Technical Data

CROMLEIGH TEXTURED
CROMLEIGH SMOOTH
CROMLEIGH RUSTIC
ARDONIT PLUS
ARDONIT / BLUETONE

Slates

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TABLE OF CONTENTS

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

1 INTRODUCTION

SVK has over 100 years of manufacturing, supply and technical expertise. As one of the biggest manufacturers of building materials in Europe, SVK offers one of the most comprehensive portfolios of fibre cement products. SVK has a presence of over 30 years in Ireland, supplying roofing materials to every part of the country.

Strength and durability are considered key features of SVK slates. Our slate range is an economical, authentic and easily installed alternative to the natural slate. With environmentally friendly systems and technologies in place, SVK ensures that clients are able to design and build homes aesthetically pleasing and in harmony with the local environment.

SVK fibre cement slates Ardonit / Bluetone, Ardonit Plus, and Cromleigh and their fittings are manufactured in accordance with the requirements of BS EN 492.

SVK slates achieve the highest class, class B, for structural stability, in accordance with the European Standard EN 492, confirmed by certificates in different countries.

1.1 SCOPE

Ardonit / Bluetone, Ardonit Plus and Cromleigh slates are used for roofing and cladding, all constructions have to be executed according to these Technical Data and all national standards and directives (see § 5 REFERENCES).

1.2 COMPOSITION AND MANUFACTURE

The Ardonit / Bluetone, Ardonit Plus, and Cromleigh slates are small size double pressed fibre cement flat sheets, composed of
Portland cement, organic fibres of superior quality, mineral additives and water.

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

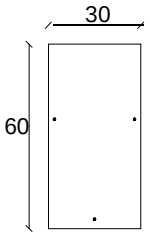
1.3 PRODUCT RANGE

1.3.1 SLATES

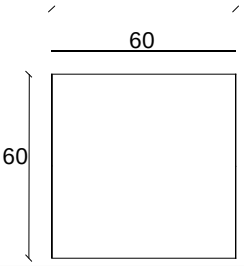
There are basically three slate ranges:

- Ardonit / Bluetone:
  Ardonit slates have a smooth surface with square edges, available in premium black and blue-black.
- Ardonit Plus:
  Ardonit Plus slates have a smooth surface with square edges, available in blue-black.
- Cromleigh:
  Cromleigh slates are available in three finishes: textured surface with square (Cromleigh Rustic) or dressed (Cromleigh Textured) edges or smooth with dressed edges (Cromleigh Smooth). They are all available in the colour blue-black. Rustic and Textured slates also in Welsh blue).

Ardonit/Bluetone slates (with smooth surface and square edges, available in premium black, blue-black)

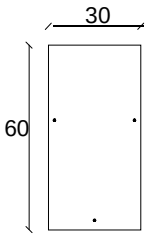


Weight: 1.53 kg

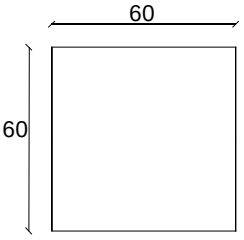


Weight: 3.06 kg

Ardonit Plus slates (smooth surface and square edges, available in blue-black)

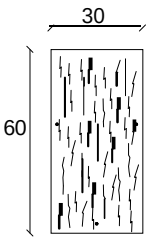
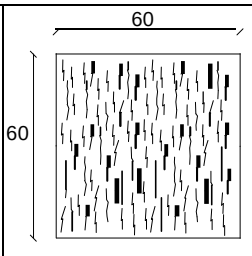
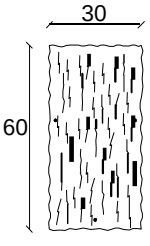
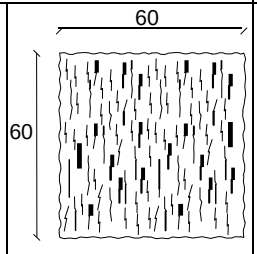
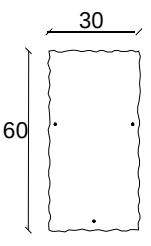
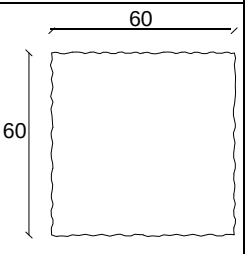


Weight: 1.53 kg



Weight: 3.06 kg

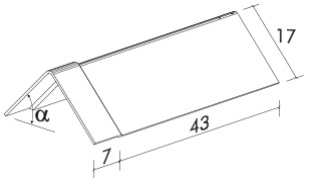
Cromleigh slates

Cromleigh Rustic (with structured surface and square edges)		**Cromleigh Textured** (with structured surface and dressed edges)		**Cromleigh Smooth** (with smooth surface and dressed edges)	
					
Available in blue-black and Welsh blue	Available in blue-black and Welsh blue	Available in blue-black and Welsh blue	Available in blue-black and Welsh blue	Available in blue-black	Available in blue-black
Weight: 1.53 kg	Weight: 3.06 kg	Weight: 1.48 kg	Weight: 2.95 kg	Weight: 1.48 kg	Weight: 2.95 kg

The dressed edges and the textured surface are portrayed schematically, not realistically.
Dimensions in cm.
A product range brochure is available from SVK.
Number of slates per pallet:
60 x 30 cm : 1080 pieces, bundled per 15 pieces
60 x 60 cm : 544 pieces, bundled per 8 pieces

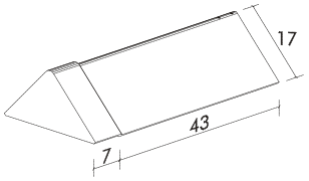
1.3.2 ACCESSORIES

1.3.2.1 Plain angle ridge type B



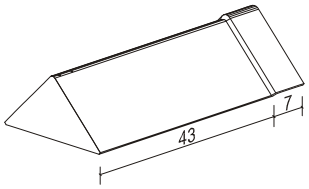
Number/m : 2.33
Effective length : 43 cm
Weight/piece : 2.0 kg
Roof pitch α : 25° (= ridge angle 130°)
30° (= ridge angle 120°)
40° (= ridge angle 100°)
45° (= ridge angle 90°)

1.3.2.2 Start end for plain angle ridge type B



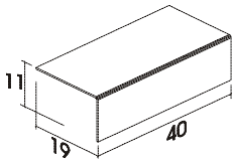
Effective length : 43 cm
Weight/piece : 2.1 kg

1.3.2.3 Stop end for plain angle ridge type B



Effective length : 43 cm
Weight/piece : 2.1 kg

1.3.2.4 Verge slate



Weight/piece : 0.960 kg
Head-lap: subject to exposition and roof pitch.
The verge slates are placed on top of the regular slates.

Head-lap (cm)	**Number/m**
9	3.23
10	3.33
11	3.45

1.4 PRODUCT QUALITY

1.4.1 MECHANICAL AND PHYSICAL CHARACTERISTICS

General performance

- Strength:
  SVK fibre cement slates exceed the strength requirements of BS EN 492, class B (highest classification) achieving an average bending moment of 70 Nm/m (far above the requirements for Class B).
  Their E-modulus under flexion is approx. 16000 N/mm² (air dry).
  The slates have a minimum density - oven dry - of 1700 kg/m³ (nominal density: 1800 kg/m³) and a nominal thickness of 4.1 mm.

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

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

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

- Thermal:
  When there is no ventilation between the roof underlay and the slates, the 'R' value of the roof covering includes the roof covering and airspace behind the slates (approx. 0.12 m^2K/W). An 'R' value should be added for the roof underlay.
  We do however advise to ventilate the air gap between the roof underlay and the roof covering. In this case the 'R' value of the roof covering, which is almost negligible anyway, cannot be taken into account.

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

- Heat:
  After an initial period of stabilisation, SVK slates are unaffected by the normal range of climatic temperatures (- 20 °C to + 70 °C). The coefficient of thermal linear expansion α is 7.5 x 10^{-6} m/mK. Therefore slates should be laid with a gap of 4 mm to accommodate any movement generated by changes in temperature and to facilitate the fitting of the crampion.

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

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

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

Dimensions

- Thickness : 4 mm (nominal: 4.1 mm)

- Tolerances on length/width : ± 3 mm
- Tolerances on thickness : - 0.4 mm / + 1.0 mm

Quality performance

	European Standards (EN) or average market value (MV)	Ardonit/ Bluetone/ Ardonit Plus/ Cromleigh average values	Relation to EN requirement or general evaluation
STRENGTH (EN 492)			
Bending strength Size 60/30	Class B ≥ 50 Nm/m (EN) Class A ≥ 35 Nm/m (EN)	Class B - 70 Nm/m	40 % above
DURABILITY (EN 492)			
Water absorption	ca. 7 % (MV)	< 4%	43 % better
Durability requirements (climatological performances) Freeze – thaw Soak – dry Immersion in warm water	 L ≥ 0.75 (EN) L ≥ 0.75 (EN) L ≥ 0.75 (EN)	 L = 1 L = 1 L = 1	 33 % better 33 % better 33 % better
COLOUR (EN ISO 11341, EN ISO 2409 and ASTM G 155)			
Adhesion of paint	class 0 to 5 (EN)	class 0	= best class
Conductivity of the paint Top side of slate Back of slate	 - -	 50 µS/cm 30 µS/cm	 = excellent = excellent
Colour consistency Q Sun Test (2.000 hours of exposure)	- -	No sign of chalking colour consistency	= excellent = excellent

1.4.2 QUALITY CERTIFICATES

CE

BENOR

BB - 212 - 683 - 492 - 01

NL BSB bouwstoffenbesluit K24136

Europe

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

Belgium

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

Netherlands

- SVK slates have a NL BSB® certificate;

Note:
From here onwards we always mention "slates", when referring to the whole slate range of "Ardonit / Bluetone, Ardonit Plus, and Cromleigh slates", unless otherwise mentioned.

