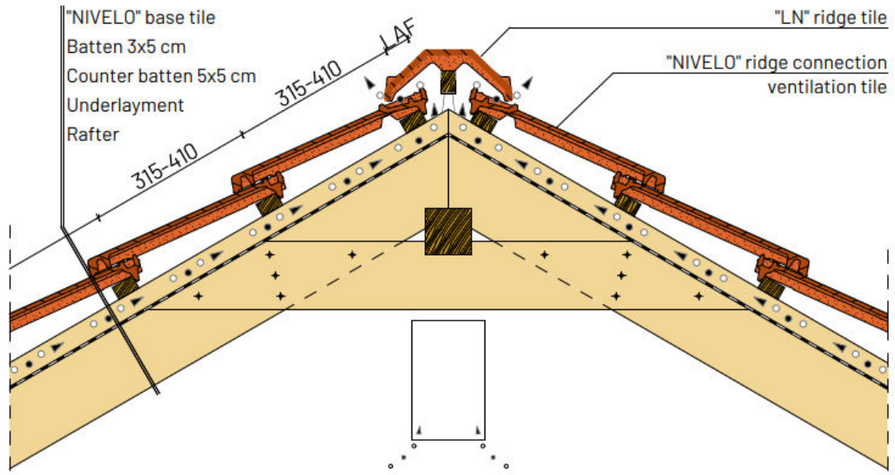
Eave detail



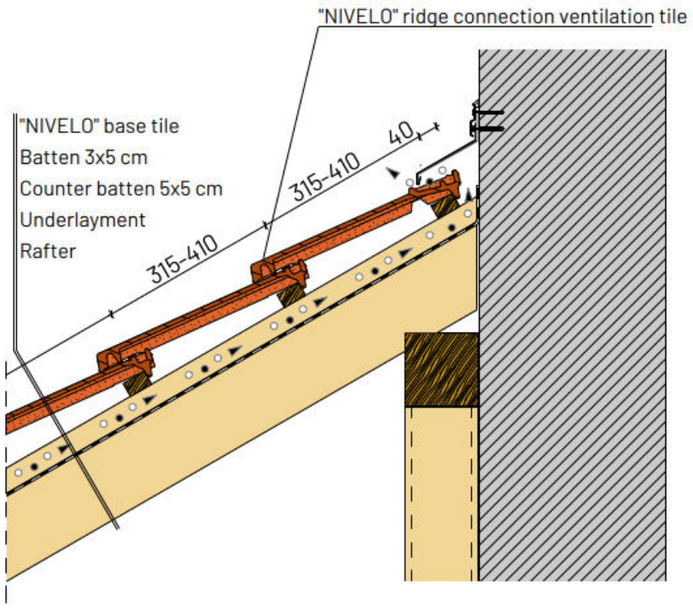
Closed eave detail



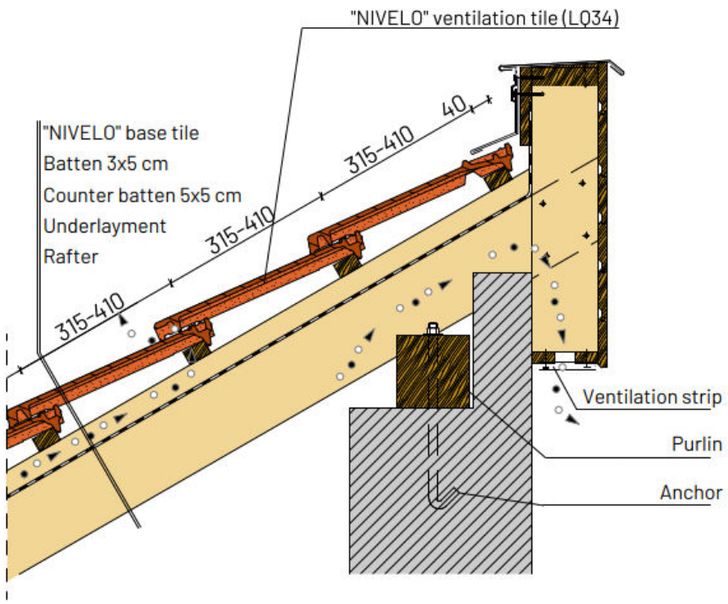
Ridge detail, with ventilation tile



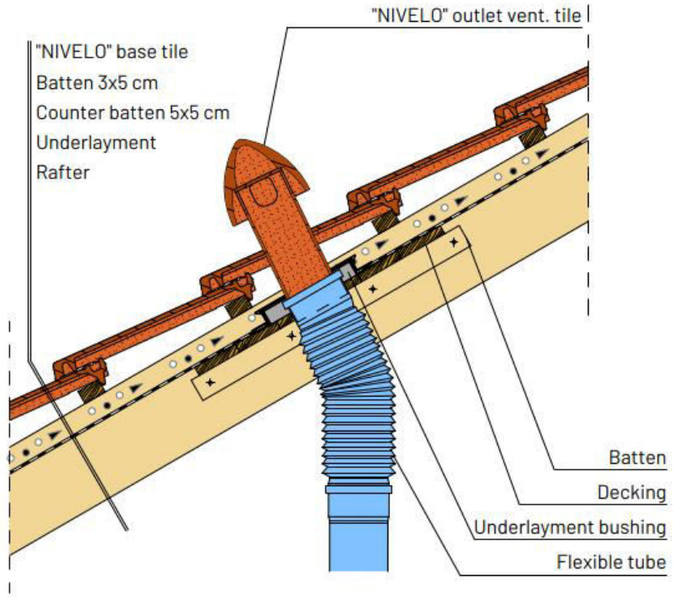
Ridge detail, with ridge connection ventilation tile



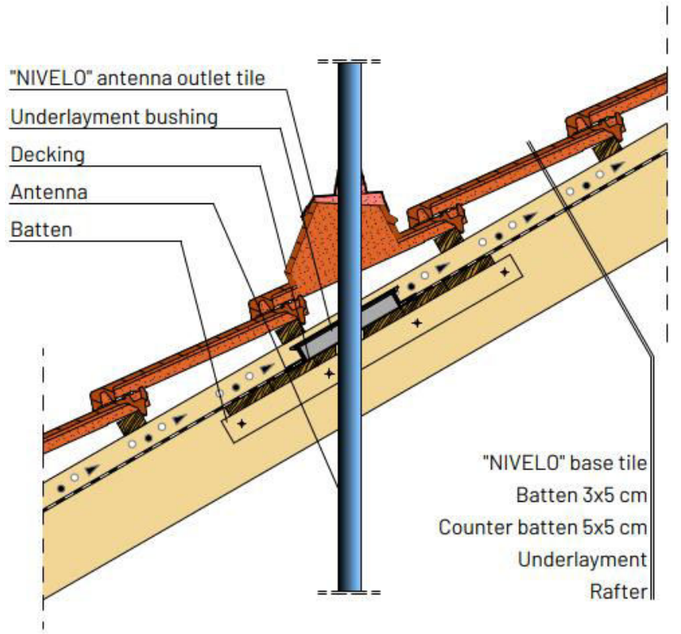
Wall connection detail



Shed ridge detail, with shad roof tile



Clay ventilation outlet tile



Clay antenna outlet tile

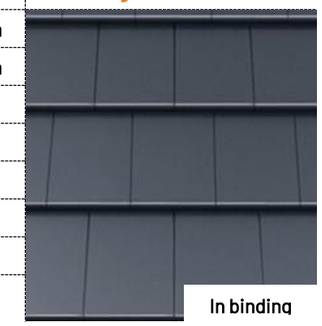
SIMPLA®



Product datas

Size	width:	300 mm
	length:	500 mm
	height:	55 mm
	thickness:	10 mm
Weight:		4,8 kg
Packaging	bundle:	4 pcs
	pallet:	192 pcs
Standrad roof pitch:		25°

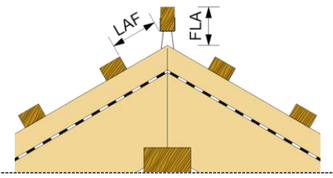
Covering method



In binding

Technical specification of the roof cover

	minimum	average	maximum
Batten distance	338 mm	352 mm	366 mm
Covering width	260 mm	261 mm	263 mm
Consumption	11,4 pcs/m²	10,9 pcs/m²	10,4 pcs/m²
Covering type		single cover	
Covering weight		52,3 kg/m²	



LAF: distance of the upper batten

FLA: height of the ridge batten

PS ridge tile and 30x50 batten

Roof pitch	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°
LAF [mm]	✘	75	70	70	70	65	65	70	90	100	✘
FLA [mm]	✘	120	110	90	80	60	60	55	20	15	✘

PS ridge tile and 40x60 batten

LAF [mm]	✘	75	70	65	65	60	60	60	75	85	✘
FLA [mm]	✘	130	120	100	90	70	70	65	30	25	✘

Underlayment requirement

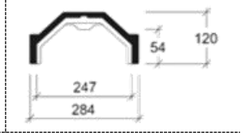
Unsupported underlayment	"CORE"	≥ 18°
Windproof underlayment	"BASIC"	≥ 16°
Watertight underlayment	"PRO"	≥ 14°
Waterproof underlayment	"ULTRA"	≥ 10°

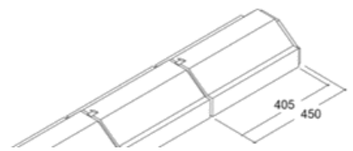
Required batten dimensions

Rafter distance	Batten dimension
≤ 800 mm	30 x 50 mm
810 – 900 mm	30 x 50 mm
910 – 1000 mm	40 x 60 mm

"PS" ridge tile 2,5 pcs/m







Hip starter



Closing plate



Funct.c.p.



3 axis hip cap



Clay accessories	Size	Quantity
Half tile	170x500	as needed
Verge tile - left	305x500	2,9 pcs/m
Verge tile - right	300x500	2,9 pcs/m
Verge Half tile – bal	170x500	2,9 pcs/m
Verge Half tile – jobb	170x500	2,9 pcs/m
Ventilation tile LQ 35	300x500	as required
Ridge connection ventilation tile	300x500	3,8 pcs/m
Ridge conn. vent. verge tl. left	305x500	as needed

Clay accessories	Size	Quantity
Ridge conn. vent. verge tl. right	300x500	as needed

Clay outlets

Ø110 outlet vent tile

Package content

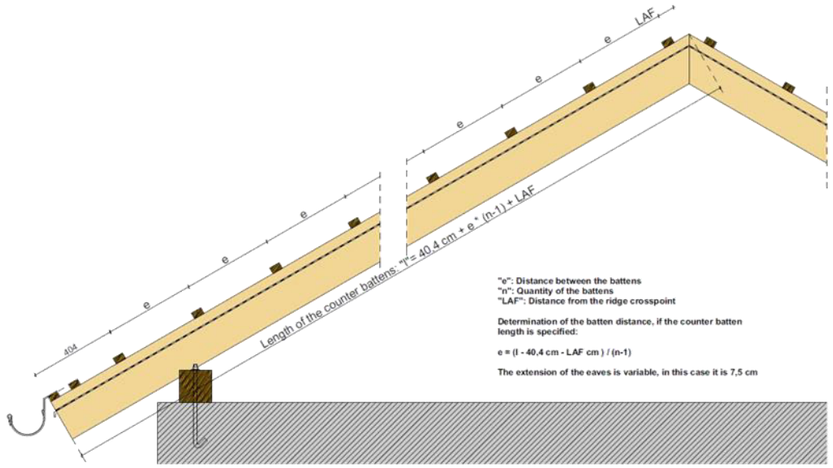
outlet tile, underlay connection bush

Outlet type

waste pipe ventilation
room ventilation
kitchen ventilation

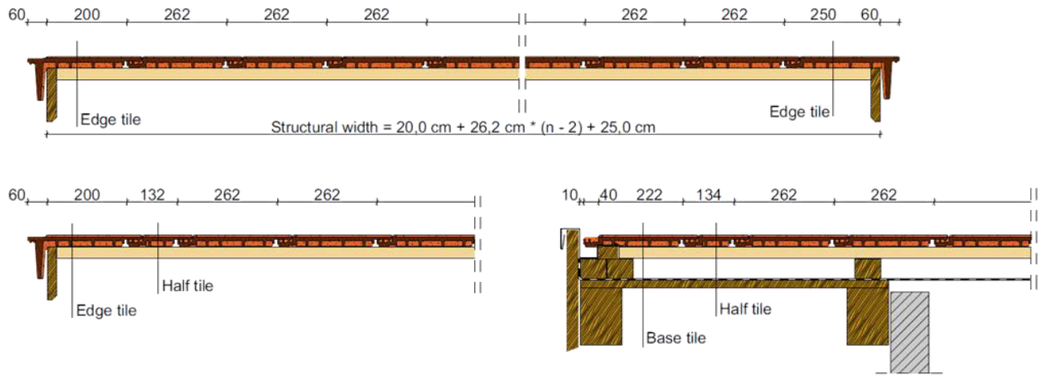
Fixing products

Name	Material	Application field
Mount-on stromclip for 30x50 mm battens	zinc-aluminium	Fixing against the wind in the edge zones and some cases in the genereal roof surface .
Mount-on stromclip for 40x50 mm battens	zinc-aluminium	
Nail-in stormclip	zinc-aluminium	
Fixing screw with EPDM sealing ring, 60 mm length	stainless steel	Fixing against loosed tiles along the edges and some cases in the average roof surfaces.
Clip with wire, 7-22 mm	stainless steel	Fixing cutted tiles along the hips and valleys
Universal stormclip	zinc-aluminium	Fixing shed roof tiles and tiles along the eaves



Roof batten alignement for "SIMPLA" clay roof tile

Specification:	7,5 cm eave overhang and 30° roof pitch "PS" ridge tile and 30x50 mm roof battens, LAF = 70 mm		
Number of battens (n)	**min. batten dist.(e)**	**avg. batten dist.(e)**	**max. batten dist.(e)**
10	338 mm	352 mm	366 mm
11	3 516	3 642	3 768
12	3 854	3 994	4 134
13	4 192	4 346	4 500
14	4 530	4 698	4 866
15	4 868	5 050	5 232
16	5 206	5 402	5 598
17	5 544	5 754	5 964
18	5 882	6 106	6 330
19	6 220	6 458	6 696
20	6 558	6 810	7 062
21	6 896	7 162	7 428
22	7 234	7 514	7 794
23	7 572	7 866	8 160
24	7 910	8 218	8 526
25	8 248	8 570	8 892
26	8 586	8 922	9 258
27	8 924	9 274	9 624
28	9 262	9 626	9 990
29	9 600	9 978	10 356
30	9 938	10 330	10 722
31	10 276	10 682	11 088
32	10 614	11 034	11 454
33	10 952	11 386	11 820
34	11 290	11 738	12 186
35	11 628	12 090	12 552
36	11 966	12 442	12 918
37	12 304	12 794	13 284
38	12 642	13 146	13 650
39	12 980	13 498	14 016
40	13 316	13 850	14 382



