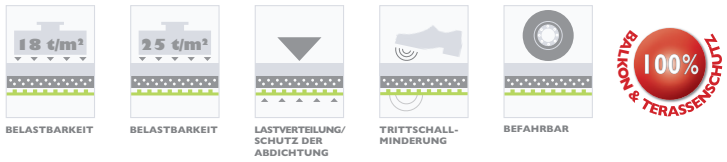
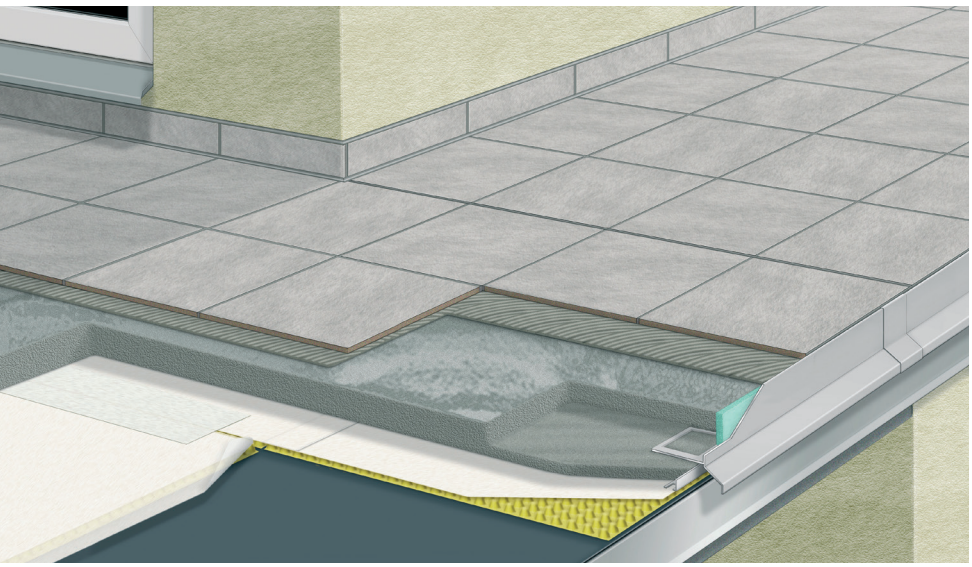
PROLINE

PROCODRAIN E

Drainage mat for tile and slab flooring exposed to weather on screed mortar





Fields of application:

PROCODRAIN E is a stilted drainage mat for effective drainage from ceramic tiles and paving on screed mortar in outside areas.

Areas of application are balconies, patios, flat roofs, pathways, garage driveways, courtyards or viewing terraces.
The tough stud membrane and the sturdy MED filter fleece laminated on the stud membrane prop up the covering laid on top.
Through this technology, a second drainage level beneath the covering is created that enables a necessary, fast, horizontal deflection of water that has ingressed from above and water that has been channelled via the grids to the sealing level.

The tiles and paving stones are bonded to the hardened load distribution plates by means of the buttering & floating method or tapped directly onto the freshly laid screed mortar using with a suitable bonding course. The tiles and paving stones are usually grouted.
Two stud heights are available depending on the evenness of the surface and the expected water quantity.

- To securely drain water from balcony and patio surfaces made from ceramic tiles and paving on cement screed.
- To create a second drainage level under the floor covering that can be walked on.
- Also suitable for garage driveways and courtyards that are driven on by passenger vehicles.
- For necessary drainage on floor surfaces with additional façade grids or line drainage.
- For easy and secure application on surfaces exposed to the weather.

Product advantages:

PROCODRAIN E ensures fast drainage of rain water and melted ice/snow on floor structures laid on screed mortar on a second drainage level. Within this level, the water is channelled down the slope to the floor structure without contact.
Thanks to the rapid deflection of water, the floor material also dries faster. The service life and appearance of the material benefits from this.