2 DESIGN CONSIDERATIONS

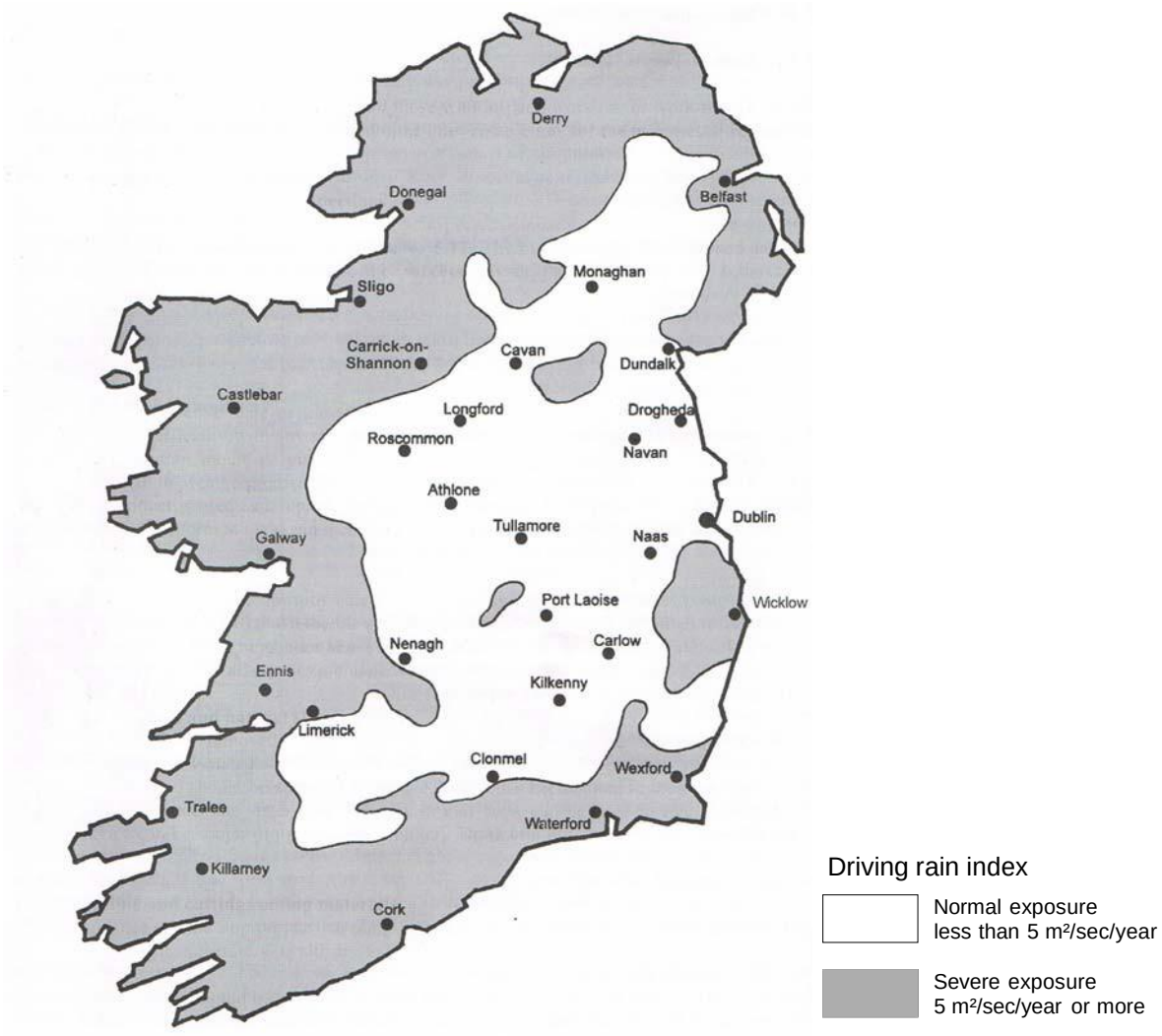
2.1 GENERAL

Ireland has a climate where there is a high risk of significant wind driven rain.

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

The Irish Building Regulations require that the roof of a building should be designed and constructed in a way that prevents any moisture infiltration to the fabric or the inside of the building. Any water ingress through the slates, in prolonged periods of wind-driven rain or other exceptional weather circumstances, must be evacuated from the building by a high quality underlay.

It is important that the exposure to local wind-driven rain of the site of construction is assessed.



The figure above details two simplified categories of exposure based on driving rain data from the Meteorological Service Climatological No. 3 (1973). This map should be used when designing buildings up to 12 meter ridge height above adjoining ground level.
If necessary (higher buildings and exceptionally exposed sites) special precautions must be taken, which are adapted to the specific situation.

Normal Exposure
Normal exposure to wind-driven rain applies in areas where the driving rain index is **less than 5 m²/sec/year**. These are shown as unshaded areas in the previous figure. In areas of normal exposure, buildings standing above their surroundings and buildings of any height on hill slopes or hilltops, should be regarded as having a severe exposure.

Severe Exposure
Severe exposure to wind driven rain always applies in areas where the driving rain index is **5 m²/sec/year or more**. These are shown as shaded areas in the previous figure.

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 with roofing products are varied and include: capillary attraction, rainwater creep, driving rain, deluge rain and flooding, raindrop bounce and negative pressure rain suction, etc.

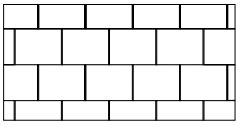
At present, Ireland does not have an agreed standard performance test, or rain or snow resistance test methods to assess the pitch and lap performance of pitched roofing products. Therefore the guidance given for rain resistance is in the form of prescriptive recommendations, which are based on experience SVK has gained from over 100 years supplying roofing products (over 10 years in Ireland).

2.2 DOUBLE LAP SLATING

2.2.1 GENERAL PRINCIPLES

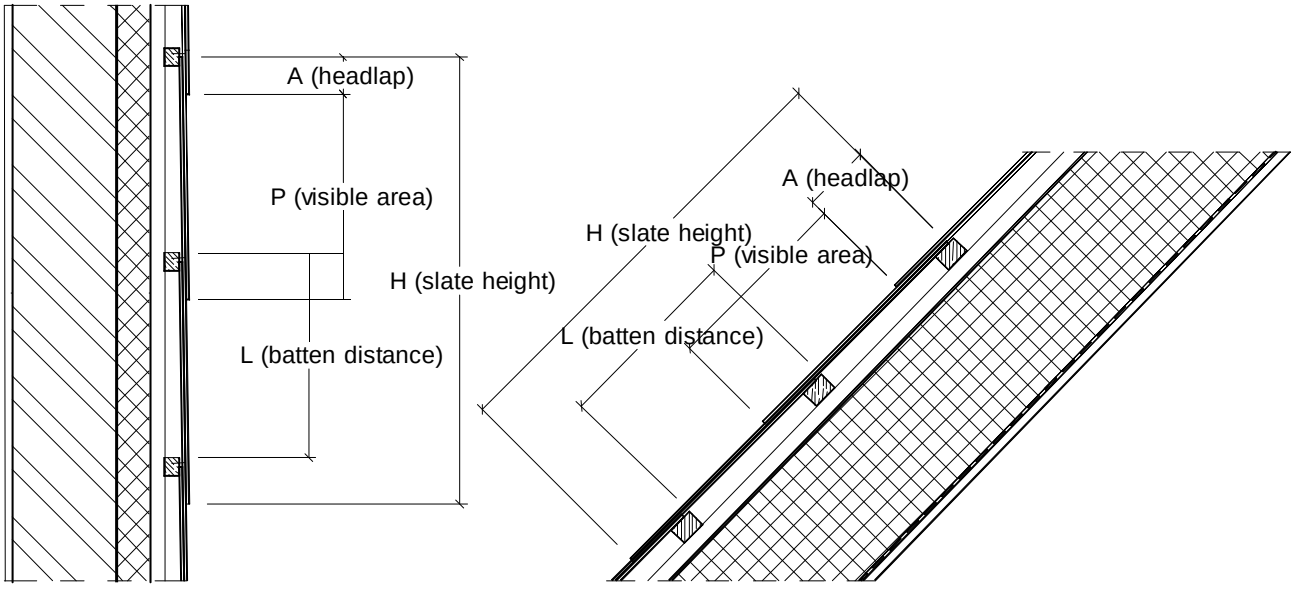
Vertical, double lap slating is the common way of working. Double lap means that each row of slates is partly covered by the two rows above the slates are placed in masonry bond, see figures below.