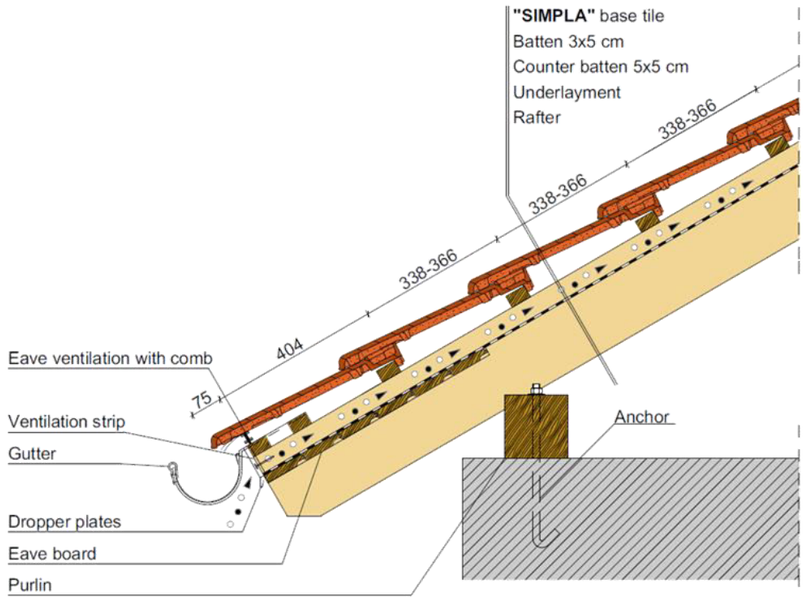
Structural width between the verge boards

	0	**1/2**	**1**	**1 1/2**	**2**	**2 1/2**	**3**	**3 1/2**	**4**	**4 1/2**
0	–	132	262	394	414	546	676	808	938	1 070
10	2 510	2 642	2 772	2 904	3 034	3 166	3 296	3 428	3 558	3 690
20	5 130	5 262	5 392	5 524	5 654	5 786	5 916	6 048	6 178	6 310
30	7 750	7 882	8 012	8 144	8 274	8 406	8 536	8 668	8 798	8 930
40	10 370	10 502	10 632	10 764	10 894	11 026	11 156	11 288	11 418	11 550
50	12 990	13 122	13 252	13 384	13 514	13 646	13 776	13 908	14 038	14 170
60	15 610	15 742	15 872	16 004	16 134	16 266	16 396	16 528	16 658	16 790
70	18 230	18 362	18 492	18 624	18 754	18 886	19 016	19 148	19 278	19 410
80	20 850	20 982	21 112	21 244	21 374	21 506	21 636	21 768	21 898	22 030
90	23 470	23 602	23 732	23 864	23 994	24 126	24 256	24 388	24 518	24 650
100	26 090	26 222	26 352	26 484	26 614	26 746	26 876	27 008	27 138	27 270

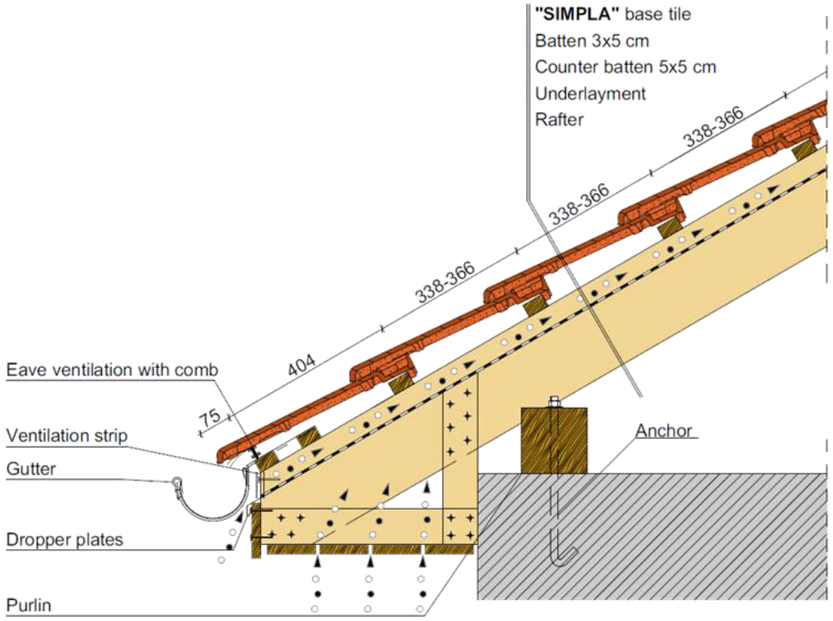
Structural width between the verge boards

	5	**5 1/2**	**6**	**6 1/2**	**7**	**7 1/2**	**8**	**8 1/2**	**9**	**9 1/2**
0	1 200	1 332	1 462	1 594	1 724	1 856	1 986	2 118	2 248	2 380
10	3 820	3 952	4 082	4 214	4 344	4 476	4 606	4 738	4 868	5 000
20	6 440	6 572	6 702	6 834	6 964	7 096	7 226	7 358	7 488	7 620
30	9 060	9 192	9 322	9 454	9 584	9 716	9 846	9 978	10 108	10 240
40	11 680	11 812	11 942	12 074	12 204	12 336	12 466	12 598	12 728	12 860
50	14 300	14 432	14 562	14 694	14 824	14 956	15 086	15 218	15 348	15 480
60	16 920	17 052	17 182	17 314	17 444	17 576	17 706	17 838	17 968	18 100
70	19 540	19 672	19 802	19 934	20 064	20 196	20 326	20 458	20 588	20 720
80	22 160	22 292	22 422	22 554	22 684	22 816	22 946	23 078	23 208	23 340
90	24 780	24 912	25 042	25 174	25 304	25 436	25 566	25 698	25 828	25 960
100	27 400	27 532	27 662	27 794	27 924	28 056	28 186	28 318	28 448	28 580

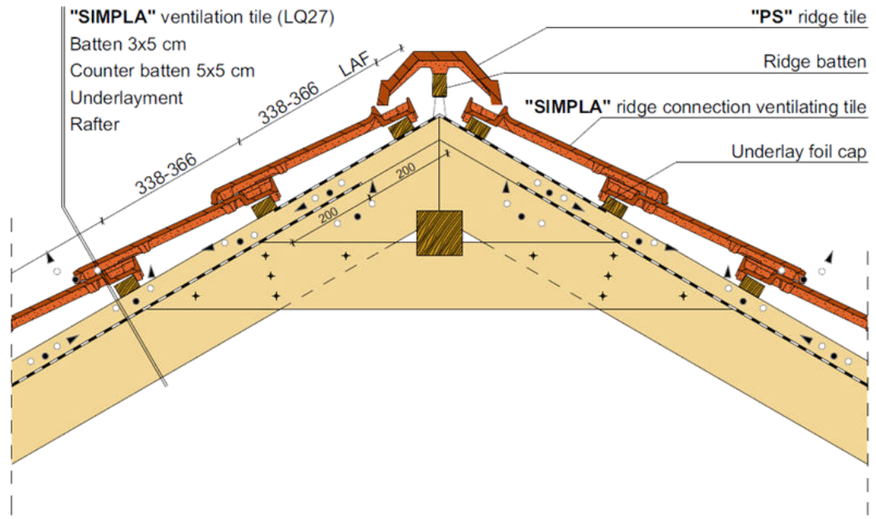
The structural widths below are calculated with 1-1 cm gap between the side plate of the verge tiles and the verge board!



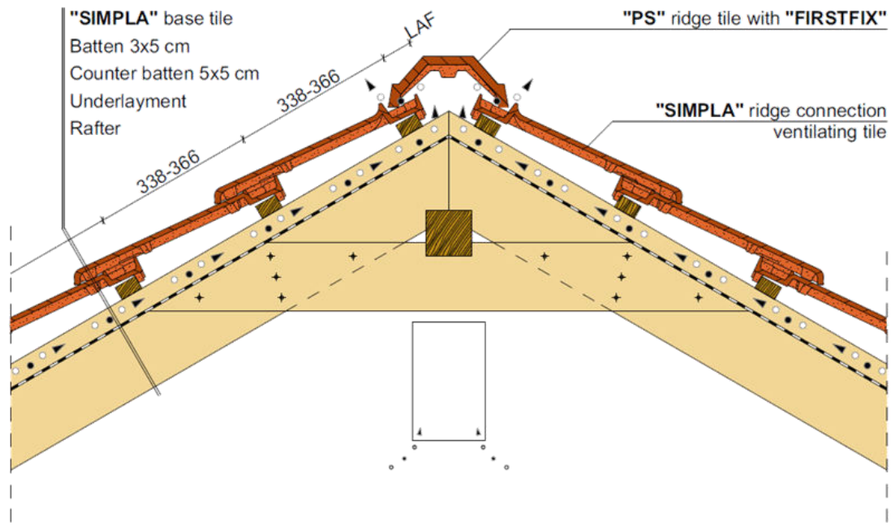
Eave detail



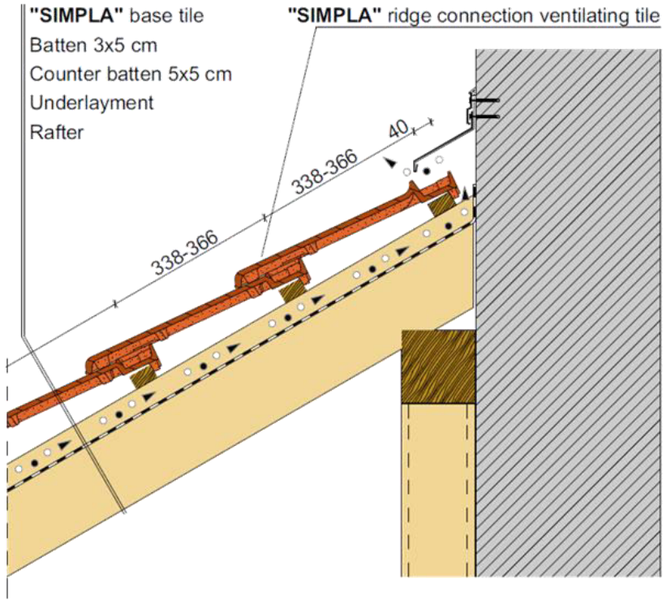
Closed eave detail



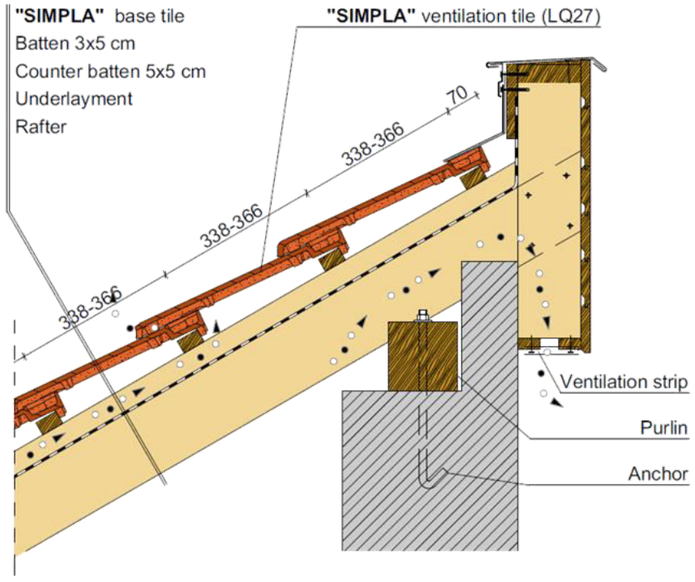
Ridge detail, with ventilation tile



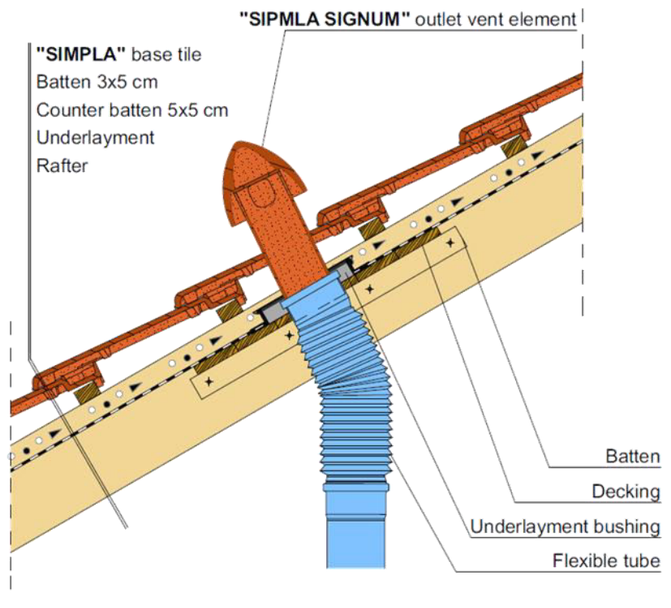
Ridge detail, with ridge connection ventilation tile



Wall connection detail

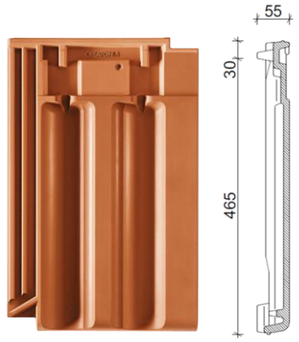


Shed ridge detail



Clay ventilation outlet tile

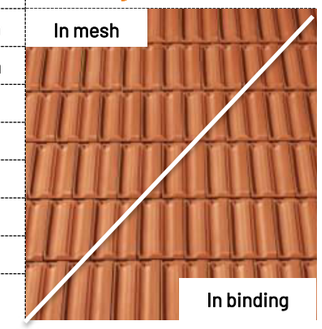
RAPIDO®



Product datas

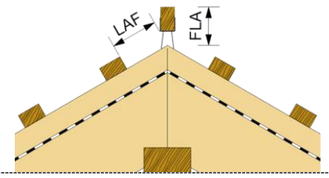
Size	width:	325 mm
	length:	495 mm
	height:	55 mm
	thickness:	10 mm
Weight:		5,2 kg
Packaging	bundle:	4 pcs
	pallet:	168 pcs
Standrad roof pitch:		25°