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Screed mortar – advantages and disadvantages:
Screed mortar is generally a sturdy load distribution layer under tiles and paving slabs. It creates the conditions for a lasting effectiveness and pleasant appearance of the floor covering.
Screed mortar is usually very compact and firm. The more compact and firm it is, the greater its resistance to frost and chemical/physical degradation. Fundamentally, however, it is not water-tight, it absorbs moisture and is surface active. Connecting and expansion joints could also open up and allow surface water to trickle into the structure.
Ingressed water is rarely deflected on the sealing level. If it is, it does so very poorly and very slowly. With the effect of heat and frost, major damage is then caused over time not just to the screed structure but also to the tiles and paving slabs that are laid on top.
Chemical degradation is caused in combination with heat and physical degradation in the event of frost. Complex mechanisms bring down the dew point under tiles and paving slabs and lead to premature degradation of the top layer. Unsightly lime and alkali silicate blisters and also damp spots and cracks are the visible consequences.

To counteract this, the load bearing cement screed should be stilted from the sealing level to such a degree that ingressed water can drain off quickly and so that the cement screed is also not soaked from underneath by the ingressed water.

The solution:
Through the use of PROCODRAIN E, ingressing seepage water is deflected immediately and kept away from the underside of screed and mortar layers. The floor structure is stilted upwards above the collected water. In this way, the capillary effect is also suppressed at the same time.

The sturdy stud membrane lies over the whole surface and protects the seals beneath and their separating layers from the strain of static and moving loads. At the same time, the drainage level and the layers built up above have a decoupling effect and thereby absorb the noise from footsteps.

The layout of the studs enables unhindered longitudinal and lateral drainage. It is not necessary to adhere to a laying direction or pattern.

The sturdy filter fleece deflects any water and breaks down in the course of time through the alkalinity of the cement screed. This prevents lime forming on the filter fleece. Once the screed has hardened, the filter fleece is no longer required.

With sufficiently bend-resistant and pressure-resistant load distribution plates, PROCODRAIN E is also capable of taking the load of slow (walking pace) passenger vehicles up to 3.50 t total weight.

- Stilting, capillary inhibiting, very high drainage performance
- Fast deflection of water through unhindered longitudinal and lateral drainage
- Better drying of floor surfaces, high resistance to pressure and takes driving loads
- Improved aesthetics, function and service life of coverings
- Protects floor structures with screed mortar effectively against damaging seepage and collected water
- Protective effect on seals – complies with DIN 18195

Delivery form:

Strips rolled up and packed in a box, approx. 110 x 40 x 40 cm

PROCODRAIN E 8 mm			Art. no.: 93324
12.50 m/box	12 boxes/pallet	150.00 m²/pallet	
PROCODRAIN E 20 mm			Art. no.: 93325
6.15 m/box	12 boxes/pallet	72.00 m²/pallet	
PROCODRAIN E SV – butt-joining tape			Art. no.: 93328
20.00 m/box			

Storage and transportation:

The rolls should be stored and transported in a closed box, in a cool and dry place with protection against sunlight and contamination. Storage and transportation over longer distances should be in an upright position. The storage period under these conditions is two years.

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Technical data:

PROCODRAIN E		
	8 mm high Art.no.: 93324	20 mm high Art.no.: 93325
Material	HDPE stud membrane laminated with filter fleece.	
Colour - membrane Colour - fleece	yellow white	
Type of material	PET/PES fleece, grammage approx. 110 gr/m²	
Width - membrane Width - filter fleece	approx. 100 cm approx. 105 cm	approx. 97.5 cm approx. 105 cm
Fleece protrusion one-sided lengthways	approx. 5 cm	approx. 7.5 cm
Weight:	approx. 0.6 kg/m²	approx. 1.1 kg/m²
Water deflecting capacity (as per DIN EN ISO 12958:1999)	approx. 4.6 ltr/m x s	approx. 12 ltr/m x s
Free drainage space	approx. 5.5 ltr/m²	approx. 12 ltr/m²
Rigidity at 10% compression up to	250 KPa	180 KPa
Temperature resistance	30°C to +80°C	
Chemical resistance	Resistant to acids usually found in the earth and inorganic acids.	
Biological properties	Resistant to bacteria and fungus, does not decompose and unaffected by root growth.	
Physiological properties	Does not pose a risk to drinking water	

PROCODRAIN E SV	
	Art.no.: 93328 Self-adhesive butt-joining tape for PROCODRAIN E
Material	Polyester material
Type	Grammage approx. 80-110 gr/m²
Bonding	To double adhesive strips attached on both longitudinal sides
Fleece protrusion	approx. 10 mm on longitudinal sides
Tape width:	approx. 15 cm
Weight:	approx. 27 gr/m

Disposal:

Offcuts and leftovers can be disposed of through the normal waste system or recycled as plastic at recycling centres.