This way, the slate can be divided into three parts:
- visible area;
- single lap area;
- double lap area (= head-lap).



The batten distance and the height of the visible and the single lap sections are equal and are:

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

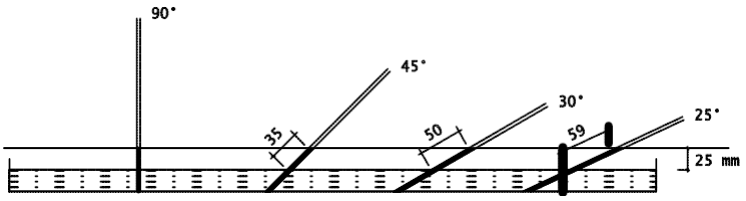


FACADE CLADDING ROOF COVERING

The minimum head-lap is determined in function of the roof pitch and the exposure of the roof.

2.2.2 CAPILLARY ATTRACTION

The head-lap is necessary because capillary action causes rainwater to rise between the close-fitting slates.
The water can rise to a maximum level of 25 mm, measured vertically. This means that the lower the pitch, the higher the water will rise between the overlapping slates (measured along the slope) – see figure.

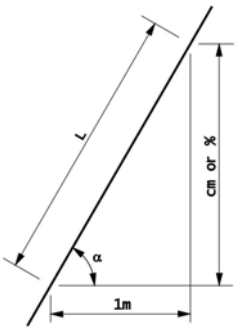


Wind-driven rain and dust building between the slates are the two key factors for capillary action.

Though they are not commonly used in Ireland, in order to minimise the risk of water infiltration by capillary action, we advise to use hooks instead of nails for fixing the slates, because with hook fixing the slates are less close-fitting.

2.2.3 ROOF PITCH

The roof pitch can be indicated in degrees (°) or in cm per meter (%).



Conversion table degrees - percent:

α (degrees)	% (percent)	Length of roof slope L per meter horizontal projection	α (degrees)	% (percent)	Length of roof slope L per meter horizontal projection
25	47	1103	50	119	1556
26	49	1113	51	123	1589
27	51	1122	52	128	1624
28	53	1133	53	133	1662
29	55	1143	54	138	1701
30	58	1155	55	143	1743
31	60	1167	56	148	1788
32	62	1179	57	154	1836
33	65	1192	58	160	1887
34	67	1206	59	166	1942
35	70	1221	60	173	2000
36	73	1236	61	180	2063
37	75	1252	62	188	2130
38	78	1269	63	196	2203
39	81	1287	64	205	2281
40	84	1305	65	214	2366
41	87	1325	66	225	2459
42	90	1346	67	236	2559
43	93	1367	68	248	2669
44	97	1390	69	261	2790
45	100	1414	70	275	2924
46	104	1440	75	373	3864
47	107	1466	80	567	5759
48	111	1494	85	1143	11474
49	115	1524	90	-	-

The roof pitches in this manual are pitches **measured on the slates**. This pitch is slightly inferior to the pitch of the rafters.

If the pitch is measured on the rafters, a correction factor has to be deducted.

Correction factors for a slope, measured in degrees, are:
- lap 90 mm: 0.90 °
- lap 100 mm: 0.92 °
- lap 110 mm: 0.94 °

2.2.4 LENGTH OF 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 longer the slope, the more water accumulates at the bottom part of the roof slope.
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:

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

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).

2.2.5 ROOF PITCH – HEAD-LAP

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 has to provide to obtain a watertight covering.

Roof pitch α (degrees)	Minimum head-lap under normal exposure	Minimum head-lap under severe exposure
$\alpha \geq 35°$	90 underlay advised	100 underlay advised
$30° \leq \alpha < 35°$	100 underlay strongly advised	110 underlay strongly advised
$25° \leq \alpha < 30°$	110 underlay obligatory	110 superior quality underlay obligatory

If the prescriptions for head-laps and minimum roof pitch are not respected, the SVK product guarantee is nullified.

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.

In order 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.

2.2.6 GAUGES AND NECESSARIES

Dimensions in cm	Head-lap A in cm	Appx. gauge L centre-to-centre in cm	Appx. pieces per m² **	Appx. weight per m² ** in kg
60 x 30	5 * 9 10 11 13	27.5 25.5 25.0 24.5 23.5	11.96 12.90 13.16 13.43 14.00	18.30 19.74 20.13 20.54 21.42
60 x 60	5 * 9 10 11 13	27.5 25.5 25.0 24.5 23.5	Not relevant	Not relevant

* Vertical cladding only.
** Gap of 4 mm between the slates is taken into account.

2.3 OTHER SLATING SYSTEMS

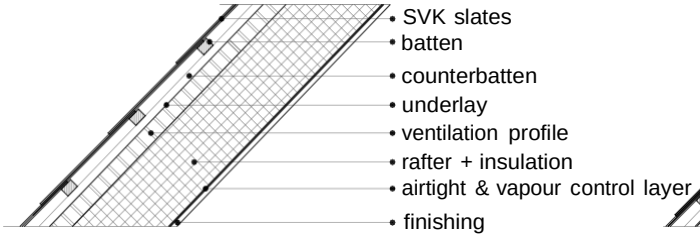
For single lap slating, open slating or any other non-standard slating systems, SVK advice should be sought.

3 ROOFING COMPONENTS

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 Irish standards, which have to be respected at all times.

To allow a high quality and aesthetic slating, it is important that the roof structure is adequately designed and executed, according the valid Code of Practice and all other building regulations.

VENTILATION UNDER UNDERLAY



VENTILATION UNDER SLATES

3.1 ROOF STRUCTURE

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.
It is advisable to bear in mind the slate dimensions when drafting the roof plan, in order to avoid unnecessary cutting of slates and to prevent that small pieces of slate have to be used.

3.2 ROOFING UNDERLAY

Because the roof covering itself cannot offer a complete protection from water and dust, it is strongly advised, and often necessary, to install a watertight underlay that evacuates all moisture out of the building structure.
This underlay also provides a barrier to minimise the effects of the wind load acting on the slates.

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.
Install it carefully, in order to avoid any risk of contact with the underside of the slates, even in the worst conditions.

We refer to the ICP 2 for more information on the underlay.

3.3 BATTENS AND COUNTER-BATTENS

For accepted timber species, permissible defects and characteristics, we refer to the ICP 2:2002.

Battens
Battens should have adequate strength to support the dead load, the imposed load and the wind load on the roof. They must have adequate stiffness to satisfy the requirements of alignments and to avoid excessive bounce or spring when fixing slates. Use planed, straight battens of equal thickness. A perfectly level surface of the supporting frame for the slates is required to obtain an even and level finished roof surface.

The quality of the timber must be adequate. It requires careful consideration whether or not to use wood with a preservative treatment. On this matter we refer to the ICP and the Irish standards.

The section of the battens must be sufficient to prevent any splitting and any penetration of the underlay by the slate fixings.
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.

Sizes for timber battens:

Rafter centres (*)	Nominal (mm) width x depth	Minimum (mm) width x depth
≤ 400 mm 400 mm < d ≤ 600 mm	50 x 25 50 x 36	47 x 22 47 x 35
(*) absolute dimensions Rafter centres exceeding 600 mm are not allowed.		

Counter-battens
Counter-battens are fully supported, they must have a depth of min. 22 mm, their width is equal to that of the supporting rafter; they are fixed through the underlay into the rafter.
The counter-battens create a space underneath the battens, which makes sure that any water ingress, retained by the underlay, is evacuated out of the roof structure and that the moisture content of the battens is minimised. They also provide the necessary gap for ventilation above the underlay. See § 3.5.3.
The fixings of both battens and counter-battens must penetrate deep enough in the roof structure to provide adequate withdrawal resistance of the fixing.

In cases of vertical slating, the battens and counter-battens usually are fixed to a solid wall. Use fixing devices with a proven adequate pullout resistance. Nail type, length and diameter: see ICP 2:2002.

Preservative treatment
Impregnation of the timber used for battens and counter-battens should be considered where they are at risk from attack by wood-rotting fungi.

3.4 FIXINGS

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

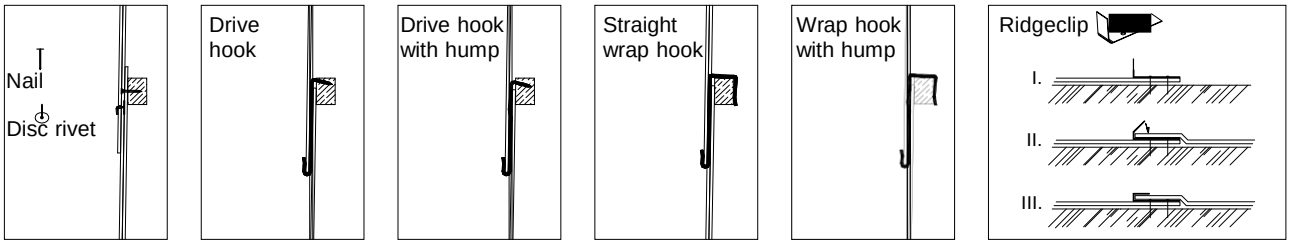
3.4.1 GENERAL

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

The nails must comply with I.S. 105-1 and should have a diameter of 2.65 mm. Their minimum length is 30 mm, or more if this is necessary to obtain a 15 mm penetration into the batten (where there is a gap between slate and batten, e.g. when tilt is provided at the eaves).
SVK strongly advises to use square extra crenelated copper nails, offering a high withdrawal resistance for centre and head fixing.

