SVK

Experts in fibre cement

TECHNICAL DATA

Ardonit - Montana

Export

VERSION 2025.02.01

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This technical information is meant to inform you about the SVK slates and how to apply them.

Information about the bearing construction, fixing materials and other products / accessories is only informative and not binding. Always ask for information from the manufacturer or the supplier of these products and follow their advice.

SVK slates must be applied in compliance with the national and/or local building regulations and guidelines. If these do not correspond with the SVK-guidelines, SVK must be contacted before construction starts.

Our product guarantee is only valid if construction is carried out conform our most recent technical data, which can be acquired by simple demand. You can also find them on our website www.svk.be.

PRODUCTION

SVK slates are manufactured from a homogeneous mixture of Portland cement, organic process and reinforcement fibres, fillers and water. This mixture is deposited in thin layers on a forming roll in a circular sieve machine (Hatschek) under constant pressure until the desired sheet thickness is achieved.

Slates are double pressed and harden for a minimum of 4 weeks under normal atmospheric conditions.

TECHNICAL CHARACTERISTICS

PHYSICAL CHARACTERISTICS

EN 492	Density (oven dry)	≥ 1.700 kg/m³
	Bending moment	
	h ≤ 350 mm	30 Nm/m
	350 < h ≤ 450 mm	40 Nm/m
	450 < h ≤ 600 mm	45 Nm/m
	Water impermeability	No water drops
	Elasticity modulus (wet)	ca. 16.000 N/mm²
	Water uptake (coated slates)	< 4% (weight)
EN ISO 2409	Paint adhesion	Class 0
EN ISO 16474-2	Colour fastness	conform

DURABILITY

EN 492	Wet-dry cycles	L ≥ 0,75
	Warm water	L ≥ 0,75
	Frost-thaw cycles	L ≥ 0,75
	Warm-rain cycles	OK

WEIGHT

Weight (at moisture content: 12%)	8 kg/m²

REACTION TO FIRE

Class	A2-s1, d0	EN 13501-1

DIMENSIONS AND TOLERANCES

	Dimensions	Tolerances
Length	200 – 600 mm	± 3 mm
Width	200 – 600 mm	± 3 mm
Thickness	4 mm	- 0,4 mm / + 1,0 mm
Straightness	≤ 2 mm	

FINISHING

COATED SLATES

The natural colour of the slates is grey. The front and the sides of the slates are finished with a multi-layer acrylic, water-based coating, highly counteracting the growth of moss. To prevent moss growth, special moss inhibiting constituents are added to the coating. The underside of the slates is treated with an acrylic coating and a colourless water-repellent layer. This finish offers optimal protection under all weather conditions.

The slates are identifiable by a printed code on their backside.

NATURAL GREY SLATES

The slates are natural grey in the mass, their surface and edges have not been treated.

Since the slates are not treated, they can be sensitive to the typical cementitious surface phenomena such as shades of grey, which underline the natural character of the material. Because differences in colour nuance are possible, we recommend ordering the slates for a contiguous surface in one go, so that these differences are minimized. However, the uniformity of color cannot be guaranteed.

The slates are untreated, which means that no coating has been applied. As a result, it is possible that staining, efflorescence or staining of manufacturing oil is visible. The presence of slight variations (inclusions) in the slate surface is also part of the normal aspect of the slates. The foregoing shall not be considered as a shortcoming.

Patinage will largely smooth out such effects in the long run.

A second phenomenon is the possible occurrence of calcareous efflorescence. When water and cement are joined together, they react with each other to form cement stone. This reaction also produces "free lime" (calcium hydroxide). This is partially dissolved in the water. The free lime reacts with CO2 from the air and in the presence of water calcium carbonate (= lime rash) is formed.

These phenomena are not necessarily immediately visible and may even become visible after some time, after placement.

The intensity of this lime rash becomes less pronounced over time under the influence of weather conditions. Because this is a very slow process, it is difficult to predict how long it will take for the slates to take on a more even appearance. This depends on the severity of the efflorescence and the degree of influence of the weather conditions.

Removing limescale rash is not easy. Therefore, it is advisable not to take any action at first. However, if you want short-term results, the easiest way is to remove the limescale mechanically by lightly sanding the slates (dry!) with an open scouring sponge type "Scotch-Brite 3M 7447" (or equivalent) and immediately removing the sanding dust with a soft brush or dry, soft (microfiber) cloth. However, there is a chance that surfaces that have been treated in this way will suffer from limescale again afterwards. Sanding can change the aspect of the slates.

SVK wishes to emphasize that these aesthetic phenomena do not in any way detract from the properties of the slates. In terms of mechanical, physical and durability they meet the requirements of the European standard EN 492 "Slates and fibre cement fittings for roofs – product specification and test methods".

PRODUCT RANGE

Slate ranges:

- Montana textured slates have a textured surface with dressed edges.
- Montana smooth slates have a smooth surface with dressed edges.
- Ardonit textured slates have a textured surface with square edges.
- Ardonit smooth slates have a smooth surface with square edges.

SVK reserves the right to delete or add colours without prior notice. Color deviations are measured according to CieLab. The permitted deviations are: ΔE* ± 1.00.

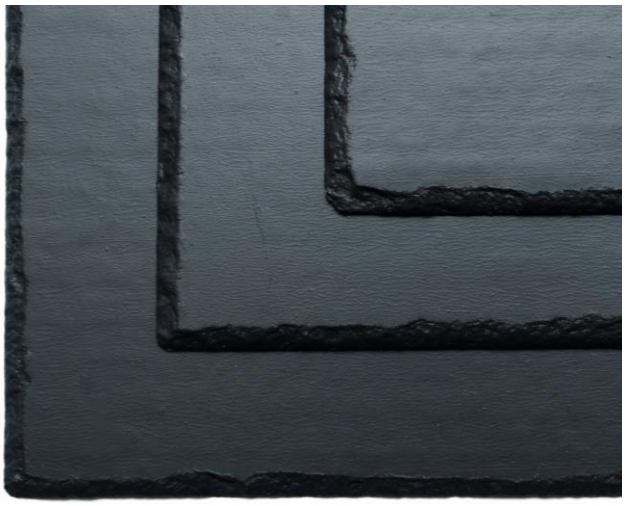
ONLY PLACE SLATES WITH THE SAME PRODUCTION DATE ON THE SAME ROOF OR FACADE SURFACE.
IT IS NOT RECOMMENDED TO PLACE SLATES WITH DIFFERENT PRODUCTION DATES ON THE SAME ROOF OR FACADE SURFACE.

See the full range on our website www.svk.be

Outer dimensions in cm.

SLATES WITH SMOOTH SURFACE

Edges: square



Edges: dressed

Dimension (cm)	60/60	60/40	60/30	60/30	40/40/10	40/40/10	45/30	40/24
Production dimensions (mm)	600/400	600/300	600/300	595/295	400/400	395/395	450/300	400/240
Weight (kg)	2,04	1,53	1,53	1,48	1,31	1,31	1,08	0,82
Edges	square	square	square	dressed	square	dressed	square	square
Holes			3		3	3		

SLATES WITH TEXTURED SURFACE

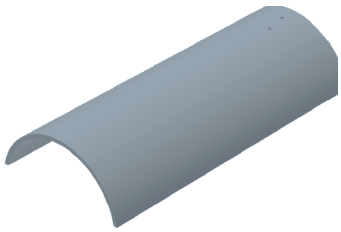
Edges: square

Edges: dressed

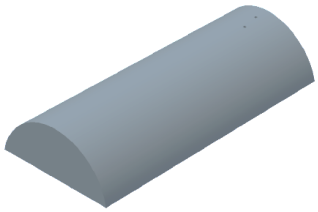
Dimensions (cm)	60/60	60/60	60/30	60/30	45/30	40/24
Production-dimensions (mm)	600/600	595x595	600x300	595/295	445/295	295/235
Weight (kg)	3,06	2,95	1,53	1,48	1,04	0,79
Corners	square	square	square	square	square	square
Edges	square	dressed	square	dressed	dressed	dressed

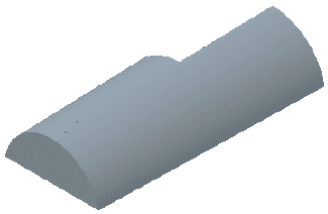
ACCESSORIES

HALF ROUND RIDGE



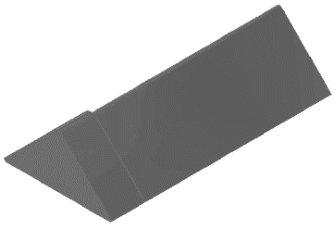
START & STOP END

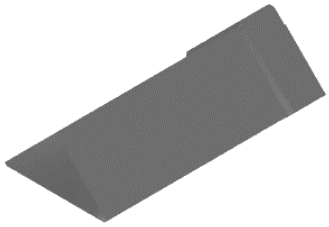




PLAIN ANGLE RIDGE

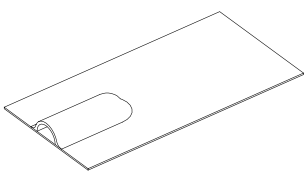
START & STOP END





VERGE SLATE

FIBRE CEMENT VENTILATION SLATE



COMB FILLER (PP)

VENTILATION UNDER RIDGE (PVC)

Slate nail	Slate nail crenelated	Disk rivet	Ridge clip
			

Drive hook straigth	Drive hook with hump	Drive hook with crimped shank
		

The drive hooks are available in copper, stainless steel and black stainless steel

WARRANTY

SVK warrants Ardonit and Montana slates and accessories in fibre cement insofar as the storage, treatment, construction and maintenance of the SVK slates and accessories take place in accordance with the rules and the guidelines of our most recent applicable technical specifications, all of which under normal atmospheric conditions and conditions of use.

The warranty conditions which must be met in order for the warranty to be fully applicable, are mentioned in the warranty certificate. This certificate is available on request.

The site-work must be in accordance with the procedures and requirements of the BS 5534: Code of Practice for Slating and Tiling, the BS 8000-6: Workmanship on Building Sites and with the prescriptions of the manufacturer mentioned in these technical data.

QUALITY

The Declaration of Performance (DOP) under European Regulation No. 305/2011 (CPR) can be found via www.svk.be

The CE marking guarantees compliance with the product characteristics covered by the harmonised European standard, EN 492

TRANSPORT AND STORAGE

Slates and accessories should be transported, unloaded and handled with care to avoid damage, soiling or breakage.

The slates are bundled in small packs and delivered on pallets, wrapped in shrink foil. This wrapping only prevents the slates from sliding during transport, it does not offer adequate protection against weather circumstances.

COVERED TRANSPORT IS OBLIGATORY.

Store the slates on a dry, firm and level surface, in a covered and thoroughly ventilated area safe from all traffic, in warehouse as well as on the building site. Fiber cement slates with their high cement content should be protected from damp.

Maximum stack height for storage is 4 pallets.

In case there is no possibility to store the slates in a covered area on site, the shrink foil must be removed or partially opened, and the pallets must be always covered by a watertight but vapour permeable tarpaulin.

CONDENSATION AND RAINWATER INGRESS BETWEEN STACKED SLATES MUST ABSOLUTELY BE PREVENTED TO AVOID EFFLORESCENCE BECAUSE OF WATER ACCUMULATION BETWEEN THE SURFACES.

Under no circumstances should natural grey slates be stored outside at work, not even under a waterproof tarpaulin.

In case of storage for a prolonged period we strongly advise to partially open the shrink film, even in case of storage under cover, to prevent condensation under the foil, and thus efflorescence.

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 always respected.

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

Avoid staining and wear gloves when handling the slates. Avoid stains of glue, silicone, polyurethane foam, adhesive tape, render as these can leave irremovable stains.

CUTTING AND DRILLING

When cutting slates, measures to reduce the effect of dust should be taken in accordance with the relevant HSE Guidance notes.

Always dry work the slates (drilling or sawing) and remove the saw dust (cement dust) immediately using a soft, dry and clean microfibre cloth or a soft brush. The cement dust can cause staining or efflorescence once the slates have been placed and exposed to the weather conditions.

Avoid stains on the slates, wear clean gloves when working and installing the slates, especially with natural grey slates. Avoid stains from glue, silicone, polyurethane foam... These can leave indelible marks. Do not stick labels, tape or any kind of adhesive tape on the visible side of the slates. As a result, adhesive residue can remain, and the slates can be affected.

CUTTING

SVK slates can be cut in different ways:

- Score the face of the slate with a scribing tool and snap over a straight edge.
- Cut with a slate guillotine. Place the slate face side up because the guillotine produces a chamfered cut edge.
- Use a hand slate cutter.
- It is not recommended to use angle grinders, because of their high dust production levels.
- To cut large quantities of slates, use a bench saw with diamond dusted blade and provide dust extraction.
- Remove cutting dust immediately from the slates

DRILLING

On delivery, SVK slates have standard holes for fixing.

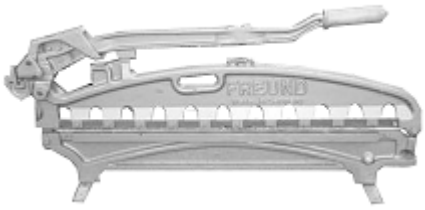
To drill additional holes, up to maximum ten slates can be stacked and holes be drilled with a 4.5 mm sharpened steel drill bit, suitable for fibre-cement.

It is also possible to punch additional holes. Remove drilling dust immediately from the slates.

MATERIAL

GUILLOTINE SCISSOR

For cutting and perforating many slates, e.g. foot slates, sloping slates for mitred hips or ridge, …



SLATE SCISSOR

For cutting and perforating slates (best solution for one-off installation). Also used for cutting out corners.

SLATE HAMMER

Hammer with four functions:

- a knife to cut the slate
- a point to punch holes
- the head to hammer
- a roofing anvil

ROOFING ANVIL

Used together with a hammer. The anvil has a sloping side, the curved point is placed in the batten.

SLATE RIPPER

Steel tool with curved handle and flat part containing hook-shaped teeth, for removing nails during repairs and as a guide when (re)placing slates.

MAINTENANCE

The safety aspect during roofing and maintenance work is not covered in this technical data. For this, we refer to the nationally applicable safety regulations.

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.

The natural grey slates have not been treated. Their surface is therefore more sensitive to pollution.

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.

To ensure the appearance, the life span and watertightness of the roof, the standards and prescriptions recommend regular maintenance.

- Removing moss, vegetation and all kinds of waste that could hinder the proper functioning of the roof covering.
- Maintenance of the rainwater drains
- Checking the fastenings, mainly at the eaves
- Replacing and replacing missing, broken or displaced elements
- Filling the damaged grooves at the level of the lead flashings and waterproofing the parts of the construction that are not protected by a rainwater seal.

This can be done by a firm specialized in cleaning roofs. If you want to do it yourself, there are chemical products on the market to clean the roof surface.

MOSS FORMATION

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: proper 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” forms an acid environment on the roof in which moss and algae thrive.

THE SLATES BECOMING GREEN HAS NO INFLUENCE ON THE QUALITY OF THE SLATES.

STAINING RISKS

Lead develops a lead carbonate patina which causes unsightly staining of the slates. To prevent this, it is advisable to treat all lead including soakers and flashings, with patination oil immediately after fixing the lead and before any rain occurs. Patination oil should be applied following the manufacturer's instructions.

To prevent damage to zinc profiles, it is advisable to choose the correct type of zinc and carefully follow the zinc manufacturer's instructions. Avoid any direct or indirect (run-off water) contact with fresh concrete, mortar and all building materials that may contain substances harmful to zinc. Manually cut slates may contain unhydrated cement. White efflorescence that results from this is a purely aesthetic damage.

CLEANING

MECHANICAL

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 as 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 drainage system.

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

CHEMICAL

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 or rinsing. Detach 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 roofing and maintenance work was not addressed in these technical data. For this we refer to the nationally applicable safety regulations.

SAFETY

To lay a roof is a hazardous activity and statutory legislation applies to all types of roofing work. Particular attention is drawn to the *Health and Safety in roof work (HSG)* regulations and other legislation setting out the duties of owners, employers and employees in relation to the construction and maintenance of buildings. Owners, designers, building contractors and roofers should ascertain the latest legislation in force at the time of building.

UNDER NO CIRCUMSTANCE IS IT ALLOWED TO WALK DIRECTLY ON THE SLATES.

WHERE ACCESS IS REQUIRED. LADDERS OR CRAWL BOARDS SHOULD BE USED.

SCOPE

Montana and Ardonit slates are used for roofing (pitch 15° or greater and less than 75°) and cladding (a pitch of 75° or more) all conservations must be applied in accordance with the technical date and the national standards and regulations. The guarantees and warranties given with SVK Slates are conditional upon adherence to the instructions given in the fixing manual.

These regulations apply up to a building height of 15 m. If used for higher buildings, an engineering office must be contacted. The following points should also be considered during the design:

RAIN AND SNOW RESISTANCE

Key

Exposure zone	Approximate driving rain (L/m² per spell)
Sheltered	<33
Moderate	≥33 <56.5
Severe	≥56.5 <100
Very severe	100

SVK slates are one of the most watertight roof coverings available and offer a full protection from water ingress under normal conditions.

In abnormal weather conditions(1) however, water penetration through the slates is sometimes unavoidable. It is essential to avoid/minimise the risk of water ingress by careful design, detailing and workmanship, attuned to the local exposure conditions.

It is important that the exposure to local wind driven rain of the construction site is assessed, and that extra measures are taken when there is a high risk of severe driving rain.

The following figure details two simplified categories of exposure based on driving rain (for example UK). This map should be used when designing buildings **up to 12 m ridge height** above ground level. If necessary (higher buildings and exceptionally exposed sites) special precautions must be taken, which must be adapted to the specific situation. The figure below shows the exposure zones as divided by BS 5534.

Roofing products, fittings and accessories, when laid and fixed on a roof, perform in different ways to resist snow and rainwater penetration. The mechanisms of rainwater ingress can include capillary attraction and water creep, driving rain, deluge rain and flooding, raindrop bounce, surcharging of rainwater on laps on long rafter roofs and wind-driven snow.

The guidance given for rain resistance hereunder is in the form of prescriptive recommendations, which are based on experience SVK has gained from over 100 years supplying roofing products. National performance tests for rain or snow resistance must be used to assess the pitch and lap performance of pitched roofing products.

(1) Abnormal weather conditions: on elevated sites, near the coast, in localities where heavy snowfalls are commonly experienced or in conditions of severe exposure.

The macroclimate and microclimate acting physically and/or chemically on a roof might affect the appearance of the roof. If this is an important part of the design, our advice should be sought.

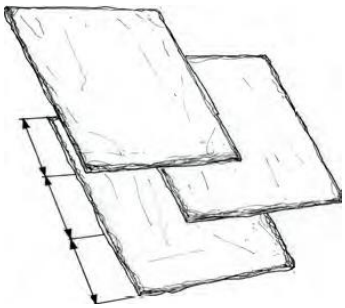
Atmospheres with high sulphur or nitrogen acid gasses created in industrial areas or by fuel combustion can attack and erode some roofing products that contain alkali salts. Similar effects can occur in marine and coastal locations where high salt content and humidity can occur.

When the applicable driving rain exposure category (see figure) is uncertain, more precise information is available in BS 8104. If this still doesn't suffice a driving rain category of 56.5 l/m² per spell or greater should be used. Abnormal weather conditions: on elevated sites, near the coast, in localities where heavy snowfalls are commonly experienced or in conditions of severe exposure.

PRINCIPLES OF WATER TIGHTNESS

THE MOST IMPORTANT FACTORS ARE:
CAPILLARITY
WEATHER CONDITIONS
LENGTH OF THE ROOF SLOPE (EAVE TO RIDGE)
ROOF SLOPE.

POSITION OF THE SLATES

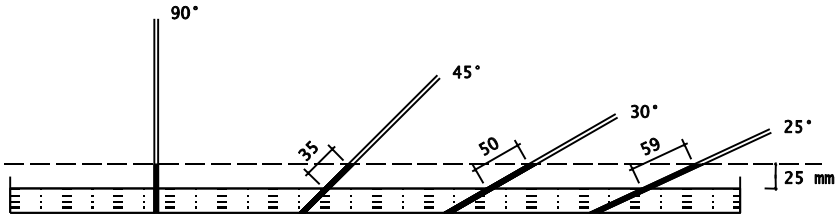


Each slate is covered in the direction of the run-off water by 2 other slates. This results in 3 parts: the visible part of the slate on which the water falls directly; the invisible, single-covered part of the slate that only receives water at the connection of the 2 slates above and the double-covered part of the slate, called head-lap, which prevents the ingress of water.