Covering method



Technical specification of the roof cover

	minimum	average	maximum
Batten distance	410 mm	425 mm	440 mm
Covering width	278 mm	280 mm	282 mm
Consumption	8,8 pcs/m²	8,4 pcs/m²	8,1 pcs/m²
Covering type		single cover	
Covering weight		43,68 kg/m²	



LAF: distance of the upper batten

FLA: height of the ridge batten

LB ridge tile and 30x50 batten

Roof pitch	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°
LAF [mm]	75	70	70	65	60	60	60	60	60	55	✘
FLA [mm]	110	95	85	75	65	60	50	35	30	30	✘

LB ridge tile and 40x60 batten

LAF [mm]	75	70	70	60	55	55	55	50	45	40	✘
FLA [mm]	120	105	95	85	75	70	60	45	40	20	✘

LR ridge tile and 30x50 batten

LAF [mm]	75	70	70	65	60	60	60	60	60	55	✘
FLA [mm]	110	95	85	75	65	60	50	35	30	30	✘

LR ridge tile and 40x60 batten

LAF [mm]	75	70	70	60	55	55	55	50	45	40	✘
FLA [mm]	120	105	95	85	75	70	60	45	40	20	✘

Underlayment requirement

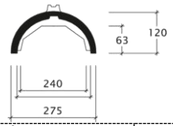
Unsupported underlayment	"CORE"	≥ 18°
Windproof underlayment	"BASIC"	≥ 16°
Watertight underlayment	"PRO"	≥ 14°
Waterproof underlayment	"ULTRA"	≥ 10°

Required batten dimensions

Rafter distance	Batten dimension
≤ 800 mm	30 x 50 mm
810 – 900 mm	30 x 50 mm
910 – 1000 mm	40 x 60 mm

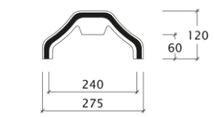
"LB" ridge tile 2,5 pcs/m

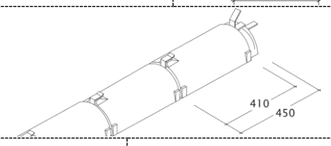




"LR" ridge tile 2,5 pcs/m

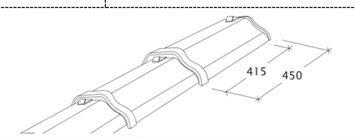






Funct.c.p.





"LB" hip starter



"LB" hip starter, shell shape



3 axis hip cap



"LR" hip starter



"LR" hip starter, shell shape



„LB" hip starter, rounded



„LB" closing plate



4 axis hip cap



"LR" closing plate



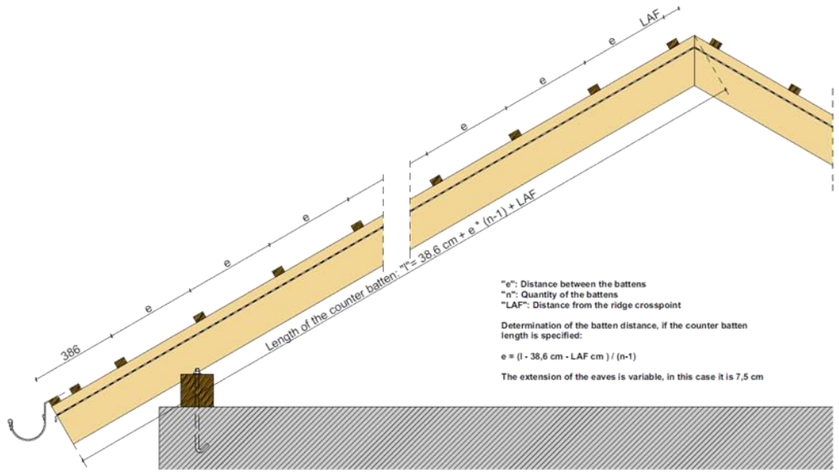
Clay accessories	Size	Quantity
Half tile	182x495	as needed
Verge tile - left	325x495	2,4 pcs/m
Verge tile - right	325x495	2,4 pcs/m
Double wave tile	325x495	2,4 pcs/m
Ventilation tile LQ 37,5	325x495	as required
Ridge connection ventilation tile	325x495	3,6 pcs/m
Ridge connection vent. half tile	182x495	as needed
Ridge conn. vent. verge tl. left	325x495	as needed

Clay accessories	Size	Quantity
Ridge conn. vent. verge tl. right	325x495	as needed
Double wave ridge connection tile	325x502	as needed
Shed roof tile	-	3,6 pcs/m
Shed roof half tile	-	as needed
Shed roof verge tile – left	-	as needed
Shed roof verge tile – right	-	as needed
Mansard tile	-	3,6 pcs/m
Mansard verge tile – left/right	-	as needed

Clay outlets	Package content	Outlet type
Ø110 outlet vent tile with "A" type unscrewable cap	outlet tile, underlay connection bush	waste pipe ventilation room ventilation kitchen ventilation
Ø125 outlet vent tile with "A" type unscrewable cap	outlet tile, underlay connection bush	waste pipe ventilation room ventilation kitchen ventilation
Ø150 outlet vent tile	outlet tile, underlay connection bush	room ventilation kitchen ventilation
Ø200 outlet vent tile	outlet tile, underlay connection bush,	room ventilation kitchen ventilation
Antenna outlet tile Ø60 mm	outlet tile, underlay connection bush,	antenna and telecommunication tubes
Solar outlet tile Ø70 mm	outlet tile, underlay connection bush,	solar and photovoltaic cables
Flue gas outlet tile Ø 110 mm or Ø 125 mm	outlet tile, underlay connection bush,	flue pipe of the condensation boilers

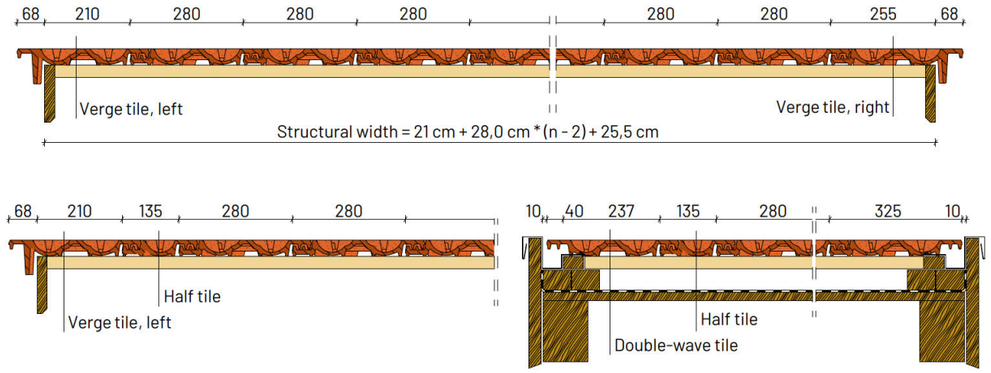
Fixing products

Name	Material	Application field
Mount-on stromclip for 30x50 mm battens	zinc-aluminium	Fixing against the wind in the edge zones and some cases in the genereal roof surface .
Mount-on stromclip for 40x50 mm battens	zinc-aluminium	
Mount-on stromclip for 40x60 mm battens	zinc-aluminium	
Nail-in stormclip	zinc-aluminium	
Fixing screw with EPDM sealing ring, 60 mm length	stainless steel	Fixing against loosed tiles along the edges and some cases in the average roof surfaces.
Clip with wire, 7-22 mm	stainless steel	Fixing cutted tiles along the hips and valleys
Universal stormclip	zinc-aluminium	Fixing shed roof tiles and tiles along the eaves



Roof batten alignement for "RAPIDO" clay roof tile

Specification:	7,5 cm eave overhang and 30° roof pitch "LR" ridge tile and 30x50 mm roof battens, LAF = 60 mm		
Number of battens (n)	**min. batten dist.(e)**	**avg. batten dist.(e)**	**max. batten dist.(e)**
10	410 mm	425 mm	440 mm
11	4 136	4 271	4 406
12	4 546	4 696	4 846
13	4 956	5 121	5 286
14	5 366	5 546	5 726
15	5 776	5 971	6 166
16	6 186	6 396	6 606
17	6 596	6 821	7 046
18	7 006	7 246	7 486
19	7 416	7 671	7 926
20	7 826	8 096	8 366
21	8 236	8 521	8 806
22	8 646	8 946	9 246
23	9 056	9 371	9 686
24	9 466	9 796	10 126
25	9 876	10 221	10 566
26	10 286	10 646	11 006
27	10 696	11 071	11 446
28	11 106	11 496	11 886
29	11 516	11 921	12 326
30	11 926	12 346	12 766
31	12 336	12 771	13 206
32	12 746	13 196	13 646
33	13 156	13 621	14 086
34	13 566	14 046	14 526
35	13 976	14 471	14 966
36	14 386	14 896	15 406
37	14 796	15 321	15 846
38	15 206	15 746	16 286
39	15 616	16 171	16 726
40	16 026	16 596	17 166



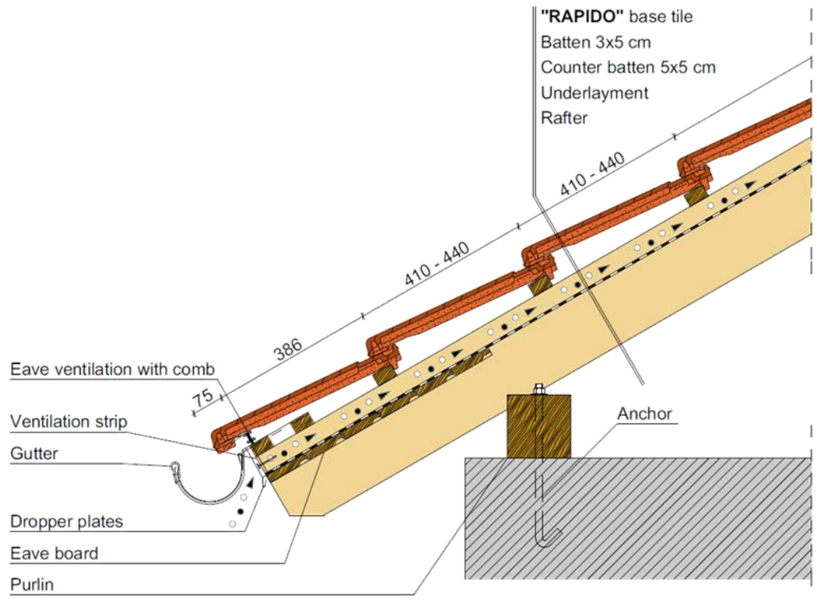
Structural width between the verge boards

	0	**1/2**	**1**	**1 1/2**	**2**	**2 1/2**	**3**	**3 1/2**	**4**	**4 1/2**
0	-	135	280	415	465	600	745	880	1 025	1 160
10	2 705	2 840	2 985	3 120	3 265	3 400	3 545	3 680	3 825	3 960
20	5 505	5 640	5 785	5 920	6 065	6 200	6 345	6 480	6 625	6 760
30	8 305	8 440	8 585	8 720	8 865	9 000	9 145	9 280	9 425	9 560
40	11 105	11 240	11 385	11 520	11 665	11 800	11 945	12 080	12 225	12 360
50	13 905	14 040	14 185	14 320	14 465	14 600	14 745	14 880	15 025	15 160
60	16 705	16 840	16 985	17 120	17 265	17 400	17 545	17 680	17 825	17 960
70	19 505	19 640	19 785	19 920	20 065	20 200	20 345	20 480	20 625	20 760
80	22 305	22 440	22 585	22 720	22 865	23 000	23 145	23 280	23 425	23 560
90	25 105	25 240	25 385	25 520	25 665	25 800	25 945	26 080	26 225	26 360
100	27 905	28 040	28 185	28 320	28 465	28 600	28 745	28 880	29 025	29 160

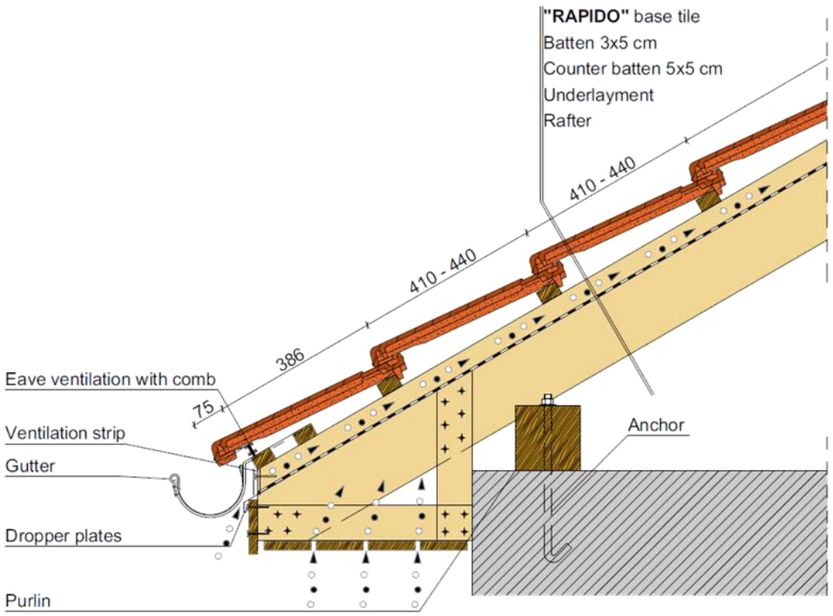
Structural width between the verge boards

	5	**5 1/2**	**6**	**6 1/2**	**7**	**7 1/2**	**8**	**8 1/2**	**9**	**9 1/2**
0	1 305	1 440	1 585	1 720	1 865	2 000	2 145	2 280	2 425	2 560
10	4 105	4 240	4 385	4 520	4 665	4 800	4 945	5 080	5 225	5 360
20	6 905	7 040	7 185	7 320	7 465	7 600	7 745	7 880	8 025	8 160
30	9 705	9 840	9 985	10 120	10 265	10 400	10 545	10 680	10 825	10 960
40	12 505	12 640	12 785	12 920	13 065	13 200	13 345	13 480	13 625	13 760
50	15 305	15 440	15 585	15 720	15 865	16 000	16 145	16 280	16 425	16 560
60	18 105	18 240	18 385	18 520	18 665	18 800	18 945	19 080	19 225	19 360
70	20 905	21 040	21 185	21 320	21 465	21 600	21 745	21 880	22 025	22 160
80	23 705	23 840	23 985	24 120	24 265	24 400	24 545	24 680	24 825	24 960
90	26 505	26 640	26 785	26 920	27 065	27 200	27 345	27 480	27 625	27 760
100	29 305	29 440	29 585	29 720	29 865	30 000	30 145	30 280	30 425	30 560

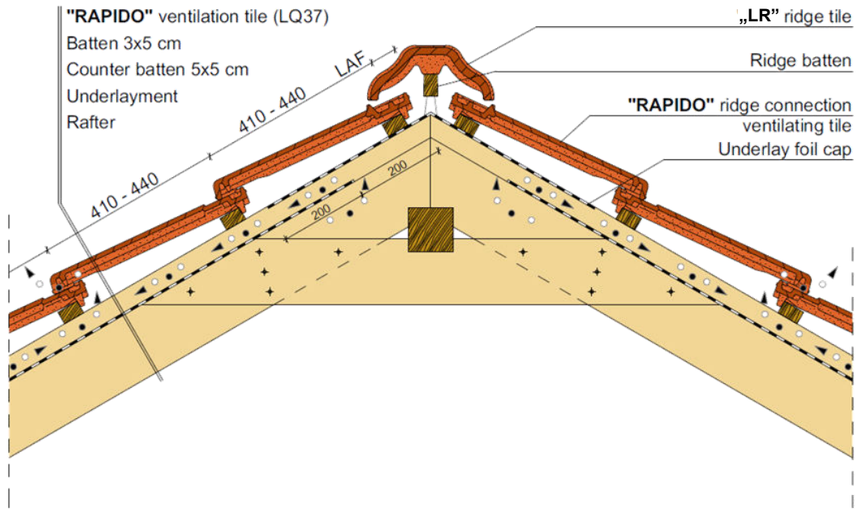
The structural widths below are calculated with 1-1 cm gap between the side plate of the verge tiles and the verge board!