Proline supports the German Grüner Punkt (green dot) recycling system.
Product packaging can be disposed of in the appropriate manner.

Instructions on hazardous goods and substances:

No special measures required.

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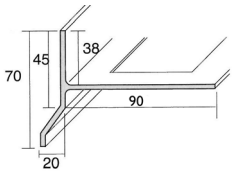
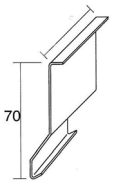
Supplementary products:

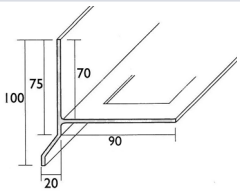
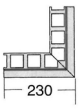
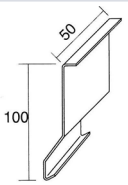
PROCOFORM balcony edge profile WSE

Edge finish profile at open end of balconies and terraces with lower attachments. The profile is installed above the drainage strips.
OK covering must always lie higher than OK profile.

Material	Aluminium, powder coated/untreated						
Types		Profile		External corner		Connector	
Colours		Art.no.		Art.no.		Art.no.	
	Light beige (RAL 1019)	70417		73517		79417	
	Light grey (RAL 7035)	70440		73540		79440	
	Autumn (RAL 8003)	70427		73527		79427	
	White aluminium (RAL 9006)	70418		73518		79418	
	Plain aluminium	70400		73500		79400	
Height	70 mm						
Length of profile	3.00 m						

PROCOFORM balcony edge profile K

Edge finish profile at open end of balconies and terraces with higher attachments. The profile is installed above the drainage strips.
OK covering must always lie higher than OK profile.

Material	Aluminium, powder coated/untreated						
Types		Profile		External corner		Connector	
Colours		Art.no.		Art.no.		Art.no.	
	Light grey (RAL 7035)	72403		73403		79640	
	Autumn (RAL 8003)	72405		73405		79627	
	White aluminium (RAL 9006)	72406		73406		79618	
	Plain aluminium	72401		73401		79600	
Height	100 mm						
Length of profile	3.00 m						

PROSTRIP S edge insulating strip

Fleece backed, fall-through safe PE edge insulating strip for lower installation heights with self-adhesive foot and clinging technique.
Can be affixed securely to the drainage mat along rising installations, such as walls, doors, railing posts, etc.

Height	Thickness	Length	Art.no.
50 mm	8 mm	25 m	93520

PROSTRIP L edge insulating strip

Fleece backed, fall-through safe PE edge insulating strip for higher installation heights with self-adhesive foot and clinging technique.
Can be affixed securely to the drainage mat along rising installations, such as walls, doors, railing posts, etc.

Height	Thickness	Length	Art.no.
100 mm	8 mm	25 m	93521

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Preparing the substrate:

The substrates for the drainage strips generally consist of:
- Sealing strips and their recommended separating layers in accordance with DIN 18195 T5
- Fluid, strip or slab shaped joint seals
- Reaction resin seals or coatings
- Concrete surfaces, also without seals if necessary

The substances that come into direct contact with the drainage must not have any solvents or other substances that could damage the HDPE stud membrane.

Height differences in the substrate or seal (e.g. caused by overlaps) must not exceed 4 mm in the case of 8 mm drainage mats and 14 mm in the case of 20 mm high mats. Greater height differences should always be levelled out by suitable means to
- avoid puddles in the substrate.
  Puddles impair the drainage performance and, in the event of frost, can cause barrages.
- enable laying of the drainage mat evenly and over the entire surface. Uneven substrates impair the durability of the structure.