It is the mutual overlap of the slates that ensures the watertightness. This must be sufficient to prevent the ingress of water by capillary action or under the influence of wind.

The covering depends on the area of application, the slope and the length of the roof, as well as the method of fastening. It may be necessary to increase the minimum values of the covering in the lower part of a roof if it receives a lot of water or if the minimum required slope is slightly lower.

CAPILLARITY



Capillarity is the phenomenon where when two plates are pressed firmly together, fluid will rise between them.

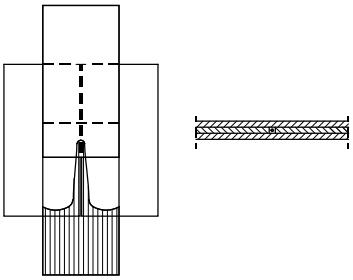
The harder the slates are pressed against each other, the higher the rain will rise between them. The maximum gauge difference between the slates is 25 mm, and this regardless of whether they are placed perpendicular or sloping.
The actual rise between the slates varies depending on the inclination they are given. It rises if the roof pitch shrinks. Driving rain and dust building between the slates strengthen the capillary effect.

The drawing above shows that the smaller the inclination the bigger the head-lap needs to be.

To minimise the risk of water infiltration by capillary action, we advise to use hooks instead of nails for fixing slates, because with hook fixing the slates are less close-fitting.

The shape of the capillary action, when fastened with hooks with double coverage, is shown in the figure below.

The suction is strongly determined by the fact that the hook with the side of the slates forms fine channels that function as capillary tubes. This suction can be reduced by using hooks with a bump, which gives the channels a local widening that slows down the capillary action.



WEATHER INFLUENCES

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, considering several factors:

- screening by surrounding buildings.
- hilly or plane landscape.
- sea or mountain region

LENGTH OF THE ROOF SLOPE

Since all the rain falling on the roof flows towards the gutter, the **amount of water increases on the lower part of the roof**. The fact that infiltrations usually occur in the lower part of the roof surface proves this statement. The longer the roof surface (from gutter to ridge), the greater the risk of infiltration. However, the amount of water that falls on a roof is not determined by the actual roof length but is proportional to its horizontal projection. For example, a 45° roof with an actual length of 7 m has a horizontal projection of 5 m. **Experience has shown that 5 m horizontal projection is the limit up to which a normal covering may be applied, beyond which the covering must be increased.**

Our technical data are valid for all roof slopes with a length - measured by horizontal projection - of max. 6 metres.

The maximum rafter length to which the recommendations for minimum roof pitch, head-laps and side-laps apply, is:

$$\text{Maximum rafter length} = \frac{6\ meter}{cosine\ (angle\ of\ roof\ pitch)}$$

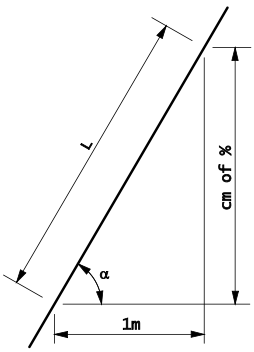
In all other cases, an evaluation of the specific situation is needed, and the appropriate measures must be taken (increasing the head-lap or making other provisions).

ROOF PITCH

The actual rise of the capillary water grows as the inclination shrinks. 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 is 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 side lap, 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 head-lap is necessary to guarantee the watertightness.

The minimum pitch for roofs with fibre cement slates is 25° (47%). De minimum pitch is furthermore dependent on the roofing system used.

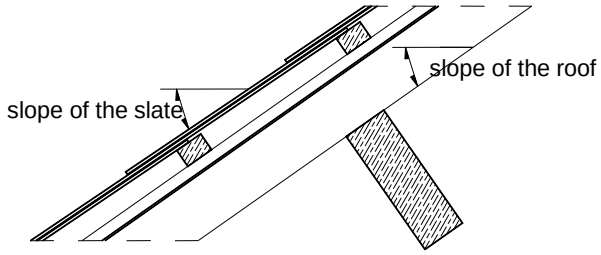
The roof pitch can be represented in degrees or in cm pro meter (of %)



COMPARISON DEGREES - PERCENTAGES

α (degrees)	%	Length of roof surface L pro meter horizontal projection	α (degrees)	%	Length of roof surface L pro 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 slope is always measured on the slate itself, at the overlap. Since the slates lift each other slightly, there is a difference between the slope of the roof and the slope of the slate. This may be important when determining the excess coverage in borderline cases. The tables accompanying the covering systems always state the minimum slope of the slates. The slope difference can be read from the following table.

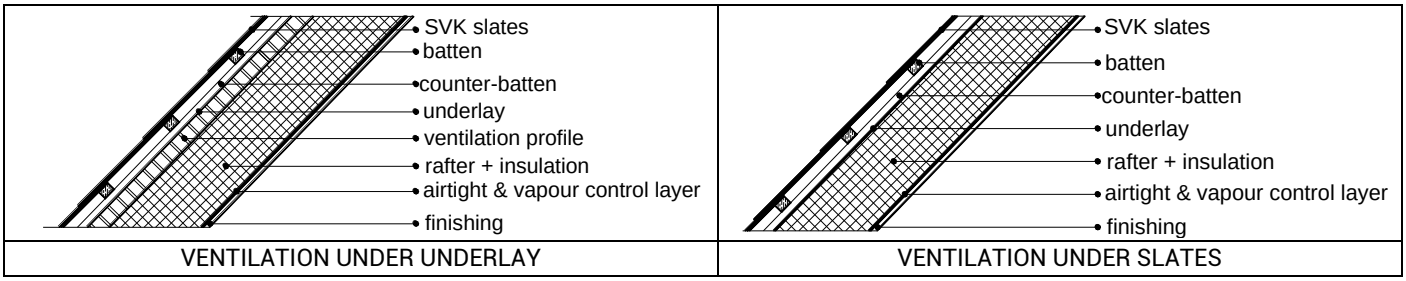
Slope difference (°) between the roof construction and the slates:

	Length (m)		
Coverage (mm)	600	450	400
50 (only for façades)	0,83	1,15	1,31
90	0,90	1,27	1,48
100	0,92	1,35	1,58
110	0,94	1,43	1,70

ROOF CONSTRUCTION

In this section SVK does not necessarily give complete information on all the different components and their properties. For further information we refer to the National standards and regulations, which must be always respected.

To allow a high quality and aesthetic slating, it is important that the roof structure is adequately designed and executed, according to all building regulations. The roof structure must be professionally designed so it can bear the roof covering and all extra loads (wind, snow …) acting on it, respecting the admissible deformations and tensions in the materials. The supporting framework must retain its form.



VENTILATION UNDER UNDERLAY | VENTILATION UNDER SLATES

SUPPORTING STRUCTURE

The supporting framework of a slate roof is usually made of purlins (girders) with rafters or trusses. Here you must take in account the minimum roof pitch and the weight of the total roof.

Consider 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 head-lap, 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.

ROOFING UNDERLAY

THE ROOF COVERING ITSELF DOES NOT OFFER A COMPLETE PROTECTION FROM WATER AND DUST. IT IS STRONGLY ADVISED TO INSTALL A WATERTIGHT UNDERLAY.

A roof has several functions:

- to temporarily ensure the **rain-tightness** of the finished roof and to drain the water to the gutter or, failing that, outside the building:
  - in the event of a slate breaking or blowing away
  - in exceptional weather conditions, such as heavy driving rain and gale force winds, resulting in local water infiltration.
  - in case of fine drifting snow or rain that is blown under the slates by the pressure of the wind
- to improve the **storm resistance** of the roof (reducing overpressure under the slates)
- to improve the **dust tightness** of the roof.
- **protect** the roof insulation.
- prevent or limit the dripping of **condensation water.**
- be permanently **vapor permeable**.
- temporarily **absorb any moisture or vapor.**

SVK STRONGLY ADVISES TO USE A VAPOUR PERMEABLE UNDERLAY AND TO VENTILATE THE GAP BETWEEN UNDERLAY AND SLATES.

All air contains water vapour. The colder the air, the less water vapour it can contain. When the air is saturated, the vapour condenses. This can happen within a structure or system (interstitial condensation) but more often on the colder surfaces. It is very

important to prevent hot air – often containing a lot of moisture – from entering the roof area and passing through the insulation layer, by applying a perfectly airtight and often also water vapour tight barrier on the 'warm' side of the insulation. If this barrier is not provided or badly placed, condensation within the roof space leads to a high moisture content of the insulation layer, or worse, to timber rot or damage to other materials. In any case, when placing the airtight, respectively vapour control layer, special attention is needed at joints and edges, joints are to be sealed and all gaps or other apertures are to be avoided.

The underlay itself provides a second airtight (but water vapour permeable!) layer. See to it that the joints and apertures are sealed. This way the risk of condensation is minimised.

A solid and permanently vapour-open roof also plays a major role in areas with high humidity.

Always use a high-quality underlay, with a high resistance and stiffness against wind uploads and all other forces. Use a damp open underlay, with good moisture absorption properties. The underlay is to be laid according to the manufacturer's prescriptions. Install the underlay membrane carefully, to make sure that the membrane is not pushed against the roof covering, and there is no contact with the underside of the slates, even in the worst conditions.

We refer to the ICP 2 SR 82 and BS 5534 for more information on the underlay.

When installing photovoltaic solar panels on a roof, attention must be paid to proper mounting. Breaks in the shelter must be closed again. The anchoring of solar panels is done in a similar way to the anchoring of ladder hooks.

COUNTER-BATTENS

THE COUNTER-BATTENS MUST BE PLANED. STRAIGHT AND OF EVEN THICKNESS.

British Standards 5534 and 5250 determine whether counter-battens are required based on the combination between:

- Type of roof, cold or warm pitched roof.
- Type of used underlay, HR or LR underlay.
- Airtightness of the roof covering, air open of airtight covering.

Fibre cement slates are a relatively airtight, close fitting roof covering. When tight outer coverings are applied there is a risk of interstitial condensation on the underside of the underlay and the external covering. To minimize such risk BS 5250 advises a ventilated batten-space with counter-battens.

Furthermore, even though SVK slates are one of the most watertight roof coverings available and offer a full protection from water ingress under normal conditions, water and snow dust penetration through the slates in abnormal conditions is sometimes unavoidable.

Due to these reasons SVK strongly advises to always use counter-battens as the purpose of the underlay isn't fully achieved until you apply counter-battens.

The space that is generated between the counter-battens 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 piling up against the slating battens.
- evening out the pressure between the outside air 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 dimensions of counter-battens must be sufficient to provide a ventilation gap as recommended in the BS 5250 and/or to provide a drainage path beneath the battens.

Nails for battens, counter-battens and underlay should conform to the relevant parts of the BS 1202.

The timber used for slating battens and counter-battens must be straight, preferably planed, and of equal thickness. Timber species, permissible characteristics and defects, preservative treatment, sizes and identification must comply with BS 5534.

THE TOPSIDES OF THE COUNTER-BATTENS MUST LIE IN THE SAME PLANE.

The centre-to-centre distance of the counter-battens depends on the underlying construction and decides the slating battens' distances. The counter-battens are nailed coinciding with the rafters/trusses on top of the underlay. The counter-battens must be fixed with nails with a round plain shank of not less than 3,35 mm shank diameter and a penetration of minimum 40 mm. Spiral roll and annular shank nails may also be used

When using an underlay with a certain overlap with a difference in thickness, additional measures must be taken at the counter-battens to maintain the flatness of the roof.

BATTENS

The battens are fixed, in straight lines, to the appropriate gauge (batten distance) depending on the slating system used.

The battens are parallel with the ridge (or at right angles to the line of drainage).

Battens should generally be continuous over not less than three supports. Battens must have a length of min. 1200 mm and must be supported at their ends and at least one intermediate support. Butt joints over intermediate supports must be staggered, cantilevering or splicing of battens between supports is not permitted. The section of the battens must be sufficient to prevent any splitting and any penetration of the underlay by the slate fixings. The centre-to-centre distance of the battens depends on the underlying span of the supporting structure and determines the batten dimensions.

Set out the battens, remembering to allow eaves slates to overhang the gutter to ensure water discharge into the gutter. The recommended overhang for a 100 mm wide gutter is **45 mm to 55 mm**, measured horizontally from the fascia, tilting fillet or wall face. For gutter with a different width, the overhang is the lesser of:

- 45 to 55 mm horizontally.
- the centerline of the gutter.

We advise to fix a vertical batten at the roof verge and at intersections.

Slating battens for roofing and cladding are the carrying element for the slates, which are fixed to the counter-battens with their widest side.

Sizes for timber battens.

Rafter centres (*)	Minimum width x depth (mm)
≤ 450 mm	38 x 25
450 < d ≤ 600 mm	50 x 25

Rafter centres exceeding 600 mm need structural calculation.

THESE MINIMUM SIZES DO NOT APPLY TO BATTENS USED TO SUPPORT RIDGES. HIPS AND VALLEYS.

The end-bearing length should be not less than 17.5 mm.

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 topsides of the battens need to be placed in the same plane, to ensure a smooth roof surface. A small glitch can immediately result in a difference of level or create tensions in the finishing of the slates.

Timber species, permissible characteristics and defects, preservative treatment, sizes and identification must comply with BS 5534.

The battens have to be fixed with nails with a round plain shank of not less than 3.35 mm shank diameter and a penetration of minimum 40 mm. Spiral roll and annular shank nails may also be used

INSULATION, AIR- AND VAPOR TIGHTNESS

INSULATION

It is very common to insulate the roof space. Insulation thicknesses keep increasing and, consequently, the temperature differences between the insulated and non-insulated areas of roof constructions are bigger. This has led to an increased risk of condensation in the cold roof spaces.

Whether an airtight layer is sufficient or a vapour control layer must be placed depends on whether the construction is a cold roof (large, ventilated space between insulation and underlay) or a warm roof (limited space between insulation and underlay, often not adequately ventilated). It also depends on the moisture content of the air in the building. Each situation must be assessed individually.

UNDER NO CIRCUMSTANCES SHOULD VENTILATION BE PROVIDED BETWEEN THE ROOF AND THE INSULATION.

AIR CURRENTS CAUSE HEAT LOSSES AND CONDENSATION.

When installing the insulation material, special attention is paid to the **joints** and connections. These must be **contiguous and closed**, with no free spaces. Also considered that certain insulation materials shrink over time. Clear spaces can lead to rotational flows around and in the insulation, resulting in internal condensation.

VAPOR TIGHTNESS

THE VAPOR CONTROL LAYER NEEDS TO BE PERFECTLY PLACED. WITHOUT GAPS.

To minimise the risk of condensation, an airtight layer or more often a vapour control layer on the warm side of the insulation is indispensable. All air contains water vapour. The colder the air, the less water vapour it can contain. When the air is saturated, the vapour condenses. This can happen within a structure or system (interstitial condensation) but more often on the colder surfaces.

It is very important to prevent hot air – often containing a lot of moisture – from entering the roof area and passing through the insulation layer, by applying a perfectly airtight and often also water vapour tight barrier on the 'warm' side of the insulation.

If this barrier is not provided or badly placed, condensation within the roof space leads to a high moisture content of the insulation layer, or worse, to timber rot or damage to other materials.

In any case, when placing the airtight, respectively vapour control layer, special attention is needed at joints and edges, joints are to be sealed and all gaps or other apertures are to be avoided.

The underlay itself provides a second airtight (but water vapour permeable!) layer. See to it that the joints and apertures are sealed. This way the risk of condensation is minimised.

AIR TIGHTNESS

THE ISOLATED ROOF SECTION MUST BE AIRTIGHT.

Airtightness refers to preventing air passage through the roof structure, from the inside to the outside or from the outside to the inside. Any inaccuracy can lead to condensation over time.

Airtightness can be achieved by installing an **airtight screen** on the inside of the roof. This can consist of, for example, a PE foil (airtight, also vapor-tight in the case of a perfectly tight design) or a plasterboard (airtight, in the case of well-finished installation).

VENTILATION

- Ventilation makes the roof structure dry faster. If this is not provided, the slates and batten will remain wet longer. Dust adheres easily to a wet surface. This is an ideal growing soil for algae and mosses. In other words, ventilation indirectly counteracts the greening of slates.
- Ventilation prevents the space behind the slates from being damp - therefore also better for the entire roof and facade structure. **Ventilation therefore extends the lifespan of the building envelope**.
- Vapor migrating from the inside through the roof must be able to be removed via ventilation. Even when there is a vapor barrier, ventilation must be provided: a vapor barrier is never 100% impenetrable. There are always vapor leaks at the connections to the walls, the connections between the strips, penetrations in the fastenings, cracks that have accidentally arisen during installation, etc. With a roof that is not airtight, the amount of condensation can amount to 120 g/day. This must be removed one way or another: through ventilation.

REALISATION

The counter-battens create the necessary gap for ventilation between the underlay and the slates. See to it that this gap is at least 22 mm and is uninterrupted from eaves to ridge.

Ventilation is realised by an air inlet at the eaves, and an air outlet at the ridge, each having a minimum section of 1/2000 of the roof surface.

This can be achieved by means of the free space between the battens of at least 15 mm thickness, an air **inlet at the base of the roof** and **an** air outlet **at the ridge; also at the location of roof openings**.

To determine the required ventilation, the following rule of thumb is used:

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

GUTTER

The recommended overhang for:

- a 100 mm wide gutter is 45 to 55 mm, measured horizontally from the fascia, tilting fillet or wall face.
- gutters of different widths should be taken to the centre-line of the gutter or 45 to 55 mm, whichever is the lesser.

The space between the battens is left open to allow for an air intake. Sufficient air supply must always be ensured.

If you want to close the opening at the location of the gutter, a ventilation comb can be used.

SLATE FIXING

Before starting work, the area to be slated should be checked, to ensure that all preparatory work has been executed to standard, and nothing will hamper the quality of the roofing work.

Load-out SVK slates on the roof safely to avoid slippage and distribute them evenly to prevent overloading of the roof structure.

ONLY SLATES WITH THE SAME PRODUCTION DATE SHOULD BE PLACED ON THE SAME UNINTERRUPTED ROOF SURFACE TO MINIMIZE COLOUR SHADES.

EXECUTION

The roof is to be set out carefully, to ensure that a minimum cutting of slates is necessary. Especially try to avoid using small parts of slates.

NO SLATE LESS THAN HALF THE WIDTH OF A FULL SLATE SHOULD BE USED UNDER **ANY** CIRCUMSTANCES AS THIS WOULD COMPROMISE THE SIDE LAP.

1. Set out both under-eaves battens as shown in figure A. Their gauge is determined by the under-eaves slate length following the correct laps, as given in the table below.
2. The first under-eaves course is cut and head-nailed to the eaves batten (see figure B). The length of the first under-eaves course is equal to the gauge. The length of the second under-eaves course is equal to the gauge plus the head-lap, the slates are center nailed through site drilled holes to the eaves batten. This first under-eaves course supports the disk rivet and stiffens the eaves.

   The sum of the lengths of both under-eaves courses is equivalent to the full slate length, so both can be obtained by cutting a full-length slate into two unequal lengths.

   The tails of both under-eaves courses and the first full slate should be aligned.

Length of under-eaves fibre-cement slate courses (dimensions in cm):

Slate Size	Lap	1st under-eaves slate length (A)	2nd under-eaves slate length (B)
60 x 30	11	24.5	35.5
60 x 30	10	25.0	35.0

3. Fix the slates for the second under-eaves course to the lower of the two under-eaves battens. **Use an SVK slate-and-a-half width at the verge**, to obtain a broken bond over the first course. Prior to fixing this, drill an extra hole, half a slate width in from the verge and 30 mm up, to allow for the copper disk rivet that will fix the first full slate course, see figure C.
4. Fix the first course of full size SVK slates. At the verge, an additional hole is drilled 50 mm from the outside edge of the slate, and 30 mm plus gauge from the bottom edge, see figure D. This hole is required for the extra copper disk rivet in the next course.
5. Each slate of the first full size row is now fixed with:

   - two nails, firmly driven into the batten. The hole in the slates is larger than the nail diameter to allow working.
   - the slates must always be centre-nailed;
   - a disk rivet placed between the edges of the two lower slates. The shaft of the disk rivet projects through the hole in the tail of the appropriate slate in the next course and is bent down the roof slope to secure the tail of the slate, not too tight however, to allow the working of the slates.