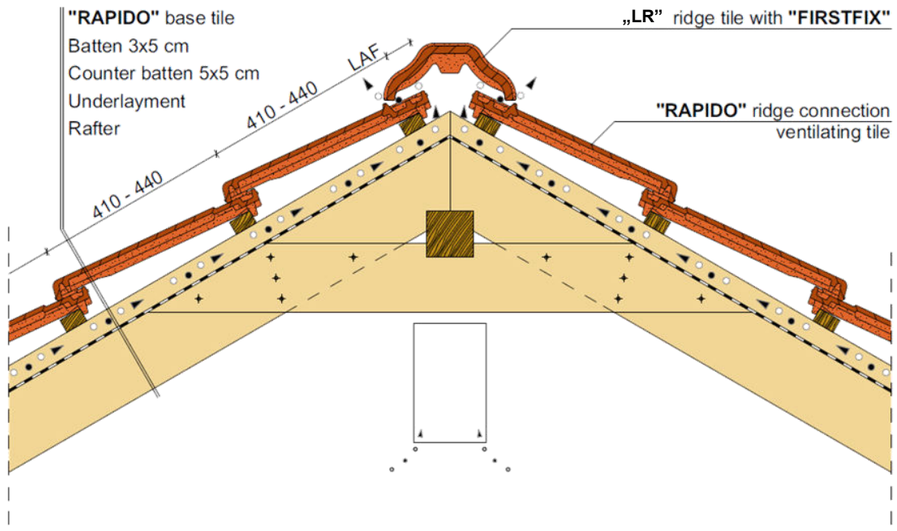
Eave detail



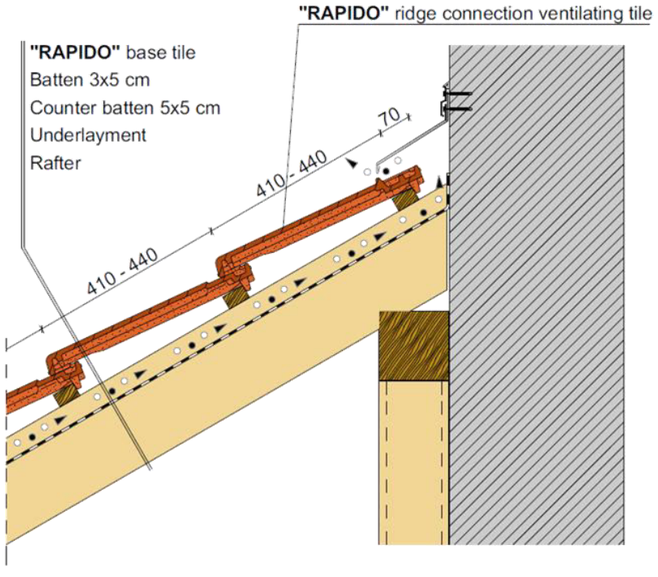
Closed eave detail



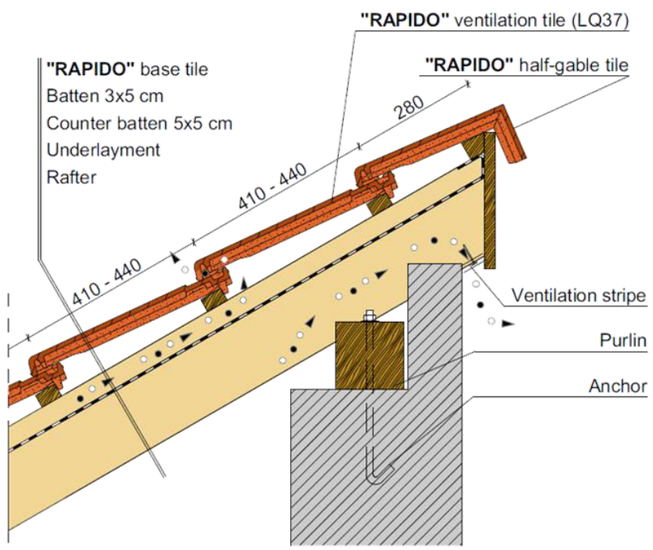
Ridge detail, with ventilation tile



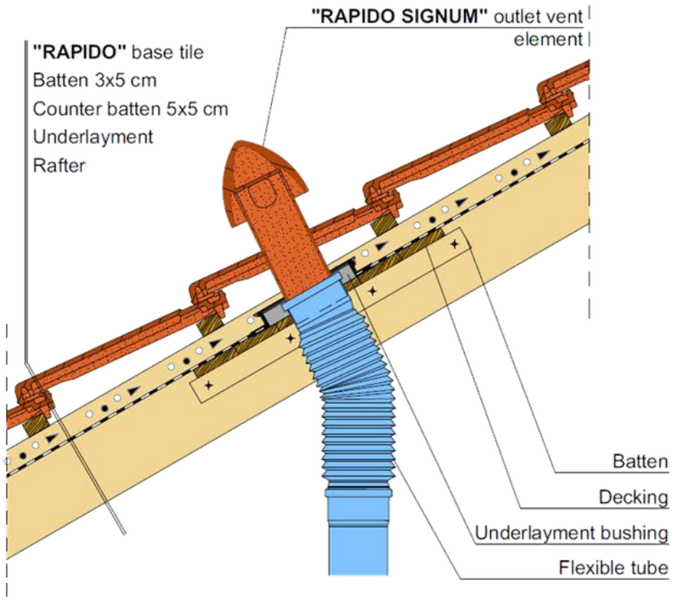
Ridge detail, with ridge connection ventilation tile



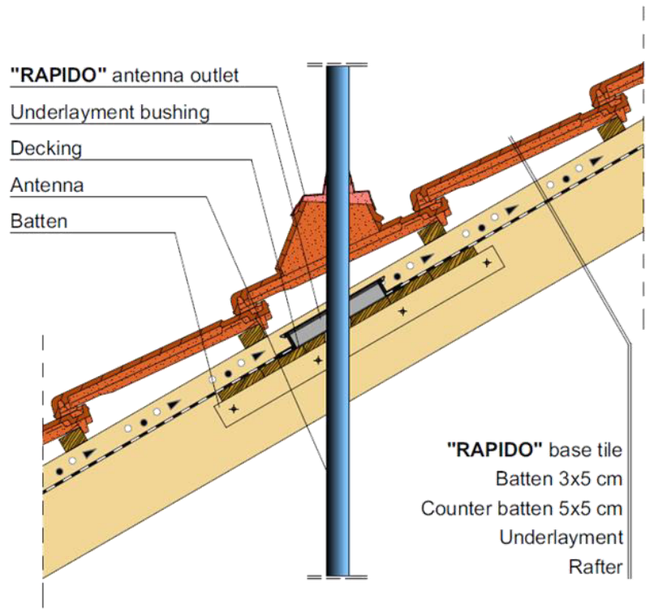
Wall connection detail



Shed ridge detail, with shad roof tile

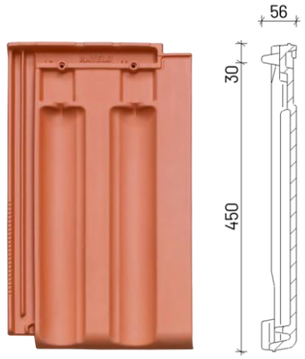


Clay ventilation outlet tile



Clay antenna outlet tile

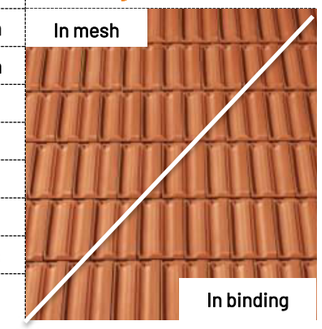
RAVELO®



Product datas

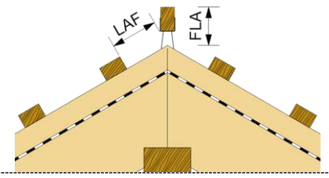
Size	width:	290 mm
	length:	480 mm
	height:	56 mm
	thickness:	10 mm
Weight:		3,9 kg
Packaging	bundle:	4 pcs
	pallet:	256 pcs
Standrad roof pitch:		25°

Covering method



Technical specification of the roof cover

	minimum	average	maximum
Batten distance	387 mm	401 mm	415 mm
Covering width	246 mm	247 mm	249 mm
Consumption	10,5 pcs/m²	10,1 pcs/m²	9,7 pcs/m²
Covering type		single cover	
Covering weight		39,37 kg/m²	



LAF: distance of the upper batten

FLA: height of the ridge batten

LB ridge tile and 30x50 batten

Roof pitch	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°
LAF [mm]	70	70	60	55	45	50	50	45	40	30	✖
FLA [mm]	120	110	100	95	80	75	60	55	45	45	✖

LB ridge tile and 40x60 batten

LAF [mm]	70	60	60	55	45	40	35	40	30	✖	✖
FLA [mm]	130	120	110	100	95	85	75	65	55	✖	✖

LR ridge tile and 30x50 batten

LAF [mm]	75	65	60	55	45	55	50	45	45	✖	✖
FLA [mm]	115	110	100	90	80	65	55	50	45	✖	✖

LR ridge tile and 40x60 batten

LAF [mm]	75	65	65	60	50	40	35	30	30	✖	✖
FLA [mm]	130	120	105	95	90	80	75	70	65	✖	✖

Underlayment requirement

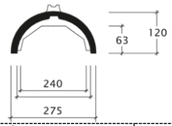
Unsupported underlayment	"CORE"	≥ 18°
Windproof underlayment	"BASIC"	≥ 16°
Watertight underlayment	"PRO"	≥ 14°
Waterproof underlayment	"ULTRA"	≥ 10°

Required batten dimensions

Rafter distance	Batten dimension
≤ 800 mm	30 x 50 mm
810 – 900 mm	30 x 50 mm
910 – 1000 mm	40 x 60 mm

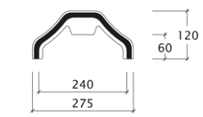
"LB" ridge tile 2,5 pcs/m

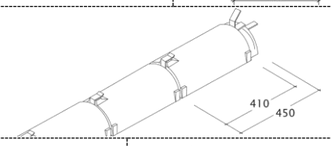




"LR" ridge tile 2,5 pcs/m

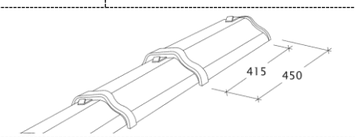






Funct.c.p.





"LB" hip starter



"LB" hip starter, shell shape



3 axis hip cap



"LR" hip starter



"LR" hip starter, shell shape



„LB" hip starter, rounded



„LB" closing plate



4 axis hip cap



"LR" closing plate



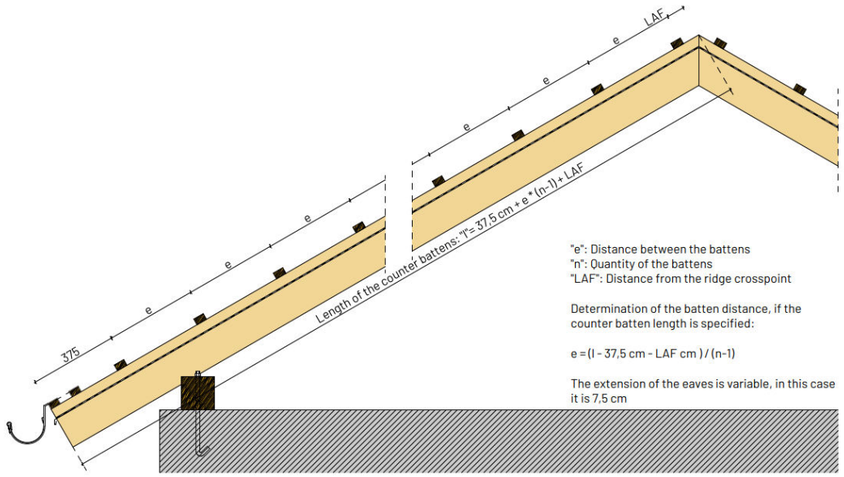
Clay accessories	Size	Quantity
Half tile	166x480	as needed
Verge tile - left	290x480	2,5 pcs/m
Verge tile - right	290x480	2,5 pcs/m
Double wave tile	290x480	2,5 pcs/m
Ventilation tile LQ 30	290x480	as required
Ridge connection ventilation tile	290x480	2,5 pcs/m
Ridge connection vent. half tile	166x480	as needed
Ridge conn. vent. verge tl. left	290x480	as needed

Clay accessories	Size	Quantity
Ridge conn. vent. verge tl. right	290x480	as needed
Double wave ridge connection tile	290x480	as needed
Shed roof tile	-	4,1 pcs/m
Shed roof half tile	-	as needed
Shed roof verge tile – left	-	as needed
Shed roof verge tile – right	-	as needed
Mansard tile	-	4,1 pcs/m
Mansard verge tile – left/right	-	as needed

