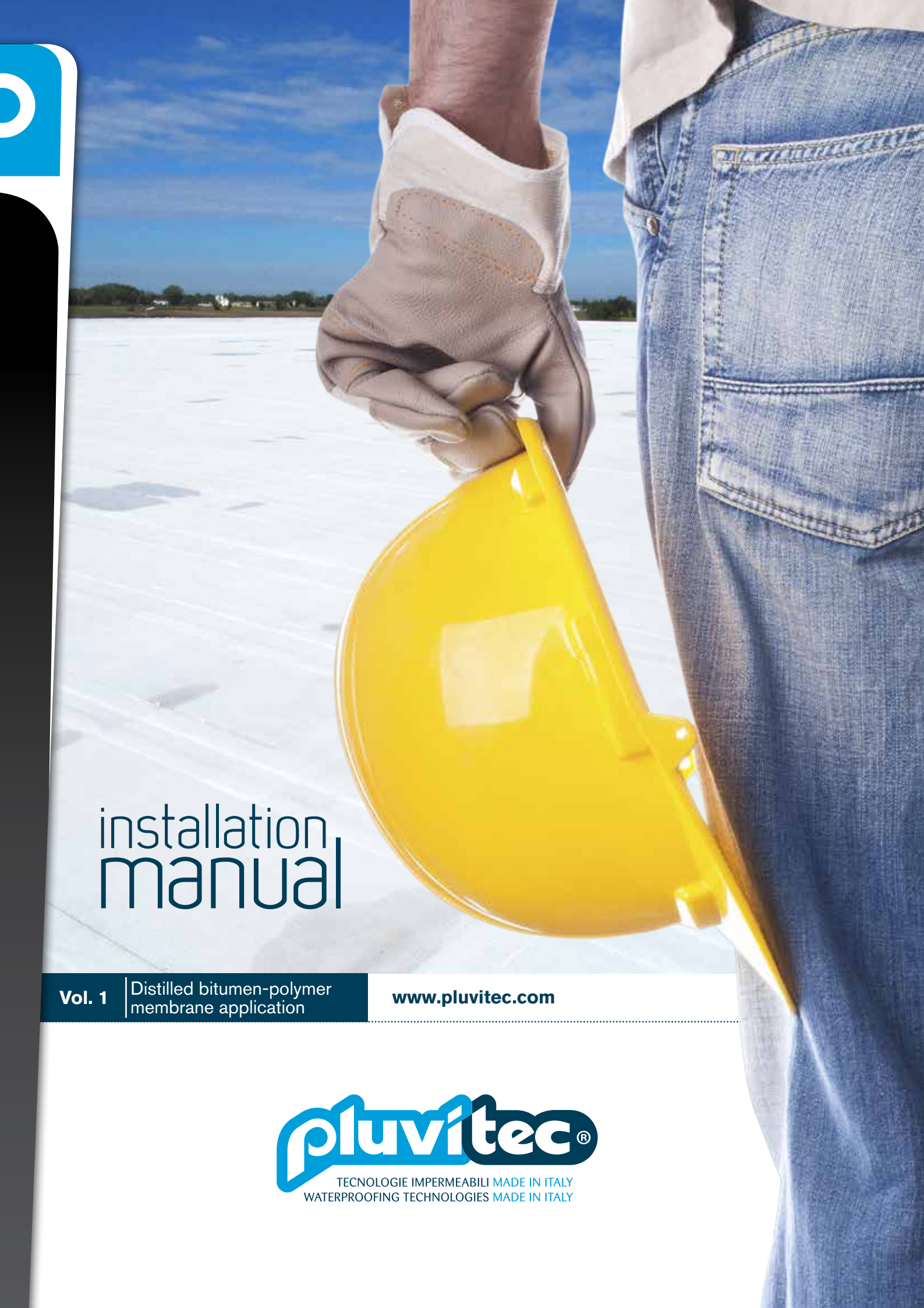


installation manual

Vol. 1 | Distilled bitumen-polymer membrane application

www.pluvitec.com

pluvitec®

TECNOLOGIE IMPERMEABILI MADE IN ITALY
WATERPROOFING TECHNOLOGIES MADE IN ITALY

The **installation manual** is an executive tool that takes full advantage of the skills acquired by the Pluvitec team of waterproofing professionals. Technicians, installers and designers have worked together to draft this complete and thorough document.
By following all the instructions provided hereto step by step, the installer can accurately install a Pluvitec membrane. This will guarantee the durability intrinsic to Pluvitec products when supported by technical aspects, qualified personnel and, obviously "text-book" installation.

Happy reading.

The Pluvitec Engineering Department

installation manual

VOLUME 1

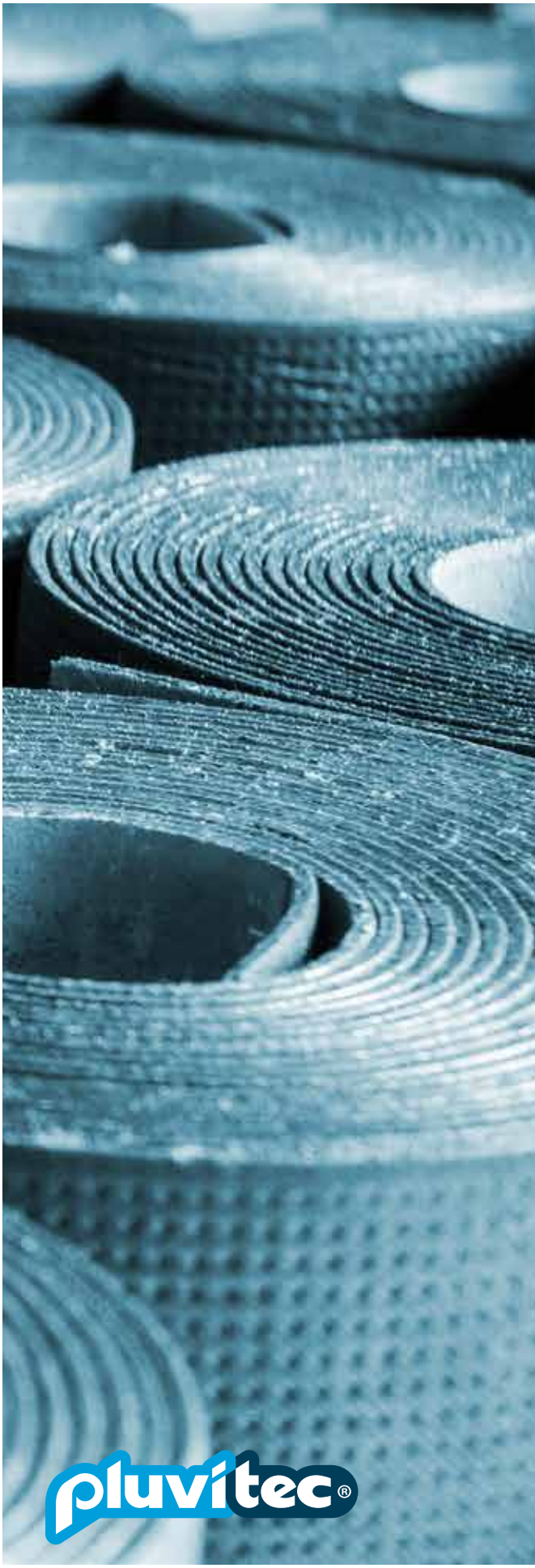
GENERAL **NOTES**

INSTALLATION **SEQUENCES**

FINISHES

DETAILS

APPENDIX OF DETAILS



THE ROOF

KEY CONCEPTS

The considerations necessary to formulate the best technological solution for a waterproof surface are:

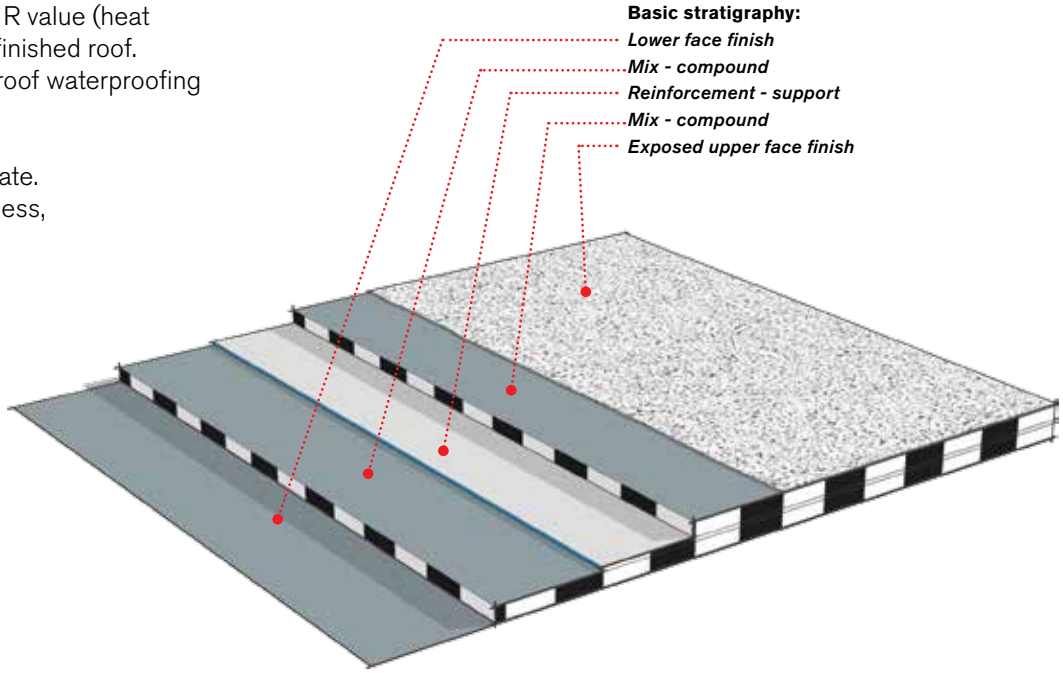
1. Distilled polymer-bitumen membrane technical-performance characteristics to be adopted (dimensional stability, tensile strength, tear resistance, heat stability, puncture resistance, etc.). Not all distilled polymer-bitumen membranes are suited to be used with the various installation methods: each compound and reinforcement behaves differently requiring careful system design.
2. Insulation panel technical-performance characteristics to be used (dimensional stability, compression resistance, heat stability, physical and chemical compatibility with the waterproof membranes, etc.).
3. Type of heat insulation installation, if included (warm roof, inverted roof, cold roof, double roof, etc.).
4. Conditions of the eventual heat insulation on the roof, with indication of the K value (heat transmission coefficient) or R value (heat resistance) required of the finished roof.
5. Protection required for the roof waterproofing element.
6. Roof slope.
7. Physical structure of substrate.
8. Wind exposure (area windiness, building height, etc.).
9. Use of roof.

THE DISTILLED POLYMER-BITUMEN MEMBRANE

The distilled polymer-bitumen membrane is a compound material created from the synergy of the two components:

- bituminous compound, based on modified bitumen with thermoplastic polymers (compound);
- support, fibre component of various nature (reinforcement).

The two constituent elements mutually integrate, exalting their individual qualities.
The bituminous compound guarantees waterproofness and durability while the reinforcement grants the product, according to the type, mechanical properties, a better load distribution and dimensional stability.
The main compound components are bitumen and the polymers that are added to improve the physical and mechanical properties, otherwise limited, in the bitumen.
PLUVITEC distilled polymer-bitumen membranes do not contain oxidised bitumen, halides, asbestos, etc.



ROOF CLASSIFICATION

These types of waterproofing systems are generally classified in roofs:

- Non-insulated roof
- Warm roof (the insulation is under the waterproofing)
- Inverted roof (the insulation is over the waterproofing)
- Double roof (warm roof + inverted roof).

Non-insulated roof

No insulation element is included in this type of solution. This solution is subject to large heat dispersions and is generally adopted in parking lots or unheated buildings. Non-insulated supports are more stressed by temperature changes than insulated systems.

Warm roof

In this type of solution, the insulation is located between the substrate and the waterproofing. This is the most frequent waterproofing system solution. Generally, a vapour shield or vapour barrier is applied on the substrate to protect the insulation from water vapour that migrates from the heated internal environment. This way the surface substrate and insulation are protected against temperature changes and the waterproofing surface is exposed to the elements, UV rays and temperature changes. Where necessary, the effects of this stress can be reduced with heavy or light protections.

Mobile heavy protections

- Gravel
- Supported floating floors
- Self-locking blocks on fine sand

Fixed heavy protections

- Cement mortar screed
- Cultivated land on drainage elements
- Tiled floor on mortar, etc.

Light protections

- Self-protected membranes with mineral slates
- Surface painting with acrylic, aluminium or polyurethane reflective paints, etc.

Inverted roof

In the “inverted roof” solution, the insulation is located over the waterproofing. The waterproof membrane applied to the substrate has a dual vapour shield and waterproofing layer function.

In this case, the substrate and waterproofing layer are protected against heat stress and UV rays thanks to the insulation and ballast layer.

The latter blocks the insulation, preventing it from being lifted by wind.

The most popular insulation used in inverted roofs is extruded polystyrene (XPS).

The insulation must have particular characteristics such as:

- the lack of water absorption;
- heat resistance;
- resistance to freezing & thaw cycles and aggressive acid rain.

When calculating heat dispersion, the thickness of the insulation should be increased by about 10%, given the water entirely surrounding the panels. We recommend installing a geo-textile between the waterproofing layer and insulation panel to promote water drainage and flow towards drains. Furthermore, to avoid lime and gravel accumulations between and under the panels, we recommend installing a divider geo-textile between the insulation and ballast.

A 4% slope is required in inverted roofs since any water stagnation would increase heat dispersion. In inverted roof systems, the ballast should be calculated according to the wind extraction effect.

Gravel ballast:

- material must be mined and not milled, cleaned and sized between 12 and 35 mm;
- the gravel ballast must always be laid after interposing a suitable dividing and/or filter layers;
- in independently applied systems, minimum gravel layer thickness and weight must be calculated according to the following table (Tab. 01).

Tab. 01

Minimum gravel layer thickness and weight calculation

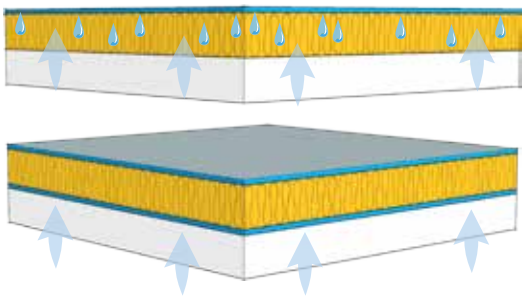
XPS extruded polystyrene foam panel thickness	Minimum gravel thickness required for the ballast	Minimum theoretic weight in gravel or pellets
Up to 30 mm	40 mm	65 Kg/m²
From 40 to 50 mm	50 mm	75 Kg/m²
From 60 to 70 mm	60 mm	90 Kg/m²
Up to 80 mm	70 mm	105 Kg/m²
Up to 90 mm	80 mm	120 Kg/m²
Up to 100 mm	85 mm	128 Kg/m²

Double roof

In the "double roof" solution, the insulation is located both over and under the waterproofing, thus offering effective protection able to reduce working temperature and thus ageing and consequent membrane hardening. The result is translated into a reduction in temperature changes effecting the structure, with less stress to the waterproofing membrane.
This type of roof can be considered one of the best possible on flat roofs, grouping all the advantages of a warm roof (heat-hygrometric control) and inverted roof (waterproofing element protection against UV rays and temperature changes); the DOUBLE roof is the PERFECT roof.
The most popular insulation used in duo roofs (inverted roof part) is extruded polystyrene (XPS).

THE VAPOUR BARRIER

The purpose of the vapour barrier is to block water vapour: its presence impedes condensation under the waterproofing layer.
At certain temperatures, air may contain high levels of vapour. The hotter the air, the more vapour it can contain. Water vapour produced in rooms migrates from the heated indoors towards the cold outdoors.