6. At the verge, every second course a slate-and-a-half width slate is used. Drill 3 nail holes in the slate on the batten line for nailing, and two additional holes for the copper disc rivets, see figure E.
7. Proceed (see figure F) as described above to cover the whole roof area.

   For the remaining courses, a third copper disk rivet hole is required in the slate-and-a half slates, to accommodate the disk rivet for the next single width verge slate. Drill this hole half the single slate width from the side and 30 mm + gauge from the bottom edge (or tail).

8. Trim to verges, hips, valley and ridges as necessary.

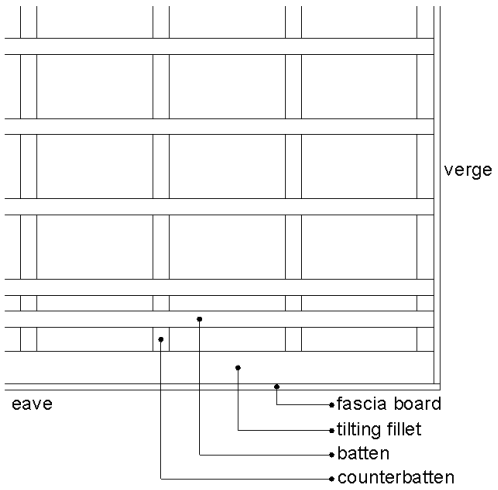


Fig A - Batten configuration at eaves

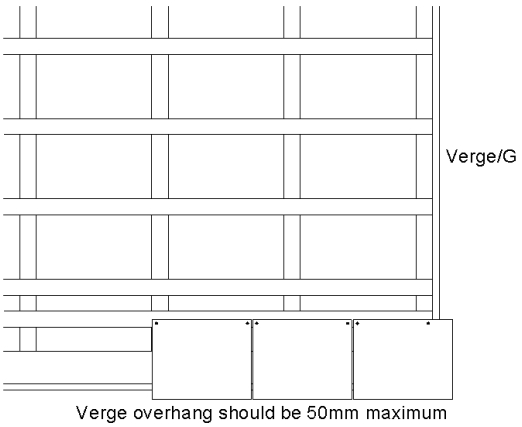


Fig B - Eaves - 1st under eaves course

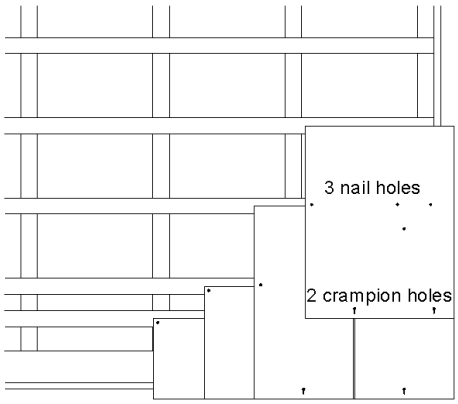


Fig E - Verge - using slate-and-a-half to break bond

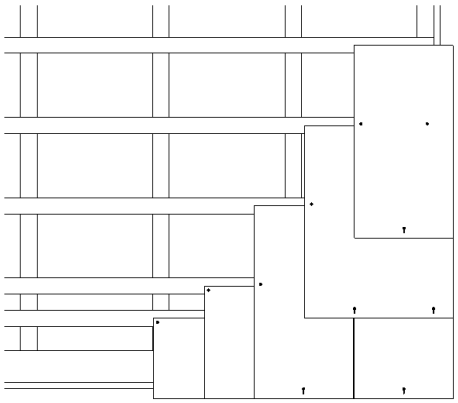


Fig F

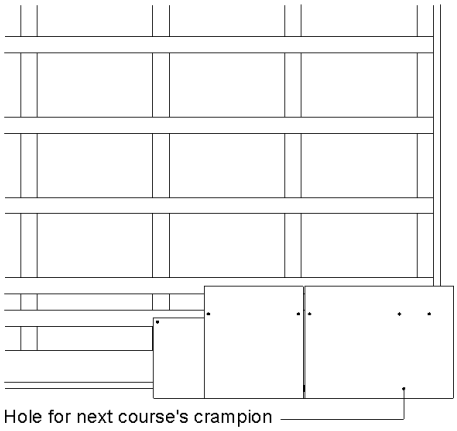


Fig C - Eaves - 2nd under eaves course

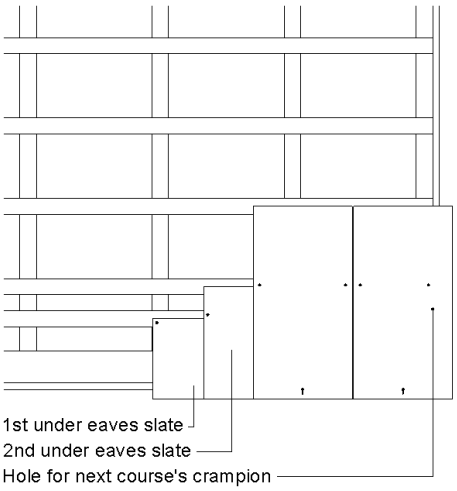


Fig D - Eaves - 1st course of standard eaves

WHEN INSTALLING THE SLATES. ALWAYS TAKE INTO ACCOUNT A SIDE JOINT OF 4 MM

FIXINGS

In general, the slates are fixed with two nails and, at the tail, a disk rivet (= disc-rivet), connecting the tail on the centreline of the slate to the two slates below, through the gap between them.

The nails must comply with BS EN 1202-2 and 3. The nail shank should be **not less than 2,65 mm** and the length should be approximately 30 mm so a **penetration of at least 15 mm** into the batten is provided.

Use disc rivets with stem of minimum 19 mm long and diameter less than 2 mm. The disc base of the disc rivet should be formed of 0,5 mm thick copper sheet and have a diameter of minimum 19 mm. Use appropriate disc rivets to obtain sufficient uplift resistance. Disc rivets are bent downwards; not too tight, so some movement of the slate is still possible.

The exposure conditions, the roof pitch and the height of the building determine the requirements for the fixing of the slates.

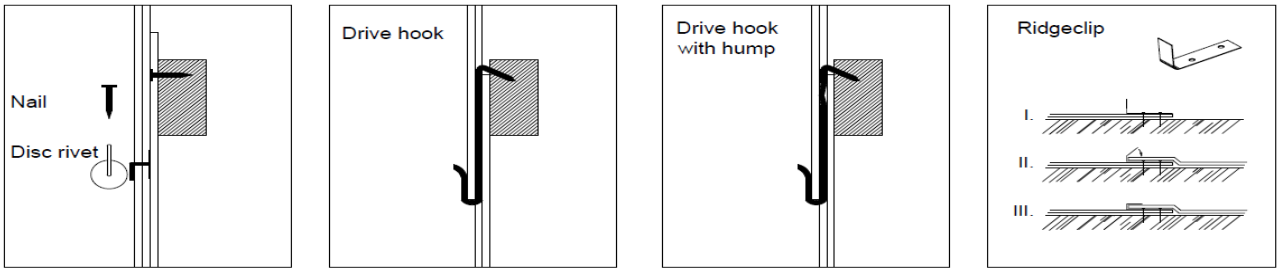
The number of applicable Fixings can be found in the chapter about slating systems.

BUILDING HEIGHT ≤ 12 M:

IN THE EDGE AREAS OR THE AREAS SURROUNDING ROOF PUNCTURES. ALL SLATES WITHIN 1 M MUST BE FASTENED WITH AT LEAST 2 NAILS.

The fixing materials must be made out of corrosion-resistant material such as copper, stainless or galvanised steel.

The type of slate, the kind of roof structure and the slating method used determines the nature and number of the fixings.



CENTRE NAILING

The slates are fixed with two nails close to the side edge (20 mm to the inner edge of the nail hole) of the slate and positioned immediately above the head of the slates below.

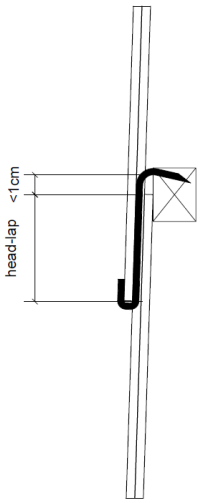
- When nailing the slates the holes are pre-pinned with a diameter greater than the slating nail.
- It's better to use crenelated nails than normal slating nails because of a higher outpull-resistance.
- 1 slate should be fixed with minimum 2 nails.
- Slates for vertical work need to be centre nailed.
- Head fixing and shoulder fixing are not recommended because they do not have the benefit of a long cantilever arm above the nails in resisting wind uplift as in centre-nailing.
- Nails should be fixed in the middle of the battens.

HOOK-FIXING

Though this is not very customary in the UK, this fixing method is a very good alternative to the nail fixing of slates and is covered by BS 5534. When applying hook fixing, please contact SVK for specific construction advice.

When applying hook fixing:

- Hooks intended for slating should be drive slate hooks formed from stainless steel wire conforming to BS EN 10088-3, grade 316.
- The hooks must never be pushed in order to counteract as much as possible capillary action and creep.
- The use of wrap hooks is not recommended by BS 5534.
- Crimped hooks should be used at pitches of 30° or less.
- Length of the hook = Greater than the head-lap +5.0 mm; and less than the head-lap +10 mm
- Hooks with crimped shanks reduce the capillary rise of water at the perpendicular joints between slates and are suitable for all roof pitches between 25° and 90°.
- Straight shank hooks should not be used at roof pitches below 30°, instead crimped hooks should be used.
- The hook shank diameter should be greater than 2.7 mm and smaller than the minimum slate thickness.
- Hooks should not be used at pitches less than 25°.
- When hook fixing, a minimum of two nail fixings in addition to the hooks should be used at eaves, ridges and top abutments and, to prevent lateral drift, at verges, hips, valleys and side abutments.



COPPER TAIL RIVET FIXING

The copper tail rivet is positioned in the centre of the slate, close to the leading edge, so the top slate is clamped to the two lower slates. It slides up in the gap between the lower slates and goes through a pre punched hole in the top slate. The pin is bent over to lock the slates and the rivet together. The British Standard 5534 recommends that the gap between the slates should not be wider than 5 mm, when a rivet with a base diameter of 19mm is used. This makes that up to 8mm of the disc lays under each of the lower slates. If the slates are laid with a gap greater than 5mm, there is a risk that the rivet will be pulled through the gap during strong winds.

The rivet pin must be sufficiently long, so it can be bent over far enough at right angles onto the top surface of the top slate

FIXING ACCESSORIES

All fixing accessories, used at junctions or finishings, must be of a material that is compatible with the fibre cement slates and their fixings. Avoid staining, corrosion or other reactions, leading to damage.

DRY ROOFING PRODUCTS - MORTAR MIX.

TRY TO AVOID MORTAR MIX

SVK strongly advises to use dry roofing products and systems. Use systems offering a proven resistance to wind load, driving rain and durability.

If additionally mortar mix is used, plasticizing admixtures must be added, in accordance to the advice of their manufacturer. Wherever problems occur, which could be caused by the fact that the mortar fixing prevents the normal working of the fibre cement roofs or accessories under weather circumstances, **SVK guarantee cannot be invoked**.

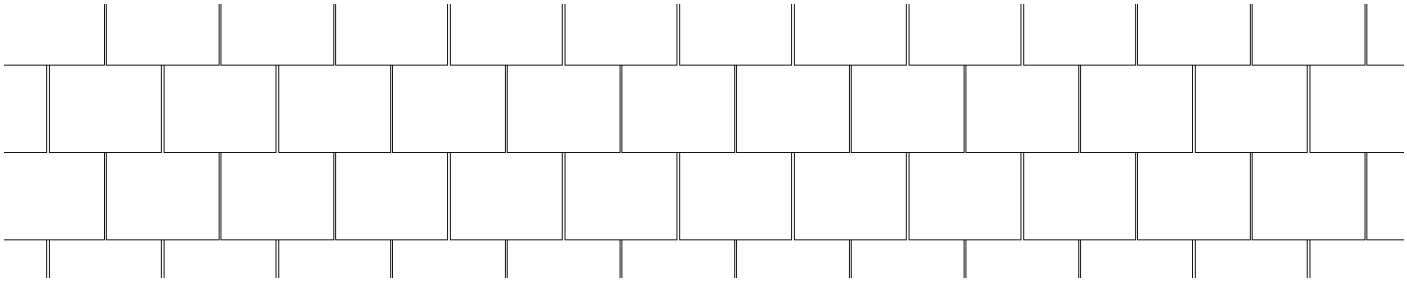
FLASHINGS, JUNCTIONS AND PROJECTIONS

Flashings and junctions must be detailed to prevent the entry of rainwater. The integrity of the underlay as a barrier to wind and water ingress should be maintained around all projections.

We refer to the technical manuals of the manufacturers or Product Federations.

SLATING SYSTEMS

VERTICAL, DOUBLE-LAP (ROOF – FACADE)



PRINCIPLE

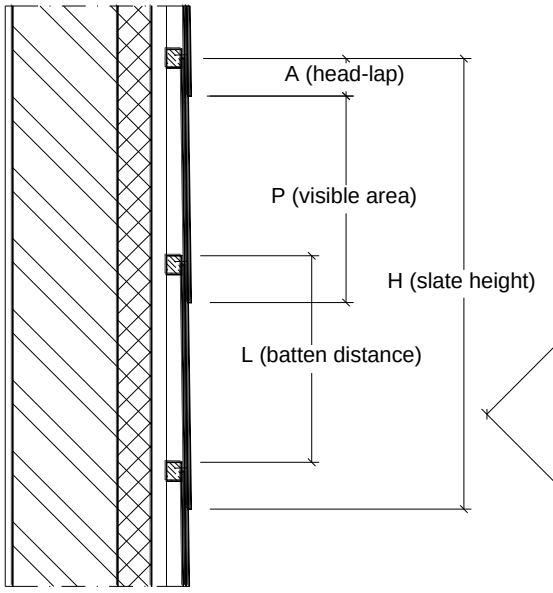
Vertical, double-lap slating is the common way of working and is suitable for all rectangular slates. The slates are laid in broken bond. Double-lap means that each row of slates is partly covered by the two rows above. The head-lap is the distance by which the upper course of slates provides a lap with the next but one course below.

This way, each slate can be divided into three areas (see figure below):

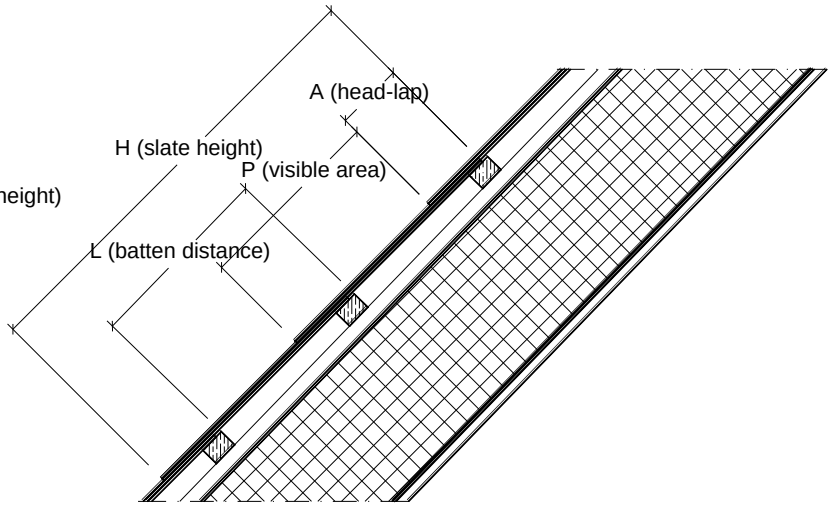
- visible area.
- single lap area.
- double-lap area (= head-lap).

The double covered part is called the head-lap. The height of each of the two other parts equals the batten distance and is determined as following:

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



FACADE CLADDING



ROOF COVERING

THE MINIMUM HEAD-LAP IS DETERMINED IN FUNCTION OF THE ROOF PITCH AND THE EXPOSURE OF THE ROOF.

The recommendations apply for rafter lengths of maximum 9m in driving rain exposure of less than 56.5 l/m² per spell and 6 m in driving rain exposures of 56.5 l/m² per spell or more.

The recommendations for laps given below might not be adequate for roof pitches of **30° or less**:

- for driving rain exposure of less than 56.5 l/m² per spell, for rafter lengths greater than 9m;
- for driving rain exposure of 56.5 l/m² per spell or greater, for rafter lengths greater than 6m.

In this case the placement of a sub-roof and/or intermediate gutters should be considered. Whilst installing to the British Standard isn't a requirement by law, SVK strongly advises to follow the installation guidelines according to BS 5534

The minimum slate width is determined by several factors: the slate length, the head-lap, the roof pitch, the driving rain exposure and the distance from the side edge of the slate to the inner nail hole. Calculation needs to be done according to BS 5534

MINIMUM HEAD-LAP – ROOF PITCH

SVK double lap slates can be laid on roofs with a pitch greater than or equal to 25°.

Due to capillary action roofs with a lower slope cannot be guaranteed. Moreover, the lower the pitch, the more head-lap one must provide to obtain a watertight covering. The minimum vertical head-lap [A] in mm for following roof pitches is:

Roof pitch α [°]	Minimum head-lap [cm]	
	< 56.5 l/m² per spell rafter length ≤ 9 m	≥ 56.5 l/m² per spell rafter length ≤ 6 m
25 ≤ α ≤ 30	11***	11***
30 ≤ α ≤ 70	9	11**
70 ≤ α ≤ 90	5	5

* underlay advised
** underlay strongly advised
*** underlay obligatory
For special applications with lower roof pitches, SVK advice should be sought. For pitches between 15° and 22.5° please contact SVK

The above recommendations are valid for normal and severe exposure. Any area where abnormal weather conditions can be expected (heavy snowfalls and/or severe exposure to wind-driven rain) special precautions may have to be taken to ensure watertightness of the roof structure.

TO OBTAIN A WATERTIGHT ROOF COVERING. THE FOLLOWING RATIO BETWEEN DIMENSIONS AND LAPS MUST BE RESPECTED WITH FULL SIZE AS WELL AS WITH CUT SLATES (WHEREVER POSSIBLE):

THE WIDTH OF THE SLATE IS MINIMUM TWICE THE HEAD-LAP.

THE HEIGHT OF THE SLATE IS MINIMUM THREE TIMES THE HEAD-LAP.

THE SIDE-LAP IS MINIMUM EQUAL TO THE HEAD-LAP.

FIXING

- Slates greater than 40 x 20 cm are fixed with 2 nails and have a disc rivet at the tail.
- Hooks should not be used for pitches less than 25°.
- Crimped hooks should be used at pitches of 30° or less.

Drive and wrap hooks are placed between 0.5 cm and 1 cm higher than the top edge of the slates. This means that the hooks are between 0,5 and 1 cm longer than the vertical lap. It is advisable to only use stainless steel hooks.

Nails should be fixed in the middle of the battens.

NUMBER AND DIMENSIONS

Format [cm]	Head-lap A [cm]	Appx. batten gauge L [cm]		Appx. pieces per m²		Appx. weight [kg/m²]	
		Ardonit	Montana	Ardonit	Montana	Ardonit	Montana
60 x 30	5	27,5	27,25	12,0	12,3	18,3	18,2
	9	25,5	25,25	12,9	13,3	19,7	19,6
	10	25,0	24,75	13,2	13,5	20,1	20,0
	11	24,5	24,25	13,4	13,8	20,5	20,4
	13	23,5	23,25	14,0	14,4	21,4	21,2
45 x 30	5	20,0	19,75	16,5	16,9	17,7	17,6
	9	18,0	17,75	18,3	18,8	19,7	19,6
	11	17,0	16,75	19,4	20,0	20,9	20,8
	13	16,0	15,75	20,6	21,2	22,2	22,1
40 x 27	5	17,5	17,25	20,9	21,6	19,1	19,1
	9	15,5	15,25	23,6	24,4	21,6	21,6
	11	14,5	14,25	25,2	26,1	23,1	23,1
	13	13,5	13,25	27,0	28,1	24,8	24,9
40 x 24	5	17,5	17,25	23,4	24,3	19,1	19,1
	9	15,5	15,25	26,4	27,4	21,6	21,6
	11	14,5	14,25	28,3	29,4	23,1	23,1

The numbers are calculated with a **perpendicular joint of 4 mm.**

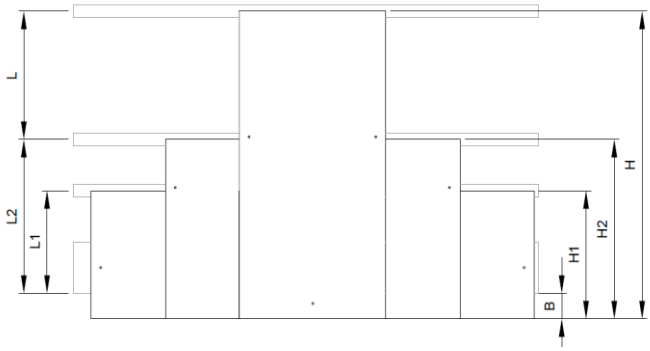
The height of the first row of slates, 1st under-eaves course: $H_1 = L$
The height of the second row of slates, 2nd under-eaves course: $H_2 = L + A$

The bottom slates are fixed with 2 nails.

