Version: November 1st 2010

Technical data

Ardonit • Montana • Fasonit

Export

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Always make sure you are consulting the most recent version of the technical information. They are obtainable on request. You can also find them on our website www.svk.be

This is the English translation of the Belgian version. SVK slates must always be placed in compliance with the national and/or local building regulations and guidelines. If these do not comply with the SVK guidelines, SVK must be informed before the work starts.

1 INTRODUCTION

1.1 SCOPE

SVK slates are used for roofing and cladding, all constructions have to be executed according to the national standards and directives.

1.2 COMPOSITION AND MANUFACTURE

SVK slates are small size double pressed fibre cement flat sheets, composed of Portland cement, organic fibres of superior quality, mineral additives and water.

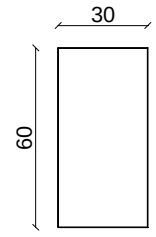
The basic colour of the slates is natural grey. The front and the sides of the slates are finished with a multi-layer acrylic based coating, highly counteracting the growth of moss. The underside of the slates is treated with a one layer coating and a colourless water-repellent resinous layer. This finishing offers optimal protection under all weather conditions.

1.3 PRODUCT RANGE

Check for availability in the country of application. The product range brochure is available from SVK.

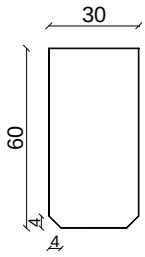
1.3.1 SLATES

Ardonit slates (with smooth surface)



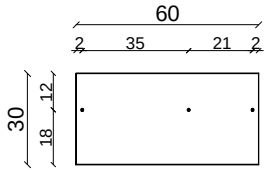
Vertical or horizontal, depending on the slating system.

Weight: 1,53 kg



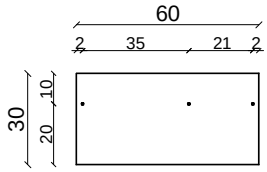
The cut corners or straight corners placed downwards, according to personal taste.

Weight: 1,52 kg



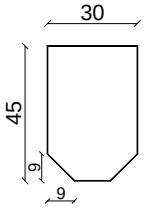
Provided with 3 holes for horizontal, double lap bond with vertical lap of 5 cm, for cladding.

Weight: 1,53 kg



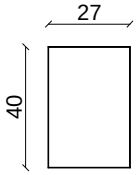
Provided with 3 holes for horizontal, double lap bond with vertical lap of 9 cm, for roofing (to order).

Weight: 1,53 kg

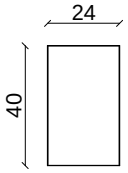


The cut corners or straight corners placed downwards, according to personal taste.

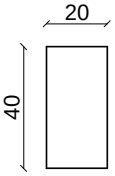
Weight: 1,08 kg



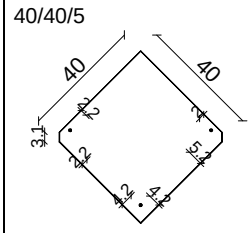
Weight: 0,92 kg



Weight: 0,82 kg

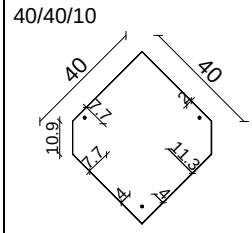


Weight: 0,68 kg



Provided with 3 holes, with overlap 5 cm, for cladding only.

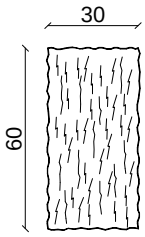
Weight: 1,33 kg



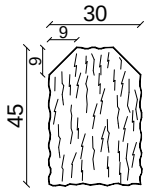
Provided with 3 holes, with overlap 10 cm, for roofing and cladding.

Weight: 1,31 kg

Montana slates (with textured surface and dressed edges)

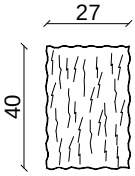


Weight: 1,48 kg

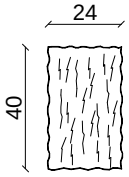


The cut corners or straight corners placed downwards, according to personal taste. The cut corners are not dressed.

Weight: 1,04 kg

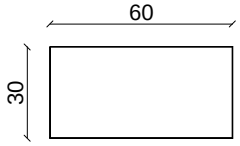


Weight: 0,89 kg



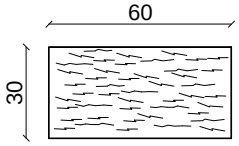
Weight: 0,79 kg

Fasonit slates (with smooth or textured surface and square edges)



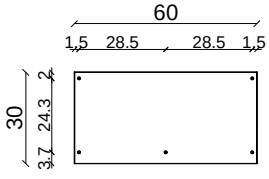
Vertical or horizontal, depending on the slating system.

Weight: 1,53 kg

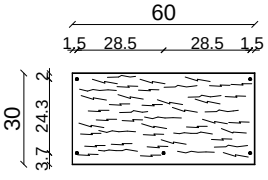


Vertical or horizontal, depending on the slating system.

Weight: 1,53 kg



Weight: 1,53 kg

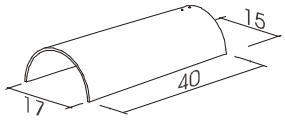


Weight: 1,53 kg

The dressed edges and the textured surface are portrayed schematically, not realistically.
Dimensions in cm.

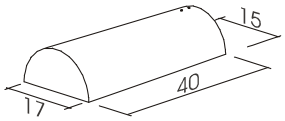
1.3.2 ACCESSORIES

1.3.2.1 Half round ridge



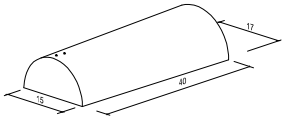
Number per m: 3,03
Effective length: 33 cm
Weight per piece: 1,420 kg
(Minimum roof pitch: 35 °)

1.3.2.2 Half round start end for half round ridge



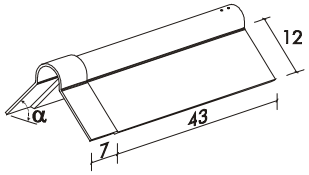
Effective length: 33 cm
Weight per piece: 1,480 kg

1.3.2.3 Half round stop end for half round ridge



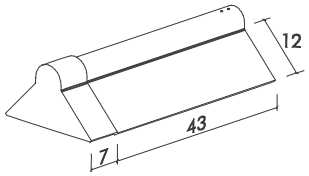
Effective length: 33 cm
Weight per piece: 1,480 kg

1.3.2.4 Roll-top ridge type A



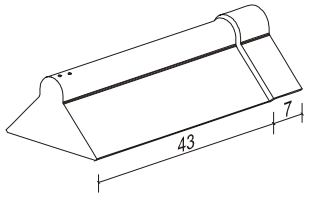
Number per m: 2,33
Effective length: 43 cm
Weight per piece: 1,820 kg
Roof pitch α: 30° (ridge angle 120°)
45° (ridge angle 90°)

1.3.2.5 Start end for roll-top ridge type A



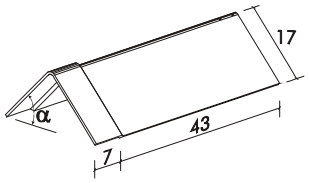
Effective length: 43 cm
Weight per piece: 1,900 kg

1.3.2.6 Stop end for roll-top ridge type A



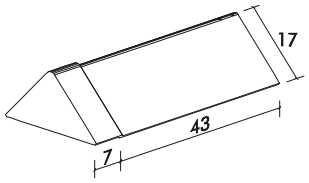
Effective length: 43 cm
Weight per piece: 1,900 kg

1.3.2.7 Plain angle ridge type B



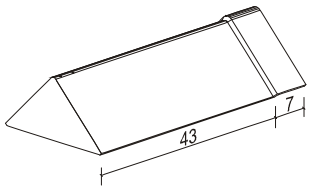
Number/m: 2,33
Effective length: 43 cm
Weight/piece: 2,0 kg
Roof pitch α: 25° (= ridge angle 130°)
30° (= ridge angle 120°)
40° (= ridge angle 100°)
45° (= ridge angle 90°)

1.3.2.8 Start end for plain angle ridge type B



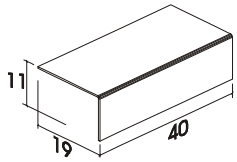
Effective length: 43 cm
Weight/piece: 2,1 kg

1.3.2.9 Stop end for plain angle ridge type B



Effective length: 43 cm
Weight/piece: 2,1 kg

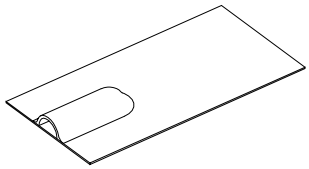
1.3.2.10 Verge slate



Weight/piece: 0,960 kg
Overlap: subject to exposition and roof pitch.
The verge slates are placed on top of the regular slates.

Overlap (cm)	**Number/m**
9	3,23
11	3,45
13	3,70

1.3.2.11 Fibre-cement ventilation slate

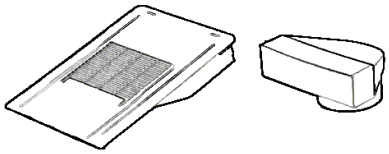


Sizes	**Weight**
60 x 30 cm	1,80 kg
45 x 30 cm	1,40 kg
40 x 27 cm	1,07 kg
40 x 24 cm	0,98 kg
40 x 40/10 cm	1,50 kg

Ventilation section: ca. 45 cm²

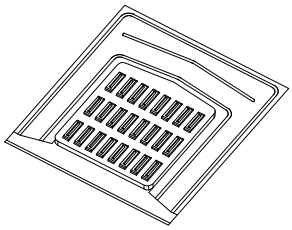
To achieve ventilation for the space below, an opening must be made in the underlying slates at the same height of the opening of the ventilation slate.

1.3.2.12 Synthetic ventilation slate



Width: 29 cm
Height: 38 cm
Joint with a 100 mm diameter for ventilating the waste stack
Ventilation section: 140 cm²
Colour: dark grey

1.3.2.13 Zinc ventilation slate



Width: 31 cm
Height: 33,5 cm
Ventilation section: 60 cm²
Colour: black

1.3.3 OTHER ACCESSORIES

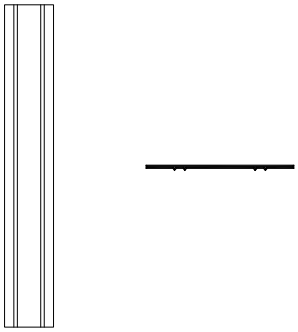
1.3.3.1 Polypropylene comb filler

Length: 100 cm
Colour: brown

1.3.3.2 Synthetic ventilation under-ridge

Length: 5 m/roll
Width: 22 cm - halfround ridge (see § 1.3.2.1)
30 cm - ridge type A (see § 1.3.2.4)
- ridge type B (see § 1.3.2.7)
Ventilation section: 160 cm²/m
Colour: black

1.3.3.3 Polyethylene for joints



Length: 30 cm
Width: 5 cm
(for horizontal, single lap)

1.3.3.4 Slate nail

1.3.3.5 Slate nail – crenelated

1.3.3.6 Disc rivet

1.3.3.7 Ridge clip

1.3.3.8 Drive hook

1.3.3.9 Drive hook with hump

1.3.3.10 Wrap hook

1.3.3.11 Wrap hook with hump

1.3.3.12 Drive hook type crosinus

The drive and wrap hooks are available in the following materials: copper, stainless steel and black stainless steel.

1.4 PRODUCT QUALITY

1.4.1 MECHANICAL AND PHYSICAL CHARACTERISTICS

General performance

- Strength:
  SVK fibre cement slates exceed the strength requirements of EN 492, class B (highest classification) achieving an average bending moment of 70 Nm/m (far above the requirements for Class B).
  Their E-modulus under flexion is approximately 16000 N/mm² (air dry).
  The slates have a minimum density - oven dry - of 1700 kg/m³ (nominal density: 1800 kg/m³) and a nominal thickness of 4,1 mm.

- Reaction to fire:
  SVK slates have been tested and are classified A2-s2-d0 according the new European Standard (EN 13501-1). They are defined as 'material of limited combustibility' according to the Approved Document B 'Fire Safety'.

- Environmentally friendly:
  At SVK we take our environmental responsibilities seriously. SVK not only purifies and recycles excess production water, the slates are also coated with a water based acrylic coating.

- Moss inhibiting constituents:
  In order to prevent moss growth, special moss inhibiting constituents are added to the coating.