When vapour meets a cold area, reaching the dew point, it condenses into water. For this reason, some damages may occur such as stains, mould and, above all, a reduction in the insulation heat resistance. Indeed, wet insulation loses its characteristics, especially if sensitive to water.
The vapour barrier must thus be located under the insulation, on the warm side, to block water vapour before it reaches a cold zone and condenses.
The correct application of the vapour barrier is of key importance; many problems may occur if the overlaps are incorrect or if there are perforations, holes and tears.
For practical purposes and for normal working conditions, a vapour barrier is considered appropriate when the μ x thickness value (expressed in m) is ≥ 100 (equivalent to a vapour transmission resistance value equal to 100 m of air), where μ is the vapour barrier material's water vapour diffusion resistance coefficient.
The specifications and application standards must always be followed when applied.
The need to create the vapour barrier must be assessed for each single case by analysing the temperature and humidity.

THERMAL INSULATION

On the overall surface, the purpose of thermal insulation is to reduce heat transmission from the inside to the outside of the building.
The choice of insulation material should take its low heat conductivity into account.
Insulation materials are marked by the heat conductivity value λ = (W/mK); the lower this value is, the better the insulation's insulating capacity.
All materials are consequently insulating, but a product is considered insulating when its λ coefficient is under 0.07 W/mK.
To characterise the incidence of a layer (insulating or other) compared to heat flow, it is described as heat resistance, considering R (m² K/W).

$$R = \frac{d}{\lambda}$$

d = layer thickness
λ = heat conductivity coefficient (W/mK)

The higher the heat resistance, the better the insulation material's heat insulation.

INSULATION MATERIALS

When choosing the roof system insulation, a series of performances must be taken into account according to the result to be obtained: insulation quality, chosen roof system composition, costs, mechanical properties, etc. The thickness of the insulation needed to obtain the results is a function of:

- Set R heat resistance
- U heat transfer set by the wall.

For convenience, some values are provided as examples (Tab. 02)

Tab. 02 - U heat transfer

Material	Values λ (W/mK)	
MW rock wool	from 0,032	to 0,041
EPS polystyrene foam	from 0,033	to 0,040
CG cellular glass	from 0,040	to 0,048
XPS extruded polystyrene	from 0,027	to 0,034
PUR polyurethane	from 0,024	to 0,029
PF phenol foam	from 0,020	to 0,025
EPB perlite foam	from 0,052	to 0,055

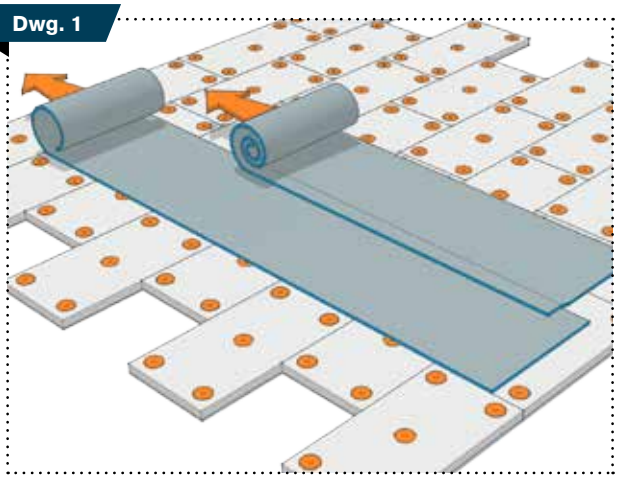
INSULATION APPLICATION

A series of factors must be taken into account when choosing the fasteners for the insulation application of the roof system:

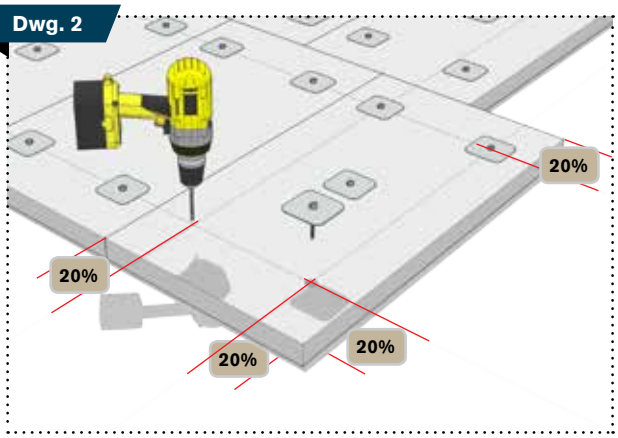
- insulation type (stability, compression characteristics, etc.);
- compatibility between the fasteners, insulation and waterproofing layer;
- stress exerted by wind;
- nature of the support.

Where mechanical fastening application is needed, panels must be staggered **(Dwg. 1)** and secured to the underlying vapour barrier, with fasteners appropriate for the substrate and of the necessary length according to thickness, placed at 20% intersection between insulation panel width and length **(Dwg. 2)**.
Overall panel fastening element resistance, at wind extraction load (Wh), should meet local requirements *"Criteria for continuous roof wind resistance design"*.
It is best to follow the manufacturer's instructions and any standard specifications when applying the insulation **(Dwg. 3)**. PLURA PLUVITEC REVOLUTION technology can be used to apply the insulation panel.
For application methods, see Volume 2 : PLURA.

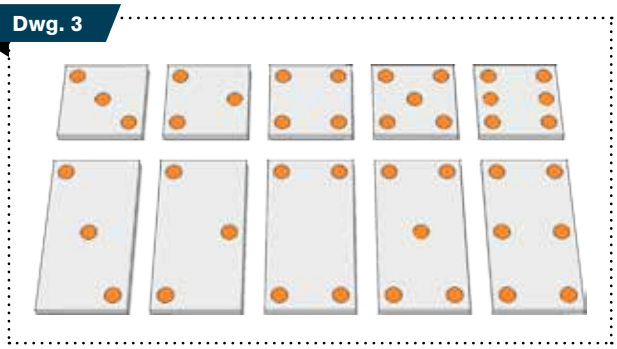
Dwg. 1



Dwg. 2



Dwg. 3



SLOPES

Slope means the slant of the support compared to the normal surface to the force of gravity.

Flat roof or sub horizontal

Slope < 5%

Do not let slopes drop under 1.5%. Should, for design, architectural or other reasons, slopes be under 1.5%, the following problems may arise:

- water stagnation on the surface;
- potential ice formation;
- formation of wet-dry areas, with the possible accumulation of organic and inorganic chemical substances, even aggressive;
- creation of environments that promote the growth of mould, bacteria and micro-organisms;
- deterioration of pavements made on cement mortar beds, due to frozen stagnant water.

Slanted roof

Slope > 5% and < 50%

This type of support is suited to convey water towards drains.

Highly slanted roof

Slope > 50% and ≤ vertical

This type of support is suited to convey water towards drains.

Curved roof

A curved base support is that support with a slope suited to convey water towards drains, in every area of the concerned surface, with simple or double curve, concave or convex.

DRAINING

The entire surface is divided into draining areas that correspond to a drain, and is divided by ridge lines.
The maximum surface of each drain area must be 100 -150 m^2.
As a safety measure in the event of clogged drains, we recommend overflow holes be installed midway between the highest point of the slope and the drains.
A simple empirical formula can be used to define the drain outlet diameter: the value of the drain diameter in cm, squared, can drain a m^2 surface of the same numeric value.
Therefore the drain diameter according to the drain area can be simplified as follows:

- a drain outlet with diameter 10 cm (10^2 =100) can easily drain a surface ≤ a 100 m^2;
- an outlet with diameter 12 cm (12^2 = 144) can drain a surface ≤ a 144 m^2;
- an outlet with diameter 15 cm (15^2= 225) can drain a surface ≤ a 225 m^2.

The choice of this calculation system, simplified and prudent, does not exempt the designer from verifying the tables and comparing results.

SURFACE WIND EXPOSURE

Wind is generally overlooked but may cause even serious problems.
In fact, the importance of wind is not assessed on normal values, but on exceptional ones.
A good roof includes a technical solution attentive to this problem (ballast, fully bonded systems, etc.).
Specifically, wind speed depends on the situation and geographic location, but also on the shape of the building that can condition wind effects.
Wind pressure exerted on a building are normally classified by local authorities (general criteria for building load and overload safety tests).
Furthermore, local norms or standards, may be in effect.

Wind speed mainly depends on the geographic location.

Wind is stronger on the coast, while buildings located near agglomerates (cities, etc.) are subject to lower wind speeds.

Thus four geographic classes have been identified to calculate wind stress of surfaces:

A. Coast
B. Urban Area
C. City
D. Rural Area

The key aspects to be considered are:

building height, shape and position compared to adjacent buildings.

The surface areas most exposed wind depression effects are the edges and corners, where a higher depressive effect is created mainly due to the vortex that is created when wind meets an obstacle (perimeter walls, protruding elements).

The higher the perimeter wall, the greater the negative depression effect.

Thus the wind effect on a surface can cause:

- membrane detachment from raised elements and formation of folds on the same, with consequent opening of the joints and loss of waterproofness;
- the membrane detached from the substrate is subject to shrinking;
- abnormal structure movements and vibrations;
- the roof could be ripped off by wind once the waterproofing system has unglued from the substrate.

Thus, to improve surface wind resistance in the areas more at risk, the following solutions must be considered in design:

- fully bonded system,
- potential mechanical fastening,
- surface ballast,
- mechanical perimeter fastening or perimeter ballast.

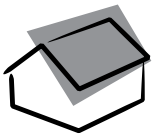
Quick calculation of the wind depression effect.

The wind depression effect on roofs is normally calculated with formula

$$P = C \frac{V^2}{64} (Kg/m^2)$$

where:
P = pressure expressed in Kg/m^2
V = wind speed in knots
C = variable coefficient, according to the surface shape and location, from –1 to +1.
With 54 knot wind and C=1, depression is p= 46 Kg/m^2

SURFACE USE



Non-walkable surfaces

This type of surface is only accessible for surface maintenance or to maintain any systems installed on it.

Walkable surfaces

Walkable surfaces, like attics, terraces, etc., are accessible to people. The upper layer will be made up of cement and/or pavement slabs (ceramic, tile, etc.) or floating prefabricated cement floor panels.

Road surfaces

These surfaces are accessible to vehicle transit and parking. The upper layer can be made up of reinforced concrete slabs and/or a bitumen compound wear layer or cement with mineral powder additives, tiles, floating road pavement.

Garden surfaces

Also called a green roof, these are ideal solutions for terraces, flower boxes & beds, etc. Normally for this type of roof solution, an anti-root waterproofing membrane is used together with a draining layer, soil or special water retaining/flow system.

SUBSTRATES

Monolithic substrates

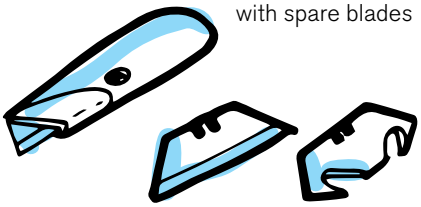
A monolithic substrate is a support with a continuous solution not due to structural needs (expansion joints, etc.). Monolithic substrates are:

- reinforced concrete,
- cement brick,
- prefabricated reinforced concrete elements with EPS + structural screed,
- juxtaposed prefabricated reinforced concrete elements + structural screed,
- corrugated sheets + structural screed.

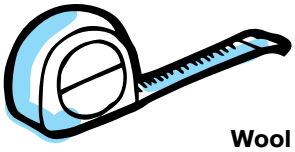
Segmented substrates

Segmented substrates lack continuity and are generally made up of prefabricated reinforced concrete elements (reinforced or pre-compressed reinforced), simply juxtaposed, perhaps equipped with their own slope, corrugated and/or composite sheets, wooden boards.