The crampions should be of copper coil, conforming to I.S. EN 1172. Use crampions with stem of minimum 19 mm long and diameter less than 2 mm. The disc base of the crampion should be formed of 0.5 mm thick copper sheet and have a diameter of minimum 19 mm. Use high quality crampions, to obtain sufficient uplift resistance.

With façade cladding wrap hooks are recommended instead of drive hooks. For large façades (height > 5 m) wrap hooks are strongly recommended. The wrap hook needs to be adjusted to the thickness of the batten + the thickness of one slate.



Though this is not customary in Ireland, we advise to fix the slates with hooks. This fixing method is a very good alternative to the nail fixing of slates. When applying hook fixing, please contact SVK for specific construction advice.

3.4.2 COMPLEMENTARY PRODUCTS

3.4.2.1 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. See ICP 2:2002.

3.4.2.2 Dry roofing products - Mortar mix.
Try to avoid mortar mix. SVK strongly advises to use dry roofing products and systems instead. Use systems offering a proven resistance to wind load, driving rain and durability.
If however 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.

3.5 INSULATION – CONTROL OF HARMFUL CONDENSATION

3.5.1 HOW TO INSULATE THE ROOF AREA

These days it is very common to insulate the roofspace. Insulation thicknesses keep increasing and, as a consequence, 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.

In Ireland, the space between insulation and underlay is often ventilated, whilst the space between underlay and slates is not.
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.
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 has to be assessed individually.

Although in Ireland this is not the common way to construct a roof, SVK strongly advises to use a vapour permeable underlay and to ventilate the gap between underlay and slates. The area between insulation and underlay is not ventilated. This way there is less risk of condensation.

3.5.2 WHY IT IS BETTER TO VENTILATE ABOVE THE UNDERLAY

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.

3.5.3 HOW TO VENTILATE ABOVE THE UNDERLAY

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.

Information on methods available to control excessive condensation, including ventilation, is also given in the Irish Building Regulations, Technical Guidance Document F, Ventilation.

In chapter 4.5 we will give not only the roofing details for constructions ventilated conform the Irish Code of Practice, but also the alternative detailing of eaves and ridge finishing for roofs that are ventilated above the underlay.

3.6 CONTROL OF INTERNAL PRESSURE

Roofs, particularly of buildings under construction, can be susceptible to damage arising from wind induced pressure. A substantially impermeable ceiling of adequate resistance to internal pressure helps to reduce the internal wind-induced pressure transmitted to the roofing underlay and roof covering. Normal ceiling constructions in houses, when executed airtight (see § 3.5) and having sufficient dead weight, or mechanical fastening resisting the pressure involved, offer adequate protection.

3.7 FLASHINGS, JUNCTIONS AND PROJECTIONS

Flashings and junctions must be detailed to prevent the entry of rainwater.
We refer to the manuals of the technical manuals of the manufacturers or Product Federations.
The integrity of the underlay as a barrier to wind and water ingress should be maintained around all projections.

4 WORKMANSHIP - EXECUTION

SVK slates are to be fixed in accordance with ICP 2:2002 'Irish code of practice for slating and tiling …' and BS 8000-6 'Workmanship on building sites – Code of practice for slating and tiling roofs and claddings'.

To lay a roof is a hazardous activity and statutory legislation applies to all types of roofing work. Particular attention is drawn to the *Safety, Health and Welfare at Work* 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.

Walking on fibre cement slates is certainly not allowed! Always use appropriately fixed ladders or planks or other safe means of access, complying with the regulations.

4.1 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 therefore 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.
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 has to be removed and the pallets must be covered at all times by a watertight but vapour permeable tarpaulin. Condensation and rainwater ingress between stacked slates must absolutely be prevented, to avoid efflorescences.
In case of storage for a prolonged period we strongly advise to partially open up the shrink film, even in case of storage under cover, to prevent condensation under the foil, and thus efflorescences.

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

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

Underlays, battens and 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.

4.2 CUTTING AND DRILLING SLATES

4.2.1 GENERAL

When cutting slates, measures to reduce the effect of dust should be taken in accordance with the relevant HSE Guidance notes.
After cutting or drilling, remove cutting dust from the slate before the slates become wet, to avoid staining by cement dust.

4.2.2 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.

4.2.3 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.

4.3 GETTING STARTED

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.

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. Pieces with a width less than half the slate width may be difficult to fix.

4.3.1 SETTING OUT OF THE BATTENS AND COUNTER-BATTENS

The prescriptions of the ICP 2:2002 must be respected.

The underlay is to be laid according to the manufacturers prescriptions.
To start with, counter-battens are placed, coinciding with the rafters / trusses. They are fixed at max. centres of 300 mm. See § 3.3 for more information.

Then the roof is to be set out with battens. The battens are fixed, in straight lines, to the appropriate gauge (batten distance) – see § 3.3.
The battens are parallel with the ridge (or at right angles to the line of drainage). Alternate the joints in the battens, no more than one joint in four consecutive battens should be on the same support.
Set out the battens, remembering to allow eaves slates to overhang the gutter to ensure water discharge into the gutter.
The overhang is the lesser of:
- 45 to 50 mm
- the centre of the gutter.

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

4.3.2 LOADING-OUT ON ROOF

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

4.4 SVK SLATE FIXING METHOD

1. Set out both under-eaves battens as shown in figure A. Their gauge is determined by the under-eaves slate lengths following the correct laps, as given in the table below (see § 2.2.5 and § 2.2.6).
2. The first under-eaves course is cut and head nailed along the eaves (see figure B). The length of the first undereaves course is equal to the gauge (see § 2.2.6). This first undereaves course supports the crampions and stiffens the eaves.

   The sum of the lengths of both undereaves 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 undereaves courses and the first full slate should be aligned.

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

Slate Size	Lap	1st under eaves slate length (A)	2nd under eaves slate length (B)
600x300	110	245	355
600x300	100	250	350
600x300	90	255	345

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 crampion 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 crampion 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, the slates must always be centre-nailed to allow working;
   - a crampion placed between the edges of the two lower slates. The shaft of the crampion 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 crampion hole is required in the slate-and-a half slates, to accommodate the crampion 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. Follow the installation instructions in the next chapter.