The surfaces to be laid must have a slope of between 1% and 3%. Larger slopes up to 5% are permissible in sections.

The structures beneath the drainage mats must be suitably secure to take the intended loads and must not give under pressure or vibrate.
This applies to insulating materials under the seal in particular. Ideally, XPS insulating material, PU insulating material or foam glass insulating material should be used that can withstand a compressive stress in excess of 300 KPa at 10% compression. If point loads are expected, suitable insulating materials and sealing strips should be used for this purpose.

Preparatory measures:

Simply unroll PROCODRAIN E and lay over the surface. Use a sturdy craft knife or carpet scissors to cut to size. The strips must be adapted free of constraint forces to adjacent components with connection joints of at least 10 mm. The studs and filter fleece must always face upwards. The membrane strips are butted up tightly against each other and held down until laying with stones or sand bags.

The lateral overlaps of the filter fleece always lie completely on the laminate of the neighbouring strip. The overlaps up to the upper edge of the surface run next to rising components and along the edge strip or are cut off at this height at a later stage.

At joints, connections and along rising components at which no overlapping zones are present, the PROCODRAIN E SV butt-joining tape is bonded down in such a way that gaps or clefts in the strips, or at the end of rising components, are completely and permanently covered.

> *At regular intervals, ensure that the filter fleece is not perforated on the surface and that all connections and butted joints with overlaps and butt-joining tape are sealed so that no screed mortar or particles of dirt can make their way into the drainage space under the filter fleece*

On the laid surface, boards or formwork boards should be secured for work access or transport paths.
The laid strips that have been secured with butt-joining tape should then be covered at once with the floor covering. At low outside temperatures, the unrolled and weighed down strips can remain in position uncovered (even over a few days) so that they can acclimatise.

At the end of rising components, PROSTRIP S (50 mm) or PROSTRIP L (100 mm) is bonded with the self-adhesive bottom part to the filter fleece of the drainage mat.
If edge strips are bonded to the seal or separating layer before the drainage mat is laid, the gap between the drainage mat and edge strip is covered using PROCODRAIN E SV butt-joining tape.

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Laying coverings:

Cement screed

can be normal or fast hardening.
The mortar may be of the type that is mixed on site, factory-dried mortar or delivered in a cement mixer from a concrete factory.
The aggregate should not contain any elements that could lead to corrosion and staining (e.g. pyrite, biotite glimmer).
The binding agents used may consist of different types of cement. The cement-based binding agents should form as little calcium hydroxide as possible during hydration (e.g. Portland puzzolan cement, 2 or 3 substance systems). The water-cement factor should be as low as possible.

The minimum thickness of screed or mortar layers is determined according to the conditions of use that the covering is expected to be exposed to and the resistance to bending and compression achieved with the mortar mixtures. Specifications dictate a minimum thickness of 50 mm. If loads are higher, the layer thicknesses must be higher.
The type of aggregate, the type and quantity of binding agent, the W/Z factor and density of the mortar determine the technical properties of the screed floor.

The cement screed must be sufficiently resistant to bending and compression, particularly with surfaces that are driven on. The floor structure must not sag or give under pressure when loads are moved over it. A static calculation (assumption of swimming screed floor without ballast index) of the necessary thickness layer is recommended.

Screed mortar can be laid as a screed slab that is covered with tiles or paving only after it has hardened. It is likewise possible to tap 'fresh in fresh' tiles or paving slabs onto the contact layer via load distributing formwork boards. Boards of different thicknesses can also be tapped in 'fresh in fresh' individually to prelaid mortar layers with and without (depending on mortar and top layer) an intermediate contact layer.

The tiles or paving slabs to be laid

are placed on suitable thin-bed or medium-bed mortar (in accordance with DIN EN 12004/12002, at least C2/S1) or suitable contact layers.
The quality of the mortar or contact layers in question must be adapted to the top layer. Bedding of the tiles and paving in the screeding mortar should cover as much of the area as possible.
The buttering & floating method is preferred.
The tiles or slabs used must be suitable for outside areas and have a good track record with regard to this. Natural stone should not have a tendency to sag as a result of one-sided water absorption and must be sufficiently thick. Ceramic tiles should have a thickness of at least 8 mm. Natural stone should have a thickness of at least 20 mm.
Large format tiles or slabs (> 30 x 30 cm) should be used due to the problem with stress.