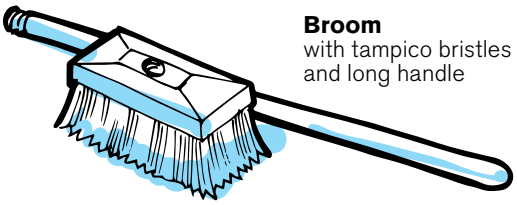
GEAR AND CLOTHING



Cutter
with spare blades

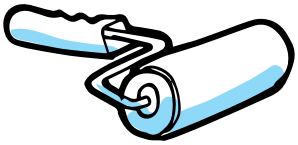


Roll-up tape measure

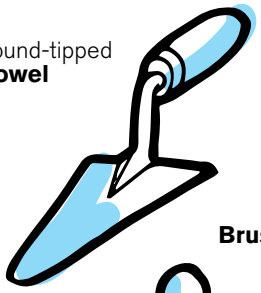


Broom
with tampico bristles and long handle

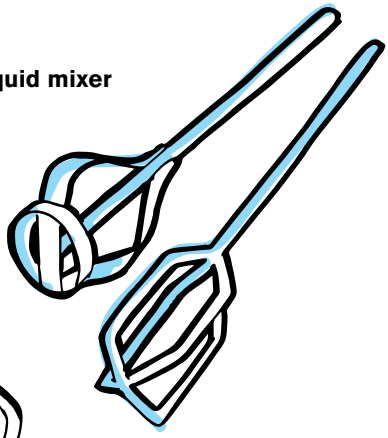
Wool roller



Roller
for selvedge



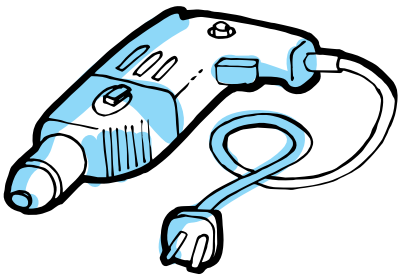
Round-tipped **trowel**



Liquid mixer

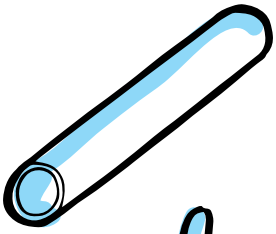
Brush

Drill

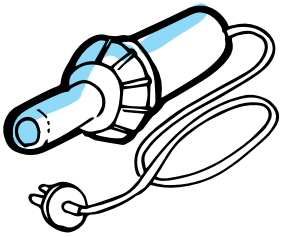


Overlap torch
to seal joints

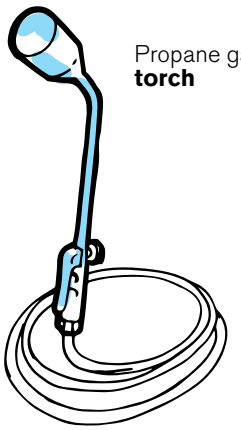
Anti-deformation tube size 96 cm

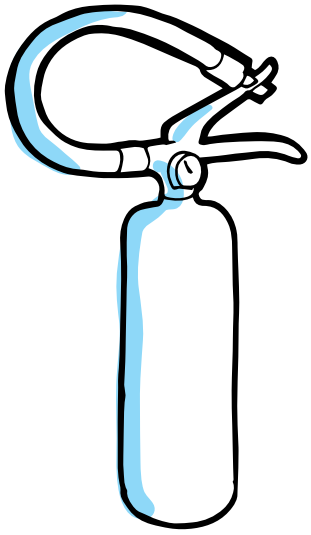


Hot air **welder**

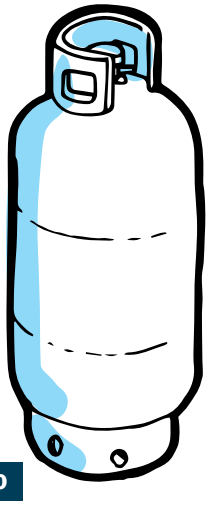


Propane gas **torch**

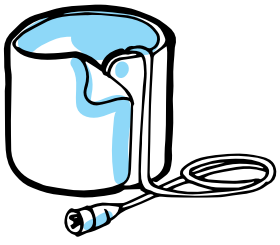




Propane gas **tank**



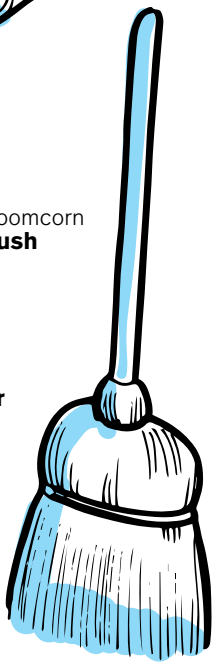
Heating band
for gas tanks



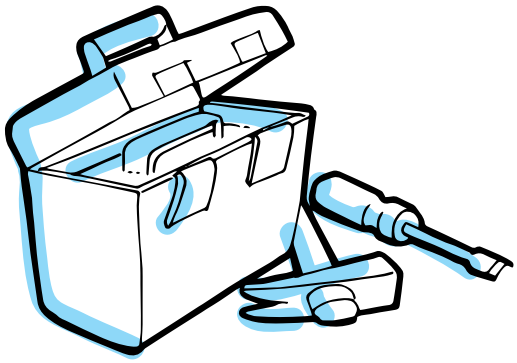
Fire extinguisher

Press roller
with long handle

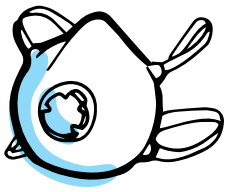
Broomcorn **brush**



Toolkit

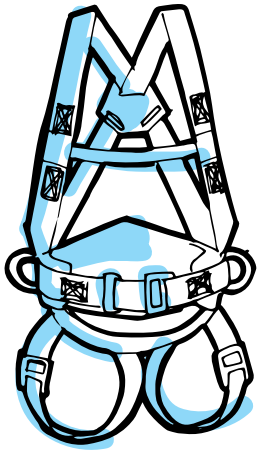


Protective mask



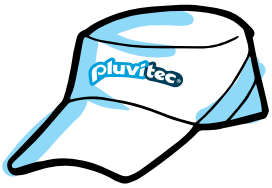
Work gloves

Safety
harness



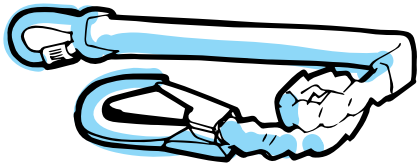
Collision
helmet

Sun
cap

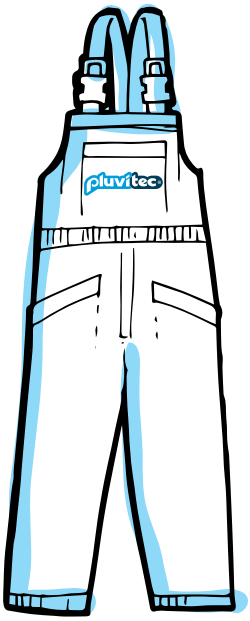


High visibility
vest

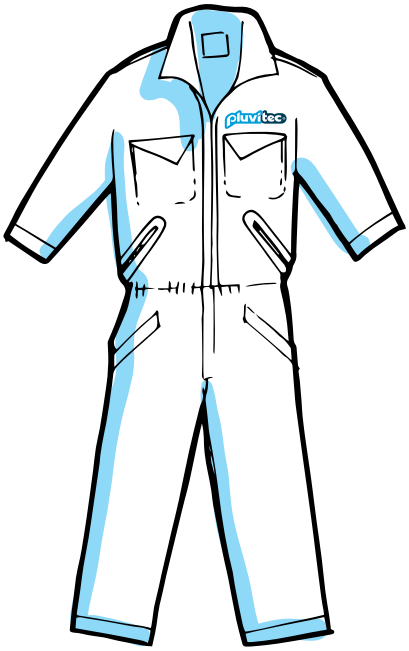
Safety
hook



Overalls
with bib



Work overalls
with pockets and reinforcements



Protected summer
sandal

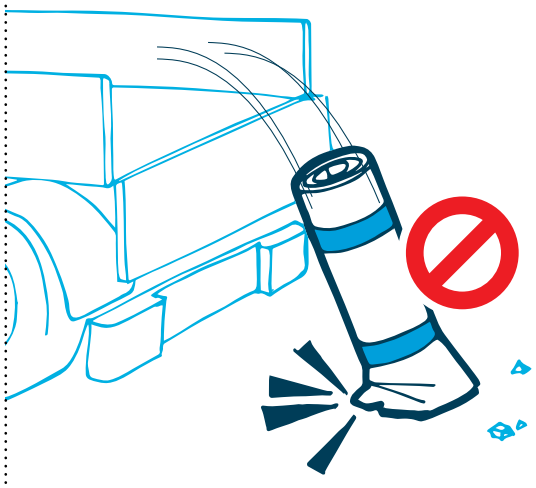
Protected work
boot

TRANSPORT AND STORAGE

TRANSPORT AND HANDLING

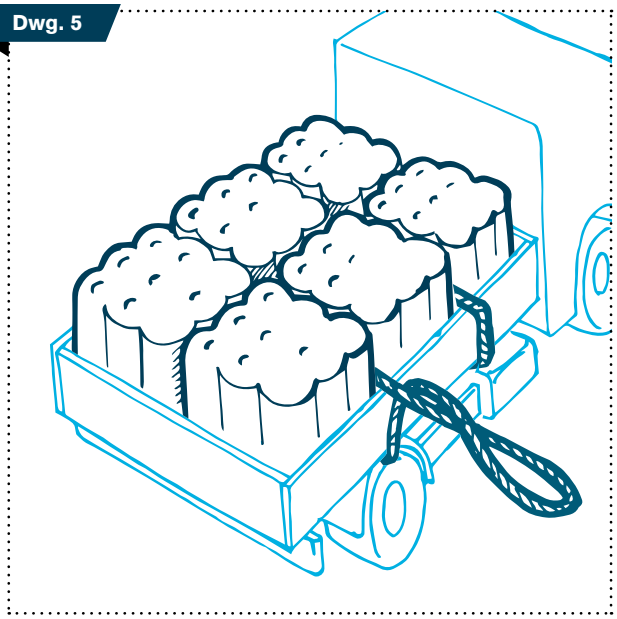
- Load and unload the pallets with care, avoiding contact with sharp corners or edges.
  Avoid violent impacts with the ground especially in low temperature conditions **(Dwg. 4)**.

Dwg. 4



- Abrupt transport vehicle braking or sudden movements could cause rolls to fall off pallets; to avoid this problem it is best to carefully and attentively load vehicles, facilitating the support of adjacent pallets.

Dwg. 5



If this is not possible, place taut cords or metallic slats across the crate to secure the load **(Dwg. 5)**.

STORAGE AND CONSERVATION

- The original packaging is designed for optimal product storage.
  Once opened, store rolls vertically on the pallet or on smooth and flat surfaces. Always handle pallets with rolls vertically.
- The rolls are to be stored in an upright position, indoors in a dry and ventilated area, away from heat sources.
- Absolutely avoid the stacking of rolls and pallets for storage or transport to avoid possible deformations which may compromise a perfect installation **(Dwg. 6)**.

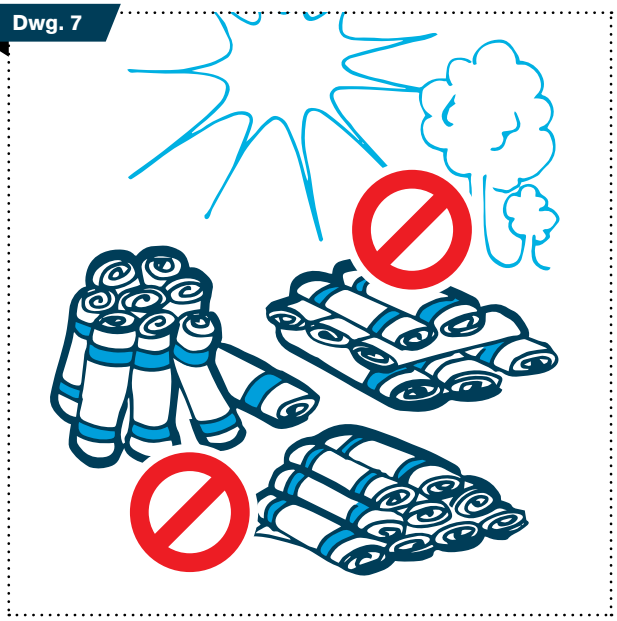
Dwg. 6

- It is recommended to store the product at temperatures above 0°C.
- In no case should rolls be stored horizontally unless equipped with an internal rigid cardboard or Styrofoam core and, even in this case, for short periods only **(Dwg. 7)**.
- Correct inventory turnover is recommended according to the stock time, first in first out logic.

WORK SITE STORAGE

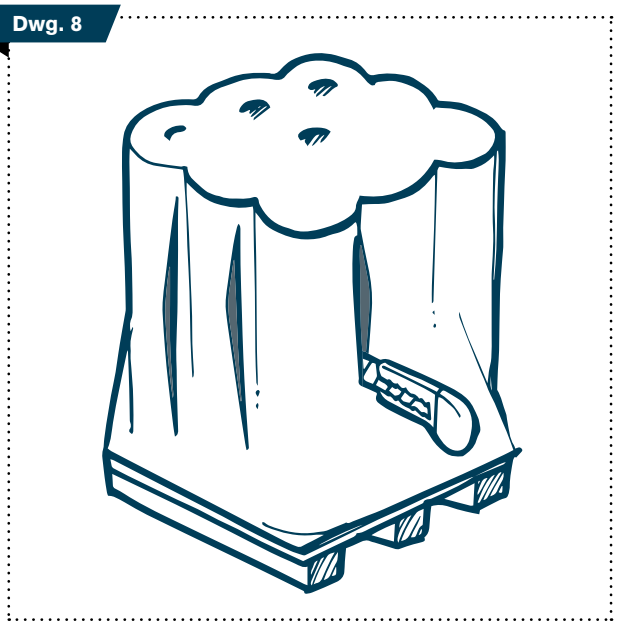
- Only place the rolls to be used during the work shift at the work site, given the importance correct storage and conservation have on these materials.

Dwg. 7



- For pallets on the roof in the summer, promote ventilation by cutting the heat shrink wrapping to reduce the greenhouse effect that would be generated inside the pallets **(Dwg. 8)**.

Dwg. 8

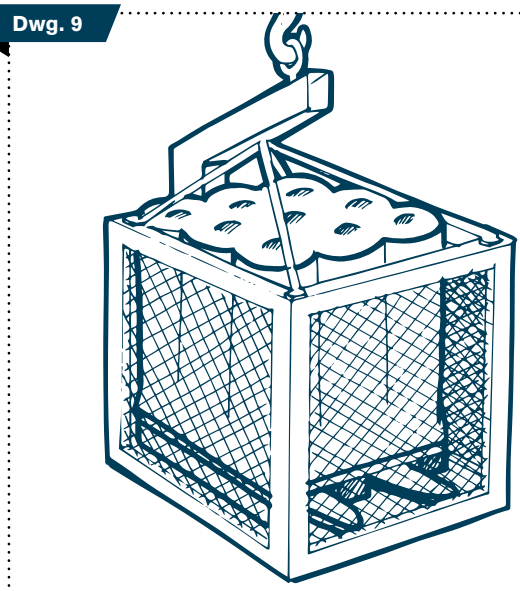


- In the winter, pallets on the roof need to be protected with insulation panels and suitably ballast so as not to expose rolls to excessively cold temperatures.

LIFTING AND HOISTING

- Supplied pallets are suited for normal warehouse handling and not hoisting.
- Rolls should be lifted on the roof with a crane, using suitable lifting accessories **(Dwg. 9)**.
- Lifting loose rolls with cords or other improper accessories that could ruin material and jeopardise operator safety is prohibited.

Dwg. 9



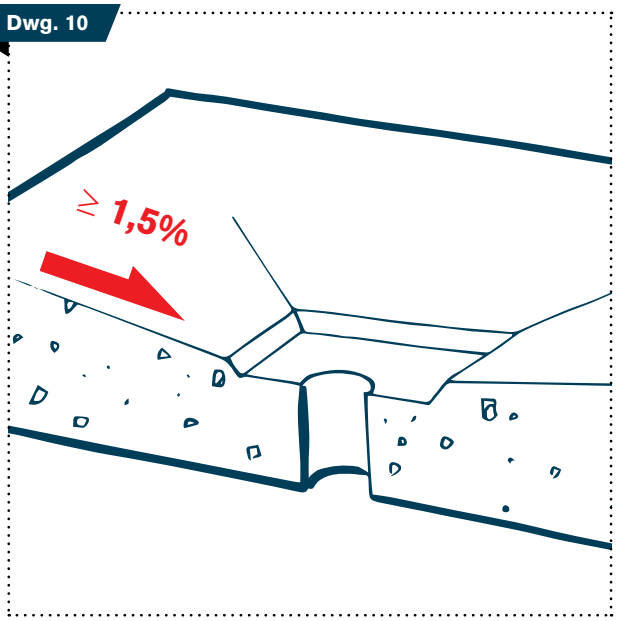
WORK SITE AND PRELIMINARY OPERATIONS

OVERVIEW

- Coordinate operations so as not to damage construction elements and underlying rooms.
- Avoid leaving portions of the roof without waterproofing overnight or when the work site is closed.
- The application surface must not have any depressions to avoid the risk of ponding water, the slope must be at least 1.5% on concrete decks and 3% for steel or wooden ones, this to guarantee a proper run off of rainwater. Drains should be dimensioned to efficiently drain off rain water **(Dwg. 10)**.
- For application on vertical surfaces over 2 m high or highly slanted supports, apply suitable mechanical fasteners at the head of the sheet, later sealed with the head joint.
- Install at environmental temperatures over + 5 °C.
- Suspend installation in the event of adverse weather conditions (high humidity, rain, fog, etc.) **(Dwg. 11)**.
- Avoid impacts and violent unrolling of the distilled polymer-bitumen membrane at low temperatures during application, that could severely damage it.

Dwg. 11

Dwg. 10



Dwg. 12

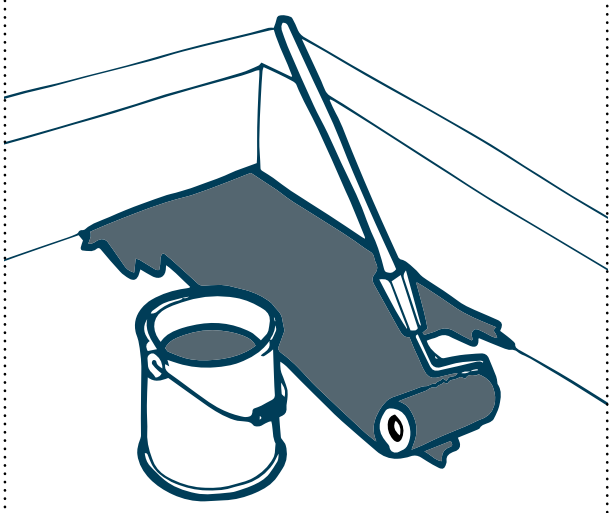
NEW BUILDINGS

- The installation surface must be clean **(Dwg. 12)**, dry, smooth and must not have depressions or irregularities over 1.5 mm under a 3 m straight edge **(Dwg. 13)**.
  Cement must have set for at least two weeks and the water content cannot be over 5%. Cement cohesion: pellet test: 1 MPa.
- Prepare the cement substrates, including uprights and other details, with bitumen primers such as PRIMERTEC AD or ECOPRIMER, to eliminate dust and promote membrane adhesion **(Dwg. 14)**. Let the primer layer dry before continuing with the other steps.
- In prefabricated constructions, apply a bridging strip of membrane suitably long on all construction joints. For structural joints, prefabricated buffer panels or sheet metal roofs, always include suitable expansion joints.