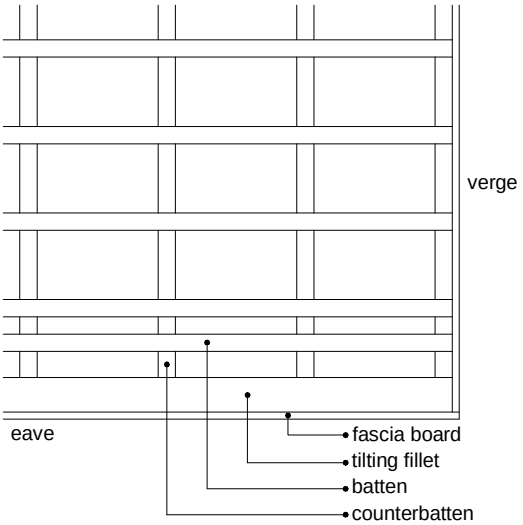


Fig A - Batten configuration at eaves

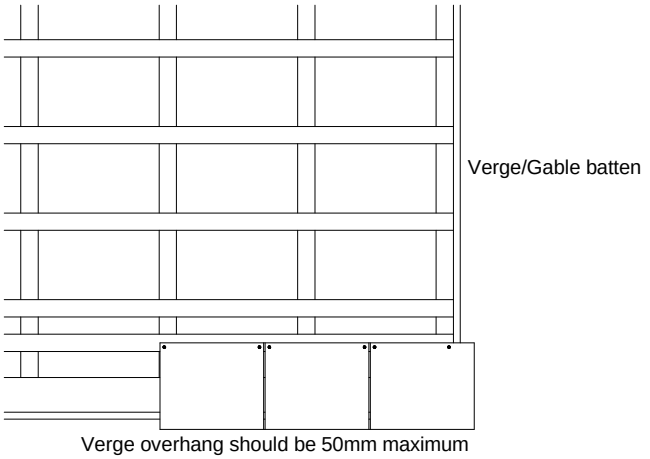


Fig B - Eaves - 1st under eaves course

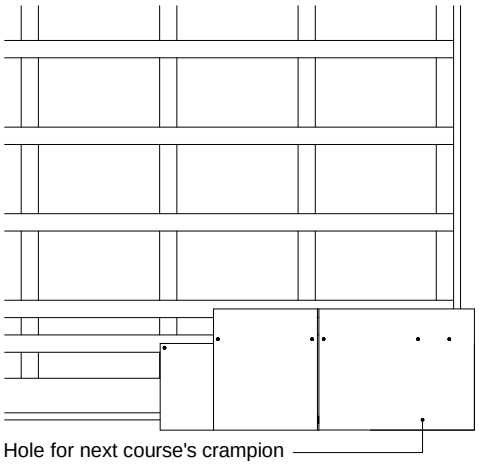


Fig C - Eaves - 2nd under eaves course

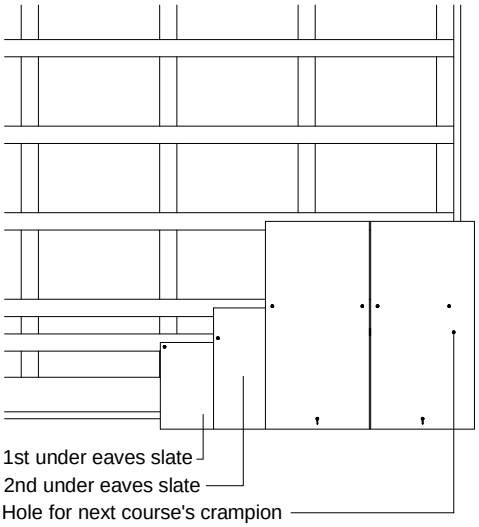


Fig D - Eaves - 1st course of standard eaves

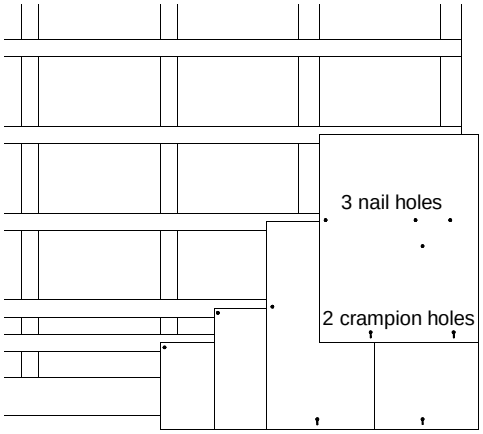


Fig E - Verge - using slate-and-a-half to break bond

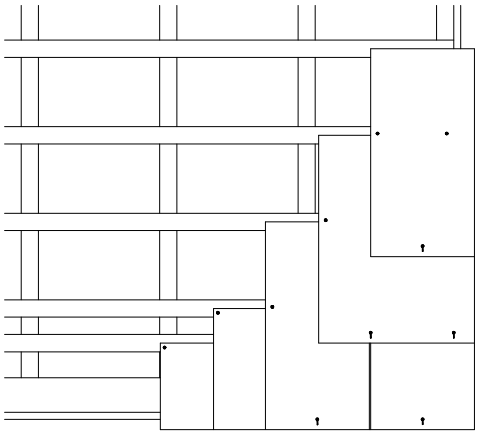


Fig F

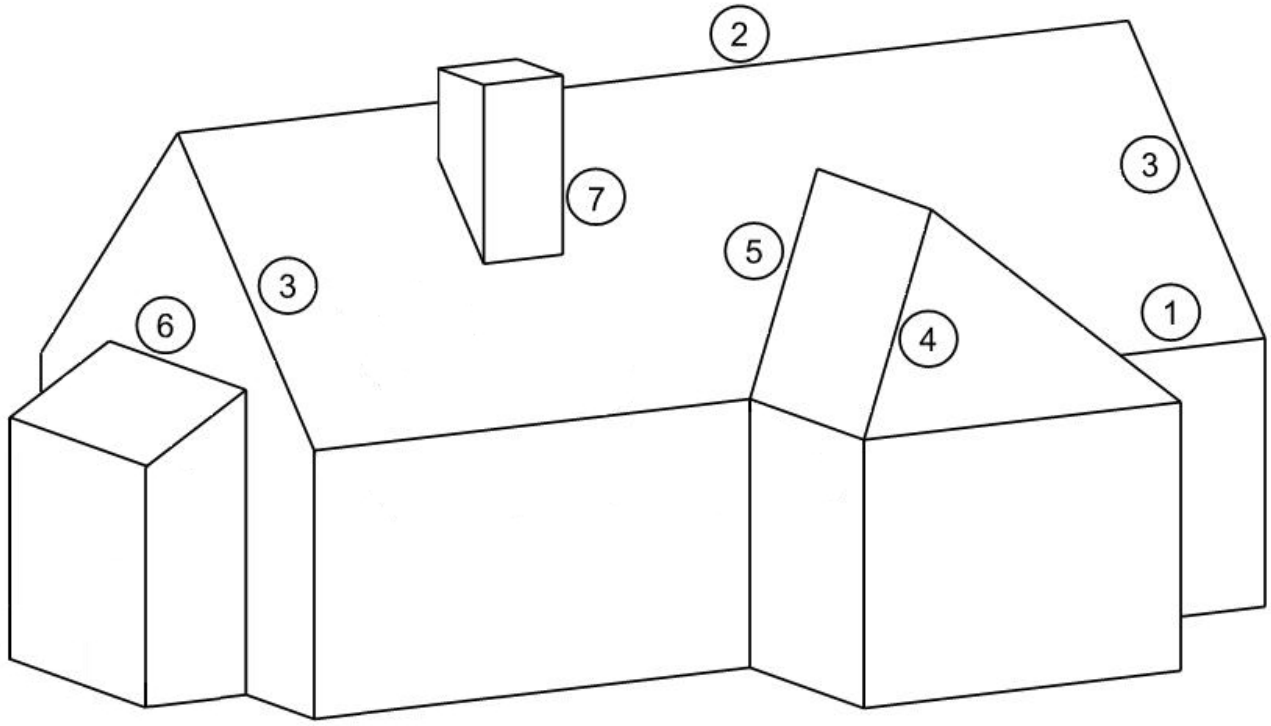
4.5 PRINCIPAL PARTS OF A ROOF

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, a number of 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 vapour 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.).



1. Eaves (see § 4.5.1)
2. Ridges (see § 4.5.2)
3. Verges (see § 4.5.3)
4. Hips (see § 4.5.5)
5. Valleys (see § 4.5.6.1)
6. Abutments (see § 4.5.4)
7. Chimneys (see § 4.5.4)

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

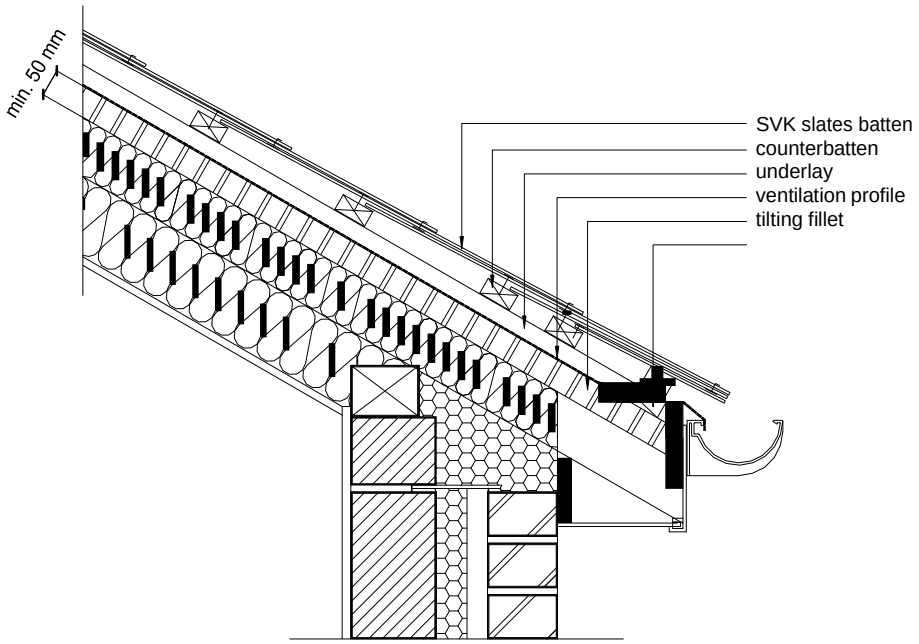
4.5.1 EAVES

4.5.1.1 Ventilation underneath the underlay

Set out the battens, remembering to provide the correct overhang of the eaves slates to the gutter (see § 4.3.1).
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 undereave courses of the slates;
- lifts the eave and undereave courses up between 8 and 15 mm to ensure an even inclination over the slate surfaces.