Expansion joints

of a sufficient size and quantity should be formed along rising components and also as boundary joints above the drainage mat up to the upper edge of the covering. The individual areas should exhibit a tendency towards square surfaces. The length of the area should not be greater than twice the width of the area.
As an orientation aid, the following table can be used:

Points Parameter	**5** Points	**4** Points	**3** Points	**2** Points	**1** Point
chosen surface colour	white - light grey	grey - light beige	beige - red	brown - blue	dark brown
Covering direction/ solar irradiation	little / covered	little / northwest	moderat / northeast	strong / southwest	high / exposed
Tilesize	11,5 x 24 cm	24 x 24 cm	30 x 30 cm	35 x 35 cm	40 x 40 cm
Joint pattern	cross joint clearance > 5 mm	cross joint clearance > 2 mm	diagonal laying	half tile laying	unite laying
Points:					

Total: _____ **: 4** (Parameter) **=** _____ largest field length in this area (meters)

(Calculation table in appendix)

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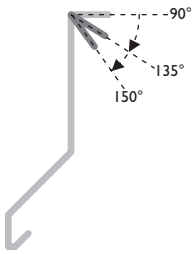
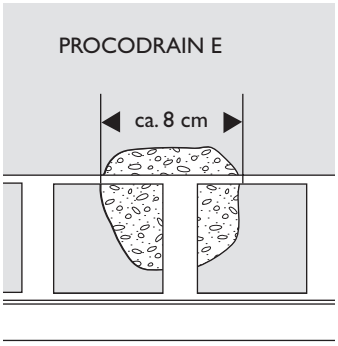
Finishing open surface ends with PROCOFORM balcony and terrace profiles:

Cut the PROCOFORM profile to the respective length and lay on the drainage mat.
Where PROCOFORM external corners join or between two bar sections, allow a space of approx. 5 mm and cover from the outside with a PROCOFORM connector.

To do this, fit a connector and bend over the upper horizontally standing panel section of the profile by approx. 135° - 150°. Cover the gap on the inside with a section of PROSTRIP S or PROSTRIP L measuring approx. 5 cm, covering the full interior height of the profile.



Align the profile to the desired direction and height.
Apply a quick hardening flexible mortar suitable for outside areas (at least C2F S1) approximately every 50 cm in lump form under the strip of the profile and over PROCODRAIN E SV and fix the profile in it once it has been aligned.



If necessary, use plastic shims or tile strips to support the height. The lumps should have a diameter of approx.
8 cm and enclose the T in the profile strip. The mortar escaping upwards should be scraped off with deep channels so that the following screed mortar can take a hold in them.

For a flexible height finish, a PROFLOOR angle profile made from stainless steel or aluminium can be inserted above the drainage mat first as a 'lost shell lining' for the screed mortar. To do this, apply a quick hardening flexible mortar suitable for outside areas (at least C2F S1) approx. every 30 cm in lump form under the strip of the PROFLOOR profile and fix the profile in it once it has been aligned. If necessary, use plastic shims or tile strips to support the height. The lumps should be approx. 4 cm wide and 7 cm long.
The mortar escaping upwards should be scraped off with deep channels so that the following screed mortar can take a hold in them. Once the flexible mortar has hardened sufficiently, the screed layer can be spread over the profile.
Now bed in the PROCOFORM WSE profiles with flexible mortar, which should be applied approx. every 50 cm in lump form on the screed mortar layer, and spread on the screed mortar fresh in fresh if possible.