Batten distances are calculated as following:

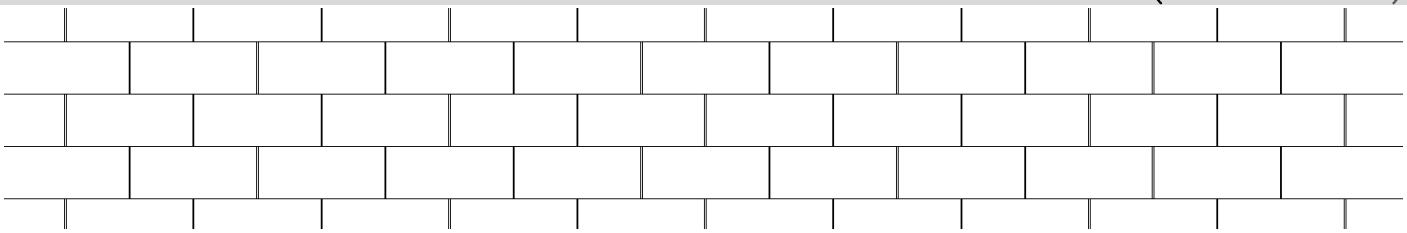
$L_1 = L - B$ & $L_2 = L + A - B$

A = head-lap
B = overhang of the bottom slates past the lowest batten (max. 5 cm)
L = batten gauge centre-to-centre, depending on slate height H and head-lap A



Height slate H [cm]	Head-lap A [cm]	Ardonit					Montana				
		L [cm]	H_1 [cm]	H_2 [cm]	L_1 [cm] (B = p. ex. 5 cm)	L_2 [cm] (B = p. ex. 5 cm)	L [cm]	H_1 [cm]	H_2 [cm]	L_1 [cm] (B = p. ex. 5 cm)	L_2 [cm] (B = p. ex. 5 cm)
60	5	27,5	27,5	32,5	22,5	27,5	27,25	27,25	32,25	22,25	27,25
	9	25,5	25,5	34,5	20,5	29,5	25,25	25,25	34,25	20,25	29,25
	10	25,0	25,0	35,0	20,0	30,0	24,75	24,75	34,75	19,75	29,75
	11	24,5	24,5	35,5	19,5	30,5	24,25	24,25	35,25	19,25	30,25
	13	23,5	23,5	36,5	18,5	31,5	23,75	23,75	36,75	18,75	31,75
45	5	20,0	20,0	25,0	15,0	20,0	19,75	19,75	24,75	14,75	19,75
	9	18,0	18,0	27,0	13,0	22,0	17,75	17,75	26,75	12,75	21,75
	11	17,0	17,5	28,0	12,0	23,0	16,75	17,75	27,75	11,75	22,75
	13	16,0	17,0	29,0	11,0	24,0	15,75	16,75	28,75	10,75	23,75
40	5	17,5	17,5	22,5	12,5	17,5	17,25	17,25	22,25	12,25	17,25
	9	15,5	15,5	24,5	10,5	19,5	15,25	15,25	24,25	10,25	19,25
	11	14,5	14,5	25,5	9,5	20,5	14,75	14,75	25,75	9,75	20,75
	13	13,5	13,5	26,5	8,5	21,5	14,25	14,25	27,25	9,25	22,25

HORIZONTAL DOUBLE-LAP (ROOF - FACADE)



This method is a variation to the double-lap method. The rectangular slates are placed horizontally here. This method can be applied for both **facade cladding** and **roofing** in normal situations.

THE MINIMUM PITCH IS 27.5°. MEASURED ON THE SLATE.

The recommendations apply for rafter lengths of maximum 9m in driving rain exposure of less than 56.5 l/m² per spell and 6 m in driving rain exposures of 56.5 l/m² per spell or more.

The recommendations for laps given below might not be adequate for roof pitches of **30° or less**:

- for driving rain exposure of less than 56.5 l/m² per spell, for rafter lengths greater than 9m;
- for driving rain exposure of 56.5 l/m² per spell or greater, for rafter lengths greater than 6m.

In this case the placement of a sub-roof and/or intermediate gutters should be considered.

The minimum slate width is determined by several factors: the slate length, the head-lap, the roof pitch, the driving rain exposure and the distance from the side edge of the slate to the inner nail hole. Calculation needs to be done according to BS 5534.

MINIMUM HEAD-LAP – ROOF PITCH

- The minimum vertical head-lap [A] in mm (according to BS 5534) for following roof pitches is:

Roof pitch [°]	Minimum head-lap [cm]	
	<56.5 l/m² per spell rafter length ≤ 9 m	≥56.5 l/m² per spell rafter length ≤ 6 m
27.5 - 30	10	**11**
30 - 75	10	10
≥ 75	5	5

FIXING

The slate 60x30 is fixed with 3 jagged nails.

For the position of the middle fixing, one should take the driving wind direction into account. The slates need to be pre-pinned (position of the holes, see drawings in table below).

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

The height of the first row of slates, also called 1st under-eaves course: $H_1 = L + A - 2.5\ cm$

The height of the second row of slates, also called 2nd under-eaves course: $H_2 = L + A$

The bottom slates are fixed with 3 nails.

Batten distances are calculated as following:

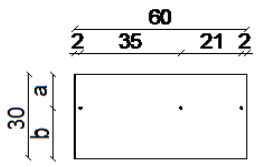
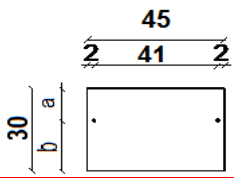
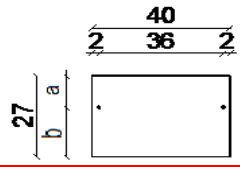
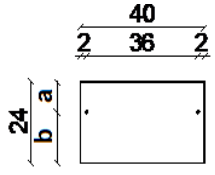
$L_1 = L + A - (B + 1\ cm)$ & $L_2 = H - B$

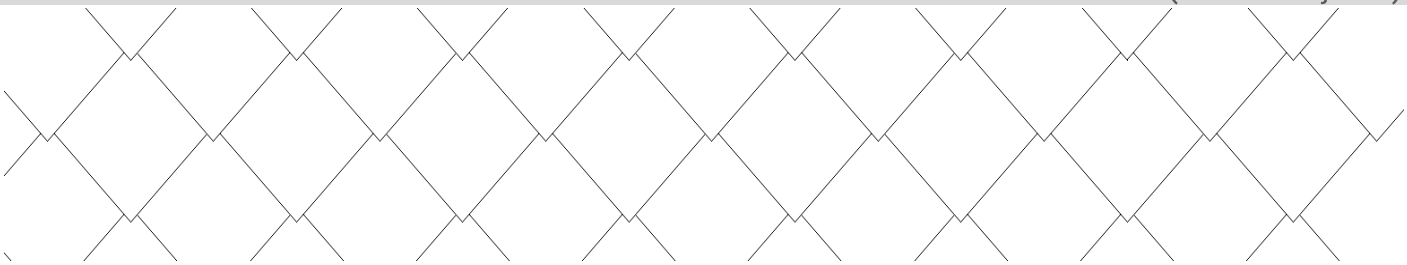
A = head-lap
B = overhang of the bottom slates past the lowest batten (max. 5 cm)
L = batten gauge centre-to-centre, depending on slate height H and head-lap A

Height slate H [cm]	Head-lap A [cm]	Ardonit				
		L [cm]	H_1 [cm]	H_2 [cm]	L_1 [cm] (B = p. ex. 5cm)	L_2 [cm] (B = p. ex. 5cm)
30	5	12.5	15.0	17.5	11.5	25.0
	10	10.0	17.5	20.0	14.0	25.0
	11	9.5	18.0	20.5	14.5	25.0
27	5	11.0	13.5	16.0	10.0	22.0
	10	8.5	16.0	18.5	12.5	22.0
	11	8.0	16.5	19.0	13.0	22.0
24	5	9.5	12.0	14.5	8.5	19.0
	10	7.0	14.5	17.0	11.0	19.0
	11	6.5	15.0	17.5	11.5	19.0

NUMBER AND DIMENSIONS

The numbers are calculated with a **perpendicular joint of 4 mm**

Size	Head-lap [cm]	a [mm]	b [mm]	Visible area BxH [cm]	Batten distance [cm]	Amount [st/m²]	Weight [kg/m²]	Battens [lm/m²]
60x30 	5	12,0	18,0	60x12,5	12,5	13,3	20,3	8,0
	10	9,5	20,5	60x10,0	10,0	16,6	25,3	10,0
	11	9,0	21,0	90x9,5	9,5	17,4	26,3	10,5
45x30 	5	12,0	18,0	45x12,5	12,5	17,6	19,0	8,0
	10	9,5	20,5	45x10,0	10,0	22,0	23,8	10,0
40x27 	5	10,5	16,5	40x11,0	11,0	22,5	20,7	9,1
	9	8,5	18,5	40x9,0	9,0	27,5	25,3	11,1
40x24 	5	9,0	15,0	40x9,5	9,5	26,1	21,4	10,5
	8	7,5	16,5	40x8,0	8,0	30,9	25,3	12,5



PRINCIPLE

Diamond slates are 40x40cm format, with 2 opposing corners cut parallel to each other. The specified overlap **A** is measured perpendicular to the side of the slate. The actual overlap is bigger as this is determined by the direction of the flow of the run-off water thus perpendicular to the battens.

Since the diamond covering is a single lap covering, the allowed field of application is limited.

THE DIAMOND COVERING IS LESS SUITABLE FOR ROOF SURFACES WITH SEVERE WEATHER EXPOSURE OR ROOFS ON HIGH BUILDINGS.

MINIMUM HEAD-LAP – ROOF PITCH

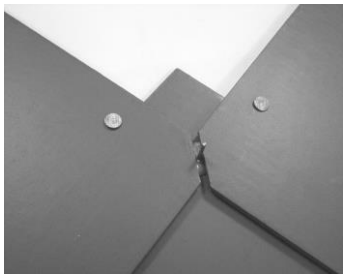
Minimum roof pitch	Moderate Exposure <56,5 l/m² per spell rafter length ≤ 9m	Severe Exposure ≥56,5 l/m² per spell rafter length ≤ 6m
40/40/10	31°	39°
40/40 Standard	50°	54°

A watertight underlay is required.

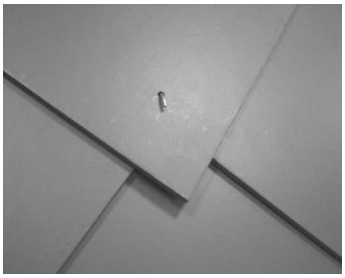
The overlap for roof covering with diamond slates is 8,4 / 10cm, depending on the format, 5cm for façade cladding, measured perpendicular to the side of the slate.

FIXATION

Slates 40/40/10 are fixed with 2 nails + one disc rivet
Slates 40/40 Standard are fixed with 2 nails + a hook of 13cm



Placing of the disc rivet in the joint in-between 2 slates



Placing of the next slate over the disc rivet and bending of the disc rivet, not to strong so that movement of the slate is still possible

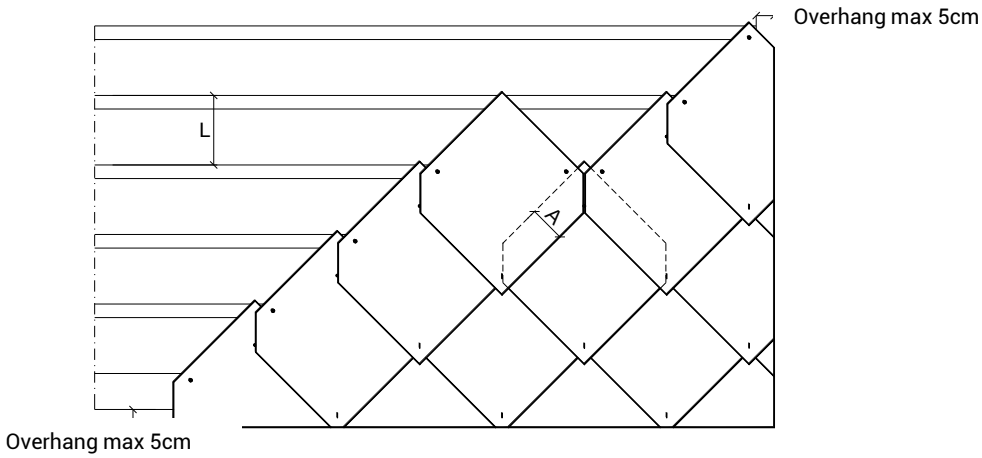
Nailing in the batten and fixing the disc rivet in the joint between 2 slates

Placing the diamond slate in the drive hook

Slates cut to size are used in the lowest 3 rows where dependent from the cut of the 'foot slates" extra nails may be required.

To support the slates at the edges of the roof or façade, extra battens might be required in between the normal battens.

NUMBER AND DIMENSIONS

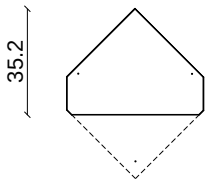
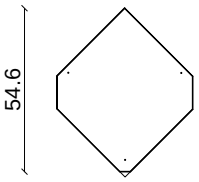
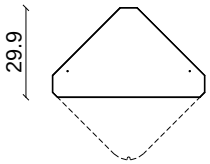
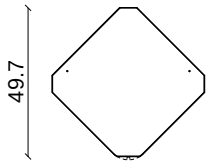


Slate Type in cm	40/40/10	40/40 Standard
Number of pieces/m²	11,2	10,2
Overlap A in cm	10,0	8,4
Weight kg/m²	14,7	13,0
Batten distance in cm	19,4	19,3*
Amount of battens m/m²	5,2	5,2

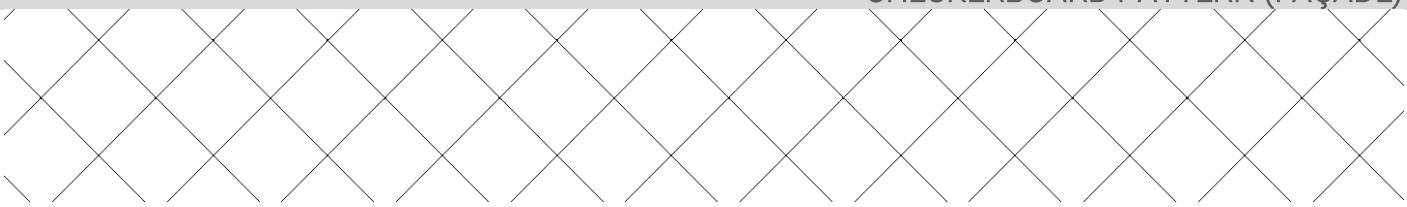
The numbers per m² are calculated with a perpendicular joint of **4 mm**.
* Width of battens = 50mm

DIMENSIONS FOOT SLATES

The above given drawing is the most common start of a roof or façade. This is finished with slates cut to size as given below (dimensions in cm, for overhang of 5cm):

	First row of slates	Second row of slates
40/40/10		
40/40 Standard		

CHECKERBOARD PATTERN (FAÇADE)



PRINCIPLE

The checkerboard pattern is based on the same principle as the diamond slates, only with a smaller head-lap, so that a rectilinear pattern is obtained. The lines form solid diagonals.

THE CHECKERBOARD PATTERN IS A SINGLE COVER WITH LESS ENCLOSURE THAN WITH DIAMOND COVER. THE AREA OF APPLICATION IS LIMITED TO THE FACADE.

This slating system is made with diamond slates **40/40/10**.

The indicated head-lap is measured perpendicular to the side of the slate. In fact, the actual cover is larger because it is determined by the direction of flow of the run-off water, i.e. perpendicular to the slates.

MINIMUM HEAD-LAP – ROOF PITCH

The head-lap for façade cladding in checkerboard pattern is 7,42cm, measured perpendicular to the edge of the slate.

FIXATION

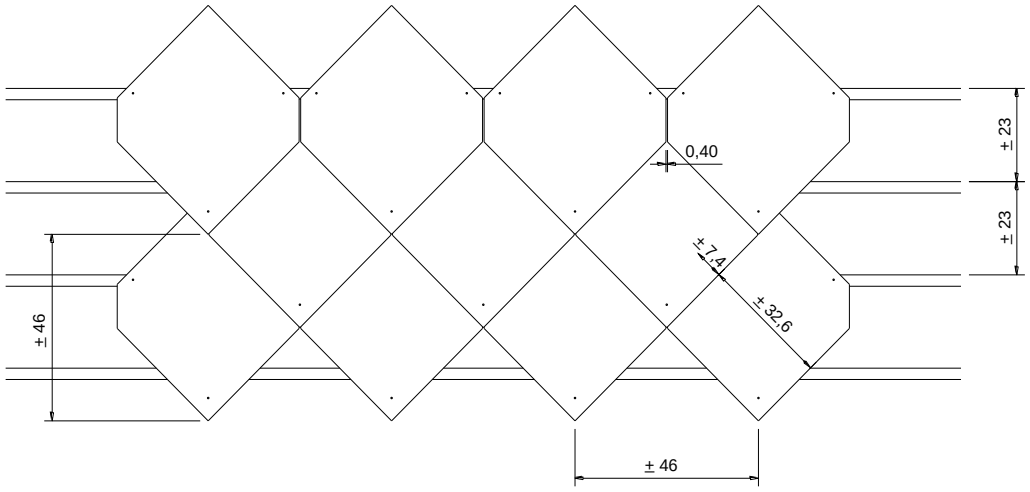
The diamond slates are attached with 2 nails + 1 disc rivet:

- Fixing the drive hook in the joint between 2 slates
- Place the next diamond slate over the disk rivet and fold the disk rivet downwards, not too tight so that movement of the slates is still possible.

In the bottom three rows, cut slates are used, whereby depending on how the foot slates are cut, additional nail holes must be made.

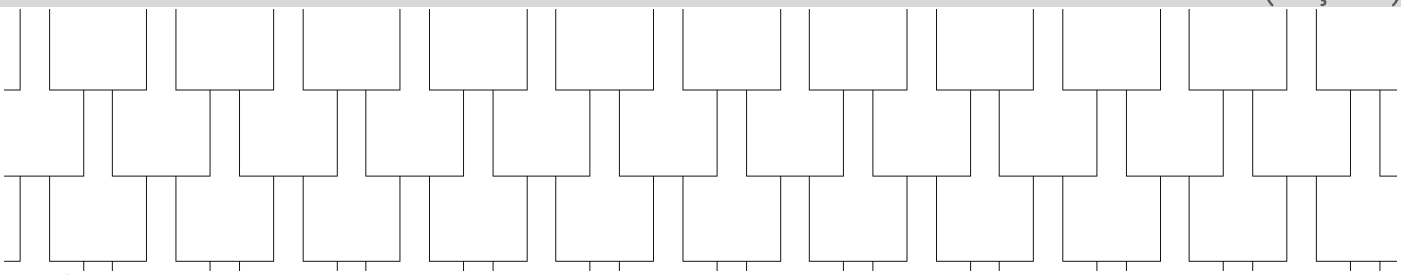
To be able to sufficiently attach the slates to the sides of the roof and façade surfaces, it may be necessary to provide additional battens between the normal battens.