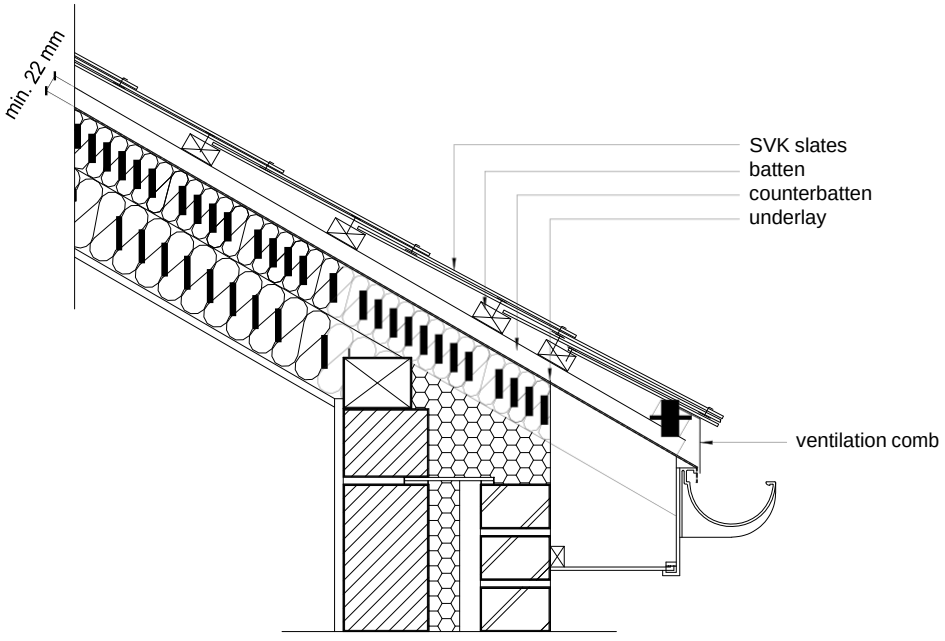
Where the eaves ventilation is located on the eaves support, allowance should be made for its height.

Chapter 4.4 explains how to place and fix the undereaves courses.



4.5.1.2 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 plane over the whole roof surface.
It is strongly advisable to put an anti bird comb at the eaves, this avoids blockage of the ventilation gap by dry leaves, birds nests, etc.
The eaves slates overhang the gutter (see § 4.3.1).

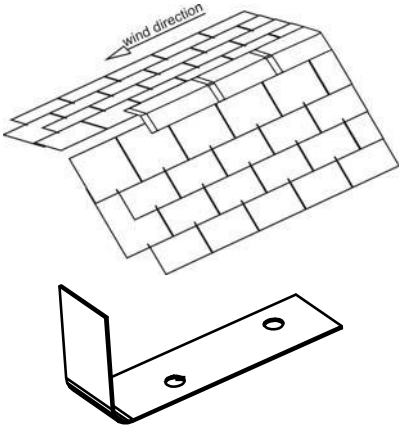


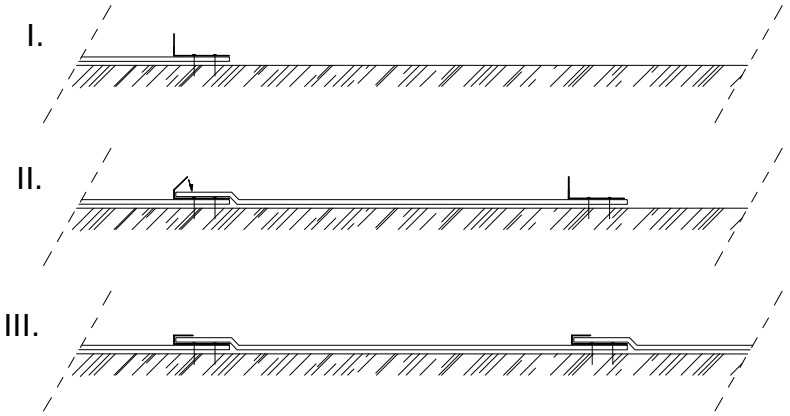
4.5.2 RIDGES

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.

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 hook and two screws. Use the factory-provided holes for fixing the head-lap. End ridge units should always be full length.
The ridges are laid with a lap equal to the socket length (70 mm).





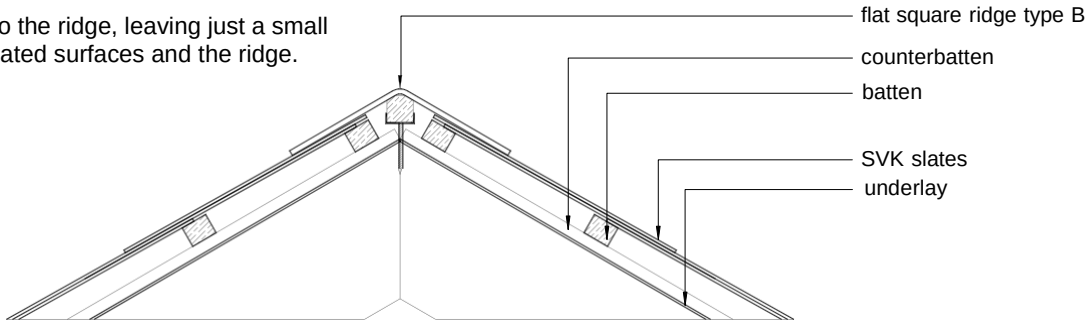
In case dry ridges are used in another material (concrete, clay, sheet metal ridges), they should be laid in accordance with the slate and/or the sheet metal manufacturer's technical recommendations.

Bedded ridges are not recommended by SVK. If however SVK double lap fibre-cement slates are used with bedded ridges we refer to the ICP 2:2002 for working instructions (also see chapter 3.4.2 COMPLEMENTARY PRODUCTS).

Special attention has to be paid to the underlay at the ridge, see ICP 2:2002 for further details.

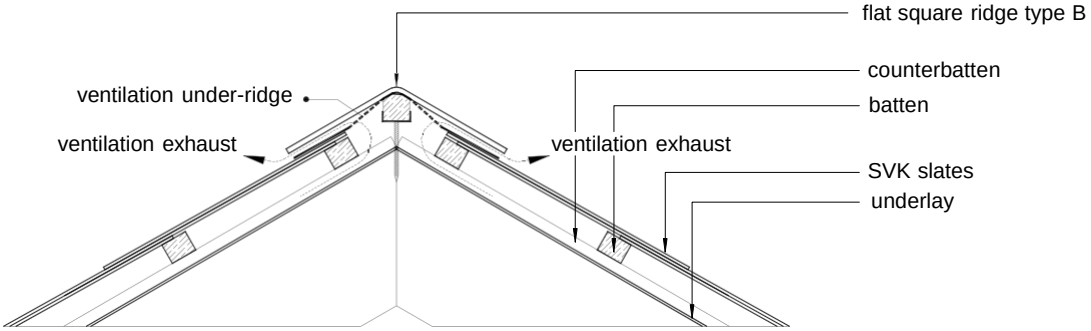
4.5.2.1 Non ventilated ridge finishing

Slates are laid up to the ridge, leaving just a small gap between the slated surfaces and the ridge.



4.5.2.2 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 manufacturers instructions. Leave sufficient space between the slated surfaces and the ridge to allow for ventilation.



4.5.3 VERGES

Verges may be straight or raked. The undercloak should be bedded in mortar when laid on brickwork or masonry.

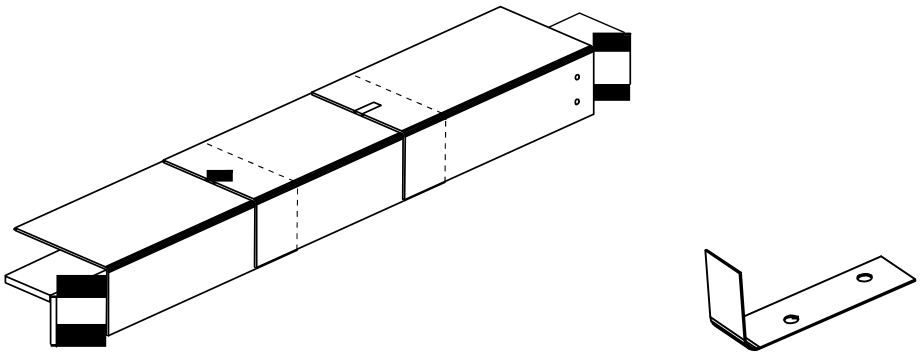
Verges, being situated at the edge of a roof surface, are exposed to high and turbulent wind loads. Therefore they must be adequately secured against lifting.
See § 4.4 for laying and fixing the slates at the verge.

The plain overhanging verge, where slates overhang the gable or bargeboard, used to be a common way of forming verges. If unsupported, the verge overhang should be greater than or equal to 38 mm and not greater than 50 mm.
We strongly advise however to use verge slates or proprietary systems.

Bedded Verges are not recommended by SVK. If however SVK double lap fibre-cement slates are used on bedded verges we refer to the ICP 2:2002 for working instructions (also see chapter 3.4.2).