- Thermal:
  When there is no ventilation between the roof underlay and the slates, the 'R' value of the roof covering includes the roof covering and airspace behind the slates (approx. 0,12 m^2K/W). An 'R' value should be added for the roof underlay.
  We do however advise to ventilate the air gap between the roof underlay and the roof covering. In this case the 'R' value of the roof covering, which is almost negligible anyway, cannot be taken into account.

- Frost:
  SVK slates are frost resistant. They meet the requirements of EN 492.

- Heat:
  After an initial period of stabilisation, SVK slates are unaffected by the normal range of climatic temperatures (- 20 °C to + 70 °C). The coefficient of thermal linear expansion α is $7{,}5.10^{-6}$ m/mK. Therefore slates should be laid with a gap of 4 mm to accommodate any movement generated by changes in temperature and to facilitate the fitting of the crampion.

- Sunlight:
  The acrylic coating used on the slate surface has excellent colour stability proven over long periods of exposure to UV and sunlight.

- Biological:
  SVK slates are vermin and rot proof. The acrylic coating has additives to reduce the potential growth of moss and/or lichen.

- Identification:
  All slates are identifiable by a printed code on their backside.

Dimensions

- Thickness : 4 mm (nominal: 4,1 mm)

- Tolerances on length/width : ± 3 mm
- Tolerances on thickness : - 0,4 mm / + 1,0 mm

Quality performance

	European Standards (EN) or average market value (MV)	SVK slates average values	Relation to EN requirement or general evaluation
STRENGTH (EN 492)			
Bending strength Size 60/30	Class B ≥ 50 Nm/m (EN) Class A ≥ 35 Nm/m (EN)	Class B - 70 Nm/m	40 % above
DURABILITY (EN 492)			
Water absorption	ca. 7 % (MV)	< 4%	43 % better
Durability requirements (climatological performances)			
Freeze – thaw	L ≥ 0,75 (EN)	L = 1	33 % better
Soak – dry	L ≥ 0,75 (EN)	L = 1	33 % better
Immersion in warm water	L ≥ 0,75 (EN)	L = 1	33 % better
COLOUR (EN ISO 11341, EN ISO 2409 and ASTM G 155)			
Adhesion of paint	class 0 to 5 (EN)	class 0	= best class
Conductivity of the paint			
Top side of slate	-	50 µS/cm	= excellent
Back of slate	-	30 µS/cm	= excellent
Colour consistency	-	No sign of chalking	= excellent
Q Sun Test (2.000 hours of exposure)	-	colour consistency	= excellent

1.4.2 QUALITY CERTIFICATES

BB - 212 - 683 - 492 - 01

K24136

Europe

- CE-marking;
  SVK slates comply with all requirements of EN 492 (type NT, class B = best class);

Belgium

- SVK slates have a *BENOR-quality label*, under the continues supervision of the SECO-control organisation;

Netherlands

- SVK slates have a NL BSB® certificate.

The site-work must be in accordance with the procedures and requirements of all national standards.

1.5 MAINTENANCE

Just like any other roofing material, slates are subject to pollution and ageing. In time **dust and atmospheric pollution sedimentation** appear on the roofing. Moss is also hard to prevent and it does not depend on the type of roofing; moss can attach itself to any kind of material.

Even though there is a **moss-inhibiting component in the coating** of the slates, external factors play a large part in the roof becoming green or not. It actually aren't the slates that become green, it's **the dust and the dirt** on the slates that is an excellent **soil for moss and algae**.

We elucidate this phenomenon a bit further:

1.5.1 CAUSE OF THE POLLUTION

The intensity of the moss development is highly dependable on:

- roof orientation
  Mosses mainly develop on the parts of the roof that are exposed to **little or no sunshine**, such as the roof surfaces facing **north** or those that are permanently lying in the shadow.

- ventilation between underlay and slates
  Good ventilation ensures that the roof covering remains damp less long. **Mosses and algae develop on the sand and dust particles** that attach themselves easiest to a wet surface. A good ventilation between the underlay and the slates contributes significantly to the roof surface drying up more quickly and consequently slows down moss development.

- the presence of trees and plants in the immediate environment
  The **presence of trees and plants** in the vicinity naturally has a negative effect.

- acid rain
  The **"acid rain"** of late forms an acid environment on the roof in which moss and algae thrive.

The slates becoming green has no effect whatsoever on the quality of the slates. But to ensure the appearance, the life span and watertightness of the roof, the norm and prescriptions recommend **regular maintenance**.
This can be done by a firm specialised in cleaning roofs. If you want to do it yourself, there are chemical products on the market to clean the roof surface.

1.5.2 METHOD

1.5.2.1 Mechanical cleaning

The moss is removed by brushing the roof with a hard, but not a metal bristle. Be sure not to scratch the surface of the materials, dust particles adhere themselves quicker on a rough surface, which aids moss development.
Finally the roof surface is thoroughly rinsed. Be sure to prevent dust and moss from ending up in the rainwater-well.

A second possibility is the cleaning of the roof with a pressure washer. These works are preferably carried out by a specialised firm because of the risks it holds.

1.5.2.2 Chemical cleaning

When the roof is fully dried out, a good moss detergent is applied that penetrates the material sufficiently to destroy all moss and algae buds.

Depending on the product used it may be necessary to, after sufficient absorption of the product, remove the remaining pieces of moss from the roof by bristling, rinsing or by detaching the drains to prevent these moss remains and the applied product from entering the water drainage system.

Products that might affect the slates, their coating or the metal parts used for roofing (nails, disc rivets, hooks, gutters, etc.) are not to be used.

The safety aspect during the roof and maintenance works were not dealt with in our technical information. We refer to national safety standards.

Check for application rules in the country of application.

2 PLACEMENT

These guidelines apply to a building height of **maximum 15 m**. Applying a design for higher buildings should be calculated by an engineering agency.

2.1 SAFETY

Roofing is a hazardous activity and all statutory regulations applying to roofing work during construction, maintenance and repair should be respected.
Under no circumstance is it allowed to walk directly on the slates. Suitable, properly fixed crawling boards (planks, ladders or other provisions) must be used at all times.

2.2 TRANSPORT AND STORAGE

SVK slates are bundled, stacked on pallets and shrink-wrapped. They can be piled to a height of maximum 4 pallets.
The wrapping keeps the slates in place during transport, but does not offer an adequate protection against weather conditions. For this reason the slates must always be covered during transport. Slates should always be stored with their wrapping on dry level ground in a **covered** and **well-ventilated** area or under a vapour open tarpaulin.

Remnants of a pack that aren't worked up immediately have to be stored under cover. They are put either vertically on two battens, or horizontally on a perfectly level surface. Condensation and rainwater ingress between stacked slates must absolutely be prevented, to avoid efflorescences.
In case of storage for a prolonged period we strongly advise to partially open up the shrink film, even in case of storage under cover, to prevent condensation under the foil, and thus efflorescences.

Remainders of a pallet of slates, that will not be used shortly, are stocked as described above, either vertically on two battens or horizontally on a level and perfectly dry surface.

When transporting and manipulating building materials, the legislation concerning lifting and hoisting must be respected at all times.

Underlays, battens and counterbattens, accessories and all other materials needed for the roofing work must be stored in accordance with national and local regulations and the product storage prescriptions.

Number of slates per pallet:

Ardonit and Montana slates:

60 x 30 cm : 1.080 pieces, bundled per 15 pieces
45 x 30 cm : 1.440 pieces, bundled per 15 pieces
40 x 27 cm : 1.620 pieces, bundled per 20 pieces
40 x 24 cm : 1.980 pieces, bundled per 20 pieces
40 x 20 cm : 2.160 pieces, bundled per 20 pieces
40 x 40 x 10 cm : 1.080 pieces, bundled per 15 pieces
40 x 40 x 5 cm : 1.080 pieces, bundled per 15 pieces

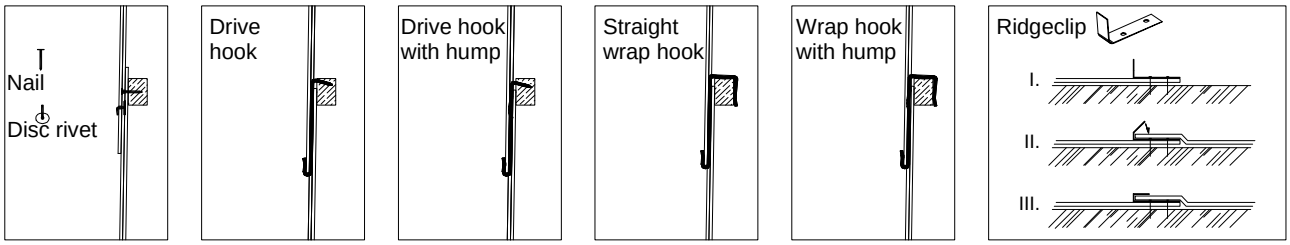
Fasonit slates:

60 x 30 cm : 600 pieces, bundled per 20 pieces

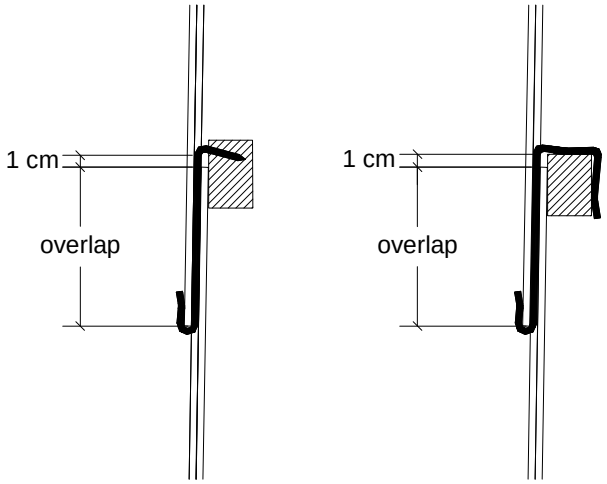
Important: Upon placing the slates at least 3 pallets should be mixed and placed simultaneously.

2.3 FIXATION

The fixing materials have to be made out of corrosion-resistant material such as copper, stainless or galvanised steel. Nature and number are determined by the type of slate, the kind of roof structure and the slating method used.



- The hooks must never be pushed in order to counteract as much as possible capillary action and creep.
- Disc rivets are bent downwards; not too tight, so some movement of the slate is still possible.
- When nailing the slates the holes are prepinned with a diameter greater than the slating nail.
- It's better to use crenelated nails (see § 1.3.3.5) than the normal slating nails (see § 1.3.3.4) because of a higher outpull-resistance.
- When using a wrap hook, take the thickness of the batten into account.
- Length of the hook = overlap + 1 cm.



Note:
- The number of applicable fixations can be found in the chapter about slating systems (see § 3).
  Some remarks: - building height ≤ 15 m;
  - in the edge areas or the areas surrounding roof punctures, all slates within 1 m are fastened with 2 nails.
- The drive or wrap hooks are only used on facade or roof pitches of 70° and up. On lower roof pitches the hump on the hook will widen the fine channels, which reduces the capillary action greatly (see § 2.4.1).
- The fixations and other metal accessories, that are used for fixation and finishing, must be made from a metal that is compatible with the slates and accessories.

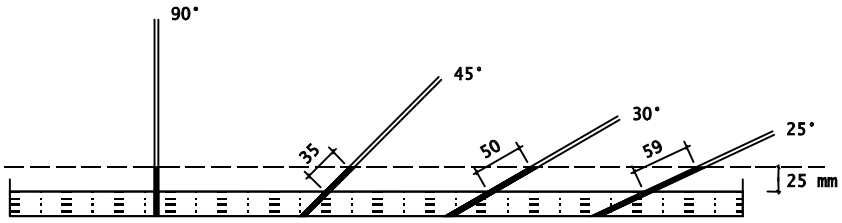
2.4 COVERING

The waterproofness of a slate roof depends on several factors, of which the most important ones are:
- capillarity;
- weather conditions;

and in case of a roof, also:
- length of the roof side (from gutter to ridge);
- roof pitch.

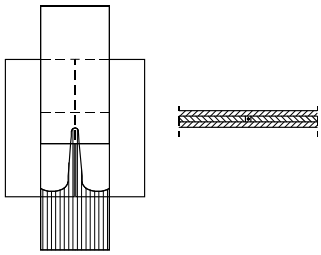
These factors together determine the slate overlap.