Clay outlets	Package content	Outlet type
Ø110 outlet vent tile with "A" type unscrewable cap	outlet tile, underlay connection bush	waste pipe ventilation room ventilation kitchen ventilation
Ø125 outlet vent tile with "A" type unscrewable cap	outlet tile, underlay connection bush	waste pipe ventilation room ventilation kitchen ventilation
Ø150 outlet vent tile	outlet tile, underlay connection bush	room ventilation kitchen ventilation
Ø200 outlet vent tile	outlet tile, underlay connection bush,	room ventilation kitchen ventilation
Antenna outlet tile Ø60 mm	outlet tile, underlay connection bush,	antenna and telecommunication tubes
Solar outlet tile Ø70 mm	outlet tile, underlay connection bush,	solar and photovoltaic cables
Flue gas outlet tile Ø 110 mm or Ø 125 mm	outlet tile, underlay connection bush,	flue pipe of the condensation boilers

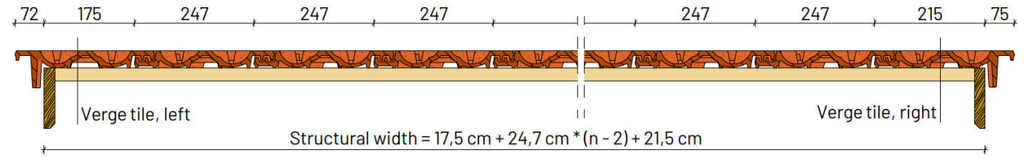
Fixing products

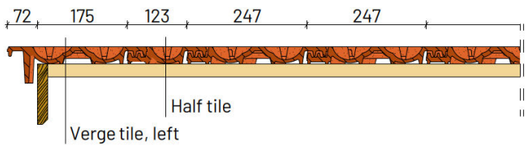
Name	Material	Application field
Mount-on stromclip for 30x50 mm battens	zinc-aluminium	Fixing against the wind in the edge zones and some cases in the genereal roof surface .
Mount-on stromclip for 40x50 mm battens	zinc-aluminium	
Mount-on stromclip for 40x60 mm battens	zinc-aluminium	
Nail-in stormclip	zinc-aluminium	
Fixing screw with EPDM sealing ring, 60 mm length	stainless steel	Fixing against loosed tiles along the edges and some cases in the average roof surfaces.
Clip with wire, 7-22 mm	stainless steel	Fixing cutted tiles along the hips and valleys
Universal stormclip	zinc-aluminium	Fixing shed roof tiles and tiles along the eaves

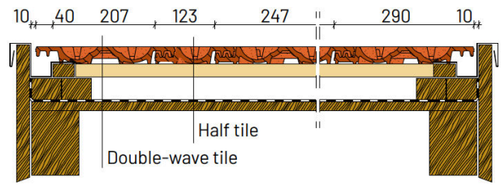


Roof batten alignement for "RAVELO" clay roof tile

Specification:	7,5 cm eave overhang and 30° roof pitch "LR" ridge tile and 30x50 mm roof battens, LAF = 45 mm		
Number of battens (n)	**min. batten dist.(e)**	**avg. batten dist.(e)**	**max. batten dist.(e)**
10	387 mm	401 mm	415 mm
11	3 903	4 029	4 155
12	4 290	4 430	4 570
13	4 677	4 831	4 985
14	5 064	5 232	5 400
15	5 451	5 633	5 815
16	5 838	6 034	6 230
17	6 225	6 435	6 645
18	6 612	6 836	7 060
19	6 999	7 237	7 475
20	7 386	7 638	7 890
21	7 773	8 039	8 305
22	8 160	8 440	8 720
23	8 547	8 841	9 135
24	8 934	9 242	9 550
25	9 321	9 643	9 965
26	9 708	10 044	10 380
27	10 095	10 445	10 795
28	10 482	10 846	11 210
29	10 869	11 247	11 625
30	11 256	11 648	12 040
31	11 643	12 049	12 455
32	12 030	12 450	12 870
33	12 417	12 851	13 285
34	12 804	13 252	13 700
35	13 191	13 653	14 115
36	13 578	14 054	14 530
37	13 965	14 455	14 945
38	14 352	14 856	15 360
39	14 739	15 257	15 775
40	15 513	16 059	16 605







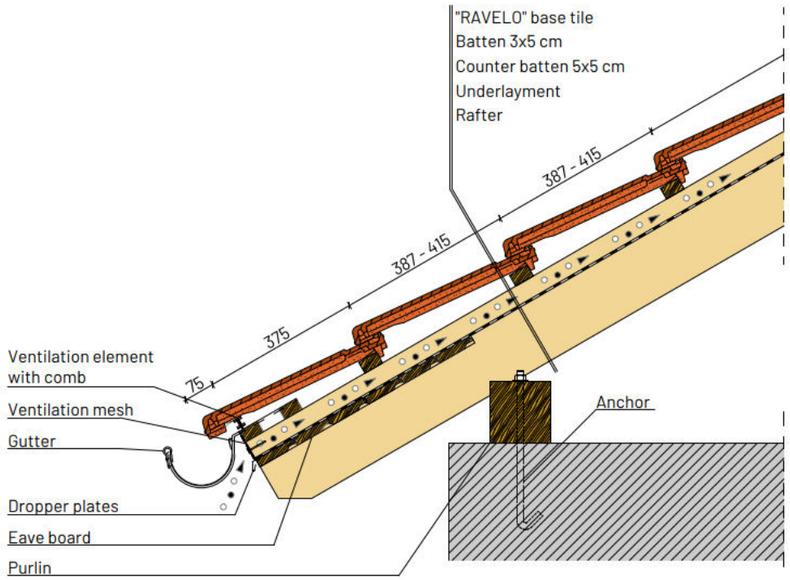
Structural width between the verge boards

	0	**1/2**	**1**	**1 1/2**	**2**	**2 1/2**	**3**	**3 1/2**	**4**	**4 1/2**
0	-	123	247	370	390	513	637	760	884	1 007
10	2 366	2 489	2 613	2 736	2 860	2 983	3 107	3 230	3 354	3 477
20	4 836	4 959	5 083	5 206	5 330	5 453	5 577	5 700	5 824	5 947
30	7 306	7 429	7 553	7 676	7 800	7 923	8 047	8 170	8 294	8 417
40	9 776	9 899	10 023	10 146	10 270	10 393	10 517	10 640	10 764	10 887
50	12 246	12 369	12 493	12 616	12 740	12 863	12 987	13 110	13 234	13 357
60	14 716	14 839	14 963	15 086	15 210	15 333	15 457	15 580	15 704	15 827
70	17 186	17 309	17 433	17 556	17 680	17 803	17 927	18 050	18 174	18 297
80	19 656	19 779	19 903	20 026	20 150	20 273	20 397	20 520	20 644	20 767
90	22 126	22 249	22 373	22 496	22 620	22 743	22 867	22 990	23 114	23 237
100	24 596	24 719	24 843	24 966	25 090	25 213	25 337	25 460	25 584	25 707

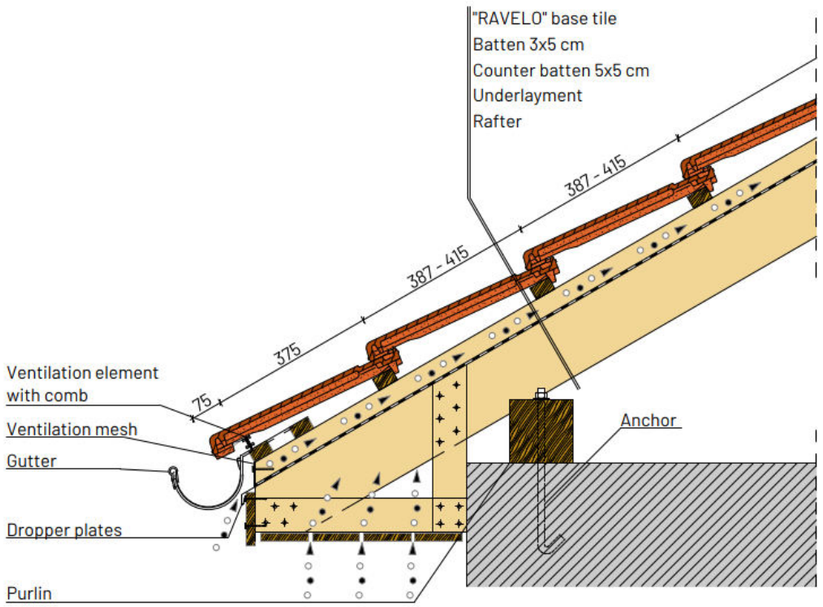
Structural width between the verge boards

	5	**5 1/2**	**6**	**6 1/2**	**7**	**7 1/2**	**8**	**8 1/2**	**9**	**9 1/2**
0	1 131	1 254	1 378	1 501	1 625	1 748	1 872	1 995	2 119	2 242
10	3 601	3 724	3 848	3 971	4 095	4 218	4 342	4 465	4 589	4 712
20	6 071	6 194	6 318	6 441	6 565	6 688	6 812	6 935	7 059	7 182
30	8 541	8 664	8 788	8 911	9 035	9 158	9 282	9 405	9 529	9 652
40	11 011	11 134	11 258	11 381	11 505	11 628	11 752	11 875	11 999	12 122
50	13 481	13 604	13 728	13 851	13 975	14 098	14 222	14 345	14 469	14 592
60	15 951	16 074	16 198	16 321	16 445	16 568	16 692	16 815	16 939	17 062
70	18 421	18 544	18 668	18 791	18 915	19 038	19 162	19 285	19 409	19 532
80	20 891	21 014	21 138	21 261	21 385	21 508	21 632	21 755	21 879	22 002
90	23 361	23 484	23 608	23 731	23 855	23 978	24 102	24 225	24 349	24 472
100	25 831	25 954	26 078	26 201	26 325	26 448	26 572	26 695	26 819	26 942

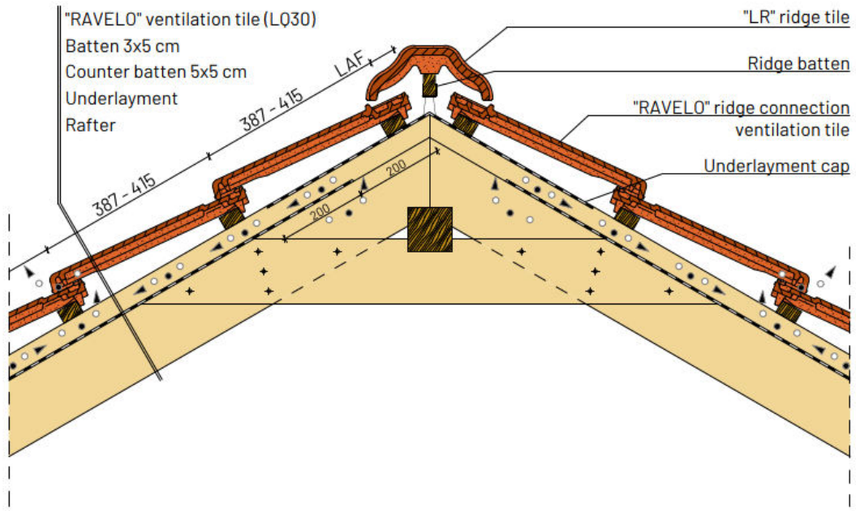
The structural widths below are calculated with 1-1 cm gap between the side plate of the verge tiles and the verge board!



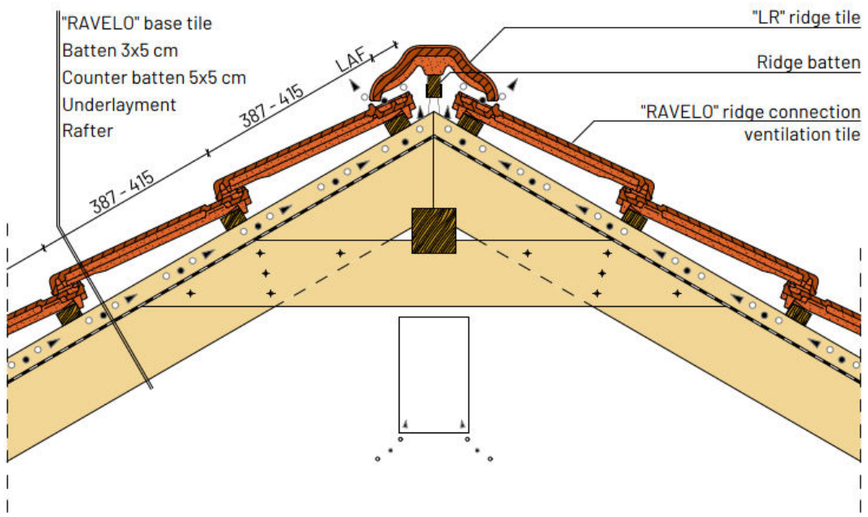
Eave detail



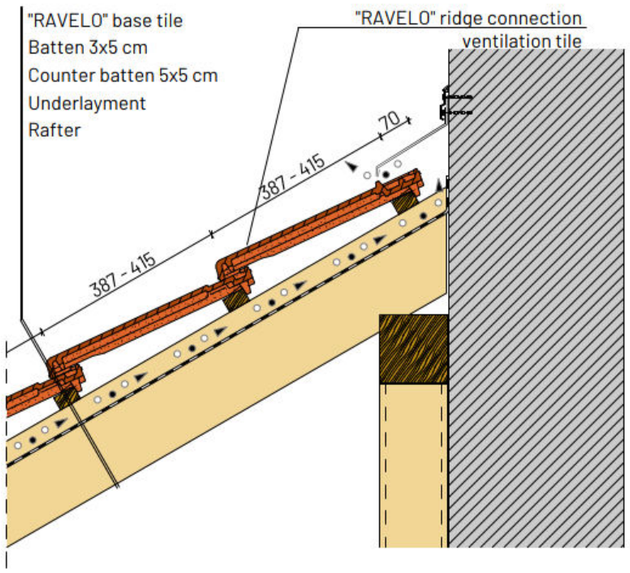
Closed eave detail



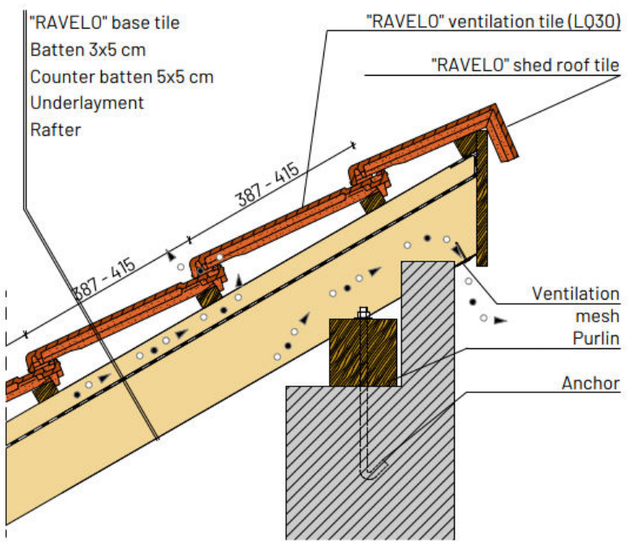
Ridge detail, with ventilation tile



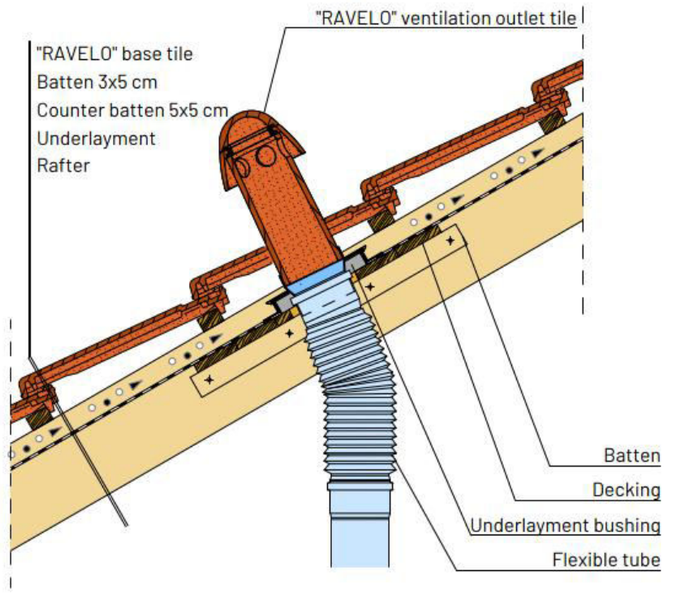
Ridge detail, with ridge connection ventilation tile