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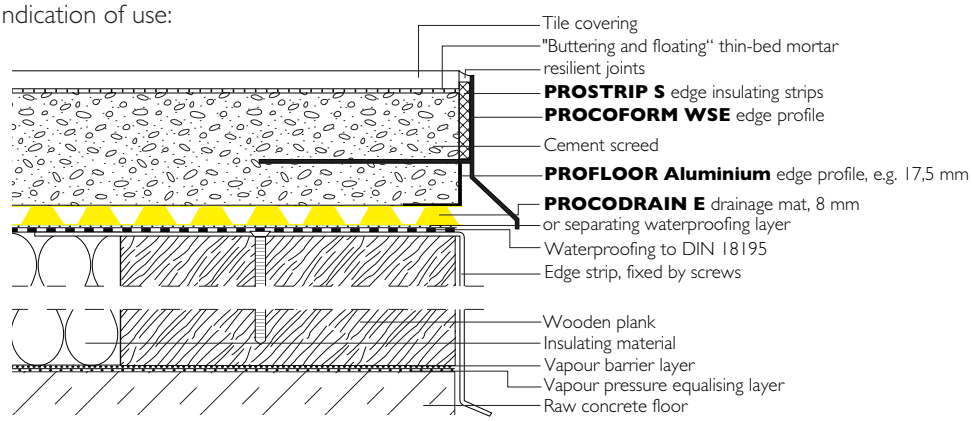
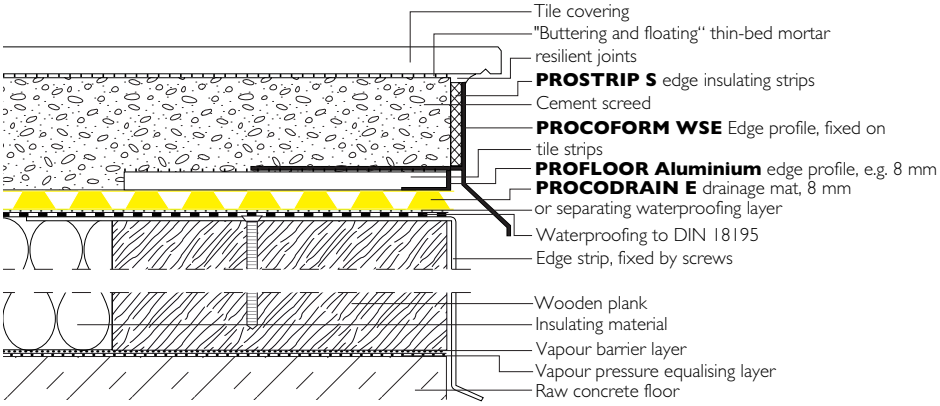
The following illustrations give an indication of use:

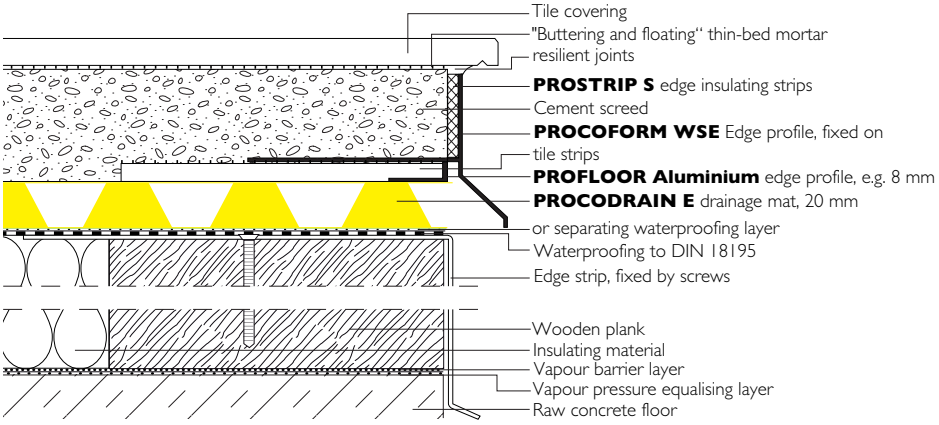
1. PROCOFORM WSE
for variable increase
in height of edge profile