2.4.1 CAPILLARITY



Capillarity is the phenomenon where when a tube with a small diameter is placed in a tub, the fluid rises higher inside the tube than the water level inside the tub.
The same thing happens between two plates pressed firmly together. The harder the plates are pressed against each other, the higher the fluid will rise between them. The maximum gauge difference between the slates is about 25 mm, and this regardless of the fact that they are placed perpendicular or sloping. The actual rise between the slates varies depending on the inclination they are given. It rises if the roof pitch shrinks. Dust between the slates may strengthen the capillary effect even more.

This drawing above shows that, the smaller the inclination is, the bigger the overlap needs to be.



The form of the capillary process, when fixed with hooks under double lap is rendered on the adjacent figure.

The suction is strongly determined by the fact that the hook and the side edge of the slates form fine channels, which will start to act as capillary tubes. This suction can be diminished by using hooks with a hump (see § 1.3.3.9 and § 1.3.3.11), which widens the channels at certain places and slows down the capillary process.

2.4.2 WEATHER CONDITIONS

When a roof surface is strongly exposed to the predominant **winds**, the wind will try to hold up the water that flows down at the bottom edge of the slates and then propel it underneath. In dry weather **dust** is blown between the slates and in the joints. These factors influence the capillary process greatly. The measure in which a roof is protected or exposed to heavy wind and rain can only be determined at the site, taking into account several factors:
- screening by **surrounding buildings;**
- hilly or plane **landscape;**
- sea or mountain **region**.

2.4.3 LENGTH OF THE ROOF SURFACE

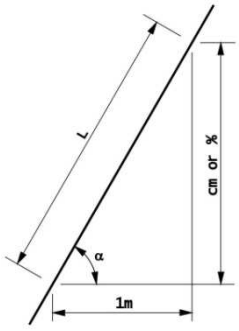
Because all the water that falls on the roof flows to the gutter, it's obvious that **the water layer gets thicker the closer you get to the gutter**. The fact that infiltrations usually occur at the bottom part of the roof proofs this thesis. The longer the roof surface (from gutter to ridge) the bigger the risk.
The amount of water that falls on a roof, is however not determined by the actual roof length, yet is proportional with the horizontal projection of it. E.g. a roof of 45° with an actual length of 7 m and a horizontal projection of 5 m (see table in § 2.4.4). **Experience has taught us that a horizontal projection of 5 m is the limit to where a normal overlap may be applied, above that the overlap needs to be increased**.

2.4.4 ROOF PITCH

When discussing the capillarity (see § 2.4.1) it was demonstrated that the actual rise of the capillary water grew as the inclination shrank. The smaller the inclination, the more the actual roof length approaches the horizontal projection. Moreover the speed at which the water flows down the roof gets slower when the roof has a fainter inclination. The flowing off takes longer, which makes the water layer even thicker. Add to that the fact that with smaller inclinations the sidelap, and consequently the width of the slate, start playing a bigger role, it is without a doubt clear that for the watertightness of a slate roof the roof pitch is a very important factor. Consequently with lower roof pitches a bigger overlap is necessary to guarantee the watertightness.

The minimum pitch for roofs covered with fibre-cement slates is 25° (47%). The minimum pitch is however also dependent on the roofing system used (see p. 17 and further).

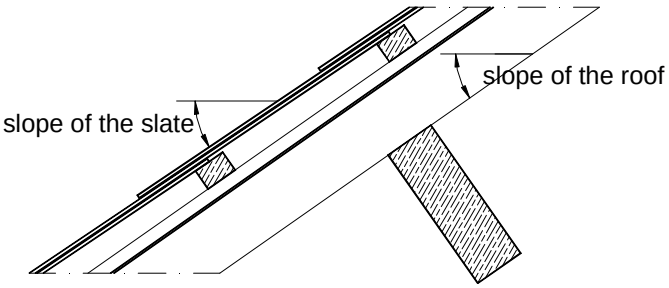
The roof pitch can be represented in 2 ways:
- in degrees;
- in cm per meter (or %).



Comparison degrees – percentages:

α (degrees)	%	Length of roof surface L per meter horizontal projection	α (degrees)	%	Length of roof surface L per meter horizontal projection
25	47	1,103	50	119	1,556
26	49	1,113	51	123	1,589
27	51	1,122	52	128	1,624
28	53	1,133	53	133	1,662
29	55	1,143	54	138	1,701
30	58	1,155	55	143	1,743
31	60	1,167	56	148	1,788
32	62	1,179	57	154	1,836
33	65	1,192	58	160	1,887
34	67	1,206	59	166	1,942
35	70	1,221	60	173	2,000
36	73	1,236	61	180	2,063
37	75	1,252	62	188	2,130
38	78	1,269	63	196	2,203
39	81	1,287	64	205	2,281
40	84	1,305	65	214	2,366
41	87	1,325	66	225	2,459
42	90	1,346	67	236	2,559
43	93	1,367	68	248	2,669
44	97	1,390	69	261	2,790
45	100	1,414	70	275	2,924
46	104	1,440	75	373	3,864
47	107	1,466	80	567	5,759
48	111	1,494	85	1143	11,474
49	115	1,524	90	-	-

Attention:



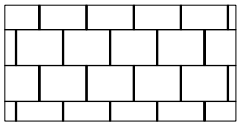
The pitch is always measured on the slate, at the overlap.
Because the slates lift each other up slightly, there is a difference between the roof pitch and the slate pitch. This may be of importance when determining the overlap in border cases. In the table with the roofing systems (p. 17 and further), the minimum pitch of the slates is mentioned.

Roofpitch difference (°) between the roof construction and the slates:

Overlap (mm)	Length (mm)		
	600	450	400
50 (vertical cladding only)	0,83	1,15	1,31
90	0,90	1,27	1,48
110	0,94	1,35	1,58
130	0,98	1,43	1,70

3 SLATING SYSTEMS

3.1 VERTICAL DOUBLE LAP



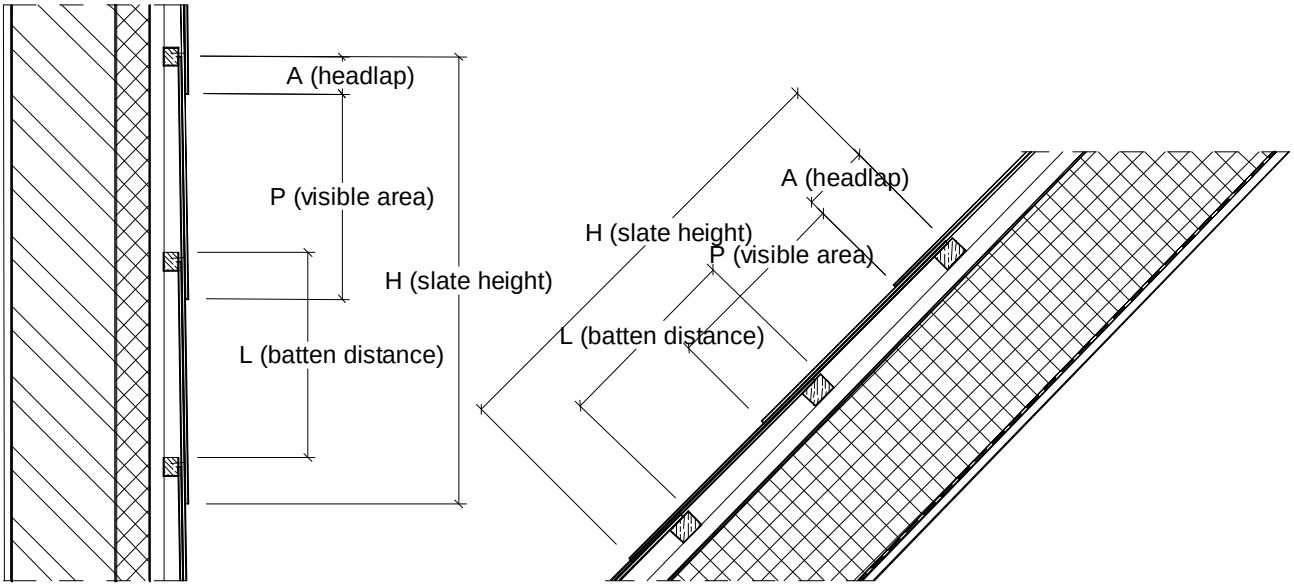
3.1.1 PRINCIPLE

This method is suitable for all rectangular slates. The slates are laid in broken bond. Every row of slates is partly covered by the two rows above, dividing each slate into three areas (see figure below):

- visible area;
- single lap area;
- double lap area (= headlap).

The double covered part is called **the overlap** (see § 2.4). The height of each of the two other parts equals the batten distance and is determined like this:

$$\text{L (batten distance)} = \frac{\text{H (slate height)} - \text{A (headlap)}}{2} = \text{P (visible area)}$$



FACADE CLADDING ROOF COVERING

De minimum pitch is 25°, measured on the slate.

To ensure the watertightness, certain ratios between slate size and headlap size should be respected:

The width of the slate is minimum 2 times the overlap.
The height of the slate is minimum 3 times the overlap.
The sidelap has to be at least equal to the headlap.

3.1.2 OVERLAP – MINIMUM ROOF PITCH

Minimum vertical overlap (A) in mm (according to NBN B 44-001):

Pitch	Normal circumstances	Unfavourable circumstances (1)
$70° \leq \alpha < 90°$	50	
$30° \leq \alpha < 70°$	90	110 SVK Novex underlay advisable
$25° \leq \alpha < 30°$	110 SVK Novex underlay mandatory 130 SVK Novex underlay advisable	

Note: Given the ratios and this table, we conclude that slates of the size 40/20 can only be used with a maximum overlap of 10 cm and a minimal roof pitch of 30° for Belgium. An underlay is mandatory in this case.

3.1.3 FIXATION

- With 1 hook, all sizes. On the outside (1m edge) of the roof or facade surfaces the slates are fixed supplementary with 2 nails.
- With 1 hook and 2 nails: roofs and facades exposed to strong winds and for bigger formats (60 x 30) under unfavourable circumstances (1).

With hooks the slates are placed 1 to 1,5 cm lower than the top edge of the battens. This means that the hooks are 1 cm longer than the vertical lap. It is advisable to only use stainless steel hooks.

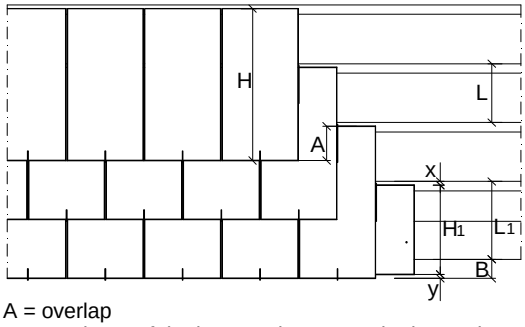
3.1.4 NUMBER AND DIMENSIONS

Size in cm	Overlap A in cm	Batten gauge L in cm		Pieces per m²		Weight per m² in kg	
		Ardonit and Fasonit slates	Montana slates	Ardonit and Fasonit slates	Montana slates	Ardonit and Fasonit slates	Montana slates
60 x 30	5*	27,5	27,25	11,96	12,27	18,30	18,12
	9	25,5	25,25	12,90	13,25	19,74	19,55
	11	24,5	24,25	13,43	13,79	20,54	20,36
	13	23,5	23,25	14,00	14,38	21,42	21,23
45 x 30	5*	20,0	19,75	16,45	16,93	17,74	17,62
	9	18,0	17,75	18,28	18,84	19,71	19,61
	11	17,0	16,75	19,35	19,97	20,87	20,78
	13	16,0	15,75	20,56	21,23	22,18	22,10
40 x 27	5*	17,5	17,25	20,86	21,55	19,14	19,09
	9	15,5	15,25	23,55	24,38	21,62	21,59
	11	14,5	14,25	25,17	26,09	23,11	23,10
	13	13,5	13,25	27,04	28,06	24,82	24,85
40 x 24	5*	17,5	17,25	23,42	24,26	19,11	19,09
	9	15,5	15,25	26,44	27,44	21,58	21,60
	11	14,5	14,25	28,26	29,36	23,06	23,11
40 x 20	5*	17,5	-	28,01	-	19,05	-
	9	15,5	-	31,63	-	21,51	-

Note: a side joint of 4 mm needs to be taken into account.
* Vertical cladding only.

(1) Unfavourable circumstances: coast, hill top, open field, horizontal projection of the roof surfaces is bigger than 5 m.

Dimensions of the bottom slates and the position of the bottom row battens



The height of the first row of slates, also called bottom slates:

H_1 = batten gauge L + overlap A – y

The bottom slates are fixed with 2 nails.