4.5.3.1 Verges finished with verge slates

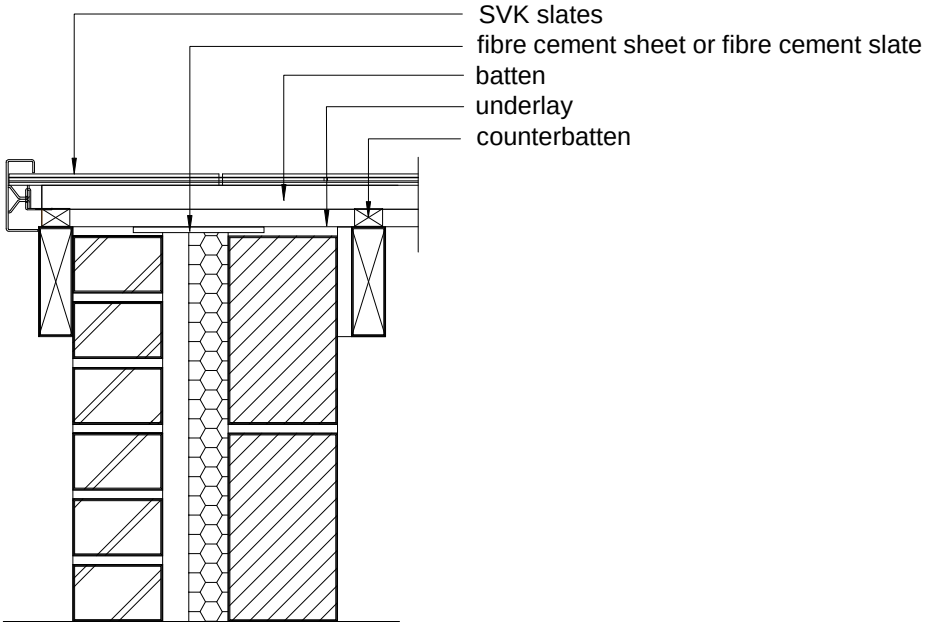
The verge slates are laid on top of the slates. They are fixed on their vertical side by 2 nails, diameter 2.65 mm, in the lap area of the slates. Pre-drill the holes with a diameter of 4 mm, to allow the working of the verge slates. Except for roofs in very sheltered areas, it is also necessary to fix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



4.5.3.2 Verges finished with dry-fix verge trims

Dry-fix verge trims are an alternative to verge slates.

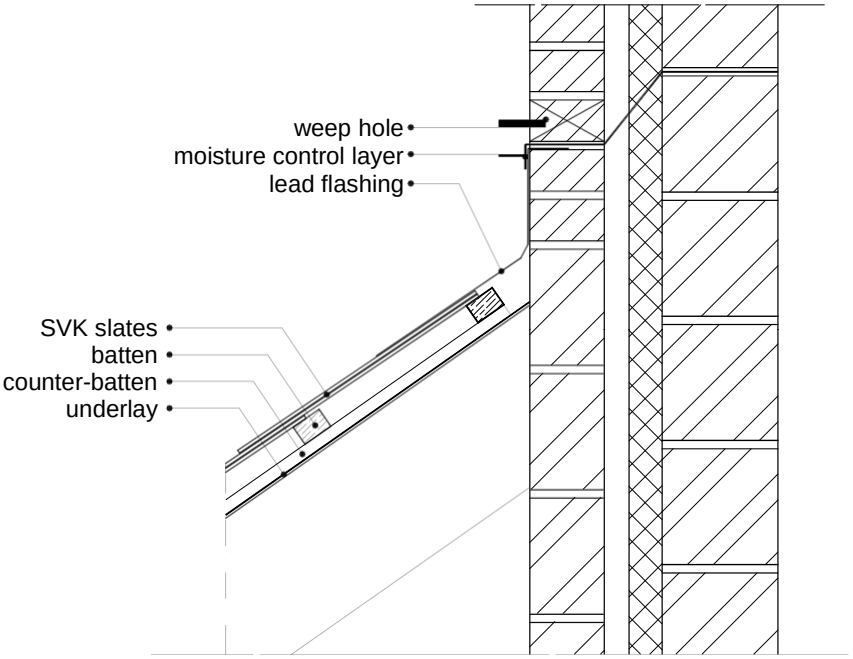
Lay dry verge systems in accordance with their manufacturers' instructions.
See to it that the verge strip leads the water away from the facade surface. Ensure that the verge slates are extended fully into the verge strip and that the latter firmly holds them.



4.5.4 ABUTMENTS

4.5.4.1 Top abutments

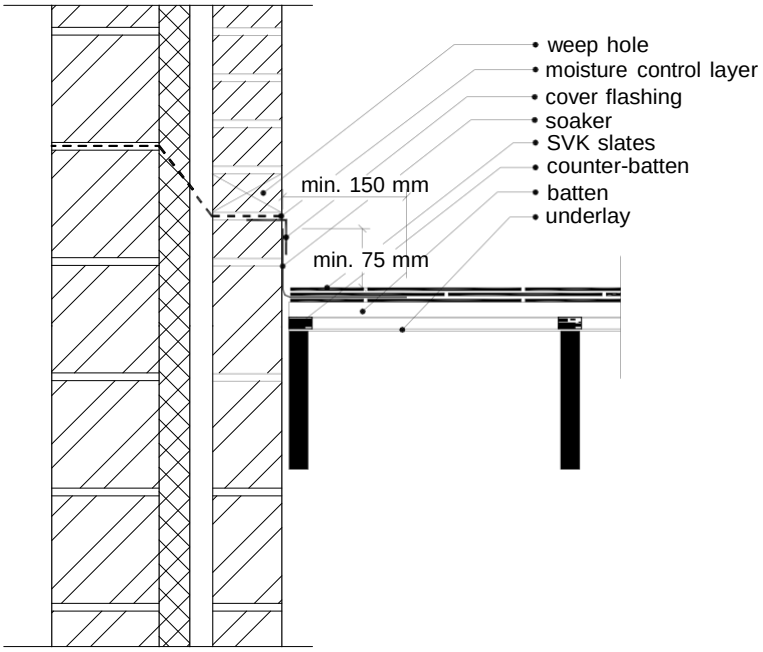
The length of the top two courses of slates should ensure the minimum lap is maintained in combination with an apron-and-cover flashing.
If ventilation has to be provided, it has to be realised by ventilation slates.
In the wall above, an effective flashing must be provided, to avoid water ingress to the inside of the construction.



4.5.4.2 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.

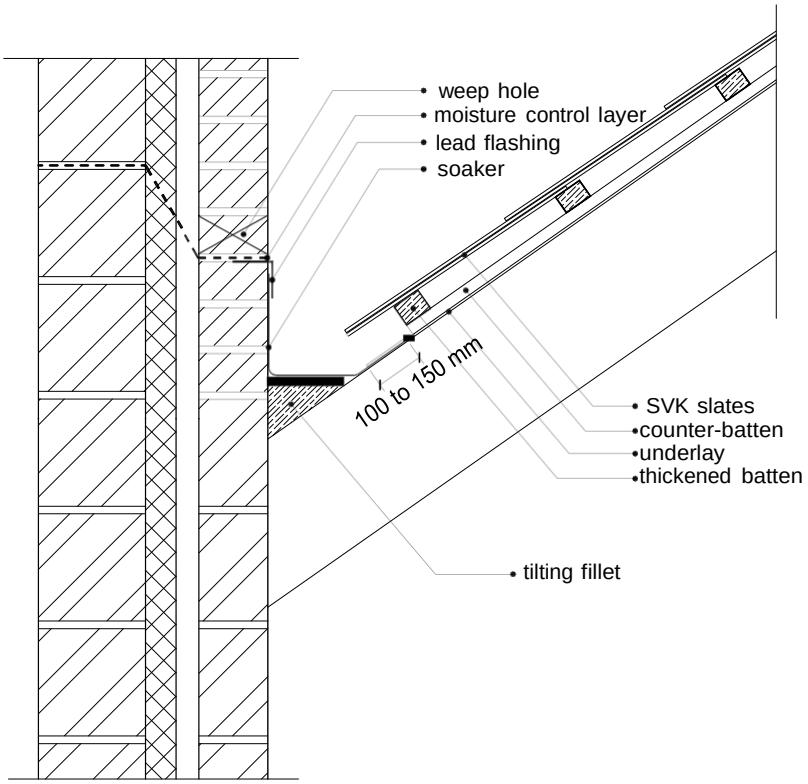
Where used, proprietary abutments or secret gutters are detailed according to the manufacturer's recommendations and should be adequately sized for the length of the abutment with sufficient provision for water outlet. Where there is a risk of blockage by debris, a combination of a cover flashing and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



4.5.4.3 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.

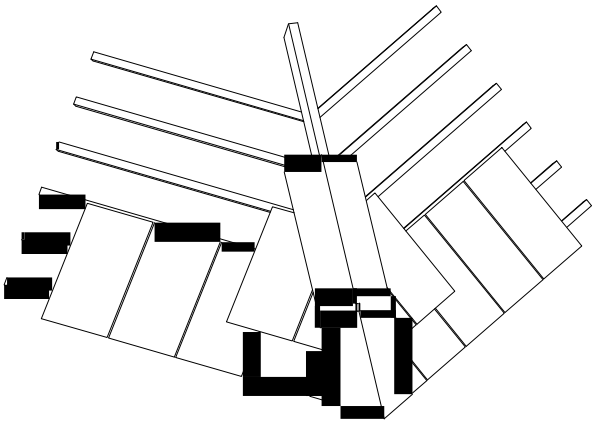


4.5.4.4 Chimneys

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.