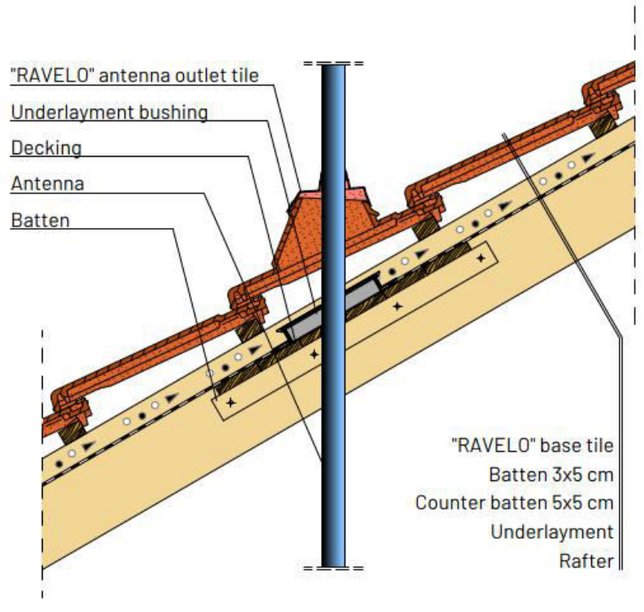
Wall connection detail



Shed ridge detail, with shad roof tile

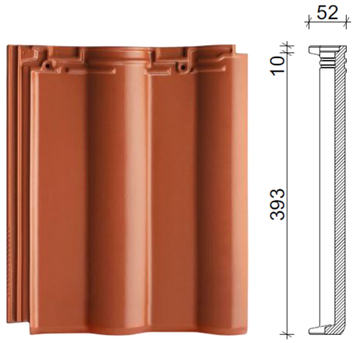


Clay ventilation outlet tile



Clay antenna outlet tile

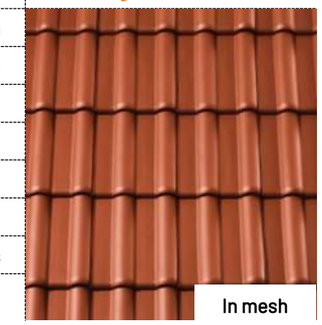
MAXIMA PRO®



Product datas

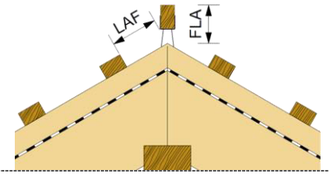
Size	width:	329 mm
	length:	397 mm
	height:	52 mm
	thickness:	11 mm
Weight:		3,7 kg
Packaging	bundle:	4 pcs
	pallet:	240 pcs
Standrad roof pitch:		22°

Covering method



Technical specification of the roof cover

	minimum	average	maximum
Batten distance	310 mm	330 mm	350 mm
Covering width	300 mm	300 mm	300 mm
Consumption	10,8 pcs/m²	10,1 pcs/m²	9,5 pcs/m²
Covering type		single cover	
Covering weight		37,40 kg/m²	



LAF: distance of the upper batten

FLA: height of the ridge batten

PT ridge tile and 30x50 batten

Roof pitch	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°
LAF [mm]	115	110	100	100	100	100	100	100	105	110	✖
FLA [mm]	105	95	85	75	65	55	45	35	25	10	✖

PT ridge tile and 40x60 batten

LAF [mm]	115	110	100	95	95	95	95	90	90	95	95
FLA [mm]	110	105	95	85	75	65	55	45	35	20	10

PT ridge tile and50x50 batten

LAF [mm]	110	105	95	90	90	85	85	80	80	85	85
FLA [mm]	120	115	105	95	85	80	70	60	50	35	25

Underlayment requirement

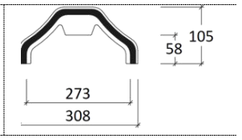
Unsupported underlayment	"CORE"	≥ 16°
Windproof underlayment	"BASIC"	≥ 14°
Watertight underlayment	"PRO"	≥ 12°
Waterproof underlayment	"ULTRA"	≥ 10°

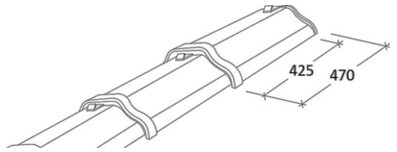
Required batten dimensions

Rafter distance	Batten dimension
≤ 800 mm	30 x 50 mm
810 – 900 mm	30 x 50 mm
910 – 1000 mm	40 x 60 mm

"PT" ridge tile 2,5 pcs/m







Rounded hip starter	Closing plate	Funct.c.p.	3 axis hip cap
			

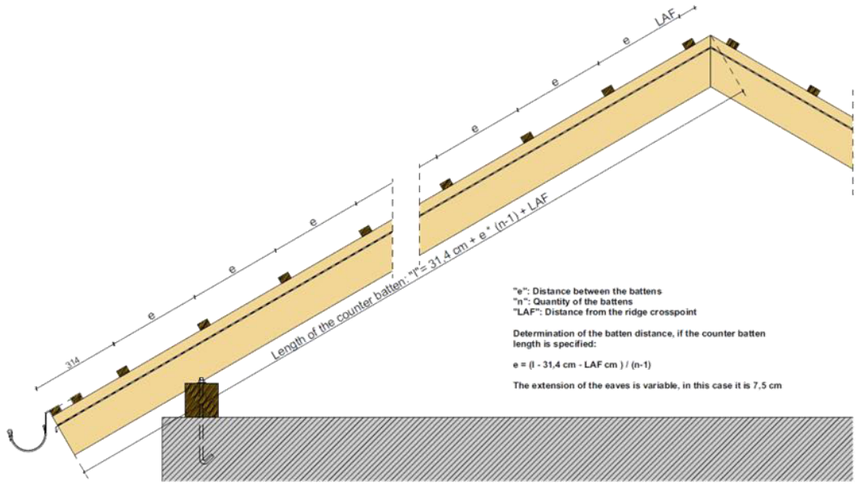
Hip starter	Shell shapedhip starter	4 axis hip cap
		

Clay accessories	Size	Quantity
Half tile	179x397	as needed
Verge tile - left	329x397	3,0 pcs/m
Verge tile - right	329x397	3,0 pcs/m
Double wave tile	329x397	3,0 pcs/m
Ventilation tile LQ 35	329x397	as required
Ridge connection ventilation tile	329x397	3,3 pcs/m
Ridge conn. vent. verge tl. left	329x397	as needed
Ridge conn. vent. verge tl. right	329x397	as needed

Clay outlets	Package content	Outlet type
Ø110 outlet vent tile	outlet tile, underlay connection bush	waste pipe ventilation room ventilation kitchen ventilation

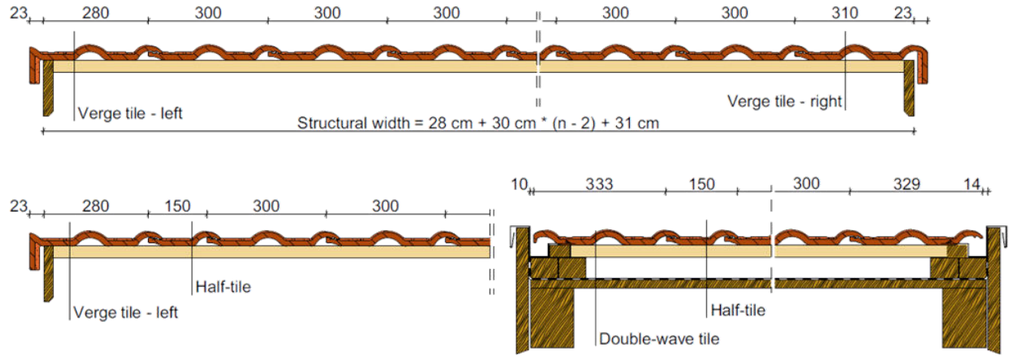
Fixing products

Name	Material	Application field
Mount-on stromclip for 30x50 mm battens	zinc-aluminium	Fixing against the wind in the edge zones and some cases in the genereal roof surface .
Mount-on stromclip for 40x50 mm battens	zinc-aluminium	
Mount-on stromclip for 40x60 mm battens	zinc-aluminium	
Nail-in stormclip	zinc-aluminium	
Fixing screw with EPDM sealing ring, 50 mm length	stainless steel	Fixing against loosed tiles along the edges and some cases in the average roof surfaces.
Clip with wire, 7-22 mm	stainless steel	Fixing cutted tiles along the hips and valleys
Universal stormclip	zinc-aluminium	Fixing shed roof tiles and tiles along the eaves



Roof batten alignement for "MAXIMA PRO" clay roof tile

Specification:	7,5 cm eave overhang and 30° roof pitch "PT" ridge tile and 30x50 mm roof battens, LAF = 100 mm		
Number of battens (n)	**min. batten dist.(e)**	**avg. batten dist.(e)**	**max. batten dist.(e)**
	310 mm	330 mm	350 mm
10	3 204	3 384	3 564
11	3 514	3 714	3 914
12	3 824	4 044	4 264
13	4 134	4 374	4 614
14	4 444	4 704	4 964
15	4 754	5 034	5 314
16	5 064	5 364	5 664
17	5 374	5 694	6 014
18	5 684	6 024	6 364
19	5 994	6 354	6 714
20	6 304	6 684	7 064
21	6 614	7 014	7 414
22	6 924	7 344	7 764
23	7 234	7 674	8 114
24	7 544	8 004	8 464
25	7 854	8 334	8 814
26	8 164	8 664	9 164
27	8 474	8 994	9 514
28	8 784	9 324	9 864
29	9 094	9 654	10 214
30	9 404	9 984	10 564
31	9 714	10 314	10 914
32	10 024	10 644	11 264
33	10 334	10 974	11 614
34	10 644	11 304	11 964
35	10 954	11 634	12 314
36	11 264	11 964	12 664
37	11 574	12 294	13 014
38	11 884	12 624	13 364
39	12 194	12 954	13 714
40	12 504	13 284	14 064



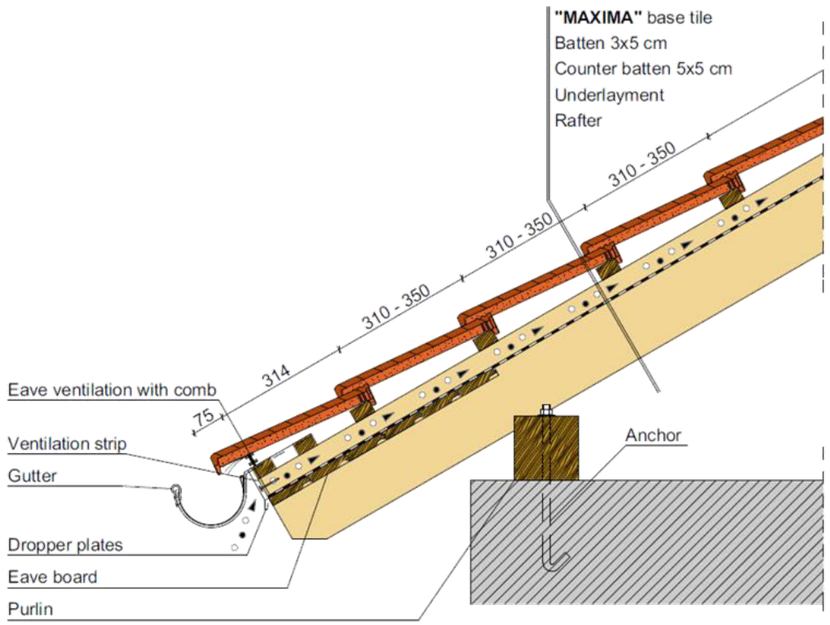
Structural width between the verge boards

	0	**1/2**	**1**	**1 1/2**	**2**	**2 1/2**	**3**	**3 1/2**	**4**	**4 1/2**
0	-	150	300	450	590	740	890	1 040	1 190	1 340
10	2 990	3 140	3 290	3 440	3 590	3 740	3 890	4 040	4 190	4 340
20	5 990	6 140	6 290	6 440	6 590	6 740	6 890	7 040	7 190	7 340
30	8 990	9 140	9 290	9 440	9 590	9 740	9 890	10 040	10 190	10 340
40	11 990	12 140	12 290	12 440	12 590	12 740	12 890	13 040	13 190	13 340
50	14 990	15 140	15 290	15 440	15 590	15 740	15 890	16 040	16 190	16 340
60	17 990	18 140	18 290	18 440	18 590	18 740	18 890	19 040	19 190	19 340
70	20 990	21 140	21 290	21 440	21 590	21 740	21 890	22 040	22 190	22 340
80	23 990	24 140	24 290	24 440	24 590	24 740	24 890	25 040	25 190	25 340
90	26 990	27 140	27 290	27 440	27 590	27 740	27 890	28 040	28 190	28 340
100	29 990	30 140	30 290	30 440	30 590	30 740	30 890	31 040	31 190	31 340