The distance between the bottom of the lowest batten and the top of the next batten:

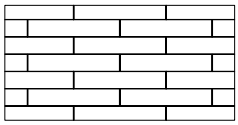
L_1 = batten gauge L + overlap A – overhang B + x

A = overlap
B = overhang of the bottom slates past the lowest batten (max. 5 cm)
L = batten gauge center-to-center, depending on slate height H and overlap A
x = space above the slate to nail into the batten, 1 to 1,5 cm
y = overhang of the second slate past the bottom slate, to create a dripping edge, e.g. 1 cm

Height slate in cm H	Overlap in cm A	Ardonit and Fasonit slates			Montana slates		
		Batten gauge center-to-center in cm L	H_1 in cm = L+A-y (y = e.g. 1 cm)	L_1 in cm = L+A-B+x (B = e.g. 5 cm) (x = e.g. 1 cm)	Batten gauge center-to-center in cm L	H_1 in cm = L+A-y (y = e.g. 1 cm)	L_1 in cm = L+A-B+x (B = e.g. 5 cm) (x = e.g. 1 cm)
60	5*	27,5	31,5	28,5	27,25	31,25	28,25
	9	25,5	33,5	30,5	25,25	33,25	30,25
	11	24,5	34,5	31,5	24,25	34,25	31,25
	13	23,5	35,5	32,5	23,25	35,25	32,25
45	5*	20,0	24,0	21,0	19,75	23,75	20,75
	9	18,0	26,0	23,0	17,75	25,75	22,75
	11	17,0	27,0	24,0	16,75	26,75	23,75
	13	16,0	28,0	25,0	15,75	27,75	24,75
40	5*	17,5	21,5	18,5	17,25	21,25	18,25
	9	15,5	23,5	20,5	15,25	23,25	20,25
	11	14,5	24,5	21,5	14,25	24,25	21,25
	13	13,5	25,5	22,5	13,25	25,25	22,25

* Vertical cladding only.

3.2 HORIZONTAL DOUBLE LAP – BROKEN BOND



3.2.1 PRINCIPLE

This method is a variation to the double lap method (see § 3.1.1). The rectangular slates are placed horizontally here.
This method can be applied for both **facade cladding** and **roofing** (roof pitch minimal 30°). This method is not applicable in unfavourable conditions (2).

Just like with double lap method, because of the watertightness, certain ratios between the size of the slate and the overlap need to be respected:

The width of the slate is minimum 2 times the overlap.
The height of the slate is minimum 3 times the overlap.
The sidelap has to be at least equal to the headlap.

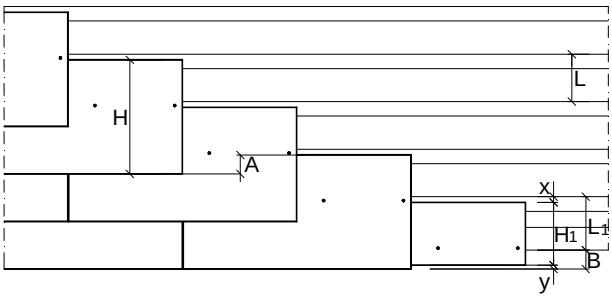
3.2.2 OVERLAP – MINIMUM ROOF PITCH

Roof pitch	Overlap in mm
70° ≤ α < 90°	50
30° ≤ α < 70°	90

3.2.3 FIXATION

The slates are fixed with 2 nails, extra crenelated (see § 1.3.3.5). The slate 30/60 is fixed with 3 nails.
For the position of the middle fixing, one should take the driving wind direction into account. The slates need to be prepinned (position of the holes, see drawings in table § 3.2.4).

Dimensions of the bottom slates and the position of the bottom row battens



The height of the first row of slates, also called bottom slates:

H_1 = batten gauge L + overlap A – y

The bottom slates are fixed with 2 nails.

The distance between the bottom of the lowest batten and the top of the next batten:

L_1 = batten gauge L + overlap A – overhang B + x

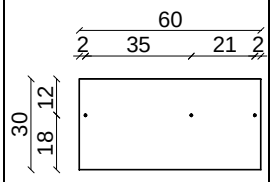
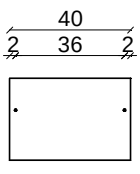
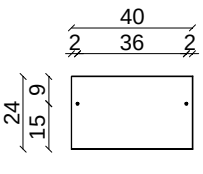
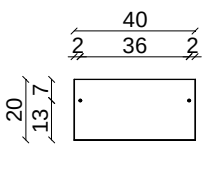
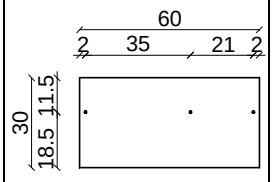
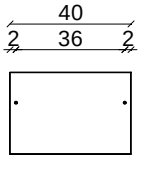
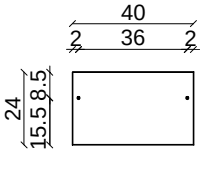
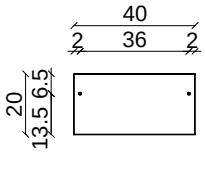
A = overlap
B = overhang of the bottom slates past the lowest batten (max. 5 cm)
L = batten gauge center-to-center, depending on slate height H and overlap A
x = space above the slate to nail into the batten, 1 to 1,5 cm
y = overhang of the second slate past the bottom slate, to create a dripping edge, e.g. 1 cm

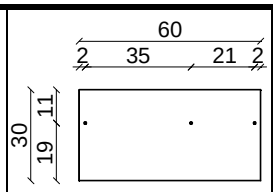
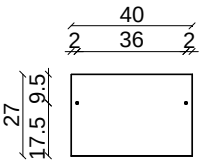
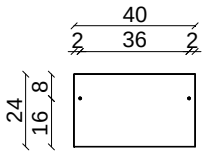
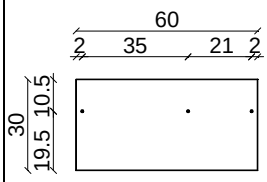
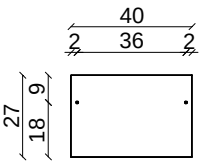
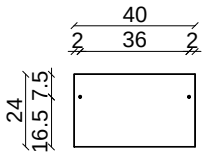
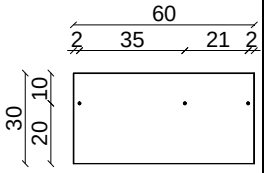
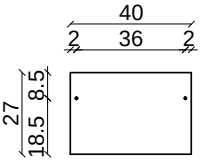
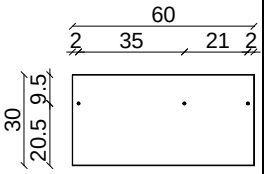
(2) Unfavourable circumstances: coast, hill top, open field, horizontal projection of the roof surfaces is bigger than 5 m.

Height of the slate in cm H	Overlap in cm A	Batten gauge center-to-center in cm L	H_1 in cm = L+A-y (y = e.g. 1 cm)	L_1 in cm = L+A-B+x (B = e.g. 5 cm) (x = e.g. 1 cm)
30	5* 6 7 8 9 10	12,5 12,0 11,5 11,0 10,5 10,0	16,5 17,0 17,5 18,0 18,5 19,0	13,5 14,0 14,5 15,0 15,5 16,0
27	5* 6 7 8 9	11,0 10,5 10,0 9,5 9,0	15,0 15,5 16,0 16,5 17,0	12,0 12,5 13,0 13,5 14,0
24	5* 6 7 8	9,5 9,0 8,5 8,0	13,5 14,0 14,5 15,0	10,5 11,0 11,5 12,0
20	5* 6	7,5 7,0	11,5 12,0	8,5 9,0

* Vertical cladding only.

3.2.4 NUMBER AND DIMENSIONS

	30/60	27/40	24/40	20/40
Overlap: 5 cm (vertical cladding only)	 Ardonit slates with holes on stock.	 Holes to be drilled on site.	 Holes to be drilled on site.	 Holes to be drilled on site.
Visible area W x H (cm)	60 x 12,5	40 x 11	40 x 9,5	40 x 7,5
Gauge (cm)	12,5	11	9,5	7,5
Number of slates (pieces per m²)	13,25	22,5	26,06	33
Weight (kg per m²)	20,26	20,66	21,26	22,44
Battens (m per m²)	8,0	9,1	10,5	13,3
Overlap: 6 cm	 Holes to be drilled on site.	 Holes to be drilled on site.	 Holes to be drilled on site.	 Holes to be drilled on site.
Visible area W x H (cm)	60 x 12	40 x 10,5	40 x 9	40 x 7
Gauge (cm)	12	10,5	9	7
Number of slates (pieces per m²)	13,8	23,6	27,5	35,4
Weight (kg per m²)	21,11	21,64	22,44	24,05
Battens (m per m²)	8,3	9,5	11,1	14,3

Overlap: 7 cm	 Holes to be drilled on site.	 Holes to be drilled on site.	 Holes to be drilled on site.	
Visible area W x H (cm)	60 x 11,5	40 x 10	40 x 8,5	-
Gauge (cm)	11,5	10	8,5	-
Number of slates (pieces per m²)	14,4	24,8	29,1	-
Weight (kg per m²)	22,03	22,72	23,76	-
Battens (m per m²)	8,7	10	11,8	-
Overlap: 8 cm	 Holes to be drilled on site.	 Holes to be drilled on site.	 Holes to be drilled on site.	
Visible area W x H (cm)	60 x 11	40 x 9,5	40 x 8	-
Gauge (cm)	11	9,5	8	-
Number of slates (pieces per m²)	15,1	26,1	30,9	-
Weight (kg per m²)	23,03	23,92	25,3	-
Battens (m per m²)	9,1	10,5	12,5	-
Overlap: 9 cm	 Ardonit slates with holes when ordered.	 Holes to be drilled on site.		
Visible area W x H (cm)	60 x 10,5	40 x 9	-	-
Gauge (cm)	10,5	9	-	-
Number of slates (pieces per m²)	15,8	27,5	-	-
Weight (kg per m²)	24,12	25,25	-	-
Battens (m per m²)	9,5	11,1	-	-
Overlap: 10 cm	 Holes to be drilled on site.			
Visible area W x H (cm)	60 x 10	-	-	-
Gauge (cm)	10	-	-	-
Number of slates (pieces per m²)	16,6	-	-	-
Weight (kg per m²)	25,33	-	-	-
Battens (m per m²)	10	-	-	-

Note: a side joint of 4 mm needs to be taken into account.
Dimensions in cm.

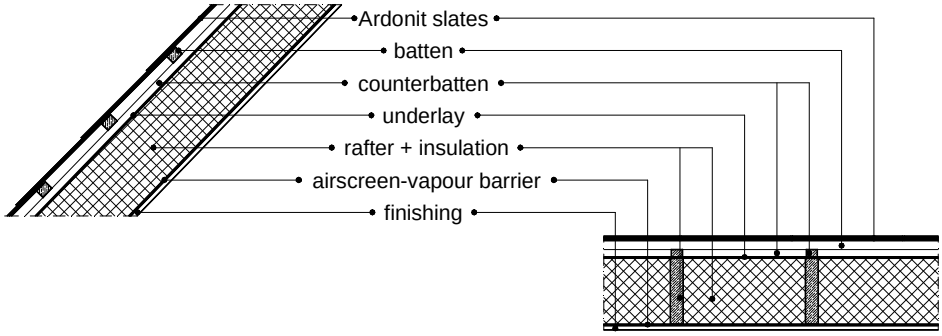
3.3 OTHER SLATING SYSTEMS

For other slating systems, SVK advice should be sought.

4 ROOF CONSTRUCTION

4.1 ROOFING COMPONENTS

When building the roof construction, it is needed to take the regulations stipulated in NBN B 44-001 into account.



4.1.1 SUPPORTING FRAMEWORK

The supporting framework of a slate roof is usually made out of girders with rafters or trusses. Here you have to take in account the minimum roof pitch and the weight of the total roof. The dimensions of the wood are derived from this and calculated by a study agency. The supporting framework has to retain its form.

Take into account the size of the slates when drawing up the design. The length and width of the roof surface are best to be seen as a multiple of slates, taking into account the overlap, the ridge, the joint between the slates and possible facade slates. This way the number of slates that need to be cut can be reduced to a strict minimum.

4.1.2 SVK NOVEX UNDERLAY

A slate roof does not assure the tightness against powder snow or dust. If one wants a protection as such, an underlay must be placed.