4.5.5 HIPS

4.5.5.1 Hips finished with SVK fibre cement cappings



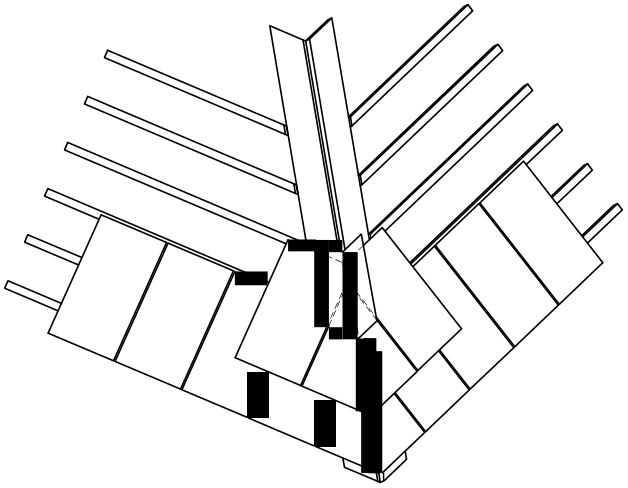
The hips are basically finished the same way as ridges (see § 4.5.2).
Position and fix a raking batten to either side of the hip rafter to suit the fixings of the hip cappings. Rake cut slates to the hip line. Wherever this is necessary, make extra holes for fixing the slates. Cut the slates close to the hip line, the head-lap of the slates by the hip capping must be minimum the head-lap.

The ridges are placed with a downward socket. Cut the bottom hip cappings from a full length unit to align with the eaves.

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

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

4.5.5.2 Mitred hips



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. 100mm 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 crampion.
A roof pitch of min. 35° is recommended.
With pitches less than 45° external tail fittings are required to resist high wind loads, except in sheltered locations.

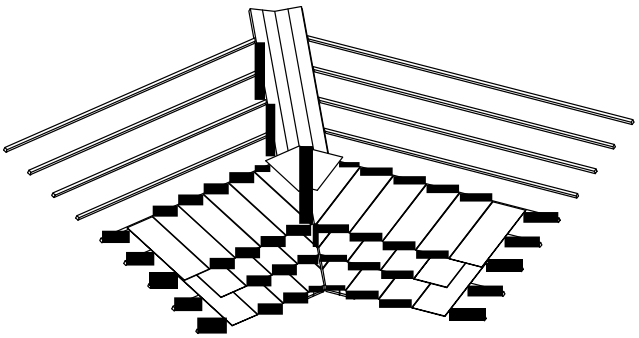
4.5.5.3 Other hip cappings

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 2:2002 for working instructions (see also chapter 3.4.2).

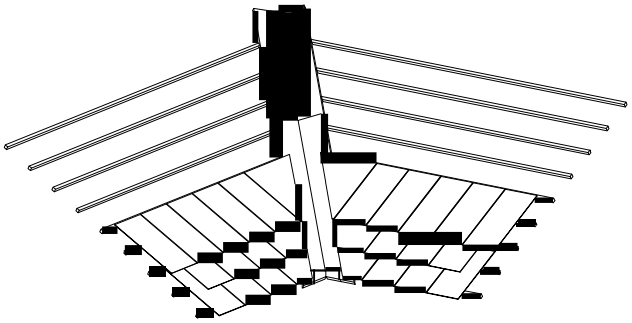
4.5.6 VALLEYS

4.5.6.1 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. Use wide slates (cut from doubles) rather than using small pieces of slate.
Lay cut soakers with each course. These soakers extend minimum 250 mm 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 crampion or another appropriate tail fixing. Wherever this is necessary, make extra holes for fixing the slates.
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.

4.5.6.2 Open valleys



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 crampion or another appropriate tail fixing. Wherever this is necessary, make extra holes for fixing the slates.
Never bend any slates.

5 REFERENCES

- EN 492 “Fibre-cement Slates and their Fittings for Roofing – Product Specification and Test Methods” – 2005.
- ICP 2:2002 “Irish Code of Practice for Slating and Tiling”.
- BS 5534 Code of practice for slating and tiling (including shingles).
- BS 8000-6 Workmanship on building sites – Code of practice for slating and tiling of roofs and claddings.
- All relevant standards, regulations, guiding documents etc… listed in the reference chapter of the above standards.

6 SPECIFICATIONS

6.1 SVK ARDONIT / BLUETONE

6.1.1 SUMMARY

See product range § 1.3.1 SLATES.

6.1.2 PRESCRIPTION

The roof covering and/or façade cladding is/are to be executed with double pressed fibre cement slates (SVK Ardonit / Bluetone), composed of Portland cement, organic fibres of superior quality, mineral additives and water.

The front and the sides of the slates are finished with a multi layer acrylic based coating highly counteracting the growth of moss. The underside of the slates is treated with a one layer coating and a colourless water-repellent resinous layer. The colour of the SVK Ardonit / Bluetone slates is premium black or blue-black.

The slates have a smooth surface with square edges.

The slates have a thickness of 4 mm (nominal: 4.1 mm).

The slates have a CE-marking, they comply with the prescriptions of the standard EN 492 (type NT, class B = best class).

The slates have the following physical and mechanical properties:

Dimensions	: 600 x 300 mm – and doubles.
Minimal density (oven dry)	: $\rho \geq 1700$ kg/m³ (nominal: 1800 kg/m³).
Water absorption	: < 4 %.
Strength (EN 492)	: Class B – 70 NM/m.

The slate is easily worked with regular slater tools.

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

Synopsis of the accessories: see § 1.3.2 ACCESSORIES.

6.1.3 TRANSPORT AND STORAGE

See § 4.1.

6.1.4 PLACEMENT

In Ireland the roof must comply with the placement guidelines of the manufacturer and the demands set in the Irish Code of Practice ICP 2:2002

6.2 SVK ARDONIT PLUS

6.2.1 SUMMARY

See product range § 1.3.1 SLATES.

6.2.2 PRESCRIPTION

The roof covering and/or façade cladding is/are to be executed with double pressed fibre cement slates (SVK Ardonit Plus), composed of Portland cement, organic fibres of superior quality, mineral additives and water.

The front and the sides of the slates are finished with a multi layer acrylic based coating highly counteracting the growth of moss. The underside of the slates is treated with a one layer coating and a colourless water-repellent resinous layer. The colour of the SVK Ardonit Plus slates is blue-black.

The slates have a smooth surface with square edges.

The slates have a thickness of 4 mm (nominal: 4.1 mm).

The slates have a CE-marking, they comply with the prescriptions of the standard EN 492 (type NT, class B = best class).

The slates have the following physical and mechanical properties:

Dimensions	: 600 x 300 mm – and doubles.
Minimal density (oven dry)	: $\rho \geq 1700$ kg/m³ (nominal: 1800 kg/m³).
Water absorption	: < 4 %.
Strength (EN 492)	: Class B – 70 NM/m.

The slate is easily worked with regular slater tools.

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

Synopsis of the accessories: see § 1.3.2 ACCESSORIES.

6.2.3 TRANSPORT AND STORAGE

See § 4.1.

6.2.4 PLACEMENT

In Ireland the roof must comply with the placement guidelines of the manufacturer and the demands set in the Irish Code of Practice ICP 2:2002

6.3 SVK CROMLEIGH

6.3.1 SUMMARY

See product range § 1.3.1 SLATES.

6.3.2 PRESCRIPTION

The roof covering and/or façade cladding is/are to be executed with double pressed fibre cement slates (SVK Cromleigh), composed of Portland cement, organic fibres of superior quality, mineral additives and water.

The front and the sides of the slates are finished with a multi layer acrylic based coating highly counteracting the growth of moss. The underside of the slates is treated with a one layer coating and a colourless water-repellent resinous layer.
The colour of the SVK Cromleigh Rustic slates is blue-black or Welsh blue.
The colour of the SVK Cromleigh Textured slates is blue-black or Welsh blue.
The colour of the SVK Cromleigh Smooth slates is blue-black.

SVK Cromleigh Rustic slates have a structured surface with square edges.
SVK Cromleigh Textured slates have a structured surface with dressed edges.
SVK Cromleigh Smooth slates have a smooth surface with dressed edges.

The slates have a thickness of 4 mm (nominal: 4.1 mm).

The slates have a CE-marking, they comply with the prescriptions of the standard EN 492 (type NT, class B = best class).

The slates have the following physical and mechanical properties:

Dimensions	: 600 x 300 mm – and doubles.
Minimal density (oven dry)	: $\rho \geq 1700$ kg/m³ (nominal: 1800 kg/m³).
Water absorption	: < 4 %.
Strength (EN 492)	: Class B – 70 NM/m.

The slate is easily worked with regular slater tools.

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

Synopsis of the accessories: see § 1.3.2 ACCESSORIES.

6.3.3 TRANSPORT AND STORAGE

See § 4.1.

6.3.4 PLACEMENT

In Ireland the roof must comply with the placement guidelines of the manufacturer and the demands set in the Irish Code of Practice ICP 2:2002