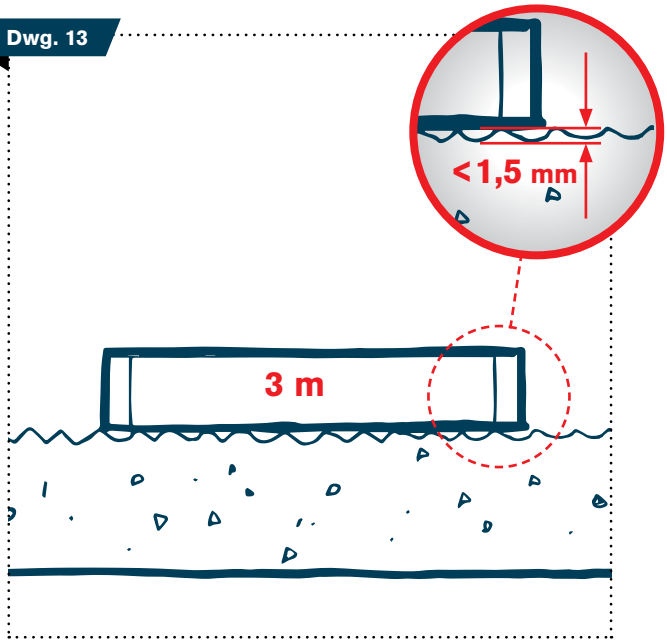
BITUMEN RE-ROOFING

- Accurately clean the existent roof and remove all dirt.
  In the event of roof defects like cracks, bubbles, folds, etc.:
  - eliminate bubbles and even out the surface using a safety or hot air torch and round-tipped trowel **(Dwg. 15)**,
  - cut folds over 10 mm tall and eliminate any protrusions, being careful to flame or hot air weld the edges of the cut fold.
- Check fasteners, the sturdiness and appropriateness of frame parts and repair if necessary.
- Remove skylights, check uprights to verify fasteners, their sturdiness and appropriateness and repair damaged parts if necessary.
- Insulation under old roofs must be in good conditions, dry, integral and suited for the technical solution chosen for the re-roofing.
- Remove and replace any insulation panels saturated with water.
- Install suitable insulation aerators to allow the humidity trapped in the old waterproofing system to dissipate.

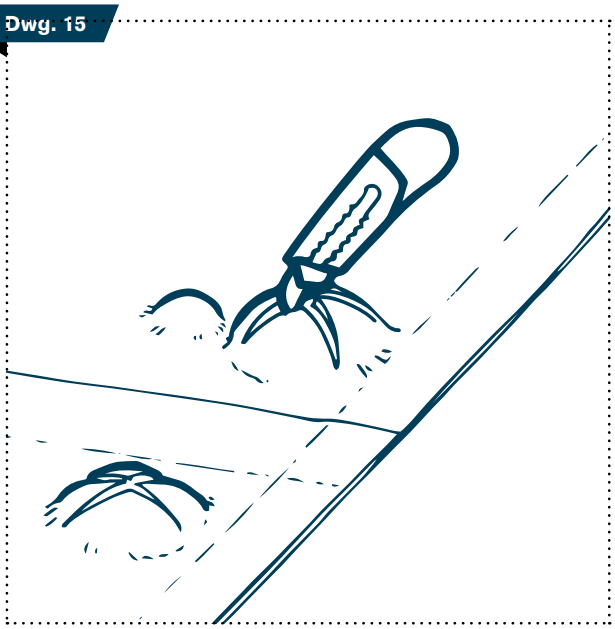
Dwg. 14



Dwg. 13



Dwg. 15



APPLICATION OF PLUVITEC DISTILLED POLYMER-BITUMEN MEMBRANE

The quality of a durable waterproof surface is determined by three components meaning:

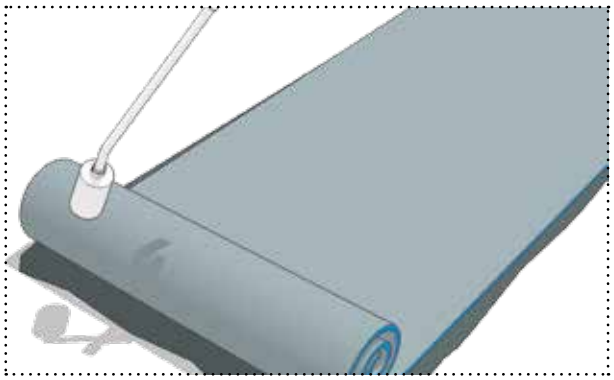
- **THE LABOUR**
- **THE MATERIAL**
- **THE TECHNICAL SOLUTION**

This manual will illustrate the correct application of the distilled polymer-bitumen membrane which is the main assumption for the complete success of the waterproofing works.

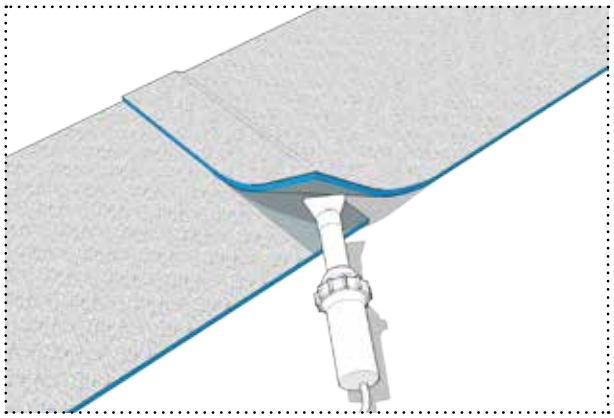
WATERPROOFING SYSTEMS

The Pluvitec distilled polymer-bitumen membranes can be applied with the following systems:

- **Torch**: application by open flame using a butane/propane gas torch.

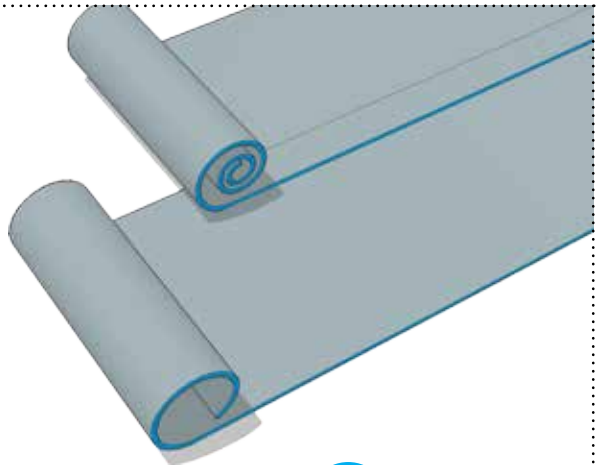


- **Hot air**: application by hot air using electric or gas blowers.



APPLICATION OF PLUVITEC PLURA REVOLUTION SYSTEMS (VOLUME 2)

- **Thermal activated systems:** the membrane adheres by indirect thermal activation with this type of application.
- **Self-adhesive systems:** the membrane adheres due to the compound's adhesive specificity with this type of application.
- **Mechanical application:** screws, fasteners or nails are used to secure the polymer-bitumen membrane to the support.
- **With cold bond glue:**
  the membrane is applied using cold bond glue (bitumen or polyurethane).
  This application provides 3 levels of safety against fire risks:
  Level 1 (less than 85% torch use): bond (prevalent part) + torch (joints and rises)
  Level 2 (hot air use): bond (prevalent part) + hot air (joints and rises)
  Level 3 (fully cold): bond (prevalent part) + special bonds (joints and rises)



PLURA
PLUVITEC REVOLUTION

[See Manual VOLUME 2]

DISTILLED-POLYMER MEMBRANE APPLICATION TYPES

A continuous roof system created with a distilled polymer-bitumen membrane always needs to be stable and as compact as possible in all its elements or layers.

Stabilisation may be achieved with:

- total element adherence to the application surface and between elements;
- mechanical element fastening to the application surface;
- ballasting (heavy, fixed or mobile) to block roofing elements;
- mixed "stabilisation" systems (bond + mechanical fastening, bond + ballast, mechanical fastening + ballast).

Totally independent system

With independent application, the waterproofing element is, obviously, independent, thus not connected to the support, permitting reciprocal mobility. Adhesion to the support is guaranteed by a ballast (layer of gravel, pavement, etc.). This type of coverage is limited to flat roofs (1.5%- 5% slope) and can structurally support the ballast overload.

A sliding layer must be placed between the waterproofing layer and the support (glass fleece, polyester, etc.) to prevent physical and/or chemical interactions between adjacent layers.

Details like vertical edges, chimneys and technical volumes must be fully bonded.

Partially independent system (semi-bonded)

In this case the waterproofing element is spot bonded to the support and can work between these.

It can be applied where there is a certain support mobility.

Spot bonding must resist the wind depression effect.

Two systems can be used to create semi-bonding:

- specifically fabricated perforated modified bitumen based membrane,
- spot torching the membrane.

Mechanical fixing system

Application with mechanical fasteners is divided into:

- direct mechanical fastening
- indirect mechanical fastening.

Direct mechanical fastening allows a layer (generally a mono-bitumen membrane) to be secured to the support (wooden roofs, substrate and heat sensitive insulation) with screws, fasteners or nails with subsequent waterproof layer fully bonded.

Indirect mechanical fastening consists in applying the bitumen membrane to the support using screws or fasteners at side or head laps.

Fully bonded system

(recommended by Matco S.r.l. for exposed roofs)

In this case, the waterproofing element is fully bonded to the support, by torch and/or hot air and/or cold bond, etc.

This type of application promotes improved resistance to puncture and can be used on any slope.

Furthermore, it does not require any type of ballast and provides excellent wind resistance.

Full bonding facilitates the identification of any waterproofing surface leaks, guaranteeing higher surface stability in both hot and cold conditions.

WHY TOTAL ADHESION IS IMPORTANT

Regardless of the type of application adopted for the roofing system, all its components, design and application must always guarantee system "stabilisation".

An incorrectly stable and monolithic system which, due to external events, fully or partially loses its "stabilisation" is destined to suffer a series of "problems" of which the most known is the "buckling" that triggers waterproofing element waves.

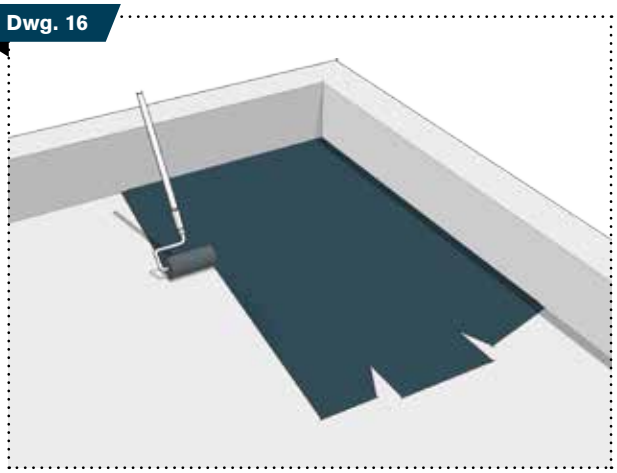
Failed waterproofing system adhesion also promotes other problems such as:

- poor bitumen membrane puncture and collision resistance;
- lower membrane resistance to shrinkage and heat dilations;
- lower membrane resistance to negative wind depression effects;
- possible detachment of the heat-insulation system;
- no possibility to segment the roof, thus searching for leaks is practically impossible.

TORCH OR HOT AIR APPLICATION: GENERAL PRINCIPLES

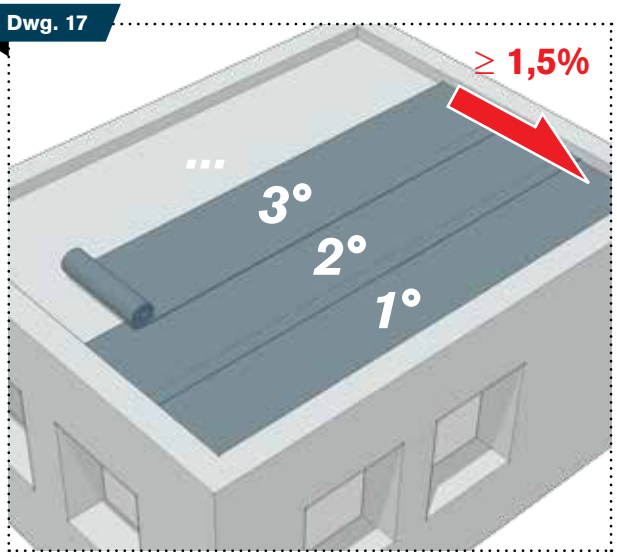
- On cement or similar surfaces, apply by roller or airless suitable bitumen primer approx. 300 gr/m^2 **(Dwg. 16)**.

Dwg. 16



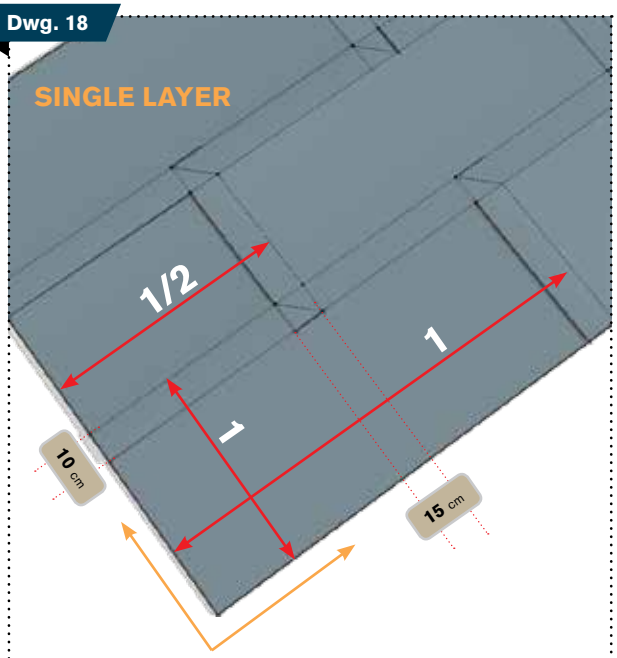
- Apply by torch a 25 cm strip of polyester reinforced bitumen membrane on all vertical app-stand corners.
- To promote the slope, always start placing the membrane sheets from the lowest point **(Dwg. 17)**.

Dwg. 17



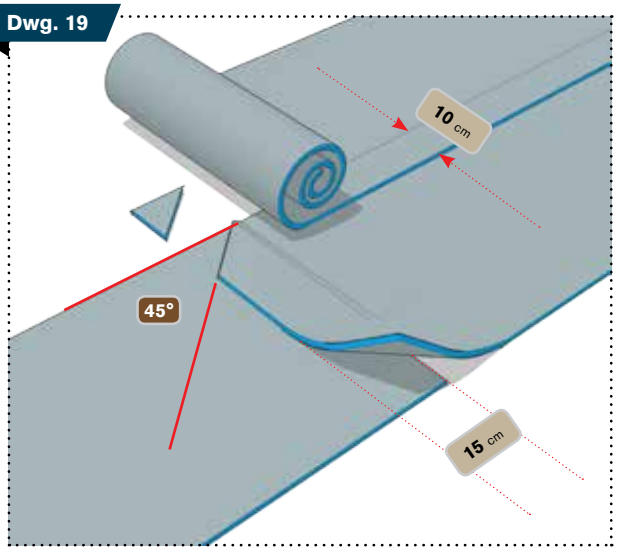
- Place the sheets alternating the overlapsto avoid creating joints against the slope towards the drais **(Dwg. 18)**.
- Cut membrane corners that would overlap with the next sheet at 45° angles (10 x 10 cm) **(Dwg. 19)**.