The SVK Novex underlay has several functions:

- to provide a temporary **rain-screen** and to transport any rainwater to the eaves:
  - when slates are broken or blown;
  - in exceptional weather conditions such as torrential rain or gale resulting in local water-infiltrations;
  - when snow or rain is blown under the slates by strong wind;
- to improve **storm-resistance** of the roof, by reducing the pressure under the covering;
- to provide a **screen to dust;**
- to improve and maintain the effectiveness of the roof **insulation;**
- to avoid or limit the dripping of **condensation water;**
- to stay **vapour permeable;**
- to temporarily **absorb moisture or vapour.**

For all of these reasons we provide the SVK Novex underlay. In certain situations a good underlay becomes especially important, see § 3. The SVK Novex underlay also plays an important role in spaces with a high dampness. That is why we always prefer a vapour permeable, stiff and capillary underlay, like SVK Novex.
The advantages of such an underlay are:

- the plates can be placed **correctly more easily**;
- because of there **stiffness** any contact between the underlay and the bottom side of the slates, as well as prevent the lifting of the underlay by the wind;
- you can press the **insulation** against the underlay, without the SVK Novex underlay being pushed upwards. So the space above the underlay remains unhampered;
- the SVK Novex underlay **doesn't flap** in windy weather;
- **vapour** that migrates to the outside through the roof construction is **absorbed** by the SVK Novex underlay plates and is released into the open air through the ventilation cavity. So there is **no risk of condensation** inside the roof structure.

So you see the SVK Novex underlay plates are extremely suited. For the guidelines for placing these plates we refer to the technical information concerning the SVK Novex underlay (obtainable on request).

4.1.3 COUNTERBATTENS

The purpose of the SVK Novex underlay isn't achieved until you apply counterbattens.

The space that is generated between the counterbattens has several functions:
- **drain** any **infiltration water** that may occur;
- allow ventilation to make sure the underlay, battens and slates are being **aired**, which gives them a longer life span;
- **prevent moist** from banking up against the slating battens;
- **realise the evening out of pressure** between the outside and the space underneath the slates, which reduces suction when it's very windy;
- **reduce** the risk of **damaging** the underlay during the construction of the roof.

The counterbattens are nailed to the underlying rafters on top of the SVK Novex underlay.
The counterbatten section measures a **minimum of 15 x 28 mm** (net shaved size). Counterbattens that are too wide may not be applied because of the stronger wind loads and the bigger opening it creates at the gutter (max. 26 mm).
Timber species, characteristics and permissible defects, preservative treatment, sizes and tolerances must comply with the national standard.
The timber used for slating battens and counterbattens must be straight, preferably planed, and of equal thickness.
The topsides of the counterbattens have to lie in the same plane.
The center-to-center distance of the counterbattens depends on the underlying construction and decides the slating battens' distances.
The counterbattens have to be fixed with stainless steel nails, which run at least 27 mm into the wood of the rafters or trusses, at least two times per meter.

4.1.4 BATTENS

Slating battens are the carrying element for the slates, which are fixed to the counterbattens with their widest side.

The section of the battens depends on the center-to-center distance of the counterbattens.
The minimal dimensions in Belgium are (h x w):
- 20 x 38 mm for an overlap smaller than 0,4 m;
- 24 x 32 mm for an overlap between 0,4 m and 0,45 m;
- 27 x 36 mm for an overlap between 0,45 m and 0,55 m;
- 38 x 38 mm for an overlap between 0,55 m and 0,6 m.

Attention: when using wrap hooks as fixation, the batten thickness and the counter batten distance need to be adjusted to the commonly used wrap hooks available on the market.

The **thickness of the bottom slating batten** (usually a tilting fillet is used for this) is raised with the thickness of a slate (ca. 4 mm), to ensure that the bottom row of slates has the same roof pitch as the ones on top.

The top sides of the battens need to be placed in the same plane, to ensure an **even roof surface**. For this reason shaved battens are used. A small glitch can immediately result in a difference of level or create tensions in the finishing of the slates.

Timber species, characteristics and permissible defects, preservative treatment, sizes and tolerances must comply with the national standard.

The slating battens are fixed to the construction with stainless steel nails that penetrate the construction by at least 30 mm. The diameter of the nails has to be at least 1/7th of the batten thickness.

4.1.5 INSULATION, AIR AND VAPOUR TIGHTNESS

4.1.5.1 Insulation

If the roof is insulated, it's best to place the insulation between the rafters. Should this be impossible or insufficient, it is possible to apply the insulation to the bottom of the supporting structure.

When using the SVK Novex underlay plates it is possible and advisable to place the insulation against the underlay plates. This to make sure that there is no cavity between the insulation and the underlay plates. In any case there **should be no ventilation provided here whatsoever,** because air circulation causes heat loss and condensation.

When placing the insulation material special attention needs to be paid to **the joints** and the connections. These need to be **fitting and closed**, with no gaps between them. It also needs to be considered that certain insulation materials shrink after a period of time. Gaps may lead to rotational currents around and inside the insulation resulting in internal condensation.

4.1.5.2 Air tightness and vapour tightness

The air and vapour tightness of the interior of the structure plays an important part in preventing internal condensation.

Vapour tightness:
The **vapour screen** also requires perfect placement.

To prevent condensation inside the roof structure, prevent vapour from migrating from the outside to the inside by placing a vapour screen **on the warm side of the insulation,** so the inside of the structure. If the vapour screen is placed elsewhere, the risk at condensation is rather increased than diminished.
Certain insulation materials have high vapour tightness. Nonetheless, because of the presence of joints and drill holes – which in practice can never be sealed perfectly – a vapour screen is placed, regardless of the type of insulation.

Air tightness:
The insulated roof section must be airtight. This air tightness means the prevention of airflow through the roof construction, both from outside to inside as from inside to outside. Every imprecision can in time lead to condensation.
Air tightness can be obtained by placing **an airtight screen** at the inside of the roof. This may consist of e.g. a PE-foil (air tight, as well as vapour tight, when placed perfectly sealed).

Before starting the works the actual roof pitch needs to be measured, to see if it complies with the plan or the given pitch. If needed, the principal must be informed of possible deviations by registered letter, if this is disregarded all harmful consequences are the responsibility of the slater.

4.1.6 VENTILATION

In the old days the attic was seen as an uninhabitable place of the house. The structure then only existed of slates on battens, fixed to the rafters of the roof structure. There was no roof insulation whatsoever.
Because of the open structure, there was plenty of ventilation, which assured that the roof structure would dry quickly.

Inhabiting attic rooms and today's insulation requirements demand an insulated roof. But an insulated roof is a roof, which knows quite a few risks:
- if the roof is not ventilated, any water seeping in may cause damage or rotting;
- condensation inside the roof structure, with diminishing of the insulation value or even mould development as a result;
- a damp roof structure is not immediately visible but has serious consequences;
- …

4.1.6.1 Use of ventilation

- Ventilation makes the roof structure dry out more quickly. If it is not provided, the slates will remain wet longer. Dust easily attaches to a wet surface. This is an ideal ground for moss and algae. This means: **ventilation indirectly stops the slates from becoming green**.

- Ventilation avoids that the space between the SVK Novex underlay and the slate is damp – which also means it is better for the counterbattens and the slate battens. **Ventilation prolongs the life span of the entire roof.**

- **Vapour that migrates through the roof structure from the inside must be carried off via ventilation.** Even when there is a vapour screen ventilation provided: a vapour screen never is 100% impermeable. There are always air leaks at the wall connections, the connections of the strips, drill holes of the connections, accidental tears, … When a roof is not full air tight the amount of condensation can amass to 120g/day. This has to be vented one way or another through ventilation.

4.1.6.2 Realisation

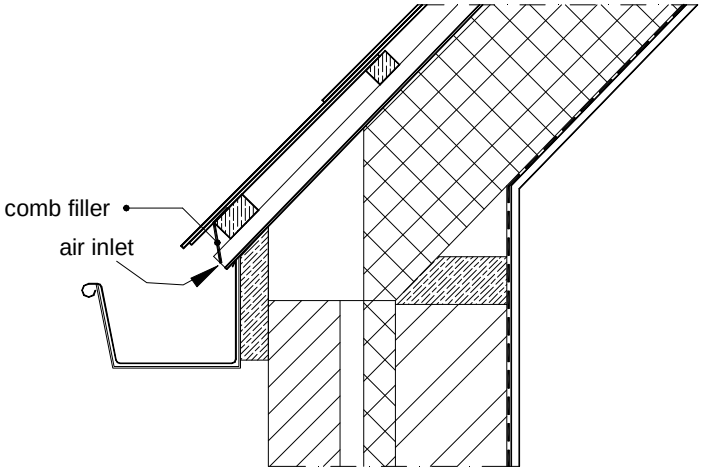
Ventilation is generated through sufficient air ventilation. This can be realised by leaving an empty space, min. 15 mm thickness between the counterbattens, placing an **air inlet** at the bottom of the roof **and an air exhaust** at the ridge, as well as roof ventilation.

To determine the amount of ventilation needed the following rule applies:

$\frac{1}{2000}$ x roof surface = required ventilation section at the gutter

= required ventilation section at the ridge

4.1.6.3 Gutter

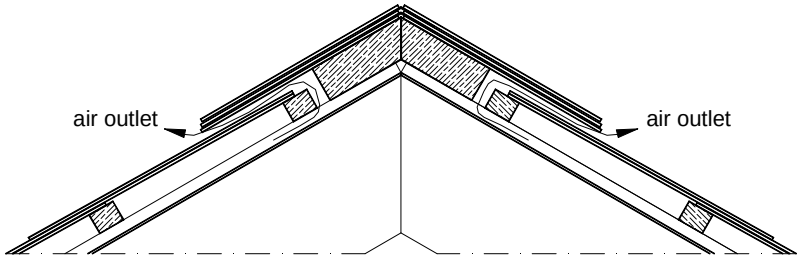


The space between the counterbatten is left open to make air inlet possible. Sufficient air exhaust needs to be assured.

If you should want to close up the opening at the gutter you can apply comb filler.

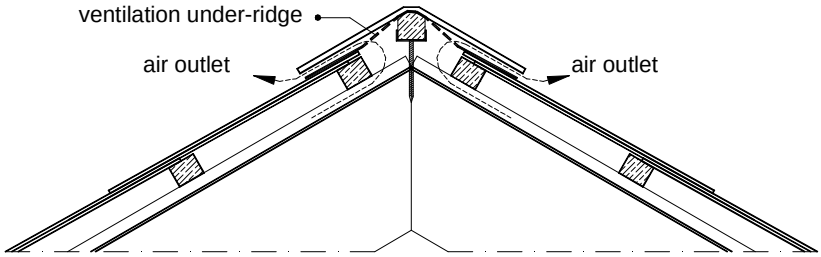
4.1.6.4 Ridge

Ridge finishing with slates:



Ridge finishing with accessories, e.g. Flat square ridge type B:

When the ridge is finished with ridge type A or B or half round ridges, a ventilation under-ridge is used.



4.1.6.5 Ventilation slates

If unlike in the two previous drawings, there is no ventilation at the ridge and the gutter, ventilation slates are placed in the second row from the ridge and from the gutter.

When ventilation slates are used at the ridge and the gutter, they should be set a saw to get a decent air circulation.

A combination of ventilation slates and an air inlet or exhaust as seen in the drawings is possible as well.