NUMBER AND DIMENSIONS



Head-lap (cm)	7,4	Note: a 4 mm lateral joint is taken into account.
Amount (pcs/m²)	9,4	
Weight (kg/m²)	12,3	
Batten distance in cm	23,0	
Amount of battens m/m²	4,3	

COVERING WITH OPEN JOINT (FAÇADE)



PRINCIPLE

The open joint cover is a variation of the vertical double cover. The slates are pushed apart laterally, creating an open space between the sides of the slates, which is variable according to the size of the slate and the overlap used. It is recommended to provide a vapour-permeable, waterproof cladding behind the slate-bearing battens for tall buildings or surfaces exposed to heavy rain winds, as well as for slopes of 70° to 85°.

HEAD-LAP

The lateral overlap (B) is at least 7 cm, the vertical overlap (A) at least 5 cm (for façade). Combinations of overlaps, other than those listed in the underlying table remain possible, but depend on the exposure to heavy rain, winds or on the aspect that one wants to give to the covering.

FIXING

The slates are fastened with two hooks. The slates are placed 1 to 1.5 cm lower than the top edge of the slats. This means that the hooks are 1 cm longer than the vertical cover. It is recommended to use only stainless-steel hooks.

To fasten the 60/40 slates, stainless steel hooks with a minimum diameter of 3 mm are required.

The slates are additionally fastened with two nails on the exteriors (edge of 1 m) of the façade surfaces, in areas where there are strong winds, facades exposed to wind, facades of + 5 m height and for the large formats (60 x 40 and 60 x 30) in adverse conditions (seacoast, top of a hill, open field.).

Hanging hooks are recommended instead of pin hooks. For large façades (height > 5 m), hanging hooks are even highly recommended. The hanging hook must be adapted to the thickness of the batten + the thickness of one slate.

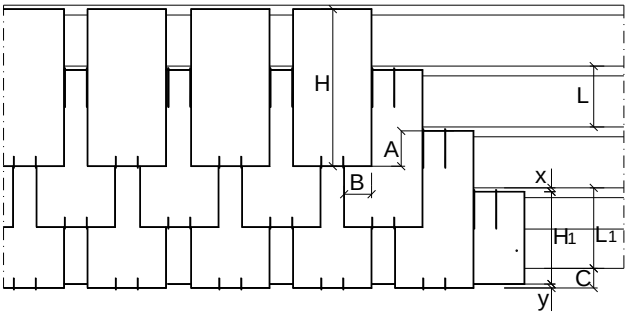
NUMBER AND DIMENSIONS

The vertical head-lap (A) shall be at least 50 mm for vertical surfaces (90°)

Format [cm]	Head-lap [cm]		Batten distance [cm]	Amount [pcs/m²]	Weight [kg/m²]
	Vertical head-lap (A)	Horizontal side-lap (B)			
60 x 40	5	7 10	27,5	5,5 6,1	11,2 12,4
60 x 30	5	7 10	27,5	7,9 9,1	12,1 13,9
45 x 30	5	7 10	20,0	10,9 12,5	11,7 13,5
40 x 27	5	7 9	17,5	14,3 15,9	13,2 14,6
40 x 24	5	7 8	17,5	16,8 17,9	13,8 14,7

If you work with the chamfered corners downwards, use a horizontal overlap B of at least 10 cm for size 45/30.

DIMENSIONS OF BOTTOM SLATES AND POSITION OF LOWER BATTENS



The height of the first row of slates (bottom slates):

H1 = batten distance L centre to centre + overlap A – y

The bottom slates are attached with 2 nails.

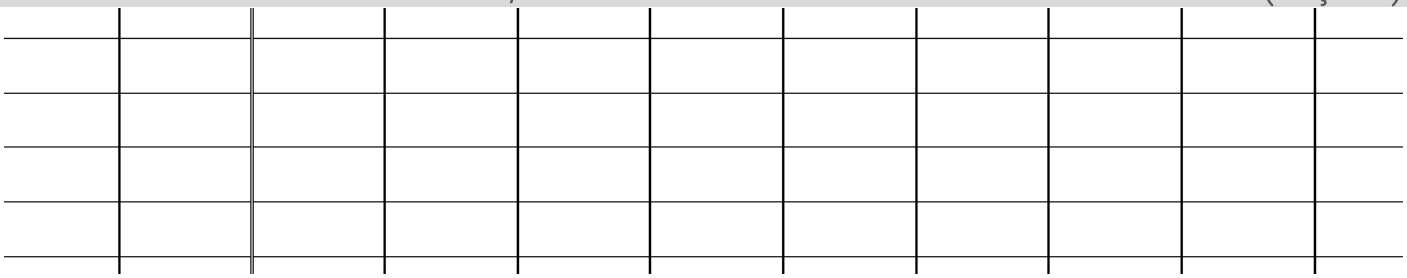
The distance between the bottom edge of the lowest batten and the top edge of the next batten:

L1 = batten distance L centre-to-centre + head-lap A – overhang C + x

A = head-lap
B = side-lap
C = overhang of lower slates past the lower batten (max. 5 cm)
L = batten gauge centre-to-centre, depending on slate height H and the head-lap A
X = space to nail above the slate on the batten, 1 to 1.5 cm
y= overhang 2nd slate past the bottom slate, to create a drip edge, e.g. 1 cm

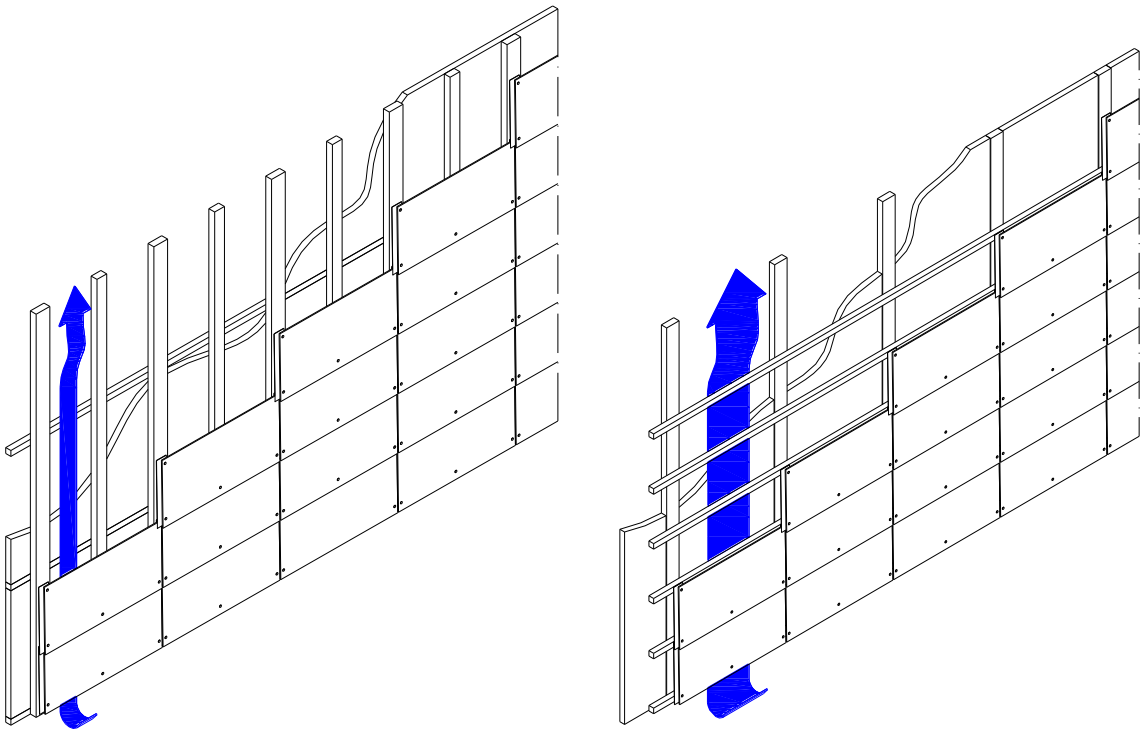
Slate height [cm] H	Headlap [cm] A	Batten distance [cm] L	H1 [cm] = L+A-y (y = e.g. 1 cm)	L1 [cm] = L+A-C+x (C = e.g. 5 cm) (x = e.g. 1 cm)
60	5	27,5	31,5	28,5
	9	25,5	33,5	30,5
	11	24,5	34,5	31,5
	13	23,5	35,5	32,5
45	5	20,0	24,0	21,0
	9	18,0	26,0	23,0
	11	17,0	27,0	24,0
	13	16,0	28,0	25,0
40	5	17,5	21,5	18,5
	9	15,5	23,5	20,5
	11	14,5	24,5	21,5
	13	13,5	25,5	22,5

HORIZONTAL, SINGLE LAP – STRAIGHT ON TOP OF EACH OTHER (FAÇADE)



PRINCIPLE

The slates are placed horizontally, next to each other, with a joint of 4 mm with the longest side. In height, they are placed directly above each other. Only applicable for vertical surfaces, 90°.



HEAD-LAP

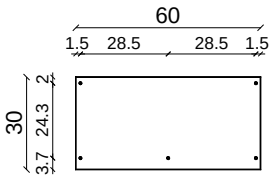
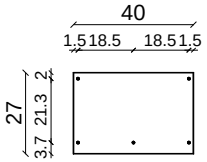
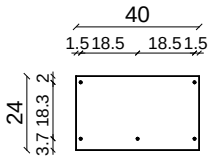
Vertical: a single cover of 35 mm.

Horizontal: no cover. The slates are placed next to each other. A joint tape made of polyethylene is placed behind the lateral joint.

FIXATION

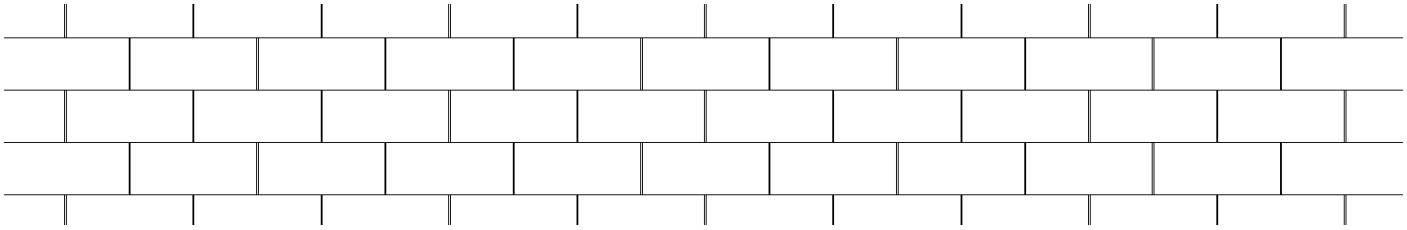
The slates are attached to the trellis with five nails.

The slates can be placed on both horizontal and vertical battens. Preferably on vertical battens because of the ventilation between these battens.

	Dimensions (cm)	Batten distance (cm)		pieces pro m²	Weight (kg/m²)
		Vertical battens	Horizontal battens		
30/60	 Pre-holded	30,2	26,5	6,25	9,6
27/40	 Holes to be pre-drilled on site.	20,2	23,5	10,54	9,7
24/40	 Holes to be pre-drilled on site.	20,2	20,5	12,08	9,9

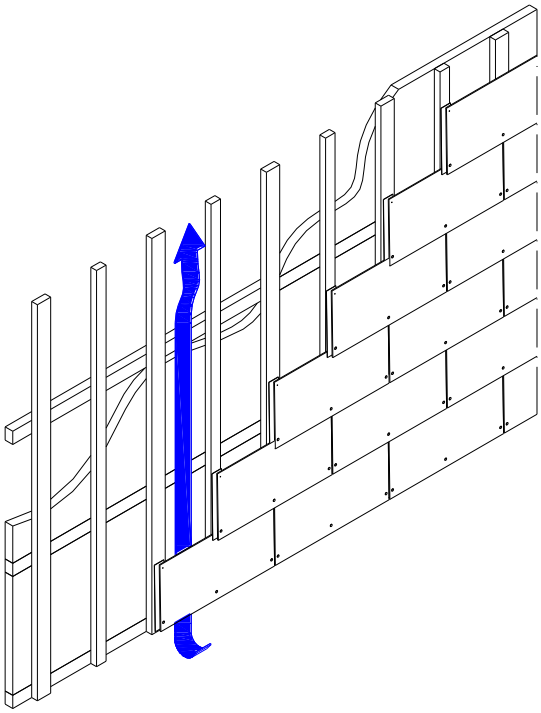
Note: calculated with a **4 mm side joint** and a 35 mm vertical cover.

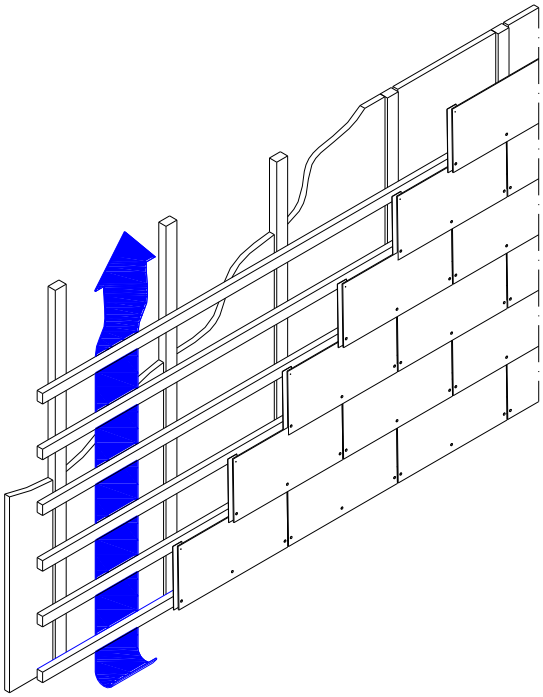
HORIZONTAL, SINGLE LAP – HALF-BRICK BOND (FACADE)



PRINCIPLE

The slates are placed horizontally, next to each other, with a joint of 4 mm with the longest side. In height, they are placed in a half-brick bond. Can only be used for vertical surfaces, 90°.





HEAD-LAP

Vertical: a single cover of 35 mm.

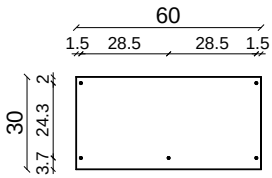
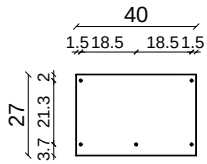
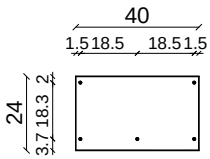
Horizontal: no cover. The slates are placed next to each other. A joint tape made of polyethylene is placed behind the lateral joint.

FIXATING

The slates are attached to the battens with five nails.

The slates can be placed on both horizontal and vertical battens. Preferably on vertical battens to allow ventilation between these battens.

NUMBER AND DIMENSIONS

	Dimensions (cm)	Batten distance (cm)		pieces pro m²	Weight (kg/m²)
		Vertical battens	Horizontal battens		
30/60	 Holes pre-drilled.	30,2	26,5	6,25	9,6
27/40	 Holes to be pre-drilled on site	20,2	23,5	10,54	9,7
24/40	 Holes to be pre-drilled on site.	20,2	20,5	12,08	9,9

Note: take into account a **4 mm side joint** and a 35 mm vertical cover.

OTHER SLATING SYSTEMS

For other slating systems, SVK advice should be sought.

CONNECTION DETAILS

Apart from the detailing given in this chapter, other situations may require a specific execution, which is not treated here.

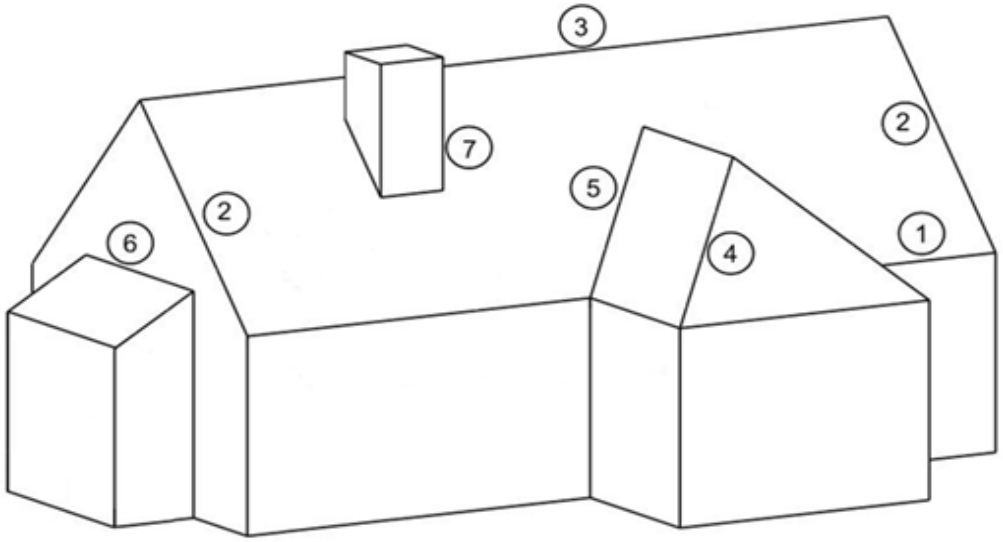
In case of doubt, do not hesitate to ask for advice from our Technical Department.

In any case, several basic rules must always be respected:

- The gap created by the counter-battens must guide any water ingress to the bottom of the roof. See to it that this space is always kept free.
- Take all necessary measures to obtain a watertight roof.
- See to it that the dividing layer between the inside of the building and the roof area is airtight and, if necessary, an effective water vapor barrier is applied (even when this is not visible in the detail).
- Insulation must be applied continuously, avoiding thermal bridges (to keep the details clear insulation may in some places be omitted from the drawings).

Wherever possible, we advise to use proprietary dry roofing products and systems to guarantee watertightness of the different roof details. Only where these are unavailable do we advise to use other materials (e.g. zinc, lead, etc.).

Except when otherwise stated, all roofing details are given for a ventilated roof covering (ventilation above the underlay).



1. eaves
2. verges
3. ridges
4. hips
5. valleys
6. abutments
7. chimneys

AT THE MOST VULNERABLE PERIMETER AREAS OF THE ROOF (SUCH AS VERGES. ABUTMENTS. VALLEYS AND HIPS) SLATES MUST BE TWICE FIXED.

TO AVOID SMALL PIECES OF CUT SLATES. USE SLATE-AND-A-HALF SLATES OR DOUBLE WIDTH SLATES

The Building Regulations require the ventilation of roofs to avoid condensation. For roof pitches 25 – 35 degrees the requirement is equivalent to a continuous 10mm opening at the eaves for standard roofs, and for non-standard the equivalent of a continuous 5mm opening.

To ensure the long-term performance and functionality of the roof, three courses of fibre cement slates are laid at all eaves.

The dimensions of the typical under-eaves slates can be found in the table below.

Format [mm]	Laps [mm]	1st under eaves slate Length A [mm]	2nd under eaves slate Length B [mm]
600x300	90	255	345
600x300	100	250	350
600x300	110	245	355

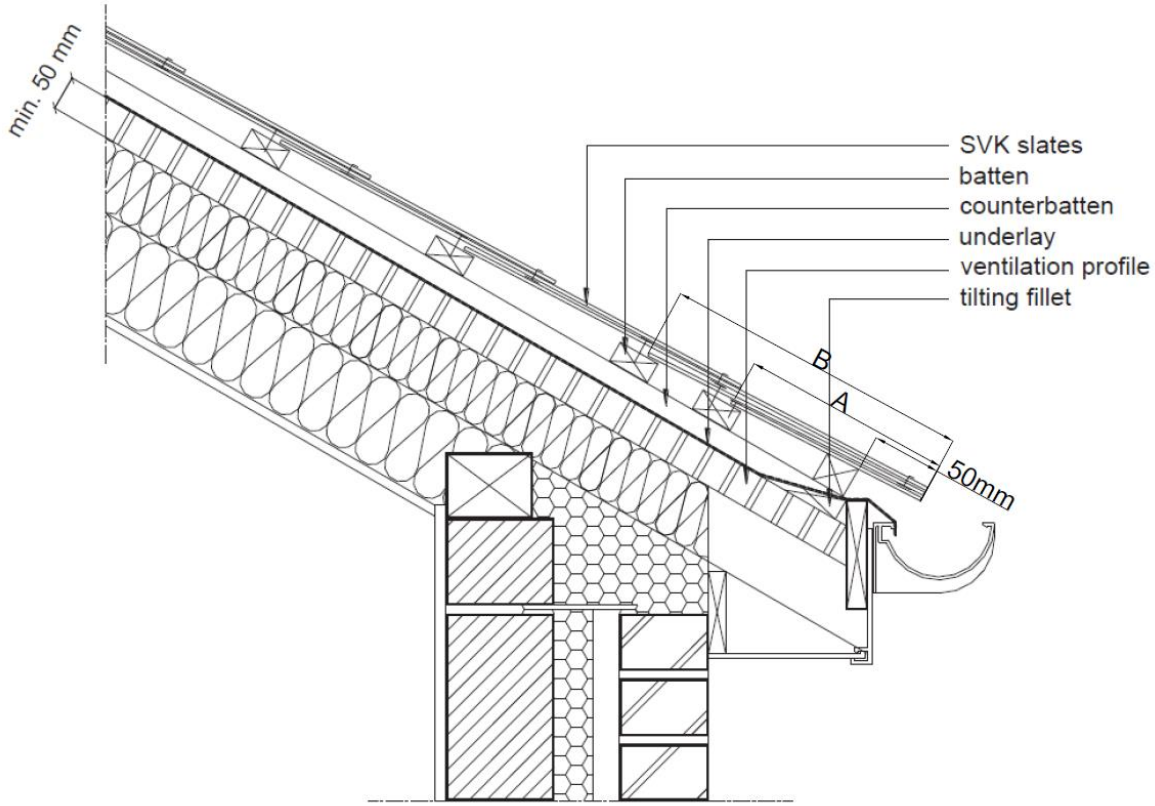
VENTILATION UNDERNEATH THE UNDERLAY

Set out the battens, remembering to provide the correct overhang of the eaves slates to the gutter.