Dwg. 18

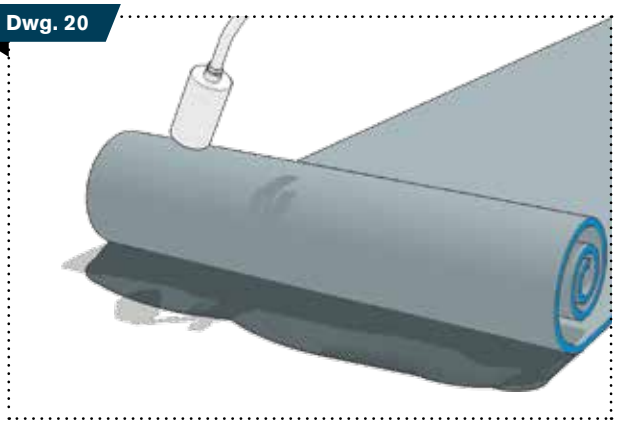


- Joins between the sheets, side & head, must respectively have at least 10 and 15 cm overlaps. **(Dwg. 19)**.
- After aligning the sheets with adjacent ones, roll them from the ends towards the centre to then weld the two portions.
  Use a propane gas or hot air torch to apply the bitumen membrane to the installation surface; the entire lower side surface except for the lateral and head joints must be heated to obtain a complete adhesion with the underlying layer.
  When blowtorching, a melted bead should form

Dwg. 19



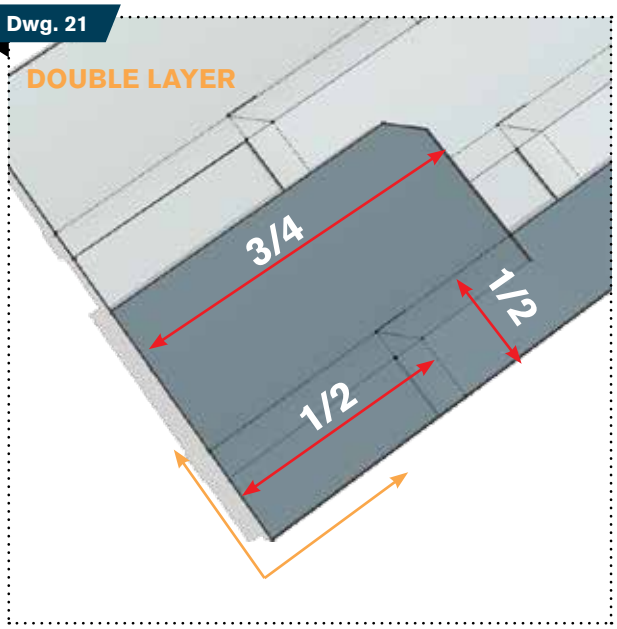
Dwg. 20



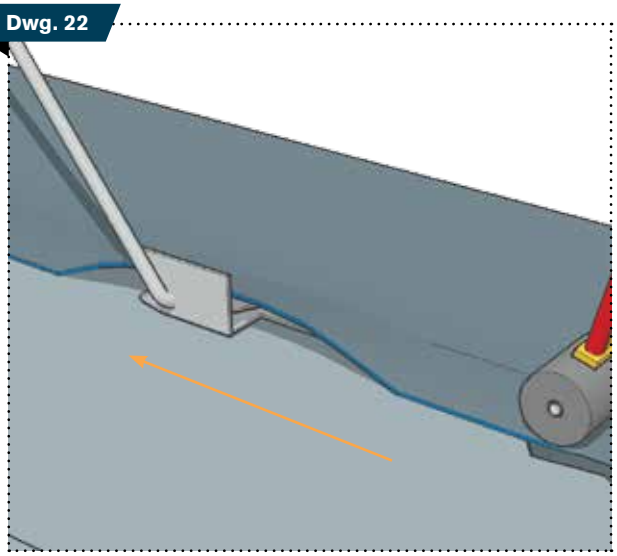
in front of the roll to saturate all support pores. **(Dwg. 20)**.

- The second membrane layer should always be applied in the same direction and staggered by width by about 1/4 in the length direction, with the same procedure as the first layer **(Dwg. 21)**.

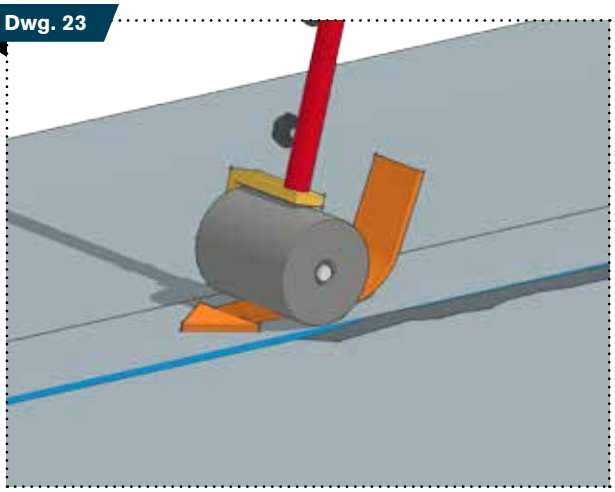
Dwg. 21



Dwg. 22

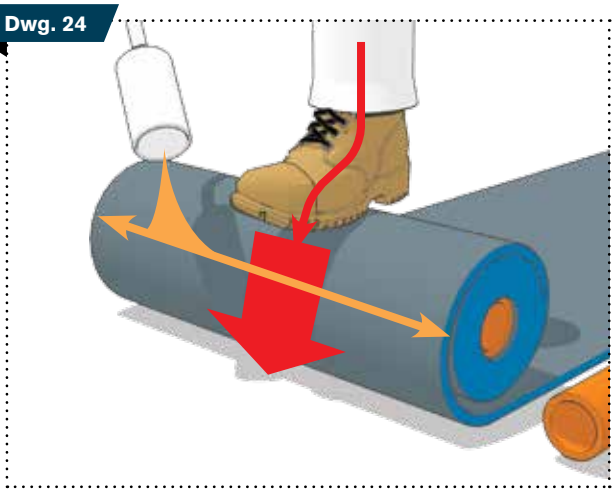


Dwg. 23



- Heat torch the side (10 cm) and head (15 cm) joints **(Dwg. 22)**; during this procedure, press the joint with a metallic roller (15 kg) from which a melted compound bead should protrude to prevent joint grouting **(Dwg. 23)**.
- In warmer seasons, membrane bonding can be facilitated by rolling the roll around a 100 mm diameter cardboard or HDPE core, shorter than the membrane width (960 mm). This will prevent roll ovalisation during application and will guarantee perfect and even pressure on the entire surface in contact with the installation surface **(Dwg. 24)**.

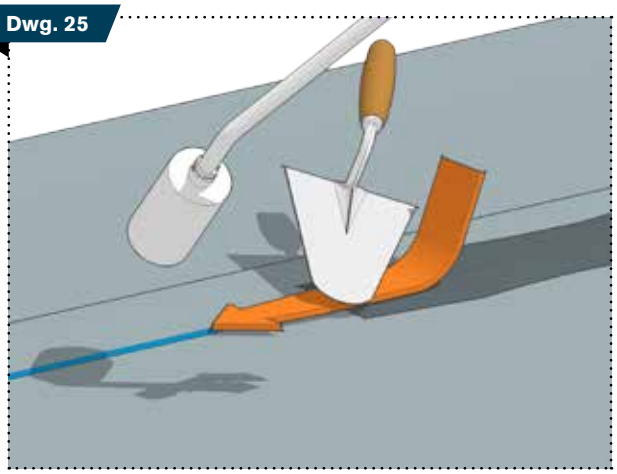
Dwg. 24



"TRADITIONAL" JOINT GROUTING

"Traditional" joint grouting promotes the removal of the distilled polymer-bitumen membrane upper face compound, causing exposure of the reinforcement which, at this point, can absorb water and cause bubbling, promoting de-lamination.
With "traditional" grouting, the applicator tends to not fully weld the 10 cm overlap, solely delegating the seal to grouting. It must be kept in mind that this system is extremely hazardous: in many cases joints are only welded by 1 or 2 cm (grout width) which is not sufficient to guarantee full joint waterproofing.
Besides being a longer process to seal the joints **(Dwg. 25)**.

Dwg. 25

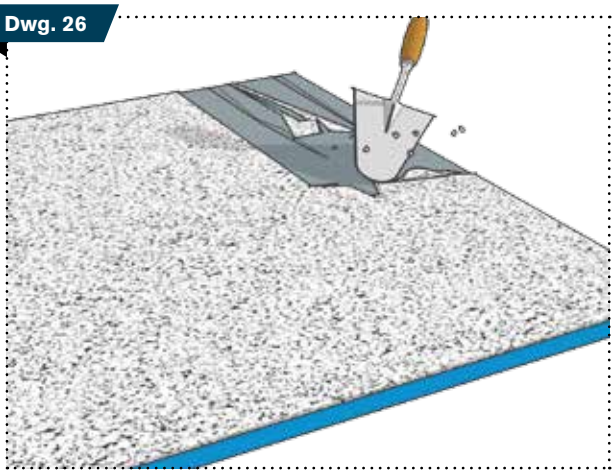


- Apply vertical up-stand membrane with the same characteristics as the horizontal area and dimensions equal to the roll width, which will overlap the horizontal surface by at least 10 cm, and heat welded by gas torch or hot air, pressing laps with a hot trowel to have the melted compound protrude to finish edges.
  Note: The height of the vertical must be at least 15 cm higher than the horizontal part of the roof system.

HEAD SELVEDGE TORCHING WITH DISTILLED POLYMER BITUMEN MEMBRANE SELF-PROTECTED WITH MINERAL SLATE

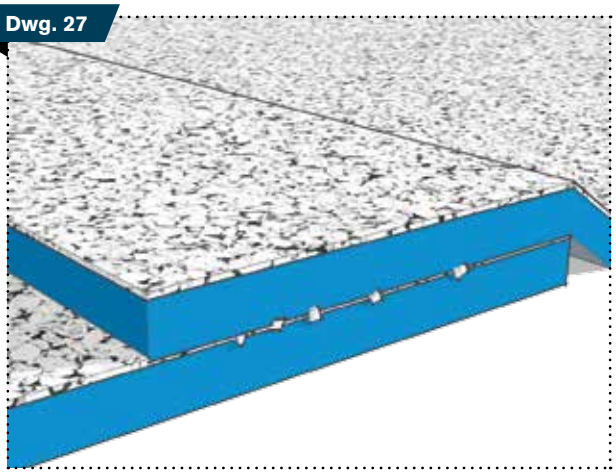
On the upper face of the self-protected bituminous membranes a selvedge side lap is provided, generally 10 cm wide, constituted of a strip of polyethylene burn-off film, which frees the torching area of the mineral slates.
The head joint, however, must be made on the edge of the self-protected membrane with mineral slates.
To perform a proper torching it is essential to cold scratch a wide area with a trowel about 10-15 cm along the transverse edge, to remove the bulk of the slate **(Dwg. 26)**.

Dwg. 26



Then the area is heated by torch, removing the remaining slate and allowing the membrane compound to surface.

Dwg. 27



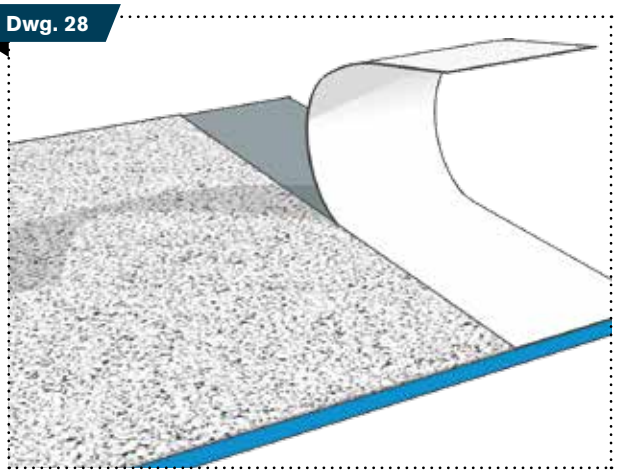
This technique has several drawbacks, in fact the mineral slates that with heat sink into the compound stop at the level of the reinforcement and create discontinuities in the mass **(Dwg. 27)**.

Under the conditions described, inevitably micro-capillaries are formed, which, with expansion and shrinkage due to freezing and temperature variations, with time can produce humidity within the selvedge and the entire roof system.
We must not forget also that by torching on the scraped surface, you inevitably create irregularities and blemishes, coming out of the welded area and which can be seen in the finished work, with not an optimal visual effect.
Last but not least, the preparation operation of the transverse part to be welded involves time, attention and a greater consumption of propane gas.

Using prefabricated PLUVITEC head selvedge

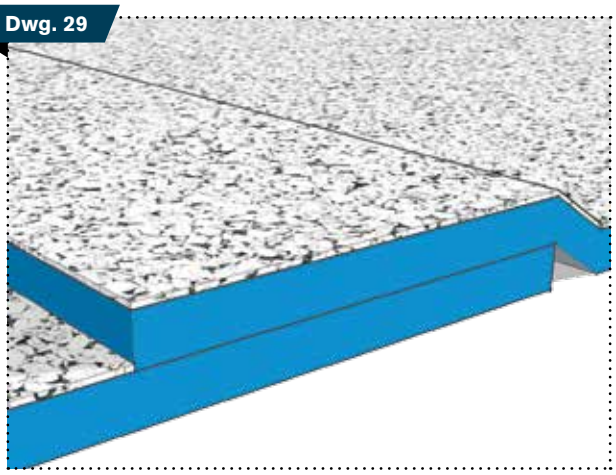
Matco S.r.l. produces distilled polymer bitumen membranes self-protected with mineral slates having a removable strip, which leaves the entire corresponding waterproofing mass exposed, without any slate residue and with a precise line of separation between the exposed and self-protected area **(Dwg. 28)**.

Dwg. 28



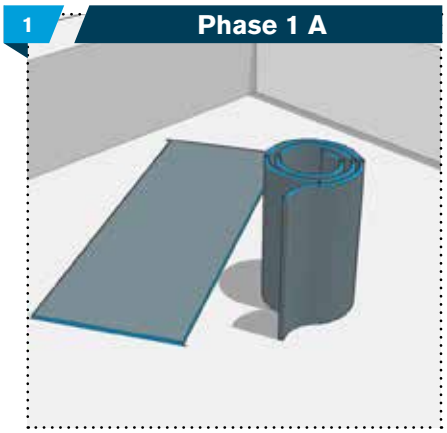
With this solution we have important and numerous advantages, in fact, the welding of the end lap is presented in all similarity to the side and therefore there are no conceivable problems of mechanical resistance and/or micro-capillarity. Since the edge of the self-protected is straight and well-defined, there are no shades or stains, which otherwise would ruin the aesthetics of the joint **(Dwg. 29)**.
Not having to insist with the torch in order to bring forth the mass, the use of the flame is regular along the entire surface of the joint, also the torching will be less than the traditional system, therefore avoiding overheating.
The subsequent operations of joining of the successive sheet are immediate and do not involve additional operations. This results in a considerable saving of time and a certain saving of propane gas.
In addition, the cleaning of the installation is simplified by the fact that there is no waste slate scraped off which can cause build-up or clogging.