The SVK ventilation slates and ventilation sections available can be found in:
§ 1.3.2.11 Fibre-cement ventilation slate
§ 1.3.2.12 Synthetic ventilation slate
§ 1.3.2.13 Zinc ventilation slate

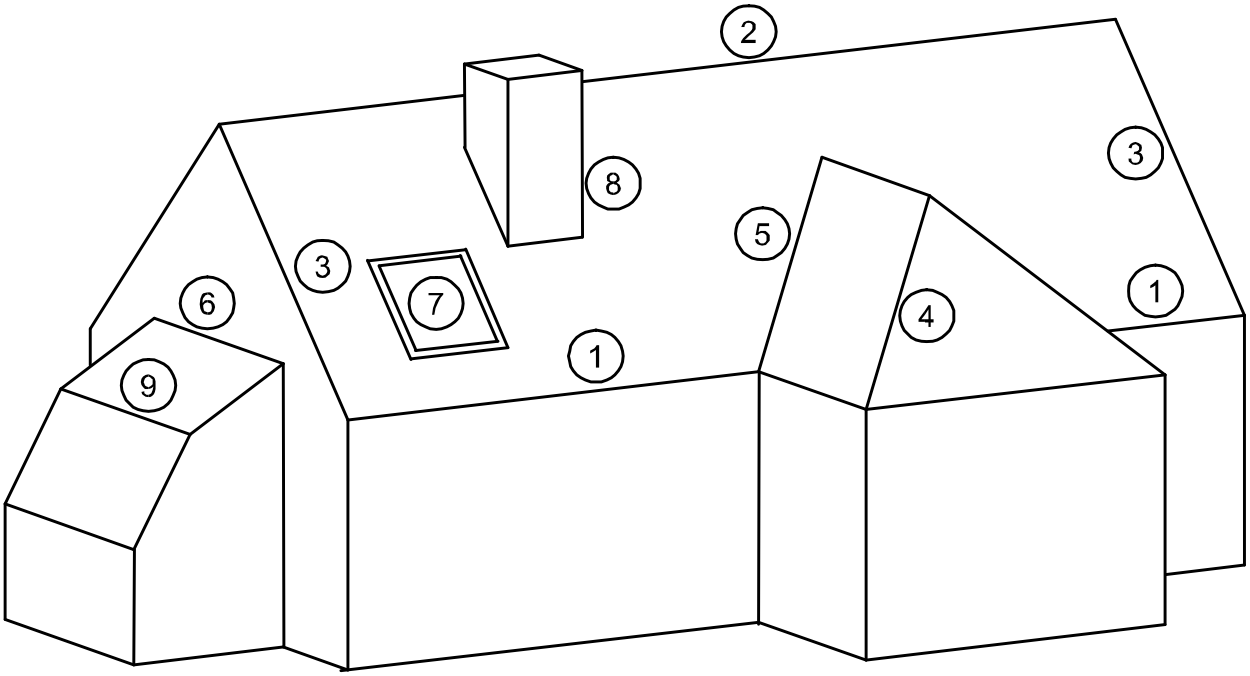
4.2 CONSTRUCTION DETAILS

After this some detail are elaborated. There are however loads of other possibilities. But always be assured of the following:

- keep the **ventilation opening** between the counterbattens open (ventilation between underlay and slates);
- **watertightness**;
- **air and vapour tightness** on the inside (this wasn't always drawn to keep the picture as clear as possible);
- **continuous insulation**, to prevent thermal bridges. (Also not drawn every time for the same reason).

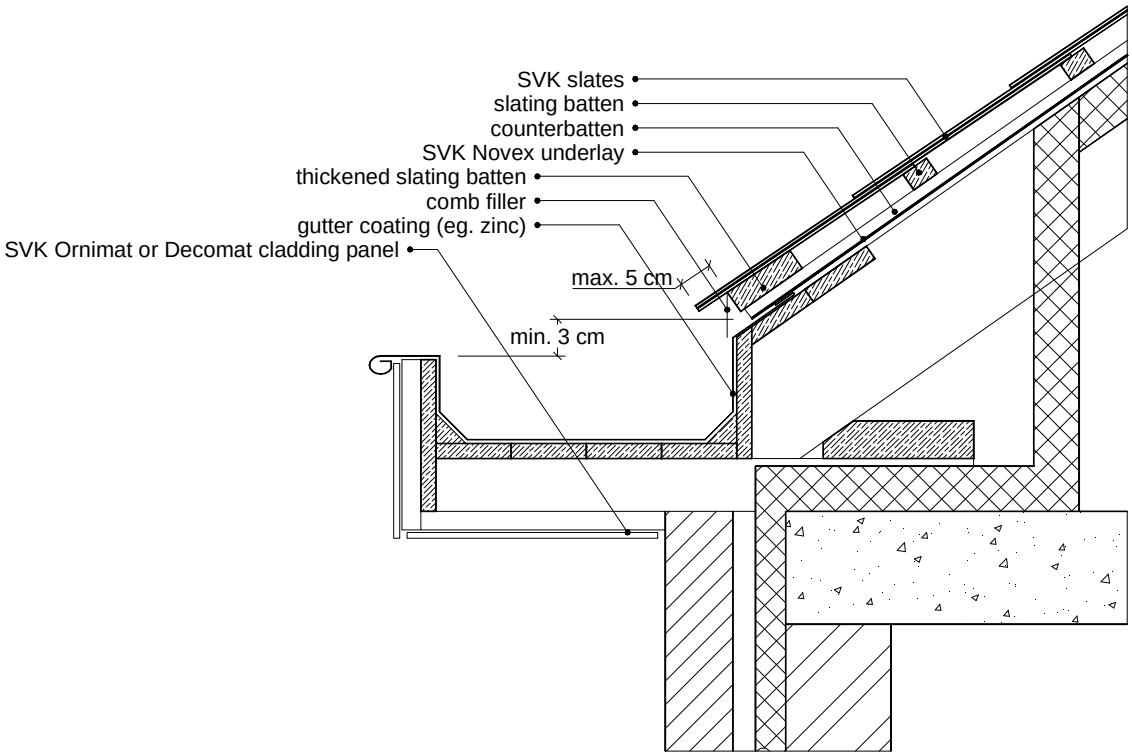
If a suitable accessory does not exist use other materials (such as zinc, lead, …) to assure watertightness.

The following details were drawn with the most applied covering system, vertical double-lap method.



1. gutter (see § 4.2.1)
2. ridge (see § 4.2.2.1 and § 4.2.2.2)
3. eaves (see § 4.2.3.1 and § 4.2.3.2)
4. hip (see § 4.2.4.1, § 4.2.4.2 and § 4.2.4.3)
5. valley (see § 4.2.5.1 and § 4.2.5.2)
6. junction roof/wall (see § 4.2.6)
7. skylight (see § 4.2.7)
8. chimney (see § 4.2.8)
9. bend in the roof surface (see § 4.2.9)

4.2.1 GUTTER



The counterbattens need to run through to the gutter to make sure that there is sufficient drainage of infiltration water and air supply for ventilation.

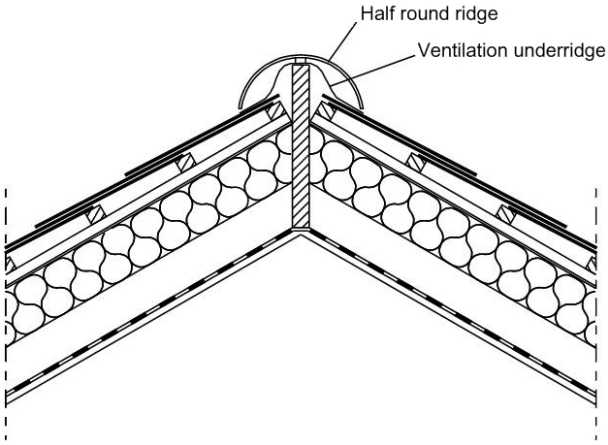
The bottom slating batten (or tilting fillet) is 4 mm (thickness of a slate) thicker than other slating battens, to give the bottom row of slates the same inclination as the upper slates, which prevents a bend in the roof surface.

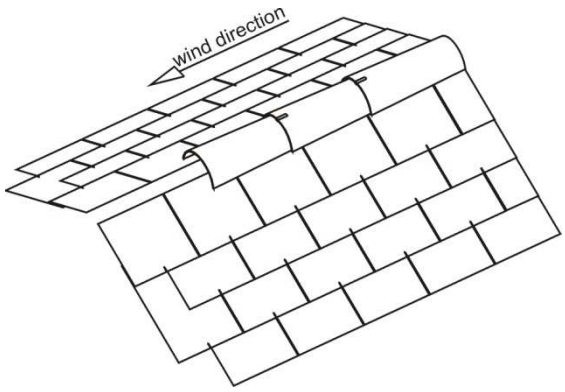
A ventilation comb may be attached to the bottom slating batten to prevent the opening from being closed down by bird nests or piling up of leaves.

The maximum overhang of the bottom slates at the eaves is 50 mm.

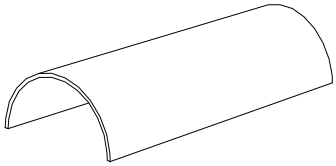
4.2.2 RIDGE

4.2.2.1 Ridge finishing with a ridge in fibre-cement

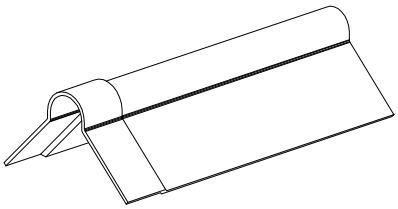




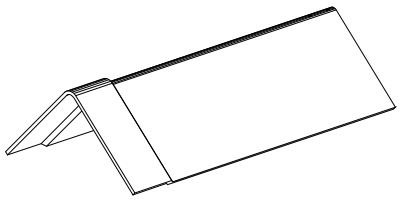
Possible ridge types:



Halfround ridge

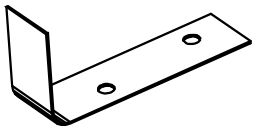


Roll-top ridge type A

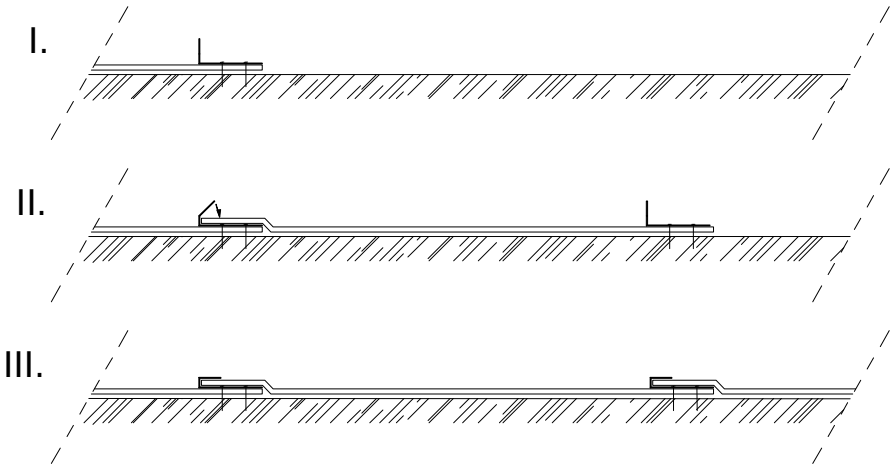


Flat square ridge type B

The top row of slates is always fixed with 2 nails and a hook. To make ventilation possible, a supple ventilation underridge is placed (see § 1.3.3.2). The ridges are fixed with 2 nails or screws and a ridge hook in the ridge batten at the height of the overlap. The ridge hook is attached with 2 nails or screws through the ridge, which also fixes the ridge at the same time.
They are placed against the predominant wind direction with a minimal overlap of 70 mm, starting with a start end ridge (see § 1.3.2.8, § 1.3.2.2 and § 1.3.2.5) and ending with a stop end ridge (see § 1.3.2.9, § 1.3.2.3 and § 1.3.2.6).
The ridge batten needs to be at least 25 mm thick.

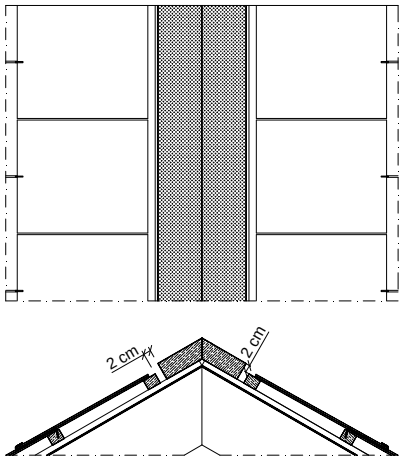


Ridge hook



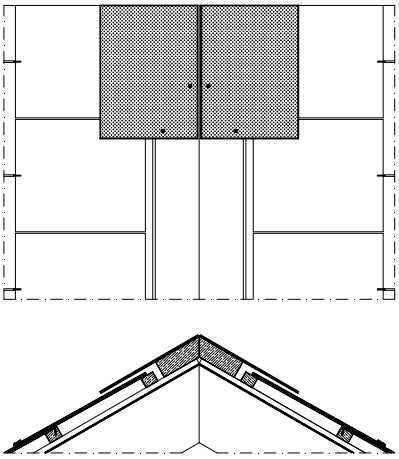
4.2.2.2 Ridge finishing with slates (= "Bardeli" or "Strackort")

I.



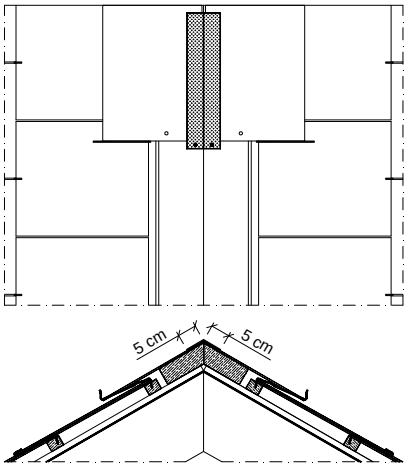
On both sides of the ridge a ridge batten of 120 mm wide is nailed to the counter-batten. This ridge batten has the thickness of the slating batten plus 20 mm. The highest slating batten is placed 20 mm from the ridge batten.