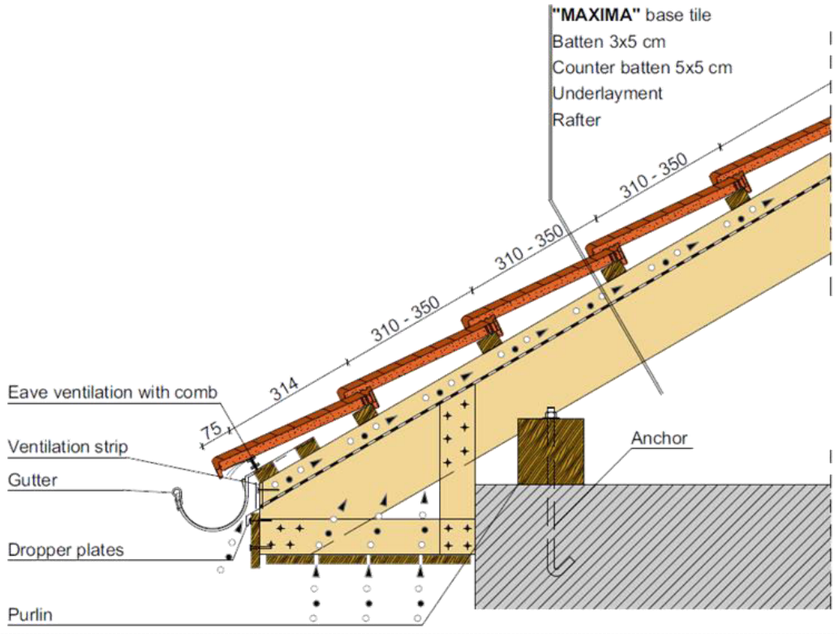
Structural width between the verge boards

	5	**5 1/2**	**6**	**6 1/2**	**7**	**7 1/2**	**8**	**8 1/2**	**9**	**9 1/2**
0	1 490	1 640	1 790	1 940	2 090	2 240	2 390	2 540	2 690	2 840
10	4 490	4 640	4 790	4 940	5 090	5 240	5 390	5 540	5 690	5 840
20	7 490	7 640	7 790	7 940	8 090	8 240	8 390	8 540	8 690	8 840
30	10 490	10 640	10 790	10 940	11 090	11 240	11 390	11 540	11 690	11 840
40	13 490	13 640	13 790	13 940	14 090	14 240	14 390	14 540	14 690	14 840
50	16 490	16 640	16 790	16 940	17 090	17 240	17 390	17 540	17 690	17 840
60	19 490	19 640	19 790	19 940	20 090	20 240	20 390	20 540	20 690	20 840
70	22 490	22 640	22 790	22 940	23 090	23 240	23 390	23 540	23 690	23 840
80	25 490	25 640	25 790	25 940	26 090	26 240	26 390	26 540	26 690	26 840
90	28 490	28 640	28 790	28 940	29 090	29 240	29 390	29 540	29 690	29 840
100	31 490	31 640	31 790	31 940	32 090	32 240	32 390	32 540	32 690	32 840

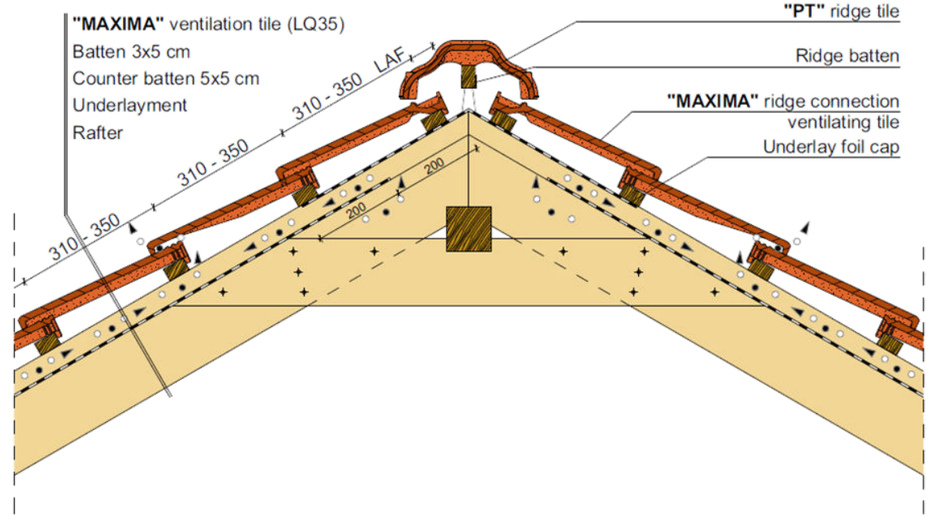
The structural widths below are calculated with 1-1 cm gap between the side plate of the verge tiles and the verge board!



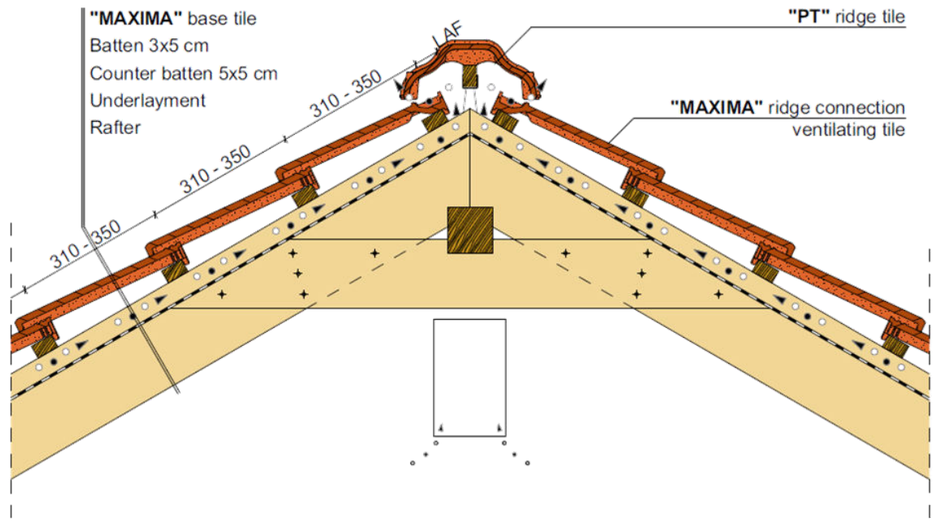
Eave detail



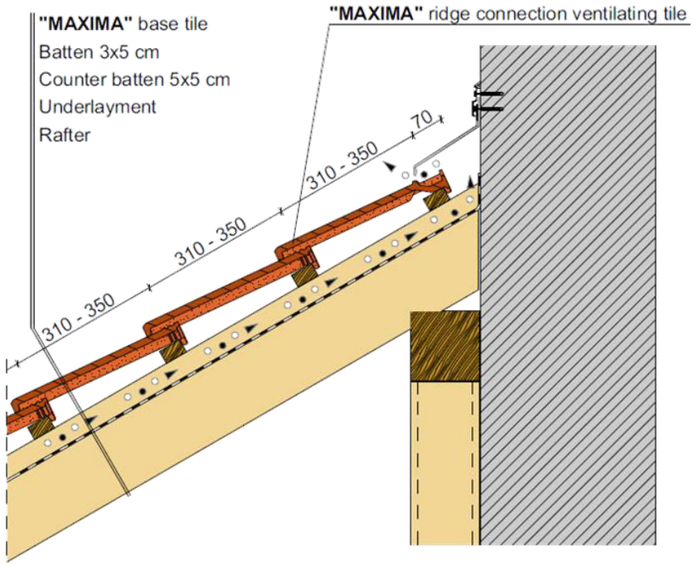
Closed eave detail



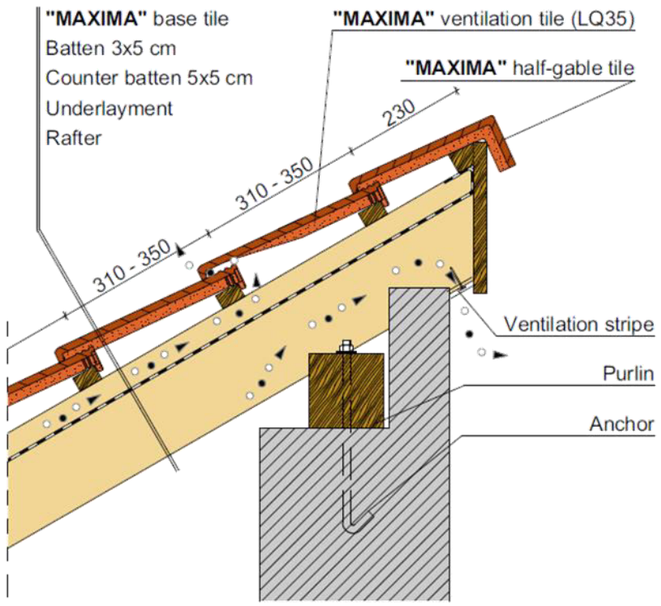
Ridge detail, with ventilation tile



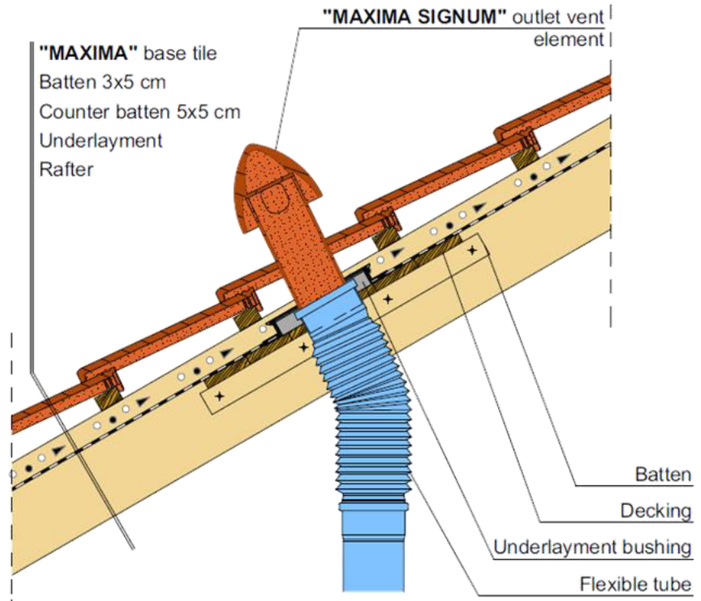
Ridge detail, with ridge connection ventilation tile