Do not forget to place a tilting piece (or underlay support tray) at the eaves. The tilting piece:

- ensures that all moisture is discharged safely into the gutter.
- supports both first and second under eave courses of the slates.
- lifts the eave and under eave courses up, between 8 and 15 mm, to ensure an even inclination over the slate surfaces.

Where the eaves ventilation is located on the eaves support, allowance should be made for its height.



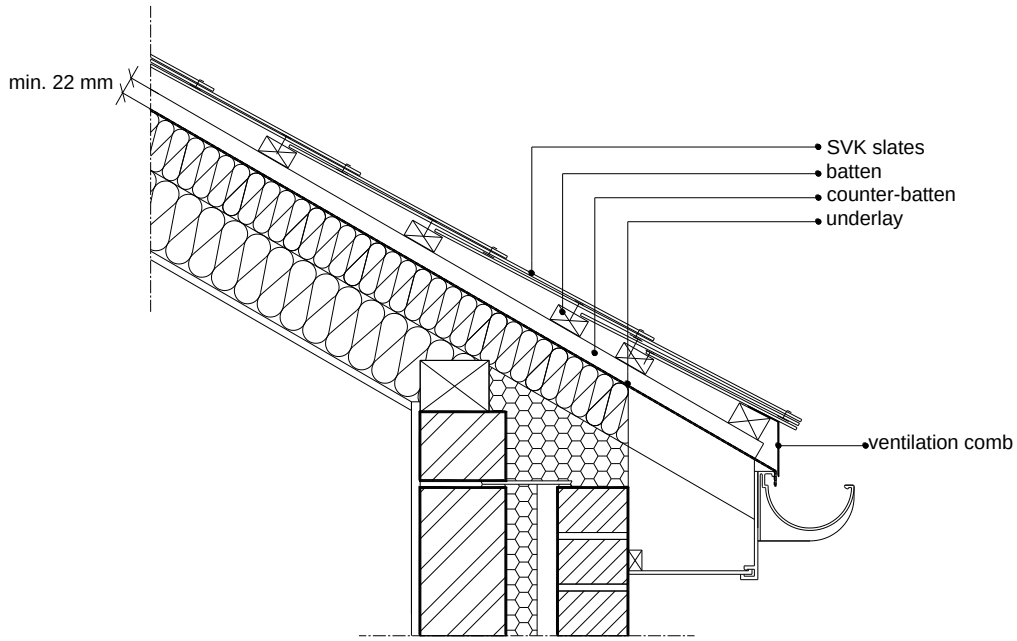
VENTILATION ABOVE THE UNDERLAY

We strongly advise using ventilation above the underlay. The counter-battens provide an uninterrupted gap so the evacuation of the infiltrated water into the gutter and the section ventilation inlet at the eaves are guaranteed.

The bottom batten is 4 mm thicker than the other battens, to obtain the same pitch of the slates over the whole roof surface. It is strongly advisable to put a comb filler at the eaves, this avoids blockage of the ventilation gap by dry leaves, bird nests, etc.

The recommended overhang for:

- a 100 mm wide gutter is 45 to 55 mm, measured horizontally from the fascia, tilting fillet or wall face;
- gutters of different widths should be taken to the centerline of the gutter or 45 to 55 mm, whichever is the lesser.



THE SPACE BETWEEN THE BATTENS IS LEFT OPEN TO ALLOW FOR AIR INTAKE. SUFFICIENT AIR SUPPLY MUST ALWAYS BE ENSURED.

IF YOU WANT TO CLOSE THE OPENING AT THE LOCATION OF THE GUTTER. A VENTILATION COMB CAN BE USED.

For roofs laid with double lap SVK fibre-cement slates, there are many possibilities for dry ridge finishing.

Ridges of fibre-cement in different degrees are readily available. At the ridge the length of the top two courses of slate should ensure the minimum head-lap is maintained. Slates laid to a fixed batten gauge or head-lap may not provide the minimum head-lap cover by the ridge. It is recommended that the top two courses are set out with shortened slates, if necessary, to ensure that the minimum head-lap of the ridge over the penultimate course is achieved.

HALF ROUND RIDGE:

Position and fix the top slating battens or additional battens to suit the fixing of the SVK ridge cappings. Use a raised ridge board of at least 25 mm thick.

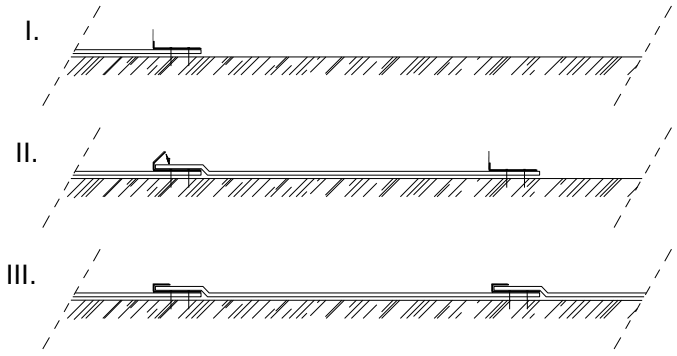
Lay the ridge pieces with the internal socket joints facing towards, or the external socket joints facing away from, the prevailing wind. Fix the ridge cappings into the ridge board to a true line with a ridge clip and two nails. Drill in the middle of the ridge and screw a self-sealing 60mm x 6.3mm wood screw. The pre-drilled hole should be wide enough to allow movement of the ridge but not too wide so that the watertightness is still guaranteed. To make ventilation possible, a supple ventilation under ridge (see § **Error! Reference source not found.**) should be placed.

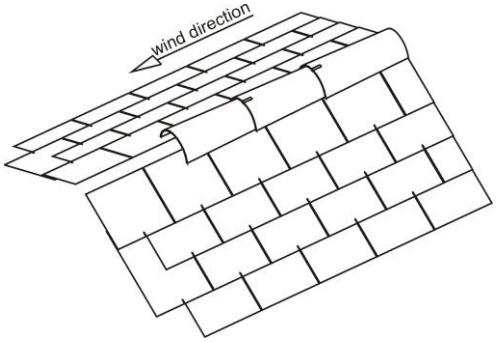
TYPE A OR TYPE B RIDGE:

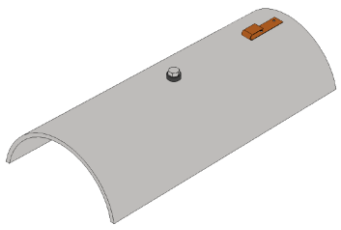
Position and fix the top slating battens or additional battens to suit the fixing of the SVK ridge cappings. Use a raised ridge board of at least 25 mm thick. An additional ridge fix batten downslope is required for the fixing of a self-sealing wood screw, minimal dimension 60mm x 6.3mm.

Lay the ridge pieces with the internal socket joints facing towards, or the external socket joints facing away from, the prevailing wind. Fix the ridge cappings into the ridge board to a true line with a ridge clip and two nails. Drill the ridges as required, the screws penetrate the ridge in the middle on both sides, 50mm from the bottom edge. The pre-drilled hole should be wide enough to allow movement of the ridge but not too wide so that the watertightness is still guaranteed. To make ventilation possible, a supple ventilation under ridge (see § **Error! Reference source not found.**) should be placed.

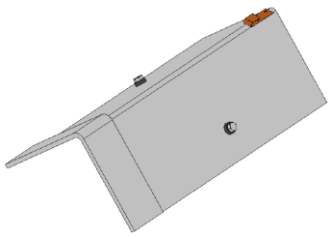
The ridges are placed against the predominant wind direction with a minimal head-lap of 70 mm, starting with a start end ridge and ending with a stop end ridge. End ridges should always be full length. Shorten the last ridge before the stop end ridge if necessary).



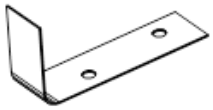




Half-round ridge



Flat straight ridge



Ridge clip

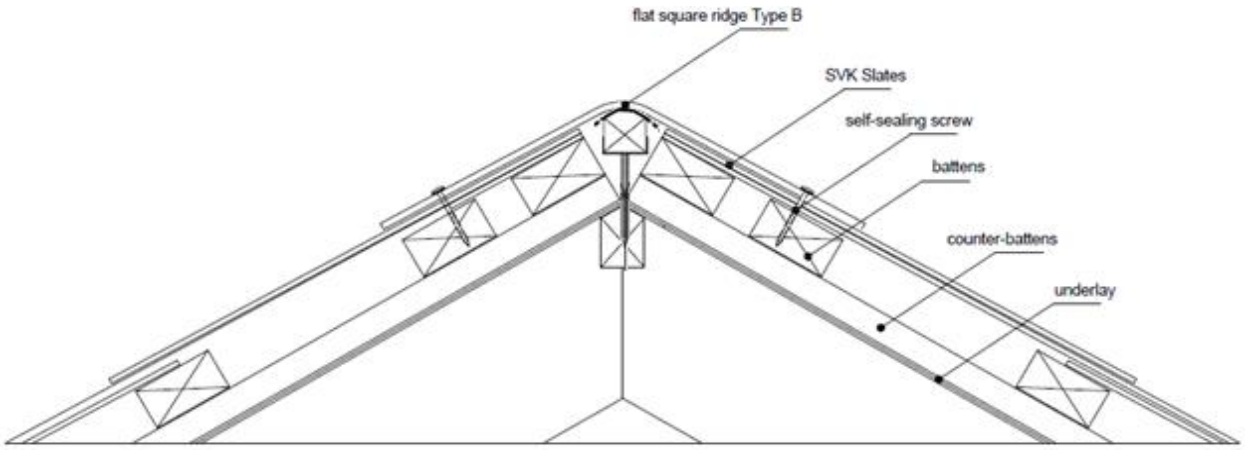
In case dry ridges are used in another material (concrete, clay, sheet metal ridges), they should be laid in accordance with the slate and/or the sheet metal manufacturer's technical recommendations.

Mortar bedding of ridge tiles onto fibre-cement slates is not recommended by BS 5534. If SVK double-lap fibre-cement slates are used with bedded ridges we refer to the BS 8000-6 for working instructions.

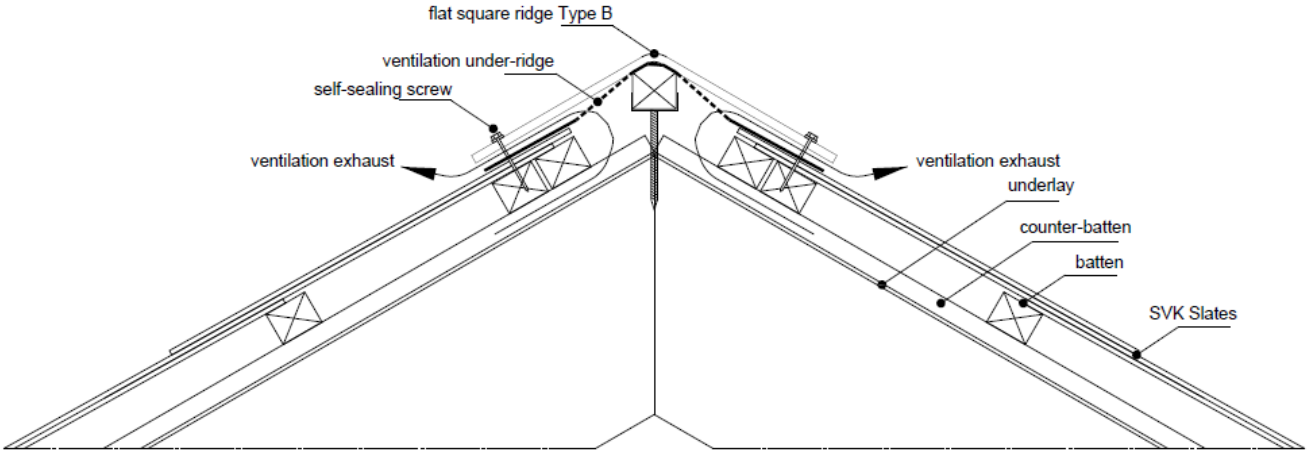
SPECIAL ATTENTION MUST BE PAID TO THE UNDERLAY AT THE RIDGE.

NON-VENTILATED RIDGE FINISHING

Slates are laid up to the ridge, leaving just a small gap between the slated surfaces and the ridge. In this case ventilation slates are placed in the second row down from the ridge, to ensure a continuous airflow. Possible ridge types: half-round ridge, roll-top ridge type A, flat straight ridge type B



VENTILATED RIDGE FINISHING



For roofs finished with fibre cement ridges, use a ventilation under-ridge to provide the necessary ridge ventilation. Install it in accordance with the manufacturer's instructions. Leave sufficient space between the slated surfaces and the ridge to allow for ventilation. Possible ridge types: half-round ridge, roll-top ridge type A, flat straight ridge type B

VERGES

Verges may be straight or raked. They are exposed to high and turbulent wind loads, being situated at the edge of a roof surface. Make sure they are adequately secured against lifting.

The plain overhanging verge used to be a common way of forming verges: slates overhang the gable batten. Battens should overlap onto the outer skin of the brickwork or the undercloak material by minimum 50 mm or, in the case of an overhanging verge, onto the flying rafter/ladder truss. Where the distance of the nearest batten fixing to the rafter is greater than 300 mm, an additional fixing should be used.

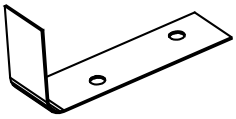
We strongly advise however to use verge slates or other finishing systems.

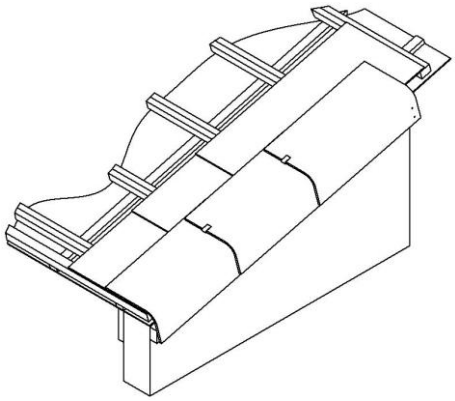
When hook fixing the slates, a slate and a slate-and-a-half should be used in alternate courses. Each verge slate should be hooked and fixed with two centre-nails and one head-nail. In areas of high wind exposure, a clip or verge closure can be used to increase wind resistance.

VERGES FINISHED WITH VERGE SLATES

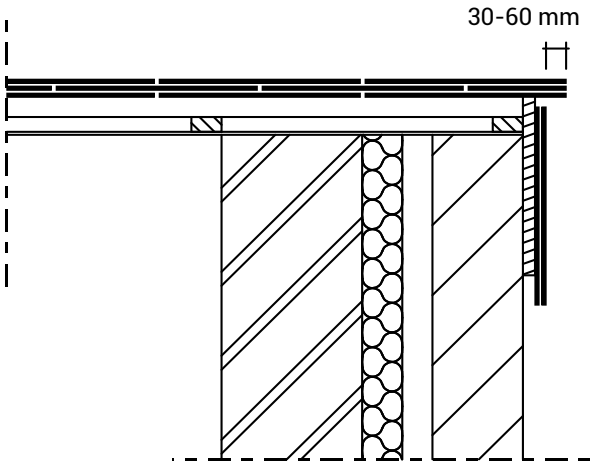
The verge slates are laid on top of the slates. They are fixed on their vertical side by 2 nails, diameter 2.65 mm, in the head-lap area of the slates. Predrill the holes with a diameter of 4 mm, to allow the working of the verge slates. Except for roofs in very sheltered areas, it is also necessary to fix the upper surface of the verge slates. Predrill two 4 mm diameter holes in the slate underneath and fix with a ridge hook.

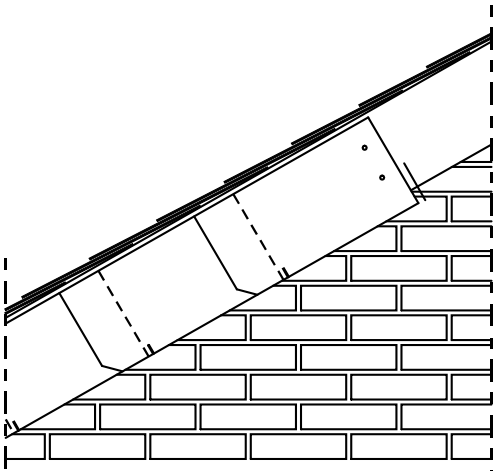
When using hook fixing for the slates, each verge slate should be hooked and nailed. In case of high wind exposure, use an extra clip to increase wind resistance.





VERGE FINISHING WITH FACADE SLATES





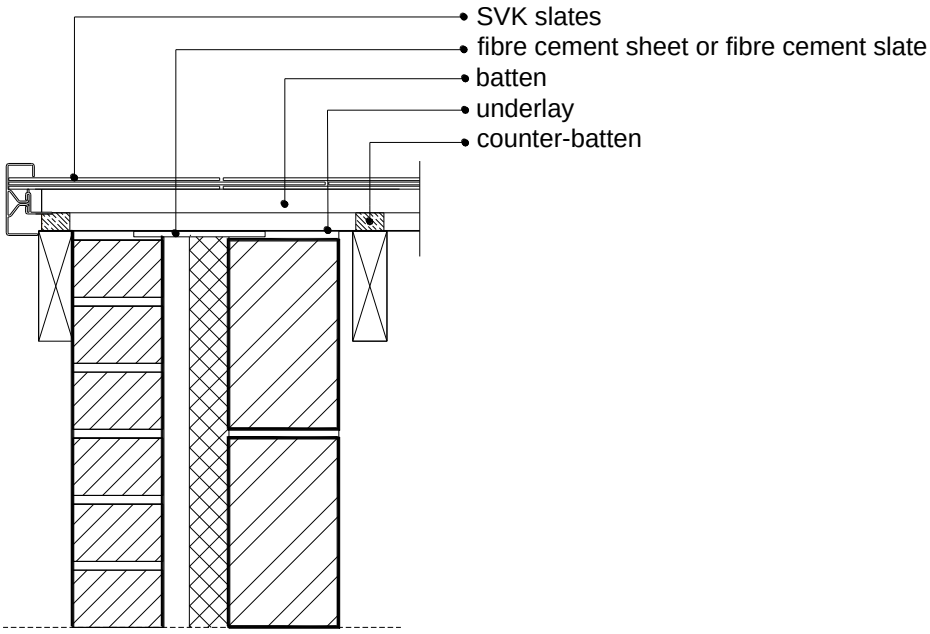
At the verge of the roof surface only full or one-and-a-half slates may be placed. The outer top corners of the outer slates at the edge of the roof surface need to be cut sloping (preferably at a 45° angle) to prevent water from seeping in through the upper edge. We also advise cutting the bottom corners sloping, so the water runs towards the roof surface, away from the facade.

At the facade level the slates are attached to a gable plank with two slate nails and a hook. They overhand the gable plank, so a dripping edge is created.

VERGES FINISHED WITH DRY-FIX VERGE TRIMS

Dry-fix verge trims are an alternative to verge slates. Lay dry verge systems in accordance with their manufacturers' instructions.