II.



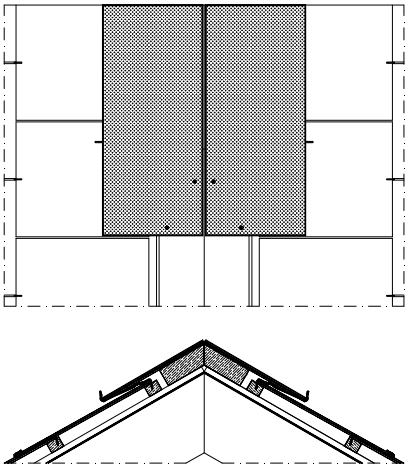
The ridge slate is fixed with the longest side parallel to the ridge with 2 nails and 1 hook. The ridge slates are placed against the prevailing wind direction.

III.



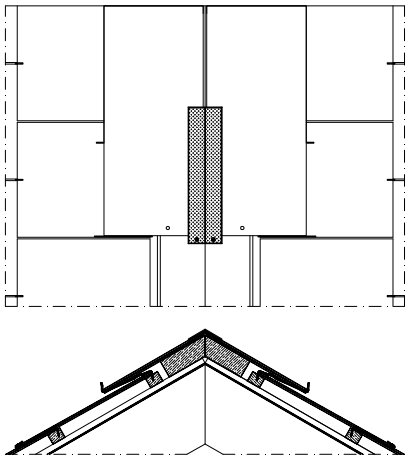
On top of the ridge slate a rectangular lead flashing is put with a length equal to the visible area of the ridge slate plus 100 mm. The lead flashing is bent in the length direction and fixed with 2 nails. It's placed so it's shifted 20 to 30 mm from the slate above.

IV.



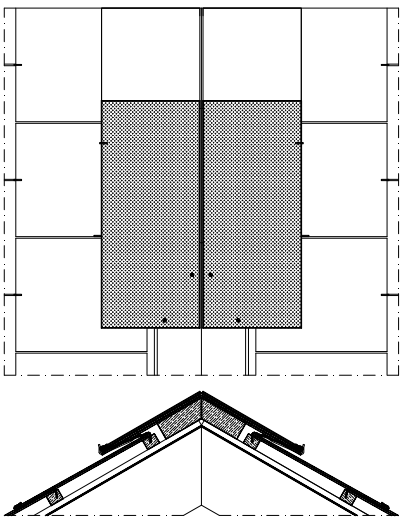
A full-length slate is placed.

V.



Again a lead flashing is put according III.

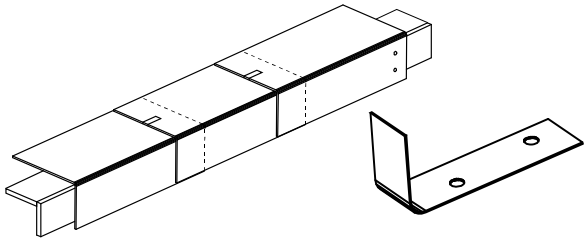
VI.



The following full slates are laid, shifting compared to the slate below.

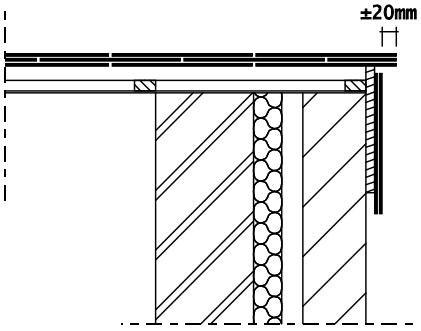
4.2.3 ROOF VERGE

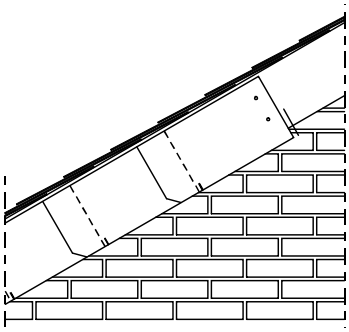
4.2.3.1 Side verge finishing with corner slates



The corner slates are placed on top of the slates. They are fastened to the facade with 2 nails at the overlap. The holes for the facade slates have to be pre-drilled, so they can expand separate from each other. When heavy wind loads are to be expected, an extra fixation can be applied on the roof surface using a ridge hook. The holes in the underlying corner slate are then pre-drilled at 4 mm.

4.2.3.2 Side verge finishing using facade slates

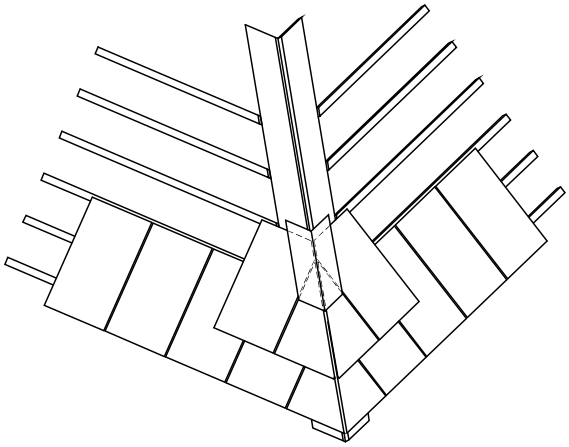




At the side edge of the roof surface only full or half slates may be placed, if necessary using 2 gable slates. If the width of the roof surface is not a multiple of full slates, the gable slates must never be placed completely on the outside verge. They always have to be processed towards the middle of the roof surface.
The outer top corners of the outer slates at the edge of the roof surface need to be cut on the bias to prevent water from seeping in through the upper edge. We also advise you to cut the bottom corners on the bias, so the water runs towards the roof surface.
Because of the bigger wind loads, all slates must be **attached to the side of the roof surface** with a hook and 2 nails.
At the facade level the slates are attached to a boarding plank with 2 slate nails and a hook.

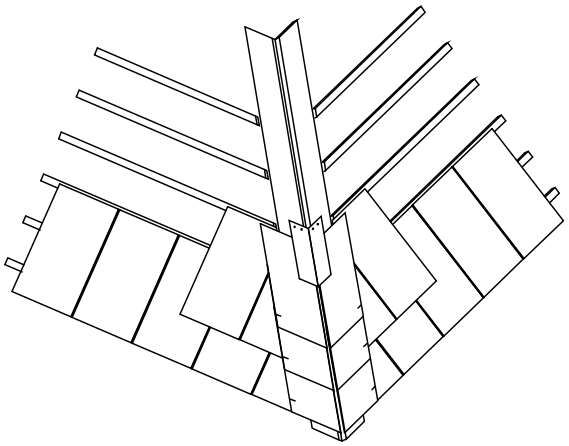
4.2.4 HIP

4.2.4.1 Hip finishing with lead soakers



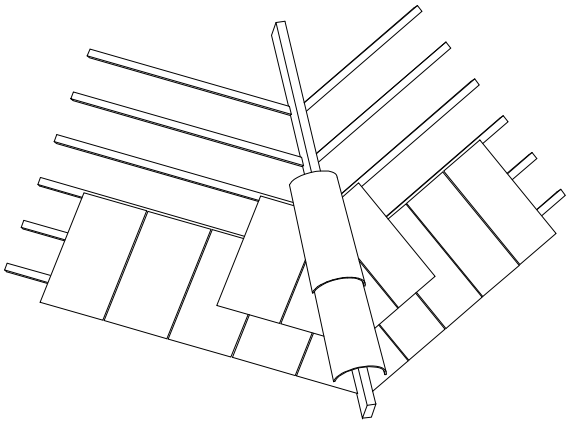
For this way of finishing, the roof pitches of both roof surfaces along side the hip need to be equal.
Between the slates at the hip lead soakers are placed (length = gauge between battens + overlap, measured on the axis of the hip). The width of the soaker (on each side of the roof surface) equals half of the overlap. The lead soakers are fixed to the roof construction with 2 slate nails per roof surface. The slates themselves are fixed with 1 slating hook and 2 nails.

4.2.4.2 Hip finishing with a German corner (type bardeli)



This type of construction can be applied for roof surfaces with an equal or different inclination.
The German corner is formed by an extra row of slates on both sides of the hip that cover the slates of the roof surface. The placement is comparable with the ridge finishing with slates (see figure § 4.2.2.2). They are attached at the overlap with minimum 2 slater's nails and 1 slating hook to bevelled slates of about 100 mm wide, against which the slates are joined. The hip slates cover each other half a slate and cover at least 70 mm of the slates in the roof surface. In-between the hip slates lead soakers are placed with a width of minimum 140 mm and a length equal to the visible part (= half a slate) increased with 50 mm for the fixation to the roof construction with 2 slater's nails per roof surface. They are covered together with the slates so they are held back 20 mm compared to the covering slates and they overlap each other 50 mm.

4.2.4.3 Hip finishing with fibre-cement accessories



The hip is finished like a ridge (see § 4.2.2.1).
The slates are fixed alongside the hip line supplementary with 2 nails.

The half round ridges are placed with their widest side downwards.
Ridges type A and B are placed with the socket downwards.

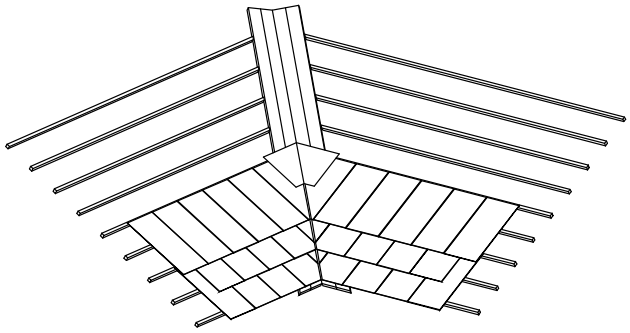
The conversion table below indicates the required angle of the plain angle ridges type B used as capping, for a specific roof pitch.

Ridge application for roof pitch of:	Ridge angle	Conversion to roof pitch when used as **hip ridge on 2 identical roof pitches** of:
25°	130°	37°
30°	120°	45°

40°	100°	65°

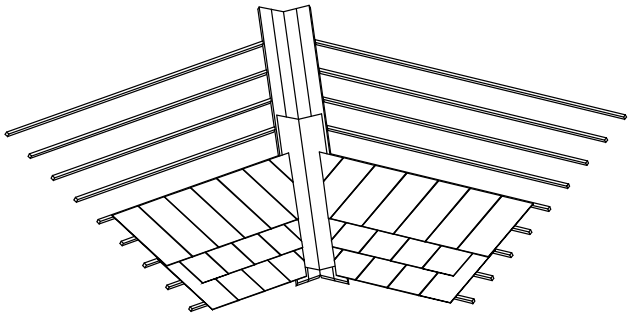
4.2.5 VALLEY

4.2.5.1 Closed Valley with lead soakers



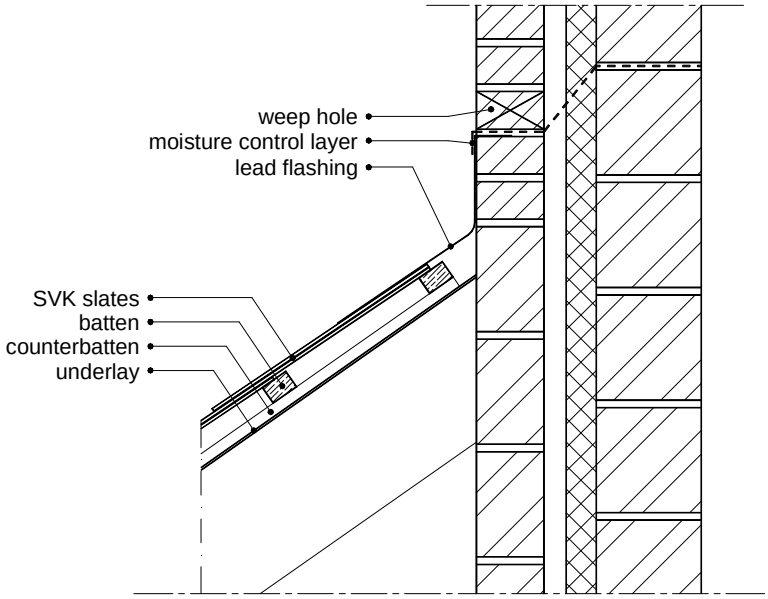
The inclination of both roofs surfaces, as well as that size of the slates and the overlap need to be equal. Alongside the valley line a zinc inner gutter is attached underneath the SVK Novex underlay plates of both roof surfaces. The width of the lead soakers has to be at least 500 mm. The length depends on the inclination, the slate type and the overlap.
The soakers are covered in such a way that they are held back 20 mm from the bottom of the overlapping slate.
The slates are fixed supplementary with 2 nails along the valley.