Wall connection detail



Shed ridge detail, with shad roof tile

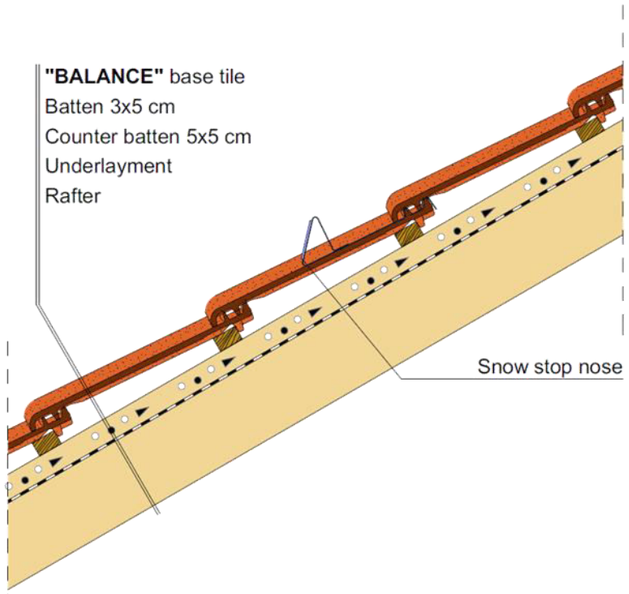


Clay ventilation outlet tile

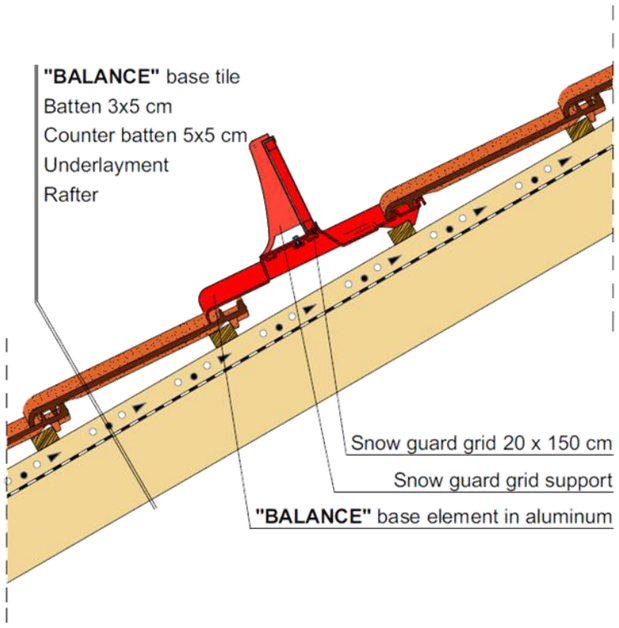
PART III.
Roof components



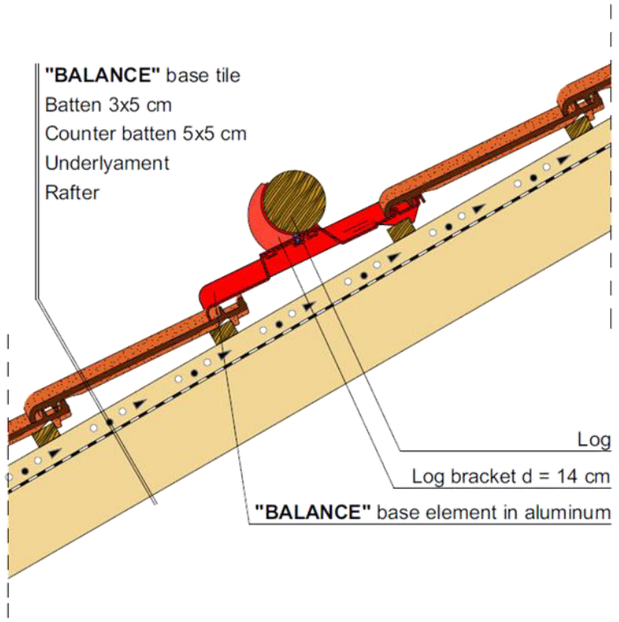
More informations:: swissporTON.hu



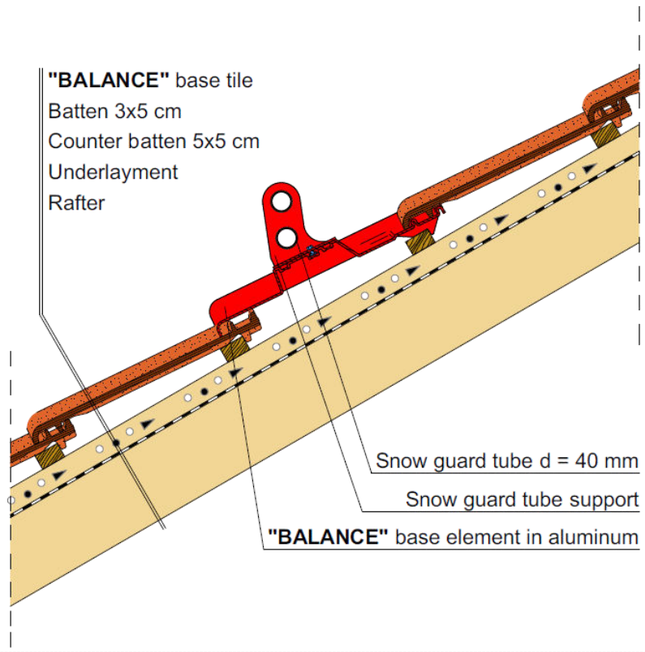
Snow stop nose placement



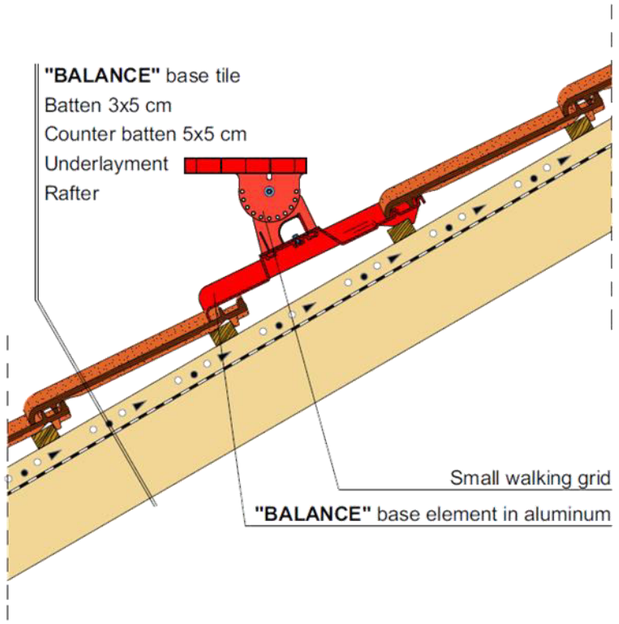
Snow guard grid placement



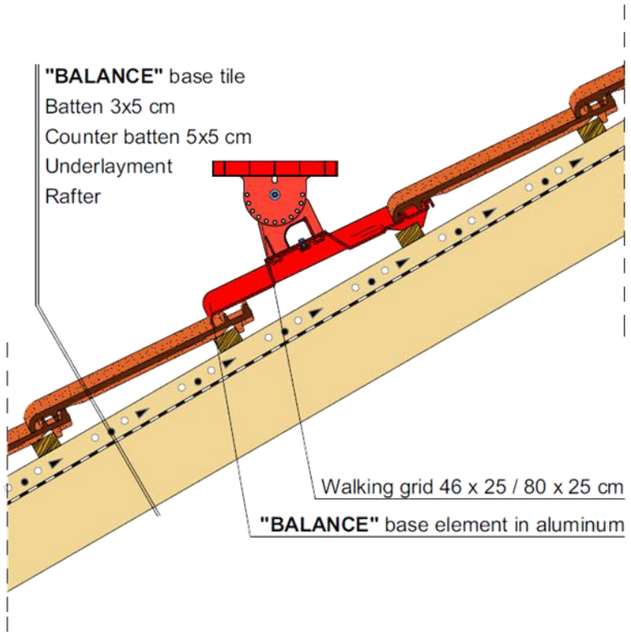
Log support placement



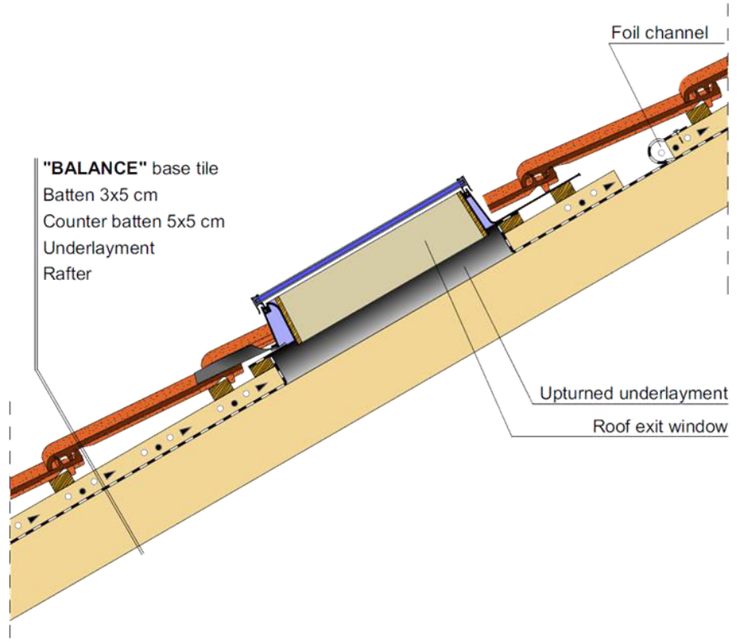
Snow guard tube placement



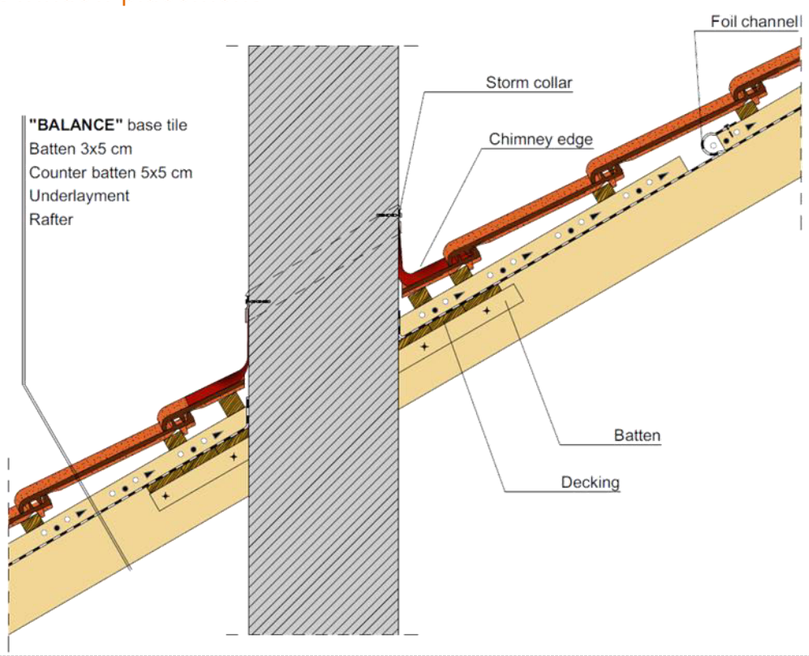
Single step placement



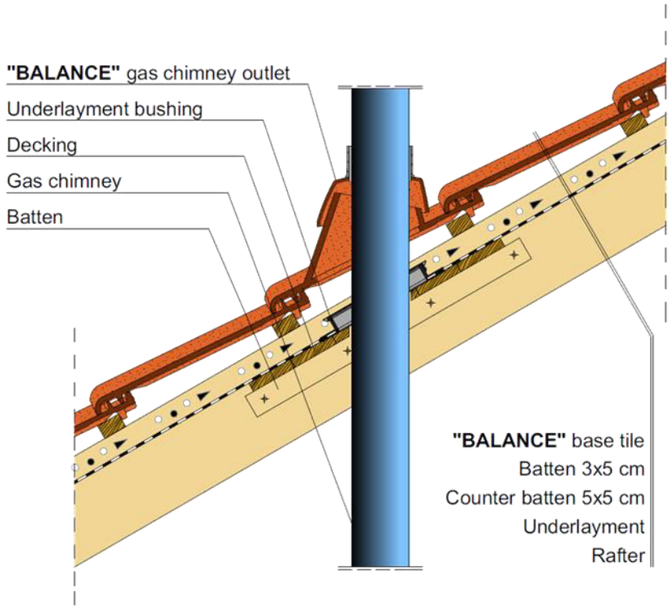
Walking grid placement



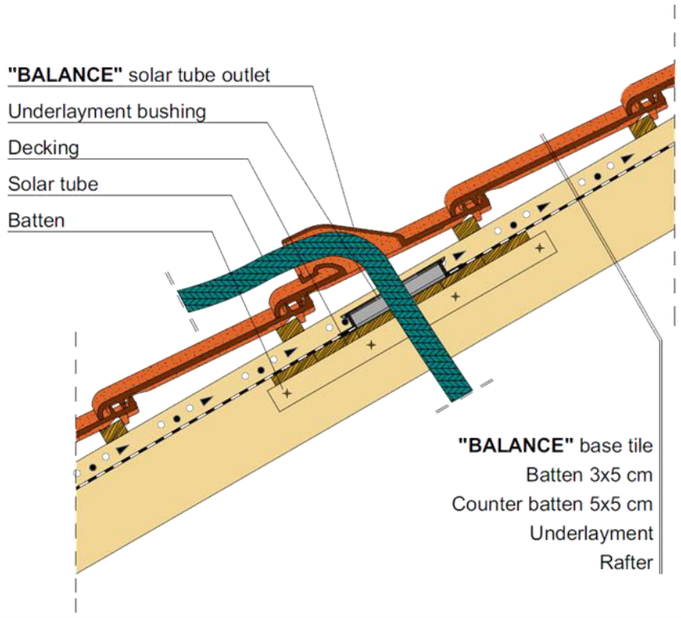
Roof exit window placement



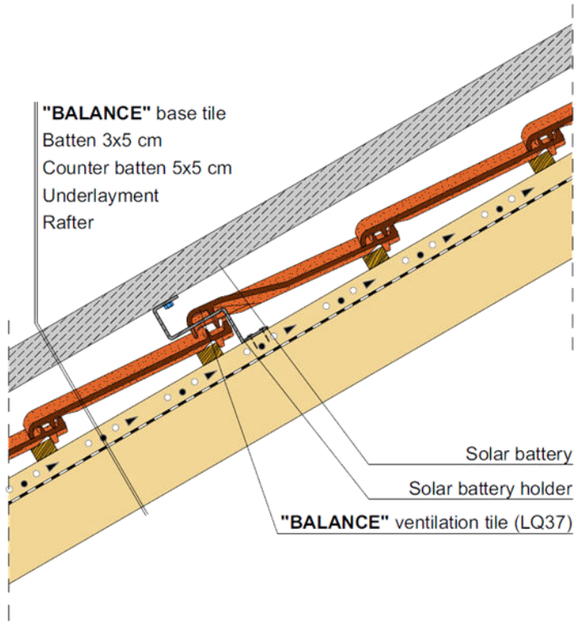
Chimney connection detail



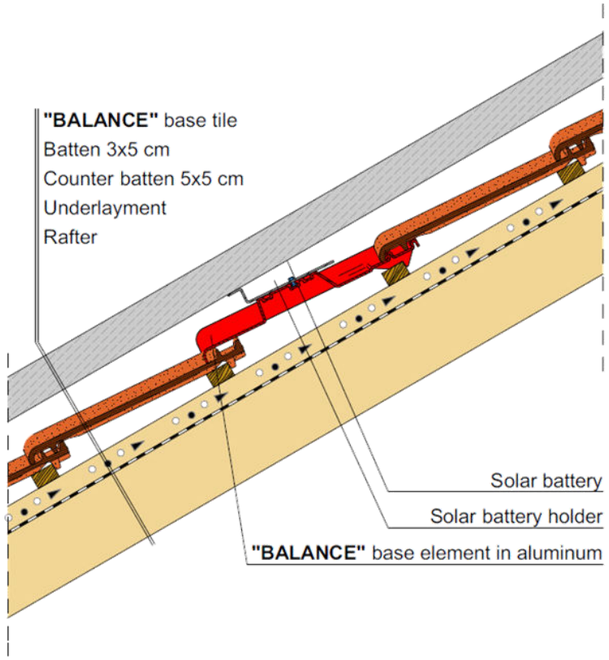
Clay gas chimney outlet detail



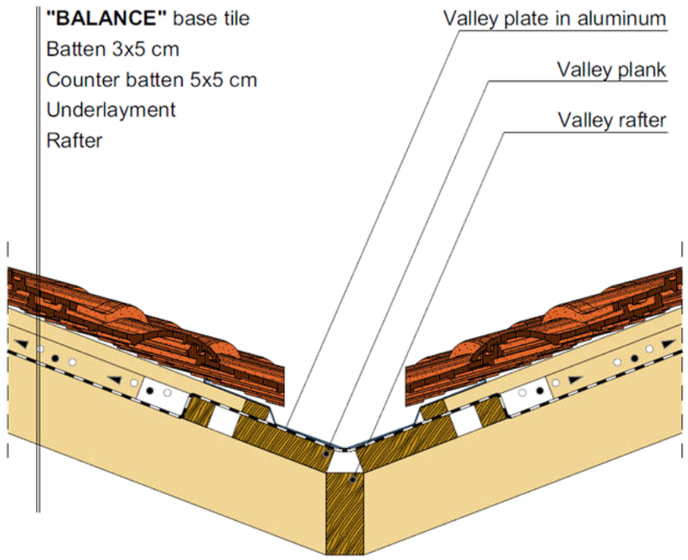
Clay solar tube outlet detail



Solar support set detail



Solar support detail



Valley detail

More informations:: swissporTON.hu

Notes

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Fenntartjuk a nyomtatásból eredő színbeli eltérések és műszaki változtatások jogát.
Tartalom lezárva 2026 november