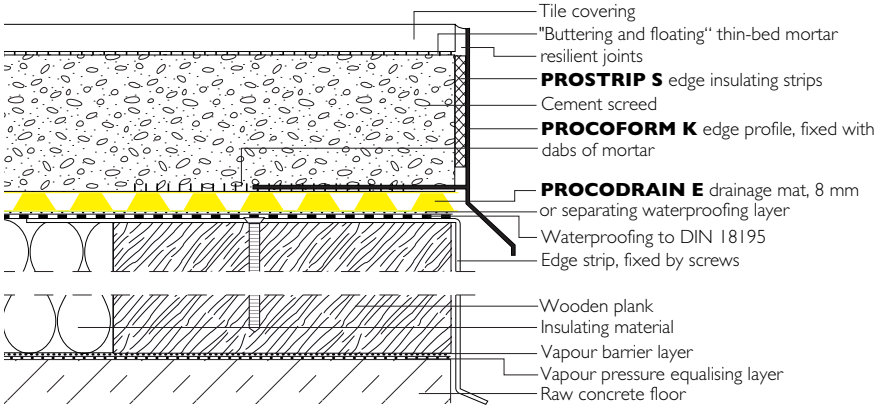
2. PROCOFORM WSE
for projecting
edge slabs



3. PROCOFORM WSE
with 20 mm high
PROCODRAIN E



4. PROCOFORM K



In general, ensure that the upper edge of the profile is always lower than the upper edge of the floor covering.

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Connection to drainage troughs and grids for façade or surface drainage:

Drainage lines or drainage points installed for façade drainage or for further surface drainage are positioned directly on the sealing level via requisite protective layers where necessary and are aligned in height and direction.

The drainage mats are cut up to the frame of the grids. PROSTRIP S or PROSTRIP L edge strips are bonded to the drainage mat along the frame.

To prevent ballast from falling down under the grid, suitable gravel stops are fitted to the edge strips at an angle and weighed down with screed mortar.

The joint between the frame and slab above the edge strip is filled with elastic filler (natural stone silicone or similar), thereby fixing the frame or grids. The frame or grids must be sturdy enough and stand on their own securely.

Important information:

- Depending on outside temperatures, it may be necessary to unroll the strips, weigh them down and allow them to acclimatise for up to a day so that they lie flat and even on the substrate.
- From adjacent ground, no substances or water should be allowed to make their way into the drainage space from the outside. If necessary, suitable protective measures (e.g. drainage pits filled with coarse stones and seepage pipes) can be implemented in front of the patio or terrace. Water should be allowed to escape from surfaces laid with drainage mats by way of suitably deep, adjacent and water deflecting ground.
- Observe the details from the manufacturer of the covering and also the manufacturer of the construction chemical products and other products that are used.

Standards and regulations:

It is recommended that the following standards and regulations are observed and taken into consideration:

- *DIN 18195 'Building seals'*
- *Rules and standards of the German roofing trade 'Trade regulations for roofs with seals'*
- *ZDB bulletin 'Outdoor flooring'*
- *DIN 18560 'Screeds in building construction'*
- *DIN EN 13813 'Screed mortar – properties and requirements'*
- *DIN EN 13318 'Screed mortar and screed flooring – terminology'*
- *DIN 18024 'Barrier-free constructions'*
- *DIN 18025 'Barrier-free flats'*
- *DIN 1986-100 'Water drainage systems for buildings and plots of land'*
- *Technical information concerning ashlar 1.4 'Outside flooring' from German Natural Stone Association*
- *Technical information concerning ashlar 1.3 'Solid steps and step covering outside' from German Natural Stone Association*
- *DIN EN 12004 'Mortar and adhesive for tiles and paving'*
- *DIN EN 12002 'Mortar and adhesive for … / Determining the shape'*

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Aid: Table for calculating maximum area length

Points Parameter	**5** Points	**4** Points	**3** Points	**2** Points	**1** Point
chosen surface colour	white - light grey	grey - light beige	beige - red	brown - blue	dark brown
Covering direction/ solar irradiation	little / covered	little / northwest	moderat / northeast	strong / southwest	high / exposed
Tilesize	11,5 x 24 cm	24 x 24 cm	30 x 30 cm	35 x 35 cm	40 x 40 cm
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Points:					

Total: _____ **: 4** (Parameter) **=** _____ largest field length in this area (meters)