4.2.5.2 Open valley

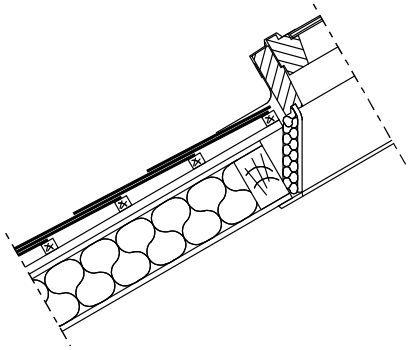


The open valley construction can also be applied for roof surfaces with a different inclination.
Alongside the valley line a zinc inner gutter is attached underneath the SVK Novex underlay plates of both roof surfaces. Along both sides of the valley boarding planks are attached on top of the counterbattens. On top of this the metal or synthetic gutter is attached. The slates are cut parallel with the valley and overlap the gutter by minimum 80 mm. These cut slates are attached supplementary with 2 nails.

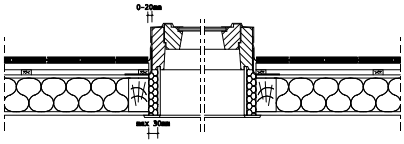
4.2.6 CONNECTION BETWEEN ROOF AND WALL



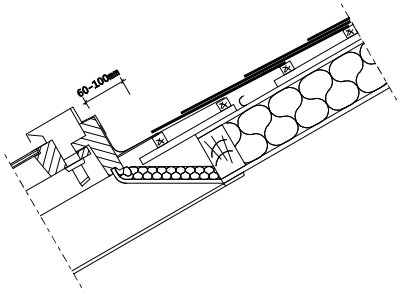
4.2.7 SKYLIGHT



Connection to the bottom of the skylight

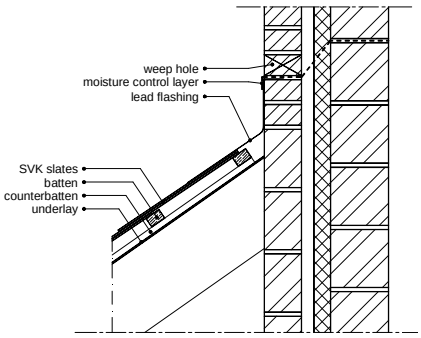


Connection to the side of the skylight



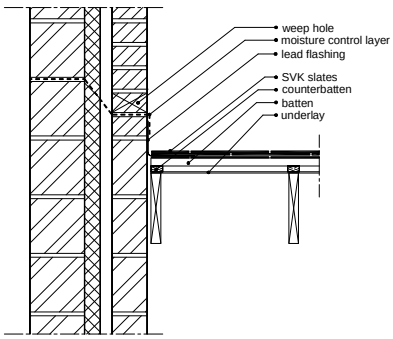
Connection to the top of the window

4.2.8 CHIMNEY



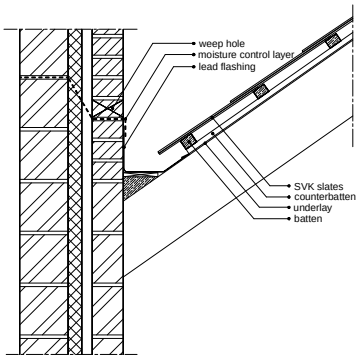
Connection to the bottom of the chimney

The connection to the chimney is realised with a metal slab that covers the slates with the same vertical overlap as the slates.



Side connection to the chimney

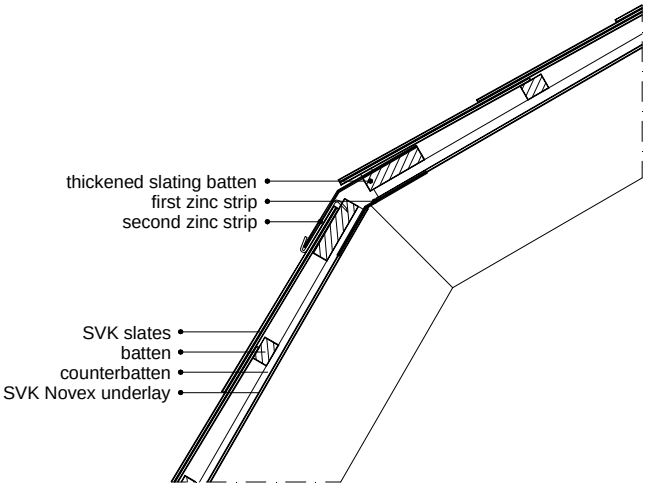
At the sides the metal slabs are woven between the slates.
The slates cover the slabs sideways by at least 100 mm.



Connection at the top of the chimney.

On top a metal guidepost is placed that is covered by the slates, comparable with a gutter (see fig. § 4.2.1).
Then on all sides of the chimney the metal parts are covered by a slab that is processed into the joints of the brickwork.

4.2.9 BEND IN THE ROOF SURFACE



The slates are placed from the eaves of the lower roof surface to the slating battens of the bend of the roof, where they can be cut if needed. Under the underlay of the upper roof surface a first zinc strip is fixed. These are folded at least 100 mm over the underlay of the lower roof surface. If there is no underlay, the strip is folded over the slates with an overlap of 90,110 or 130 mm depending on the roof pitch.
At the bottom of the upper roof surface a boarding plank is fixed that has a thickness equal to the slating battens. On this boarding plank 2 zinc strips are placed, that are folded over the lower roof surface and attached with hooks. When there is no underlay, this second zinc strip is folded over the first zinc strip. Between the ends of the strips there is a distance of at least 10 mm.
The bottom slates of the upper roof surface are cut in such a way that they stick out about 30 to 50 mm over the bend.

5 REFERENCES

- NBN B 44-001 “Roofing with cement slates strengthened with natural mineral fibres” – 1983 + Addendum 1 – 1995
- NBN EN 492 “Fibre-cement slates and accessories for roofs – production specifications and testing methods” – 2005 + Addendum 1: 2005; Addendum 2: 2006; Addendum 3: 2007
- NBN 305 “Roofing materials – guideline for a good execution – slate roofs” – 1955 + Addendum 1 – 1956 + Addendum 2 – 1964
- NBN 281 “Roofing materials – guideline for a good execution - general” – 1954
- STS 34 Roofing materials - § 03.6 Tile and slate roofs – 1987
- Technical prescription of the BBRI – n° 134 “Determining the roof structure starting from the hygrothermic data. Sloping roofs. Flat roofs.” – 1980
- Technical prescriptions of the BBRI – n° 195 “Roofs with natural slates. Structure and execution” – 1995
- Technical prescriptions of the BBRI – n° 219 “Roofing with slates. Roof details, structure and execution” - 2001

6 SPECIFICATIONS

6.1 SVK ARDONIT

6.1.1 SUMMARY

See range § 1.3.1.

6.1.2 PRESCRIPTION

The roof covering and/or facade cladding is/are executed with double-pressed fibre-cement slate (SVK Ardonit) produced on a base of a homogeneous mixture of Portland-cement, high quality organic fibres, mineral additives and water.

The slates possess a double coloured coating on a base of a waterbased acrylic resin, that strongly prevents moss formation. The sides are also especially treated with this coating. The bottom side of the coloured slates is coloured as well and on top of that coated with a non-pigmented resinous layer.

The front side is smooth.

The slates have a thickness of 4 mm.

The slates have a CE-marking.

The slates comply with the prescriptions set in the European Standard EN 492 (type NT, class B = best class).

The processed slates have the following physical and mechanical properties:
- *Dimensions, finishing, structure*: see range § 1.3.1.
- *Volumic mass (oven dry)*:ρ ≥ 1700 kg/m³ (nominal: 1800 kg/m³).
- *Water absorption after water immersion*: on average 4% (weight percentage).
- *Minimal breaking moment per meter when bending (EN 492)*: see properties § 1.4.1.

The slate is easily worked up with regular slating tools.

All accessories used come from the same manufacturer as the slates. Their colour and aspect approach those of the slates.

Synopsis of the accessories: see § 1.3.2.

6.1.3 TRANSPORTATION AND STORAGE

See § 2.2.

6.1.4 PLACEMENT

The placement of the slates is done following the guidelines in the Belgian norm NBN B 44-001 and following the guidelines of the technical prescriptions 134 and 219 of the BBRI. In any case the manufacturers' guidelines have to be accurately followed.

The space between the roof covering (facade cladding) and the SVK Novex underlay (insulation material or wall) always needs to be ventilated.

6.2 SVK MONTANA

6.2.1 SUMMARY

See range § 1.3.1.

6.2.2 PRESCRIPTION

The roof covering is executed with double-pressed fibre-cement slate (SVK Montana) produced on a base of a homogeneous mixture of Portland-cement, high quality organic fibres, mineral additives and water.

The slates possess a double coloured coating on a base of a waterbased acrylic resin, that strongly prevents moss formation. The sides are also especially treated with this coating. The bottom side of the coloured slates is coloured as well and on top of that coated with a non-pigmented resinous layer.

The slates are manufactured with natural looking dressed edges. The front side has the textured surface of a natural slate.

The slates have a thickness of 4 mm.

The slates have a CE-marking.

The slates comply with the prescriptions set in the European Standard EN 492 (type NT, class B = best class).

The processed slates have the following physical and mechanical properties:
- *Dimensions, finishing, structure*: see range § 1.3.1.
- *Volumic mass (oven dry)*: $\rho \geq 1700$ kg/m³ (nominal: 1800 kg/m³).
- *Water absorption after water immersion*: on average 4% (weight percentage).
- *Minimal breaking moment per meter when bending (EN 492)*: see properties § 1.4.1.

The slate is easily worked up with regular slating tools.

All accessories used come from the same manufacturer as the slates. Their colour and aspect approach those of the slates.

Synopsis of the accessories: see § 1.3.2.

6.2.3 TRANSPORTATION AND STORAGE

See § 2.2.

6.2.4 PLACEMENT

The placement of the slates is done following the guidelines in the Belgian norm NBN B 44-001 and following the guidelines of the technical prescriptions 134 and 219 of the BBRI. In any case the manufacturers' guidelines have to be accurately followed.

The space between the roof covering (facade cladding) and the SVK Novex underlay (insulation material or wall) always needs to be ventilated.

6.3 SVK FASONIT

6.3.1 SUMMARY

See range § 1.3.1.

6.3.2 PRESCRIPTION

The roof covering and/or facade cladding is/are executed with double-pressed fibre-cement slate (SVK Fasonit) produced on a base of a homogeneous mixture of Portland-cement, high quality organic fibres, mineral additives and water.

The slates possess a double coloured coating on a base of a waterbased acrylic resin, that strongly prevents moss formation. The sides are also especially treated with this coating. The bottom side of the coloured slates is coloured as well and on top of that coated with a non-pigmented resinous layer.

The front side is smooth.
Or
The front side has the texture of natural slates.

The slates have a thickness of 4 mm.

The slates have a CE-marking.

The slates comply with the prescriptions set in the European Standard EN 492 (type NT, class B = best class).

The processed slates have the following physical and mechanical properties:
- *Dimensions, finishing, structure*: see range § 1.3.1.
- *Volumic mass (oven dry)*: $\rho \geq 1700$ kg/m³ (nominal: 1800 kg/m³).
- *Water absorption after water immersion*: on average 4% (weight percentage).
- *Minimal breaking moment per meter when bending (EN 492)*: see properties § 1.4.1.

The slate is easily worked up with regular slating tools.

All accessories used come from the same manufacturer as the slates. Their colour and aspect approach those of the slates.

Synopsis of the accessories: see § 1.3.2.

6.3.3 TRANSPORTATION AND STORAGE

See § 2.2.

6.3.4 PLACEMENT

The placement of the slates is done following the guidelines in the Belgian norm NBN B 44-001 and following the guidelines of the technical prescriptions 134 and 219 of the BBRI. In any case the manufacturers' guidelines have to be accurately followed.

The space between the roof covering (facade cladding) and the SVK Novex underlay (insulation material or wall) always needs to be ventilated.