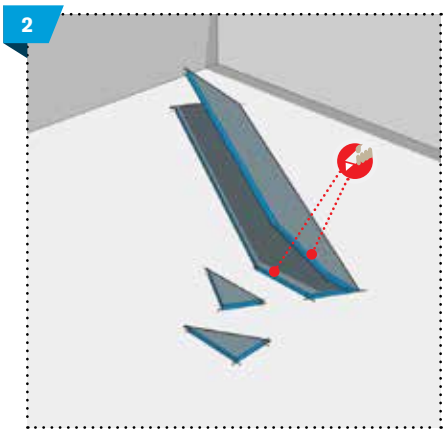
Dwg. 29

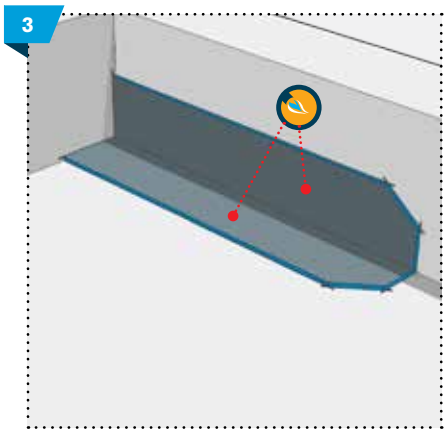


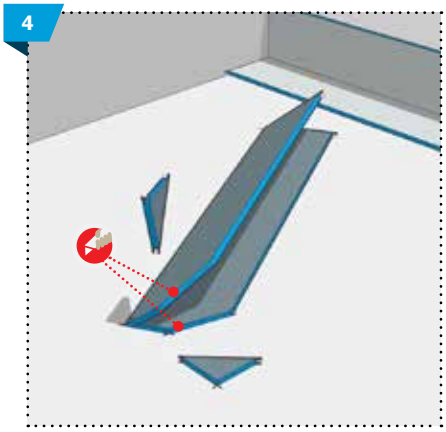
SINGLE LAYER SYSTEM

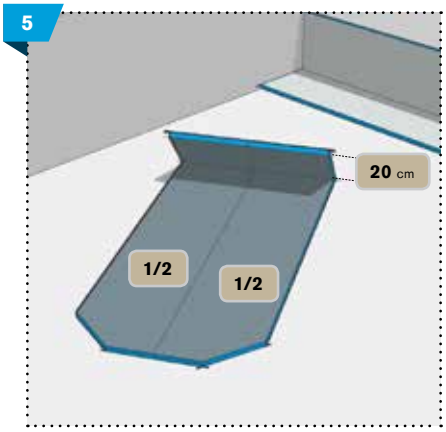
Phase	Procedure	Illustration number reference
Phase 1	**Reinforcement strip application**	
A	▪ Internal corner construction	from 1 to 10
B	▪ External corner construction	from 11 to 22
Phase 2	**Single layer waterproofing element application**	
A	▪ Internal corner construction	from 23 to 24
B	▪ External corner construction	from 25 to 28
Phase 3	**Doubled corner application**	
A	▪ Internal corner construction	from 29 to 44
B	▪ External corner construction	from 45 to 56

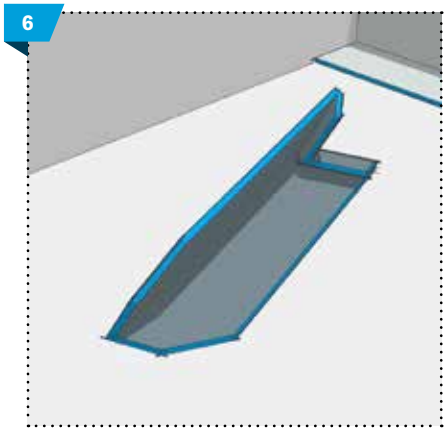












Cut

Heat
this surface
with a torch

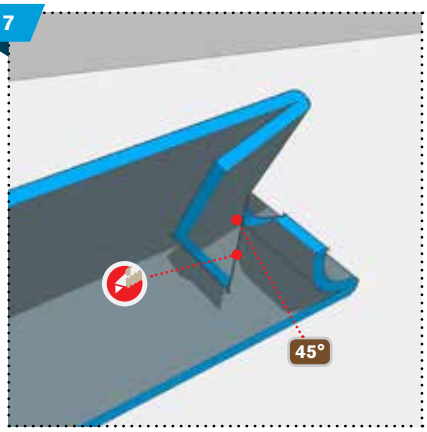
Heat
the back with
a torch before
applying to the
substrate

Linear cut
or surface
measurement

Corner
measurement

SINGLE LAYER SYSTEM

7



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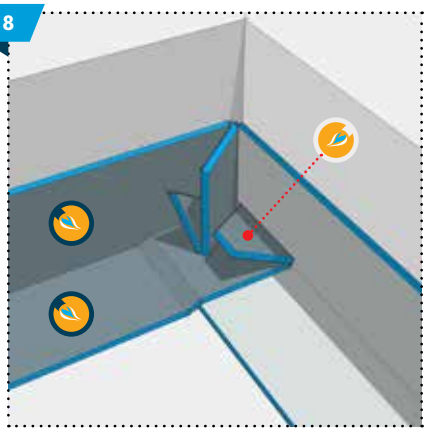

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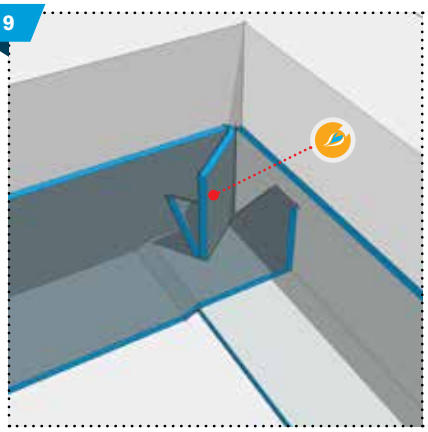

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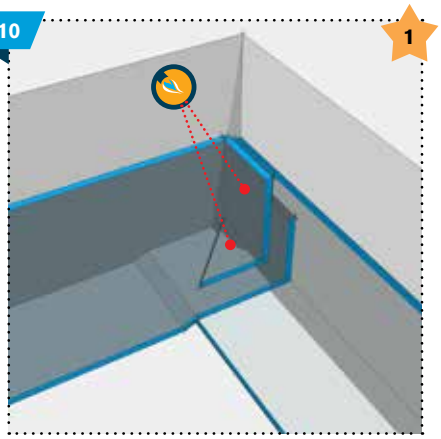

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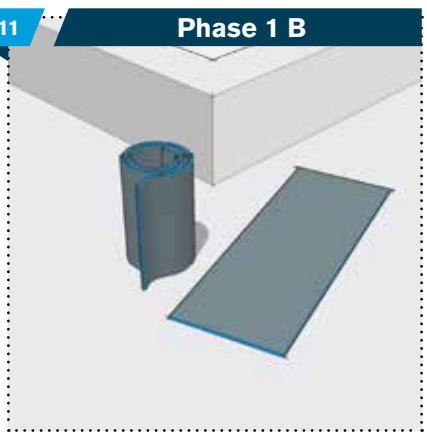
11 **Phase 1 B**



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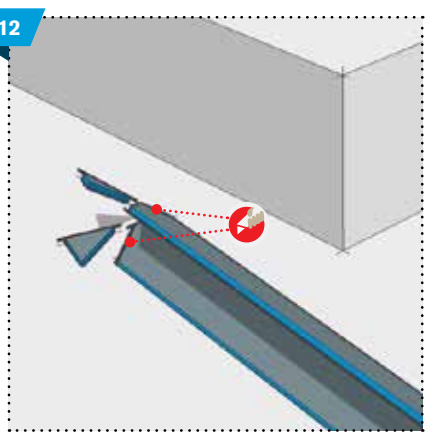

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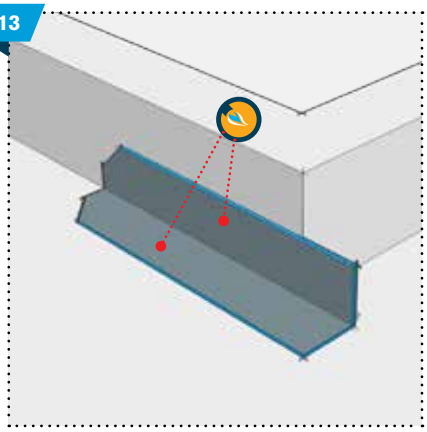

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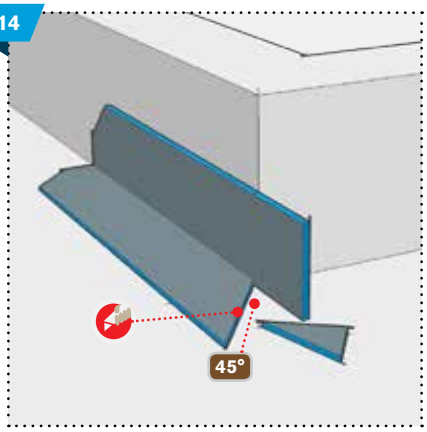

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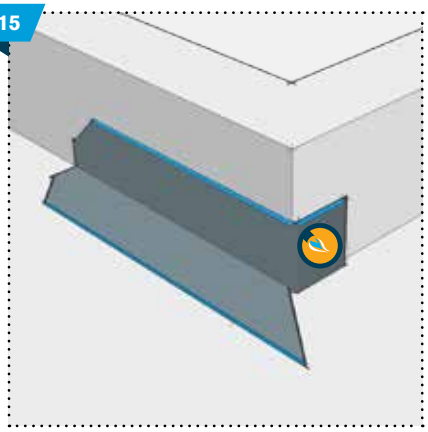
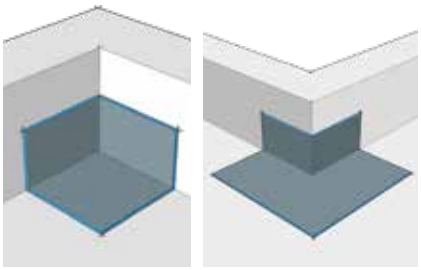


1

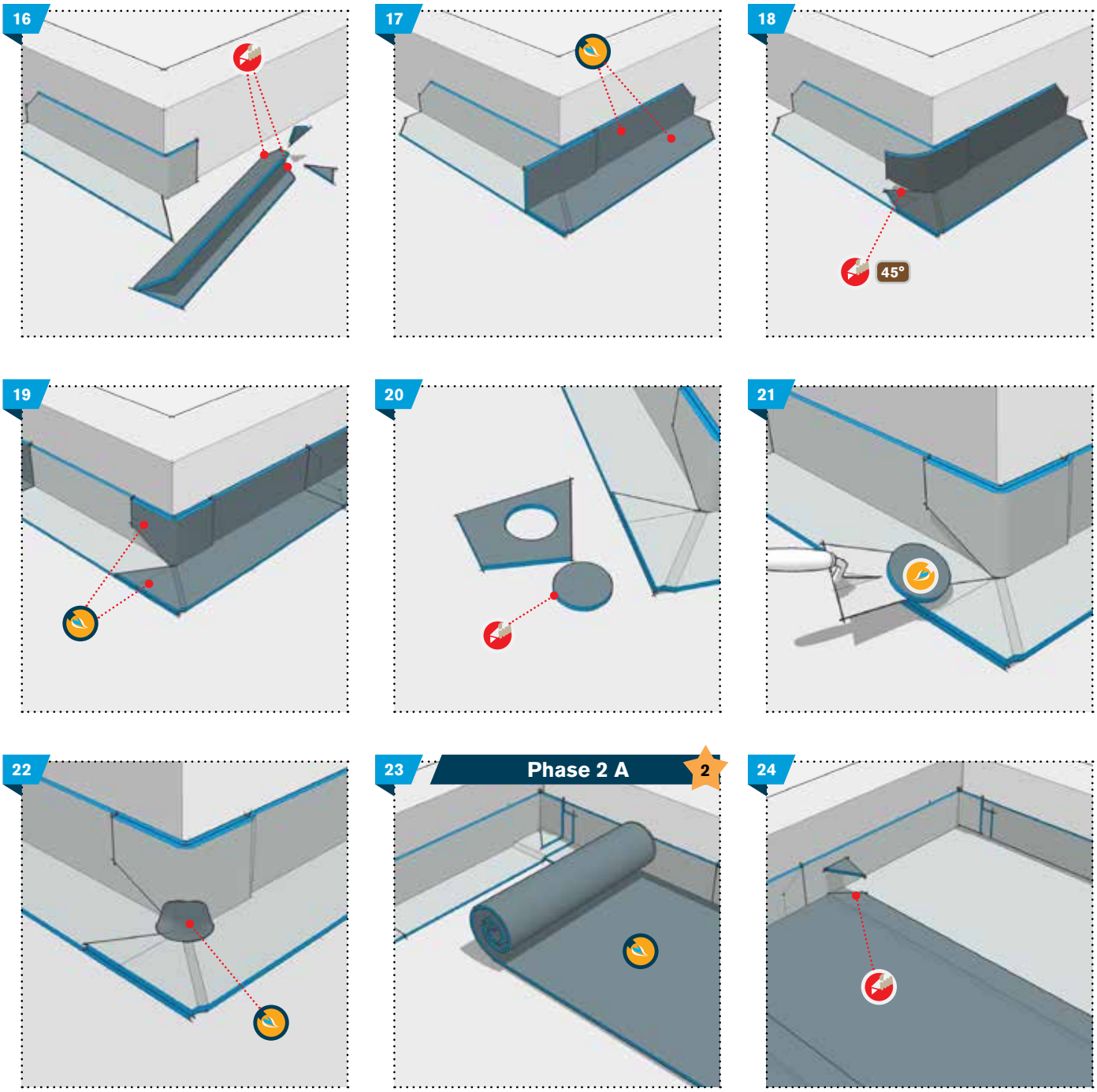
Apply a 25/30 cm high strip of distilled polymer-bitumen membrane by heat torching or hot air at the horizontal/vertical building connection corner.

note

To create internal and external corners, these steps are not required if Pluvitec distilled polymer-bitumen corners are used. Simply apply the prefabricated product by heat torching in the internal and/or external corner.



SINGLE LAYER SYSTEM



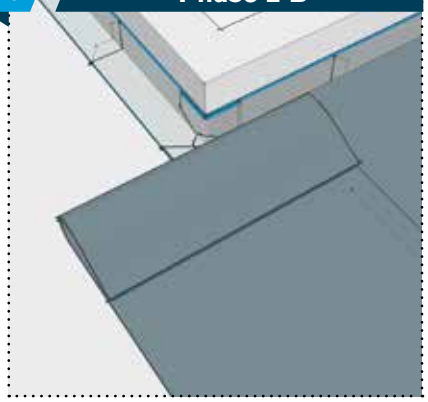
2

The horizontal waterproofing membrane is applied to the foot of the vertical and heat torch bonded to the previously installed strip; during this procedure, press the joint with a metallic roller to force a melted compound bead to protrude. Joint grouting is not necessary for this procedure.

note

SINGLE LAYER SYSTEM

25 **Phase 2 B**



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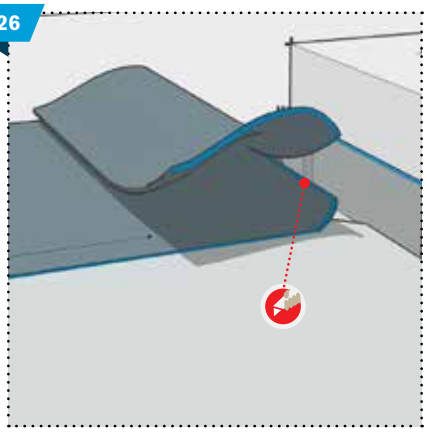

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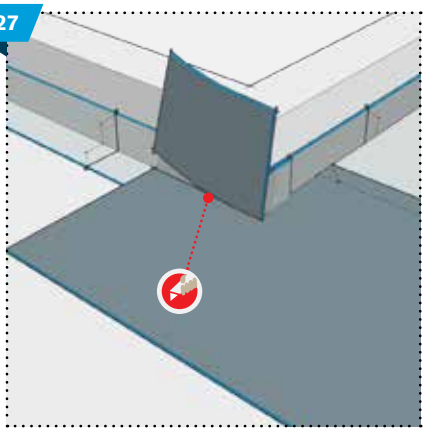

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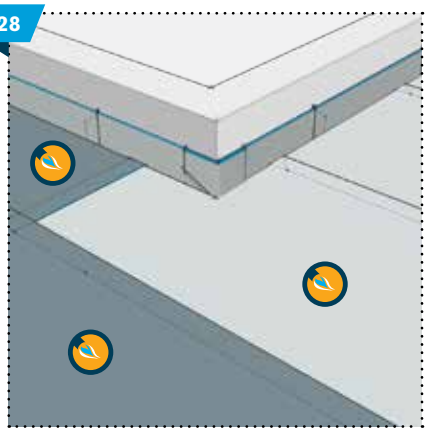
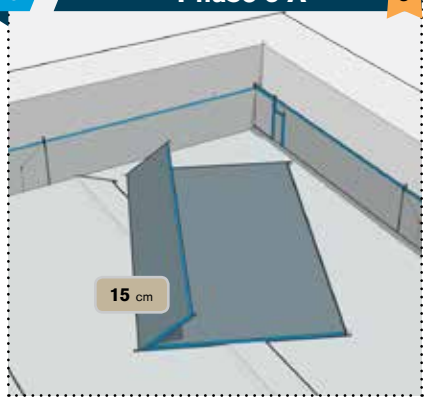