See to it that the verge strip leads the water away from the facade surface. Ensure that the verge slates are extended fully into the verge strip and that the latter firmly holds them.

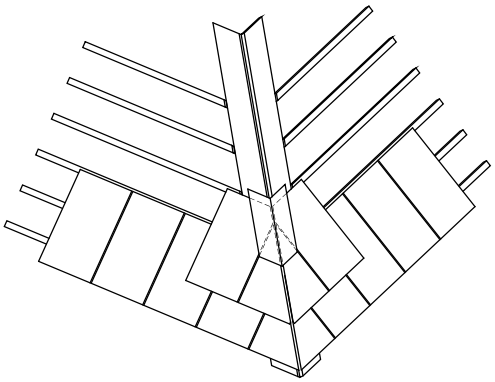


HIPS

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

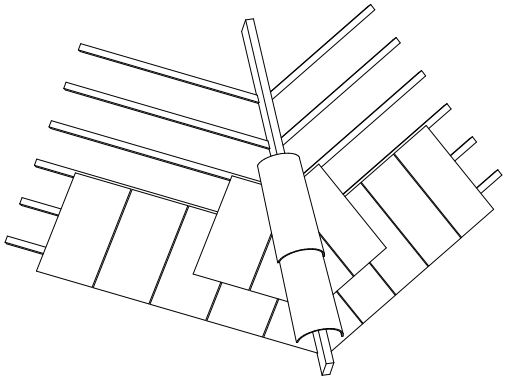
Ridge application for roof pitch of:	Ridge angle	Conversion to roof pitch when used as hip ridge on 2 identical roof pitches of:
25°	130°	37°
30°	120°	45°
40°	100°	65°

MITRED HIPS



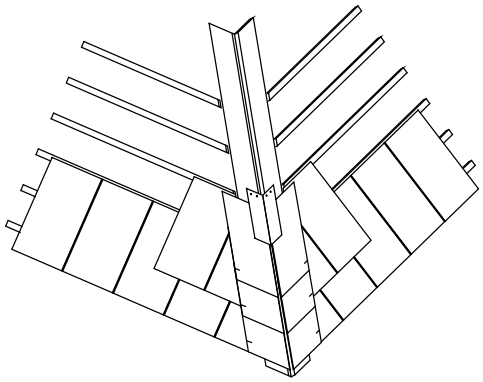
A roof pitch of min. 35° is recommended.
Mitred hips require an equal roof pitch on both sides of the hip.
Cut slates to a close mitre to the hip line. Make sure the head of the slates is always min. 100 mm wide. Use wide slates (cut from doubles) rather than using small pieces of slate.
Lay cut soakers with each course, extend minimum half the slate width each side of the hip line. These soakers have a minimum length of (batten gauge + head-lap + 25 mm). They are fixed into the support with two slate nails per roof pitch.
The slates themselves are fixed with at least two nails and a disk rivet.
With pitches less than 45° external tail fittings are required to resist high wind loads, except in sheltered locations.
In locations with severe exposure external tail fittings such as screws, washers and caps might be necessary to resist high wind loads, except in sheltered locations.
When hook fixing is used, external tail fittings such as screws, washers and caps might be necessary to resist high wind loads

HIPS FINISHED WITH SVK FIBRE-CEMENT CAPPINGS



The hips are basically finished the same way as ridges.
Position and fix a raking batten to either side of the hip rafter to suit the fixings of the hip cappings. Rake cut slates to the hip line. Wherever this is necessary, make extra holes for fixing the slates. Cut the slates close to the hip line, the head-lap of the slates by the hip capping must be minimum the head-lap. The slates are fixed alongside the hip line supplementary with 2 nails.
When using hook fixing at hips, the slates should be hooked and nailed. The hip must be capped.
The ridges are placed with a downward socket. Cut the bottom hip cappings from a full-length unit to align with the eaves.

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. They are attached at the head-lap with minimum 2 nails and 1 slating hook to beveled 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 Fixing to the roof construction with 2 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.

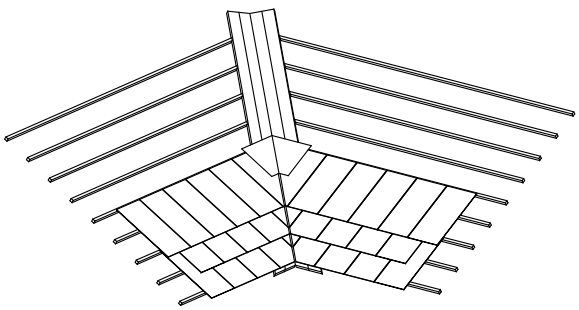
OTHER HIP CAPPINGS

In case dry hip cappings in another material are used (concrete, clay, sheet metal ridges), they should be laid in accordance with the slate and/or the sheet metal manufacturer's technical recommendations.

Bedded hip cappings are not recommended by SVK. If however SVK double lap fibre-cement slates are used with bedded cappings, we refer to the ICP 2 SR 82for working instructions.

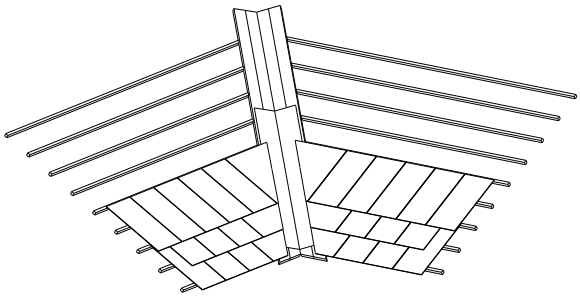
VALLEYS

MITRED VALLEYS



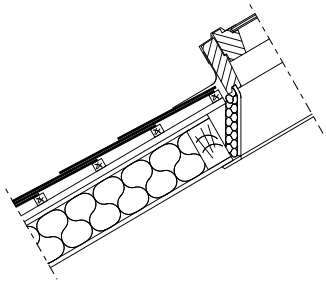
Cut slates to a close mitre to the valley line. Make sure the tail of the slates is always min. 150 mm wide. Wide slates (cut from doubles) must be used rather than small pieces of slate.
Lay cut soakers with each course. These soakers extend minimum 150 mm on each side of the valley line. Butterfly wing shaped soakers have a minimum length of the slate (measured along the valley line) + 25 mm. They are fixed into the support with two slate nails per roof pitch.
The slates themselves are fixed with at least two nails and a disk rivet or another appropriate tail fixing. Wherever this is necessary, make extra holes for fixing the slates. Should a double width slate be installed it should be fixed with at least two nails and have two disk rivets.
Mitred valleys are not recommended in exposed locations, nor if the roof pitch is less than 35° or the valley length is greater than 6 m.
Avoid mitred valleys at pitches below 50°, if the roof pitches intersect at an angle more acute than 90° on plan or have different roof pitches.

OPEN VALLEYS

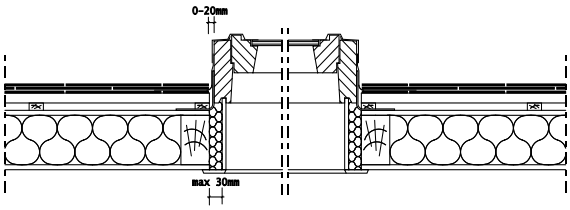


On both sides of the valley line a timber lay-board is applied. On top on both sides of the valley line a timber valley board is applied. On top of these a sheet metal valley is laid
The slates are cut to rake, parallel to the valley centre. Use wide slates (cut from doubles) rather than using small pieces of slate, ensuring that the tail of no slate is less than 150 mm wide.
In the centre is an open channel, with slates overhanging the valley edge by 80 mm.
The slates themselves are fixed with at least two nails and a disk rivet or another appropriate tail fixing. Wherever this is necessary, make extra holes for fixing the slates. Should a double width slate be installed it should be fixed with at least two nails and have two disk rivets.
Never bend the slates.

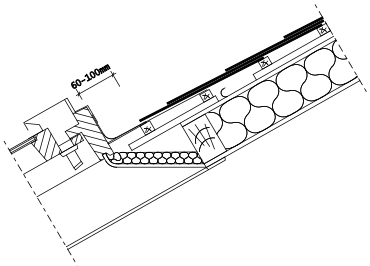
SKYLIGHT



Connection at the bottom of the skylight



Connection to the side of the skylight



Connection at the top of the skylight

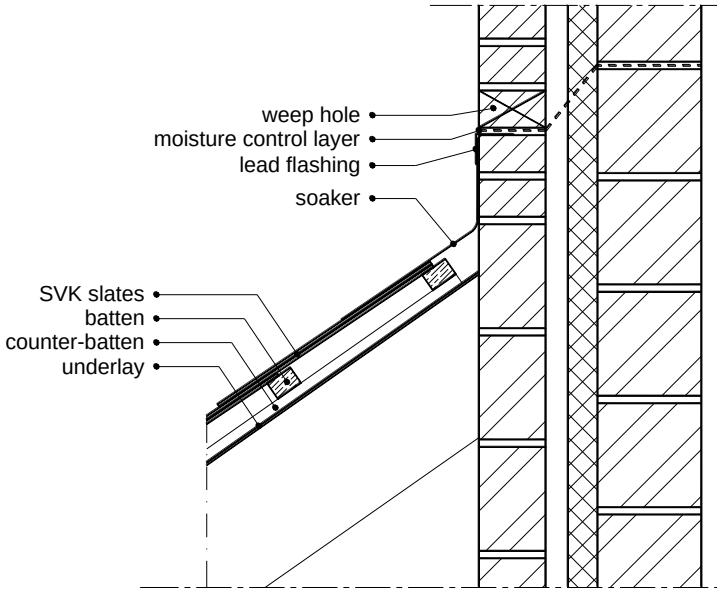
ABUTMENTS

TOP ABUTMENTS

The length of the top two courses of slates should ensure the minimum lap is maintained in combination with an apron and cover flashing.

If ventilation must be provided, it must be realized with ventilation slates.

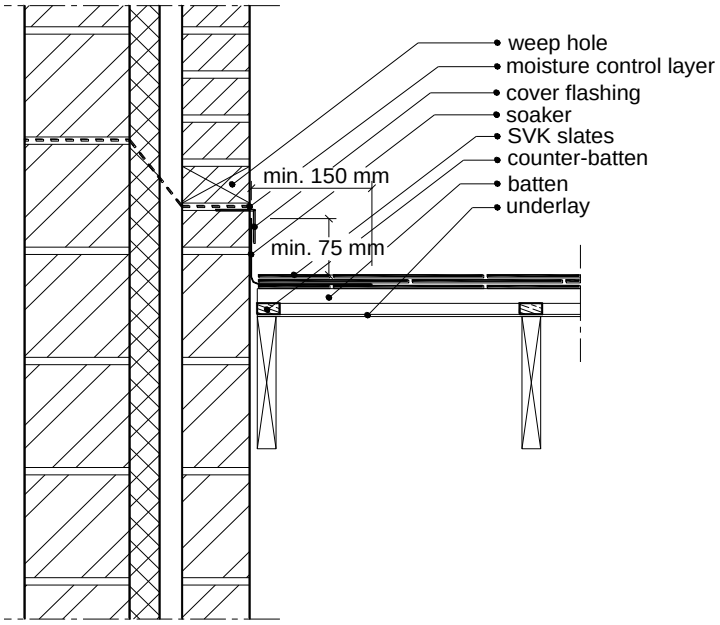
In the wall above, an effective flashing must be provided, to avoid water ingress to the inside of the construction.



SIDE ABUTMENTS

Slating should be finished close to the abutment. Use L-shaped soakers with a length ≥ the length of (batten gauge + head-lap + 25 mm). The top of the soaker should be turned down over the head of the batten and secured. The horizontal side of the soaker should be covered by the slate, at least half a slate width, the vertical side of the soaker reaches at least 75 mm above the slate surface.

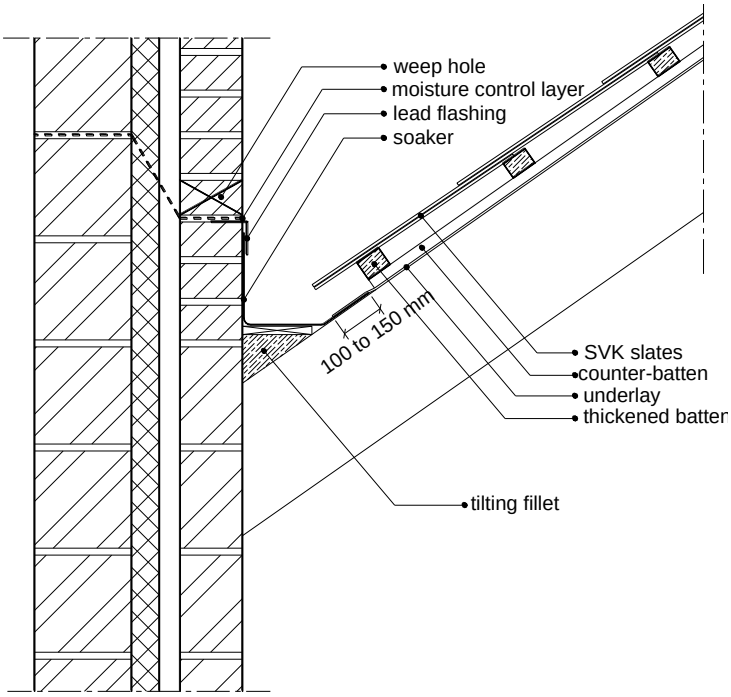
Where used, proprietary abutments or secret gutters are detailed according to the manufacturer's recommendations and should be adequately sized for the length of the abutment with sufficient provision for water outlet. Where there is a risk of blockage by debris, a combination of a cover flashing and abutment gutter could be necessary.



BACK ABUTMENTS

For SVK fibre-cement slates intended for the use at a back abutment, the following should be considered:

- The bottom course should overhang into the back gutter by 45 mm to 55 mm horizontally or to the centre of the gutter, whichever is the lesser.
- Ensure the bottom course is not kicked up and is in the same plane as the adjacent courses.
- A double course of slates, laid to give a broken bond, should be used at the bottom course.
- The flashings must ensure that, in case of blockage by debris, no water ingress into the building can occur.
- The underlay should extend over the soaker by 100 mm to 150 mm.



CHIMNEYS

Finish the roof at the top, the side and the bottom, as described above – as top, side and back abutment. Give special attention to the connections of the different flashings at the angles.

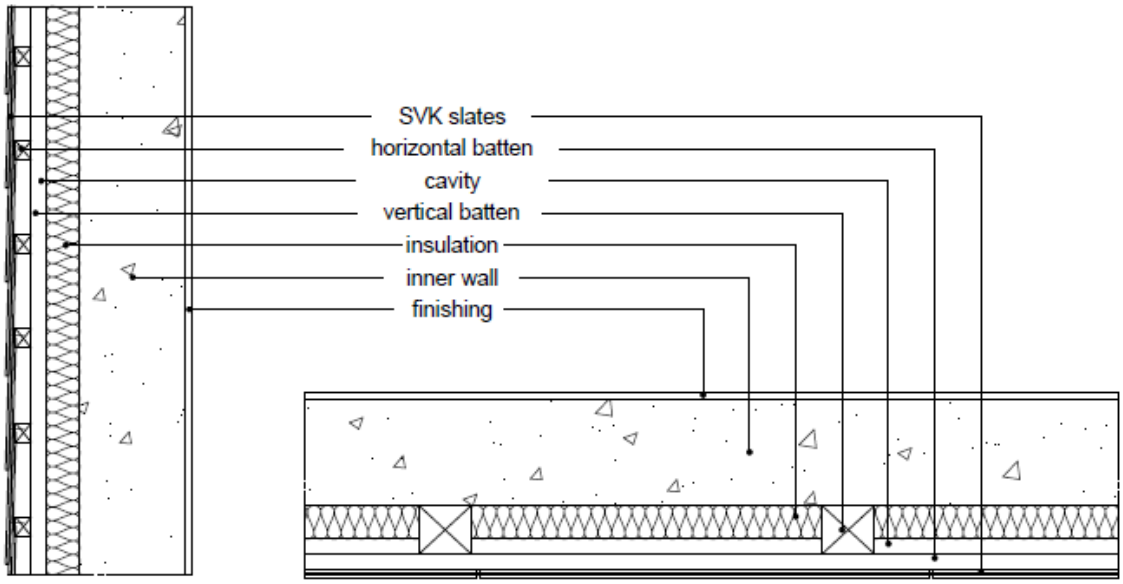
FACADE CONSTRUCTION

The façade structure depends on, among other things, the structure of the underlying structure and the choice of cover. Based on this, the slates will be mounted on a single or double slatted grating, with or without insulation. **The timber section must be calculated by an engineering firm**. Following, some possible façade constructions were worked out.

GENERAL

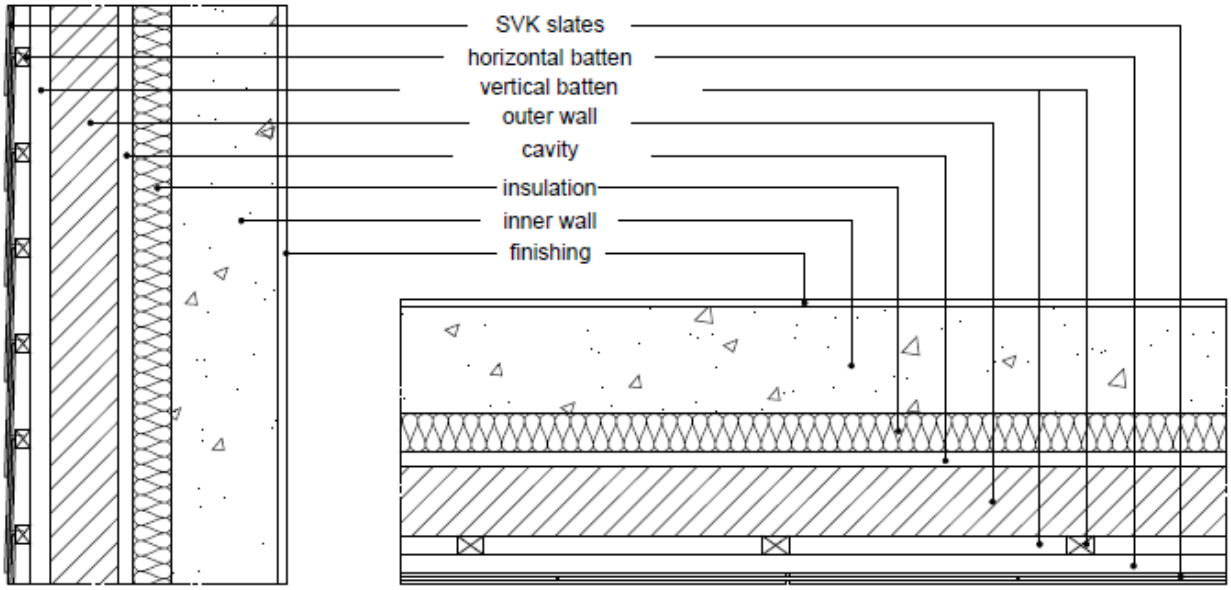
For each of the slating systems described earlier, it is indicated for which application they are suitable.

As an example, in the horizontal double-lap slating system, the slates are placed on horizontal battens. Because of the required vertical air cavity, additional vertical battens are required. Since the underlying supporting structure consists of a single wall, insulation must be placed between these vertical battens. This can easily be worked out by using vertical battens that are 2 cm thicker than the insulation. In this way, a vertical air cavity is created. Don't forget to provide an air inlet and outlet at the bottom and top of the façade.