29 **Phase 3 A** 3



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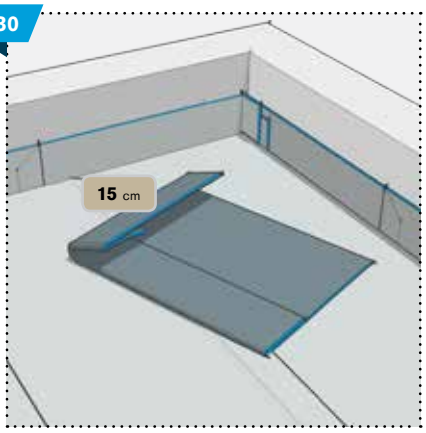

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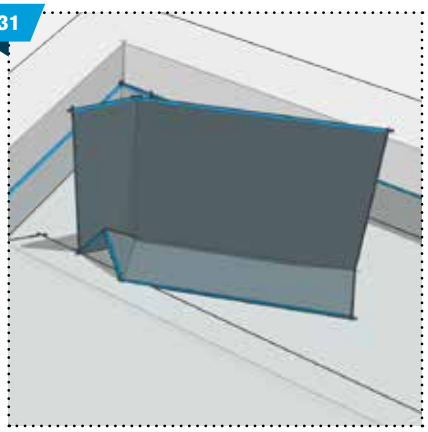

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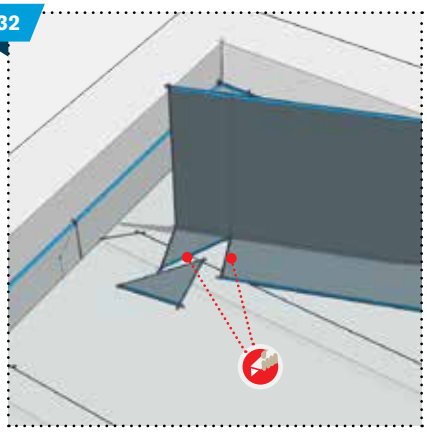

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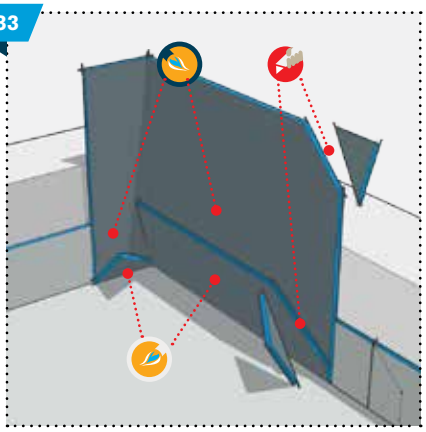
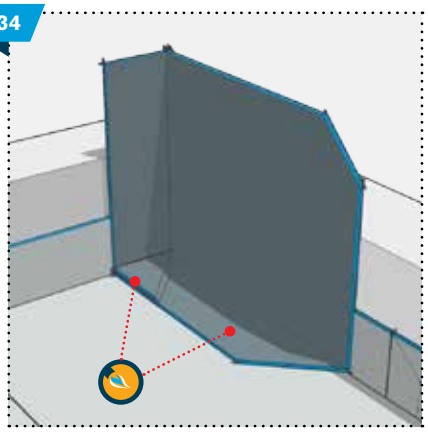


3 note

Apply the vertical waterproofing membrane strip with the same characteristics as the waterproofing on the horizontal surface and dimensions equal to the roll width, which will overlap the horizontal surface by at least 10 cm, and bonded by heat torching or hot air, pressing the laps with a hot trowel to have the melted compound protrude to finish the edges.
Vertical height will be greater than or equal to 15 cm above the upper roof finish layer.

SINGLE LAYER SYSTEM

34



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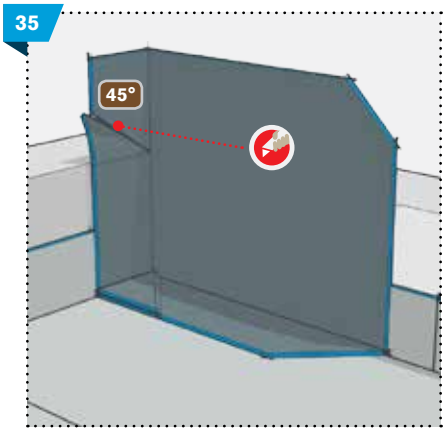

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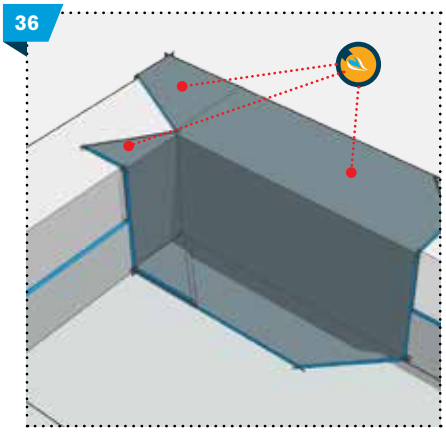

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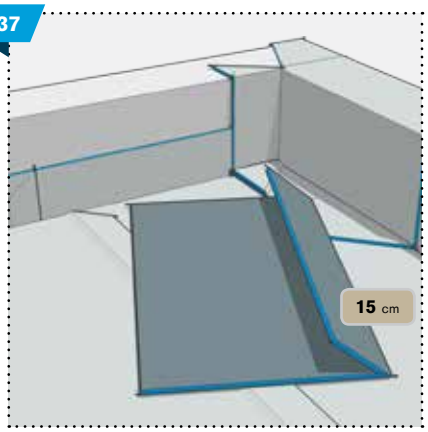

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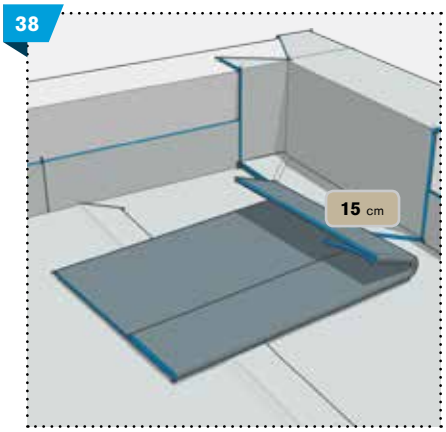

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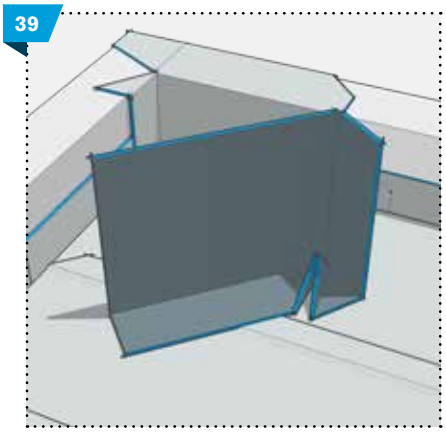

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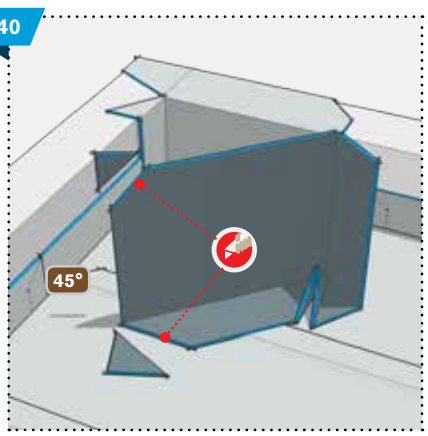

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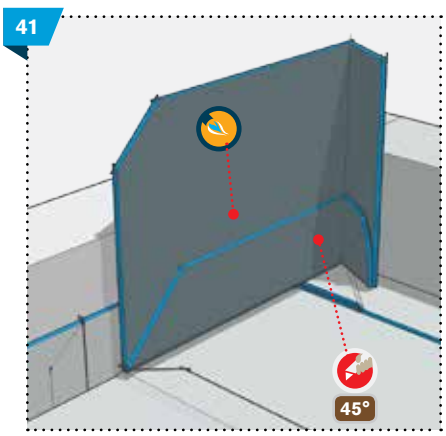

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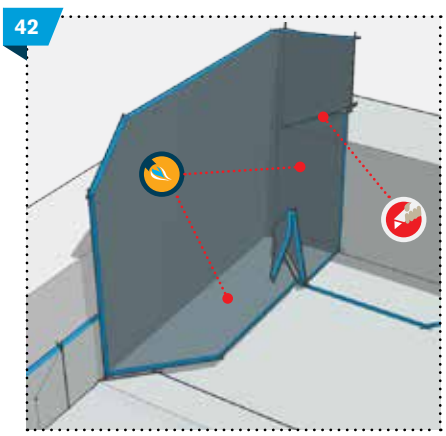
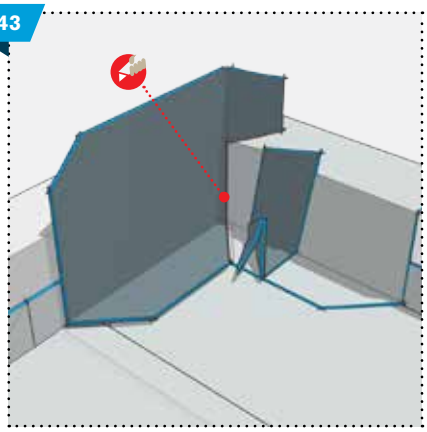


SINGLE LAYER SYSTEM

43



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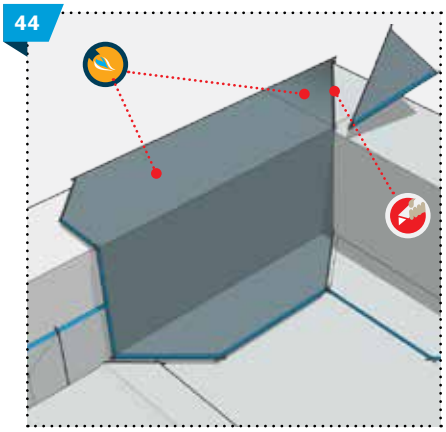

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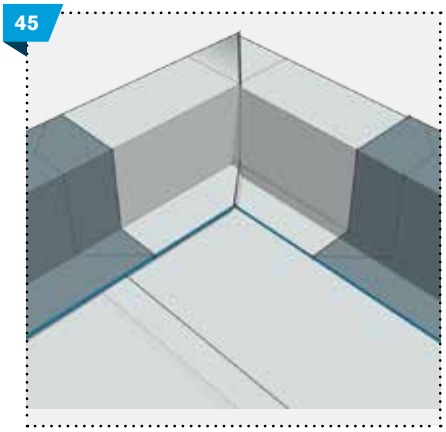
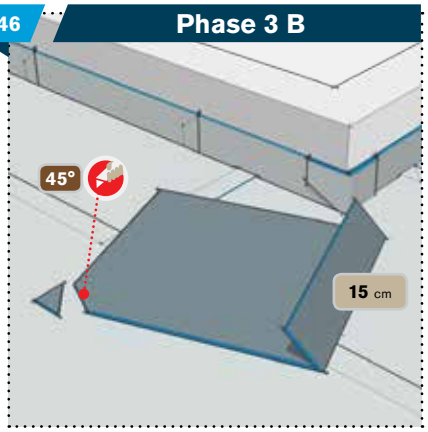


46 **Phase 3 B**



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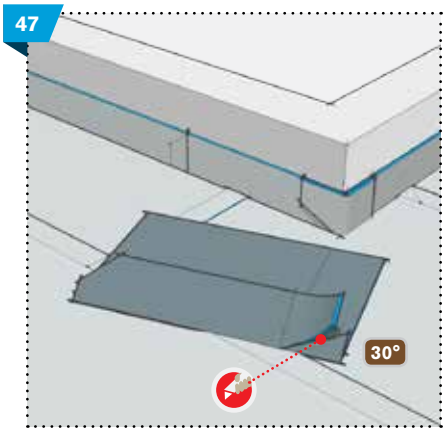

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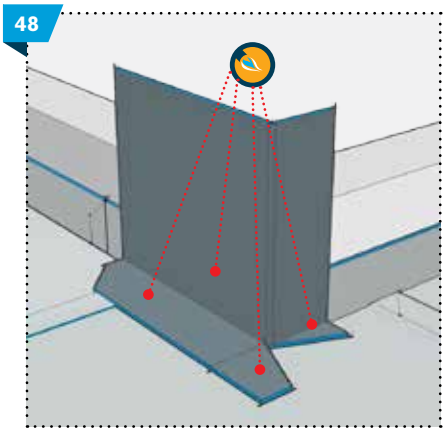

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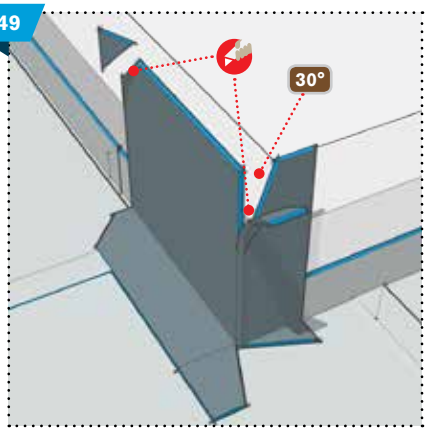

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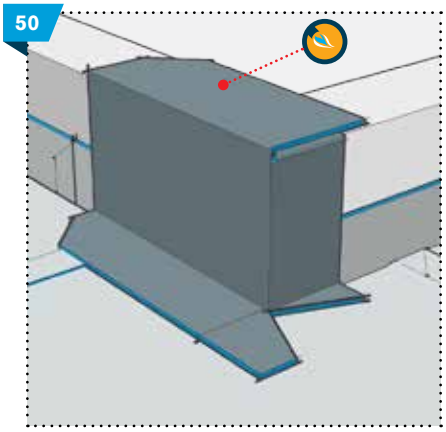

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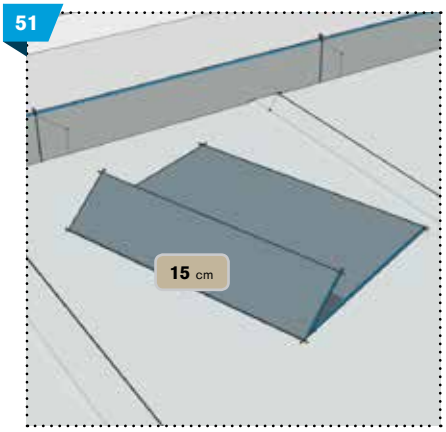

SINGLE LAYER SYSTEM

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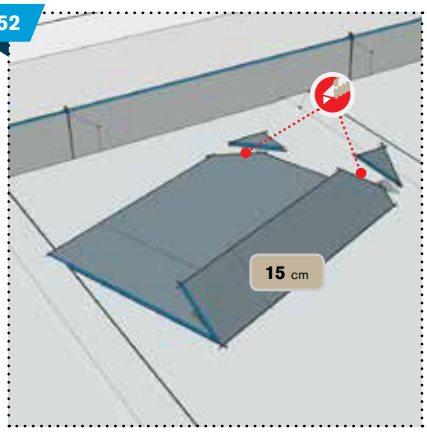

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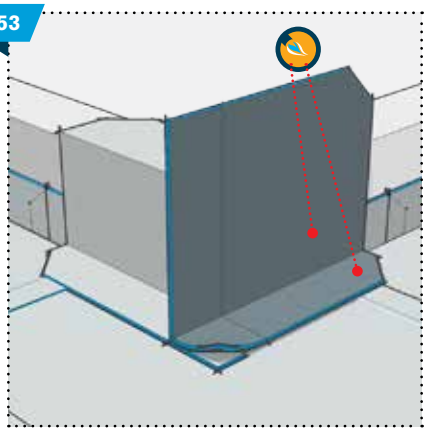

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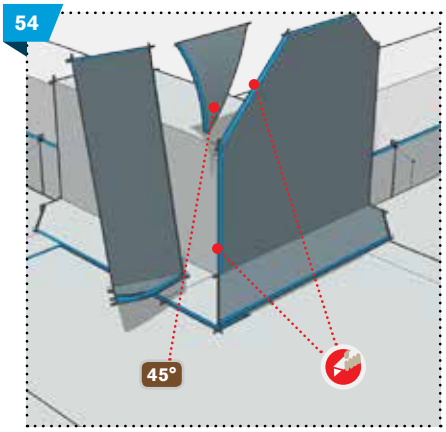