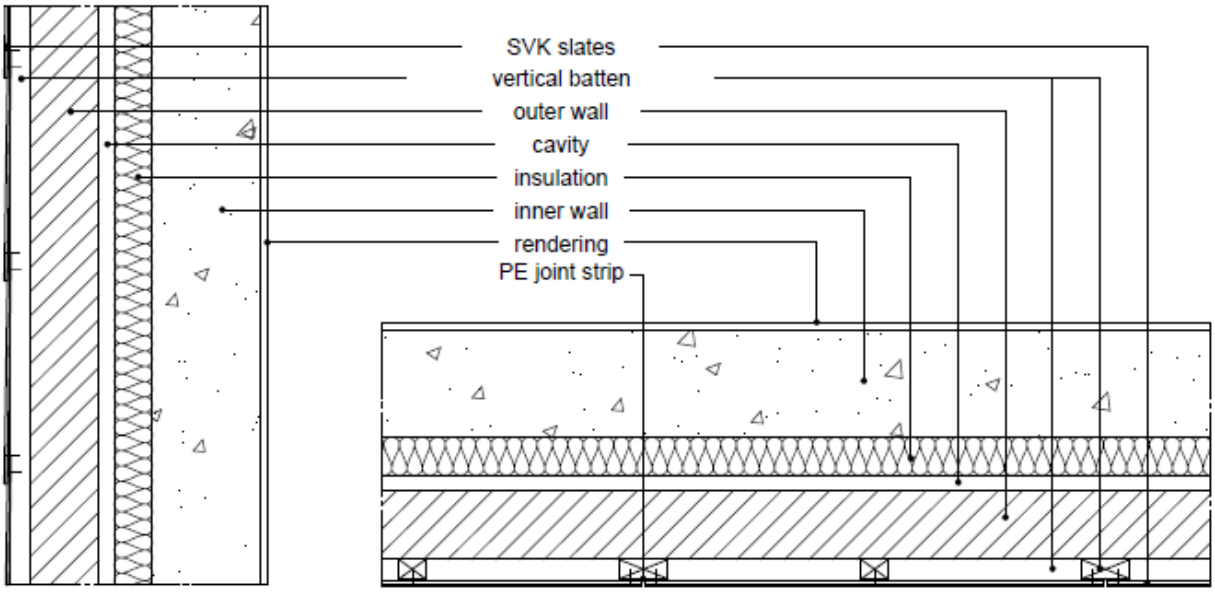
Slating system: Horizontal, Double-lap

If the load-bearing wall is sufficiently insulated, no additional insulation is required between the battens. The thickness of the vertical battens can be reduced to 2 cm.



Slating system: Horizontal, Double-lap

In the horizontal single-lap slating system, the slates are placed on vertical battens. If the load-bearing wall is already sufficiently insulated, no additional insulation is required between the battens and their thickness can be limited to 2 cm.



Coverage System: Horizontal, Single–lap

VENTILATION

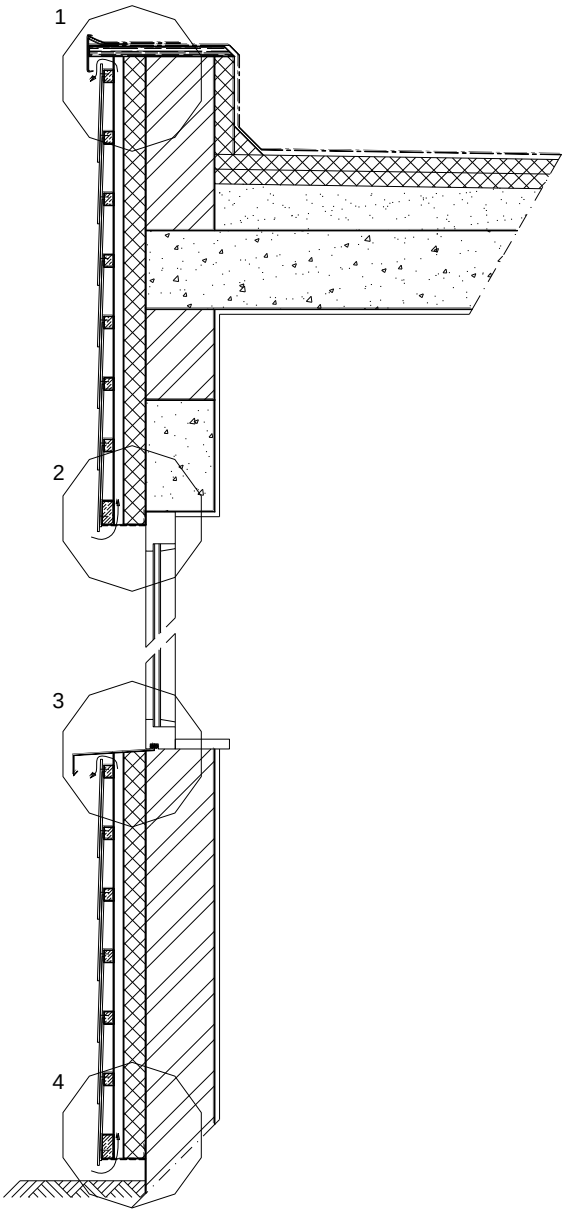
Ventilation of a façade can be achieved by leaving a minimum free space between the latticework and the insulation, depending on the height of the building: an **air inlet** at the bottom of the façade **and** an **air outlet** at the top of the façade; and at the location of window and door openings.

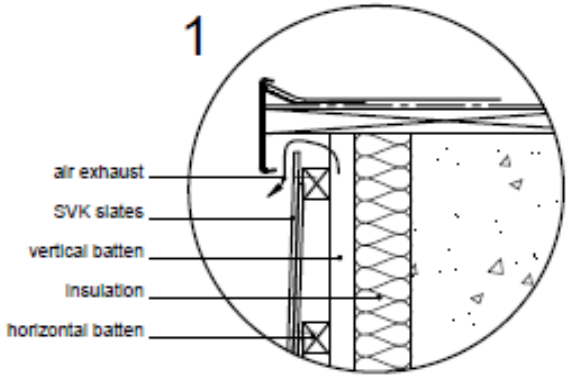
Minimum width of ventilation cavity:

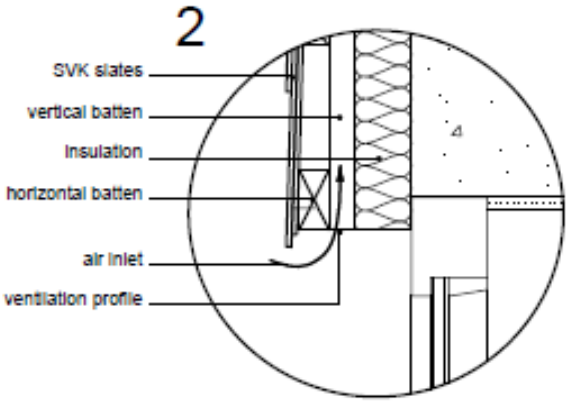
Height façade ≤ 10 m:	2 cm
Height façade > 10 and ≤ 20 m:	2.5 cm
Height façade > 20 m:	3 cm

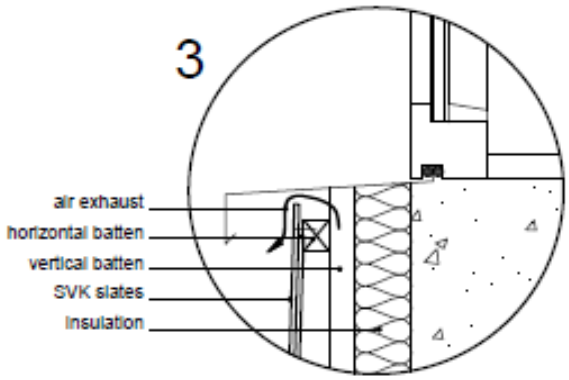
Depending on the type of cover, horizontal support battens can be used. In this case, vertical battens must be used behind these battens in such a way that a vertically continuous air cavity is created.

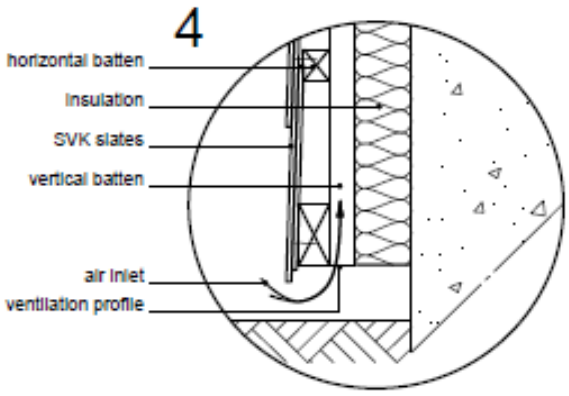
VERTICAL SECTION







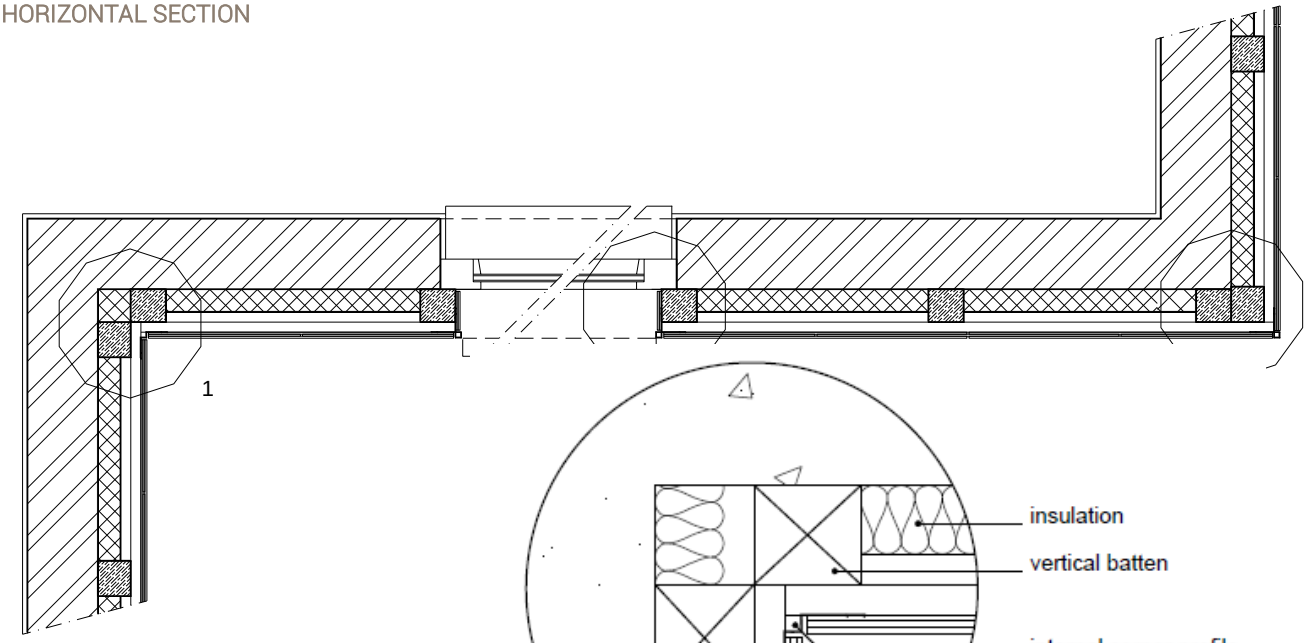




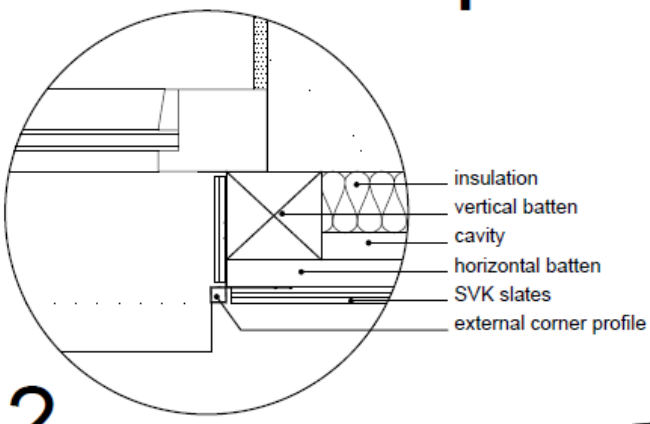
This is only a fraction of the different options for building a façade. Whichever combination is chosen, the following must always be ensured:

- vertical battens to create a vertical air cavity. If necessary, an extra slatted grid must be installed for this purpose.
- adjacent to the air cavity, an air inlet at the bottom of the façade and an air outlet at the top of the façade. This is also at the level of window and door openings. Windowsills and eaves have a overhang of min. 4 cm to avoid water infiltration and dirt streaks.

HORIZONTAL SECTION



1



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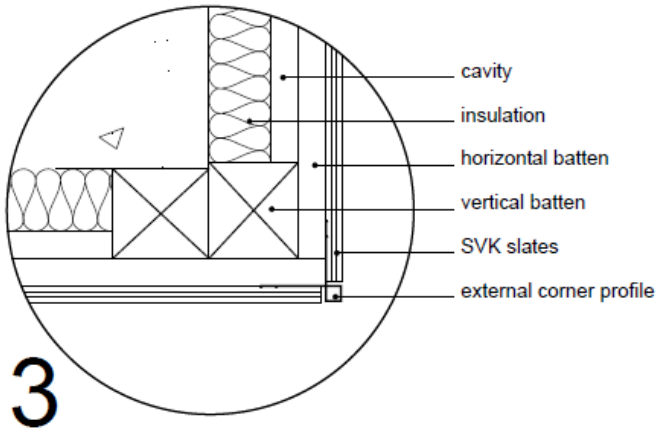
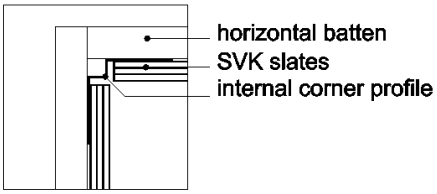


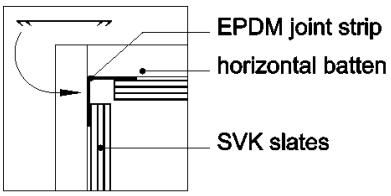
3

INNER CORNER

- with a plastic profile

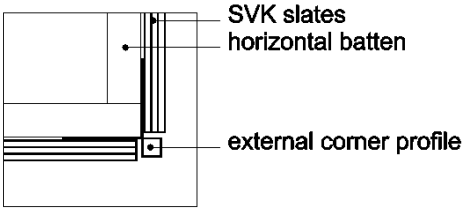


- or with an EPDM joint tape

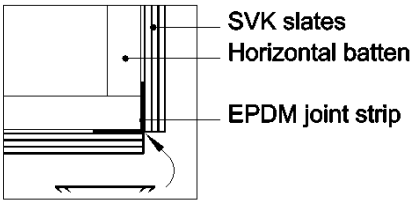


OUTER CORNER

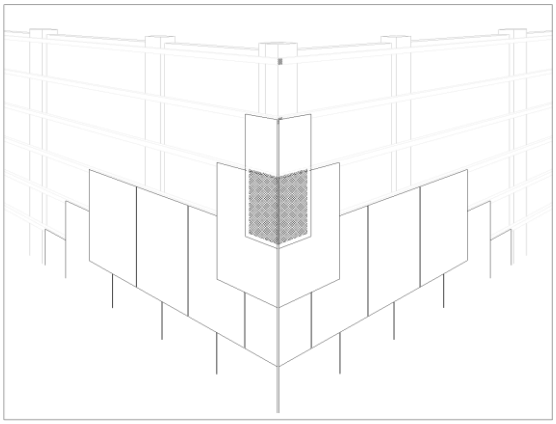
- with a plastic or aluminium profile



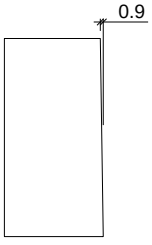
- or with an EPDM joint tape



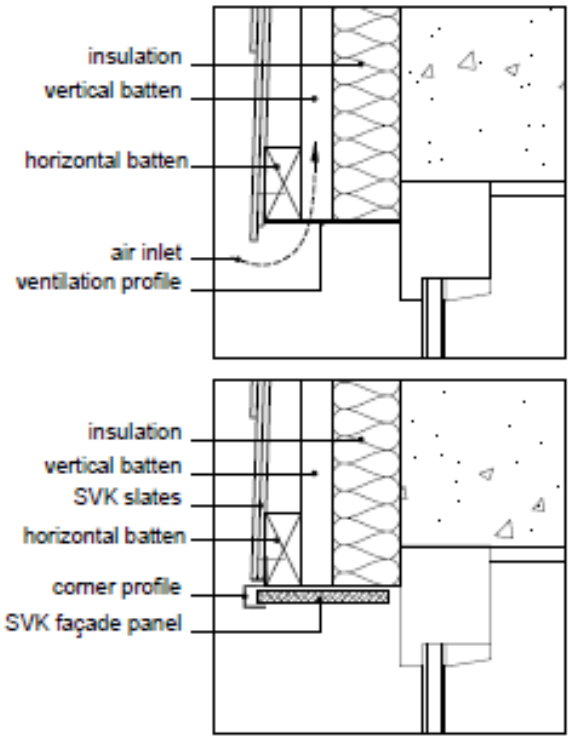
- Weaving of lead between the slates



To limit the joint between the slates at the outer corner as much as possible, the outer edge of the slates can be cut diagonally as shown on the drawing. In any case, there must always be a certain amount of leeway of min. 4 mm between the corner-forming slates.



WINDOW REVEAL - TOP



Finish the reveal, at the top of a door or window, with a ventilation profile to allow the air inlet.

With a window width < 1.5 m and a façade height < 8 m, this air inlet can be removed if this is desirable for aesthetic reasons.

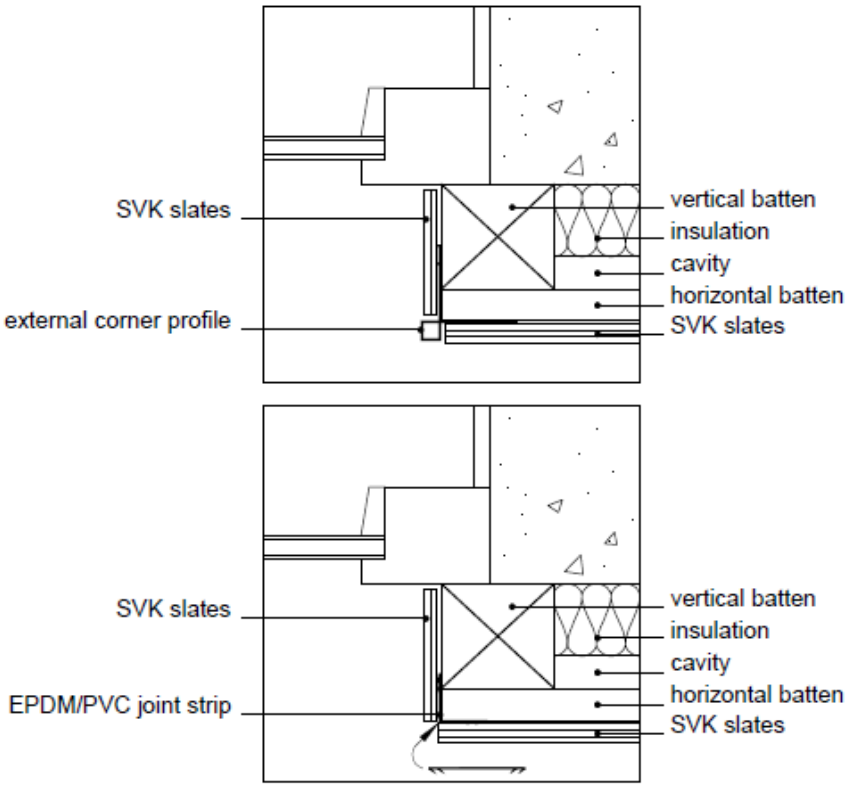
Finishing can, for example, be done with SVK façade cladding panels.

(FYI: The SVK façade panels have largely the same colour range as Ardonit and Fasonit)

WINDOW REVEAL - SIDE

The lateral reveal of a façade opening can be provided with slates or an SVK façade cladding panel.

(FYI: The SVK façade panels have largely the same colour range as Ardonit and Fasonit)



REFERENCE DOCUMENTS

- EN 492 - Fibre-cement Slates and their Fittings for Roofing – Product Specification and Test Methods.
- EN 13501-1 - Fire classification of construction products and building elements - Part 1: Classification based on results of testing of the fire behaviour.
- https://NHBC-standards.co.uk
- BS 5534 - Code of practice for slating and tiling (including shingles).
- BS 5250 - Code of practice for control of condensation in buildings
- BS 8000-6 - Workmanship on building sites – Part 6: Code of practice for slating and tiling of roofs and claddings.
- BS 8104:1992 - Code of practice for assessing exposure of walls to wind-driven rain
- BS EN 1202-2 - Specification for nails. Copper nails
- BS EN 1202-3 - Specification for nails. Aluminium nails
- BS EN 10088-3 - Stainless steels. Technical delivery conditions for semi-finished products, bars, rods, wire, sections and bright products of corrosion resisting steels for general purpose
- All relevant standards, regulations, guiding documents, etc. listed in the reference chapter of the above standards.