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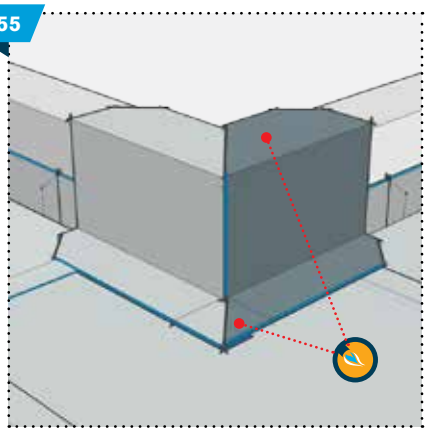

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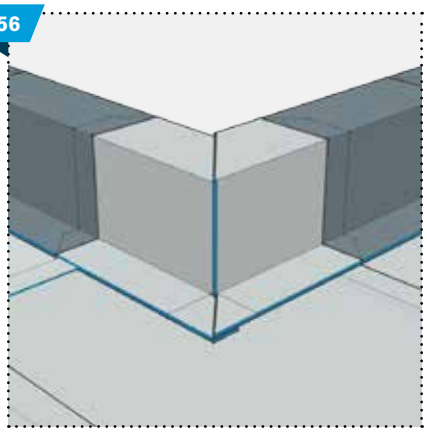
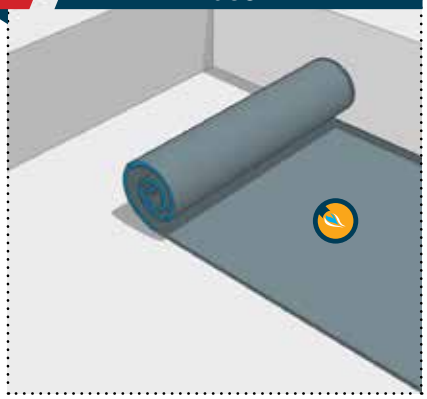


DOUBLE LAYER SYSTEM

Phase	Procedure	Procedure illustration reference
Phase 1	**Waterproofing element application**	
A	▪ Internal corner construction	from 1 to 2
B	▪ External corner construction	3
Phase 2	**Reinforcement strip application**	
A	▪ Internal corner construction	from 4 to 6
B	▪ External corner construction	from 7 to 9
Phase 3	**Protection element application**	
A	▪ Internal corner construction	from 10 to 11
B	▪ External corner construction	from 12 to 15
Phase 4	**Doubled corner application**	
A	▪ Internal corner construction	from 16 to 19
B	▪ External corner construction	from 20 to 24

1 **Phase 1 A**



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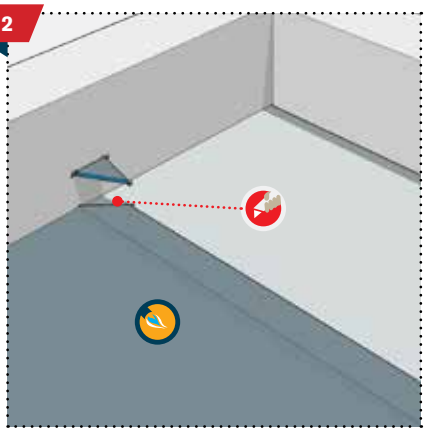
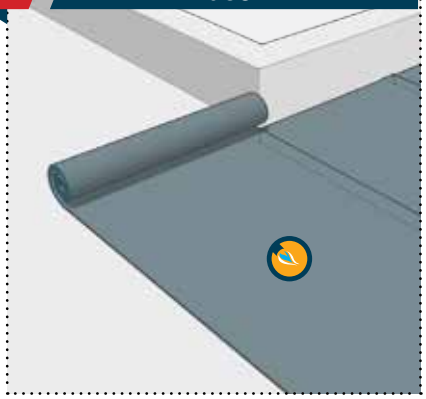
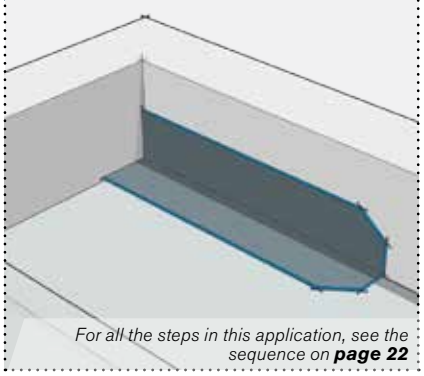


3 **Phase 1 B**

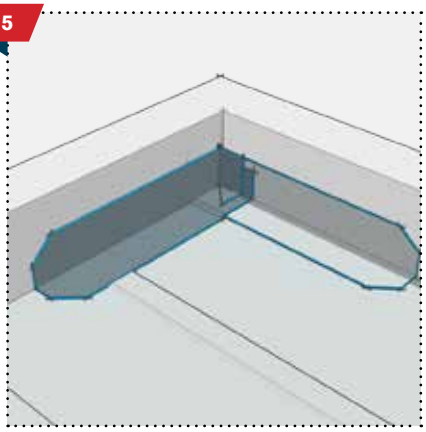


4 **Phase 2 A**



For all the steps in this application, see the sequence on ***page 22***

5



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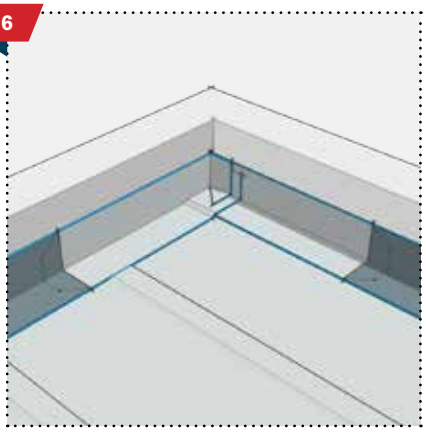


Cut

Heat this surface with a torch

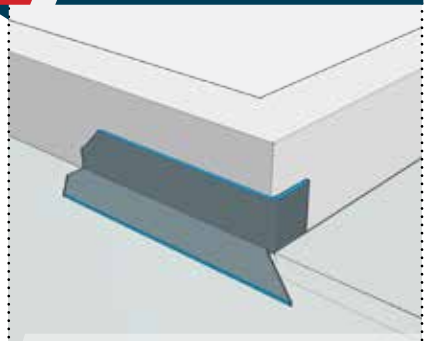
Heat the back with a torch before applying to the substrate

Linear cut or surface **measurement**

Corner measurement

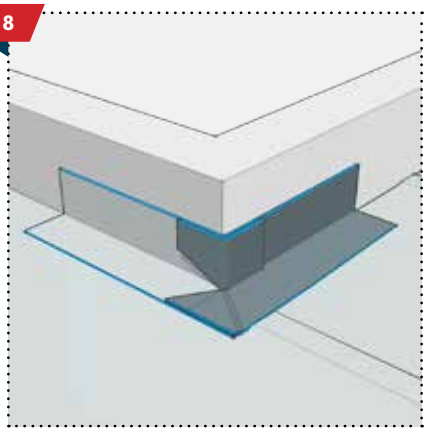
DOUBLE LAYER SYSTEM

7 **Phase 2 B**



For all the steps in this application, see the sequence on ***page 23***

8



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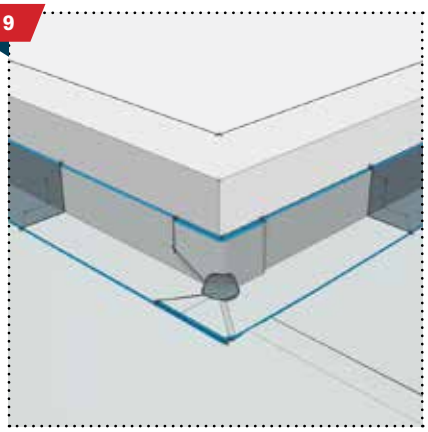
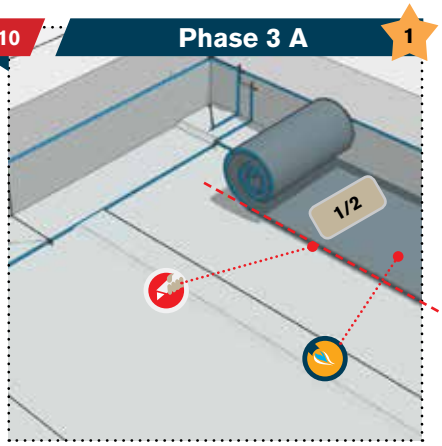


10 **Phase 3 A** **1**



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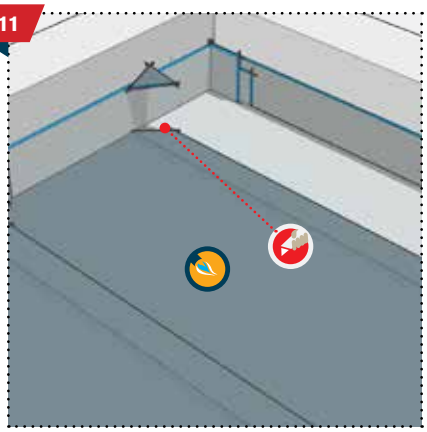
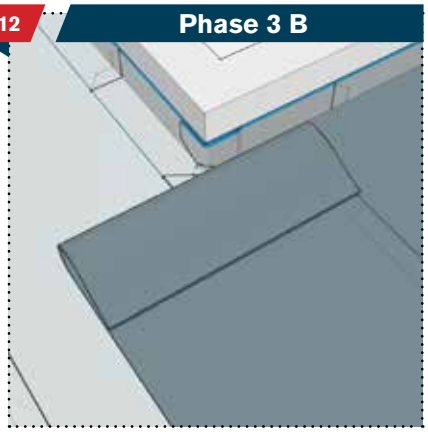


12 **Phase 3 B**



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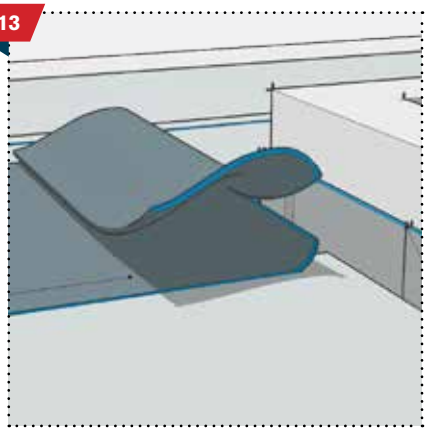

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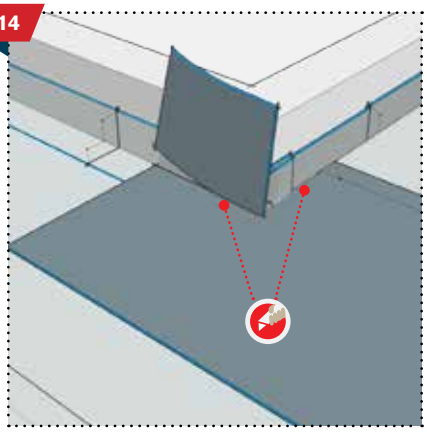
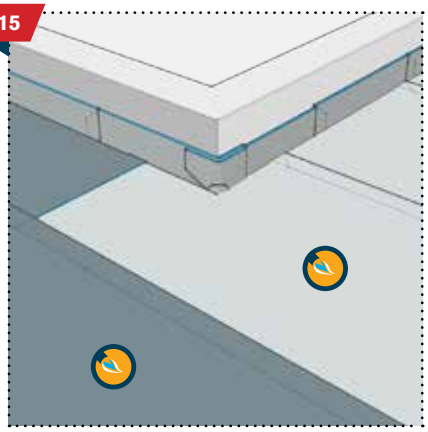


15

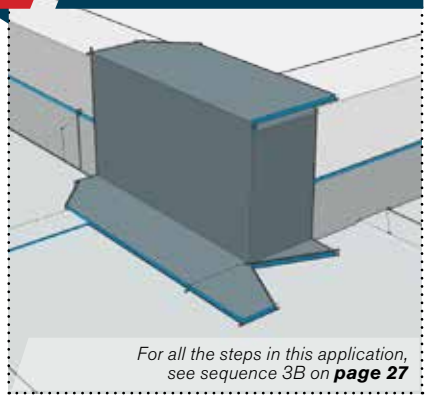


1 note

The second layer membrane should be cut in half along the length, as indicated in drawing 21 on page 19. It is then applied to the foot of the vertical and heat torch bonded to the strip previously applied; during this procedure, press the joint with a metallic roller to have the melted compound bead protrude. Joint grouting is not necessary for this procedure.

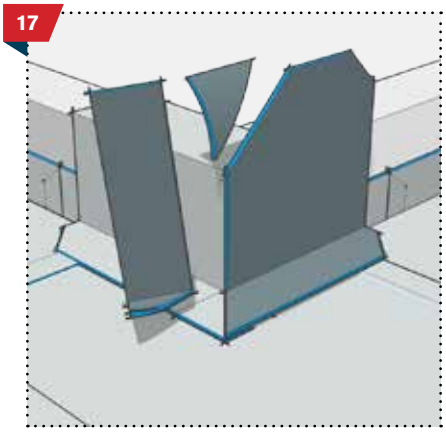
DOUBLE LAYER SYSTEM

16 **Phase 4 A**

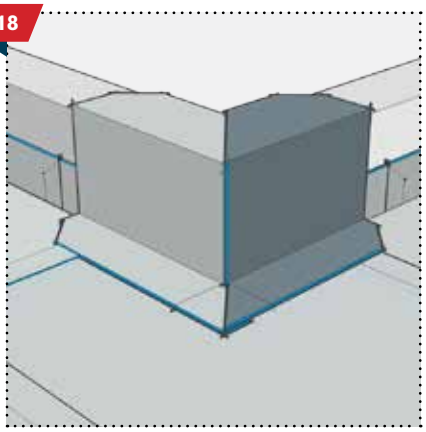


For all the steps in this application, see sequence 3B on ***page 27***

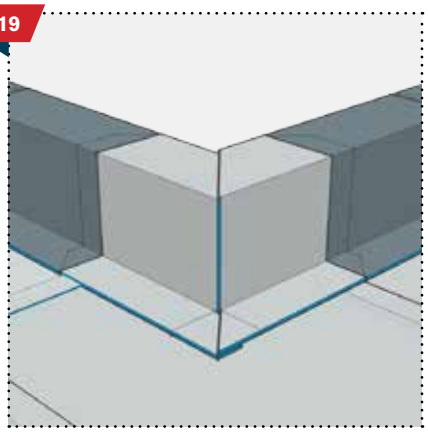
17



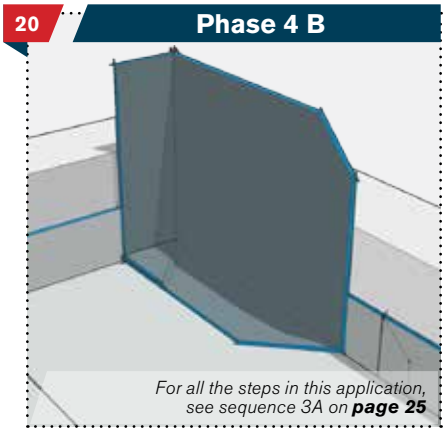
18



19

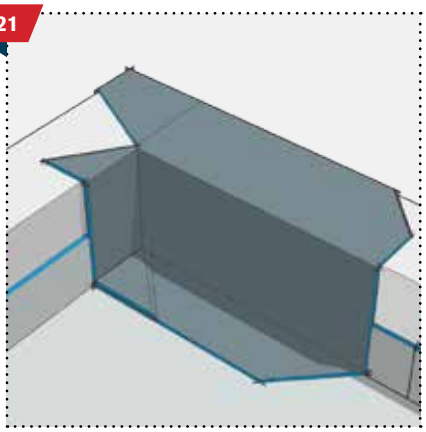


20 **Phase 4 B**

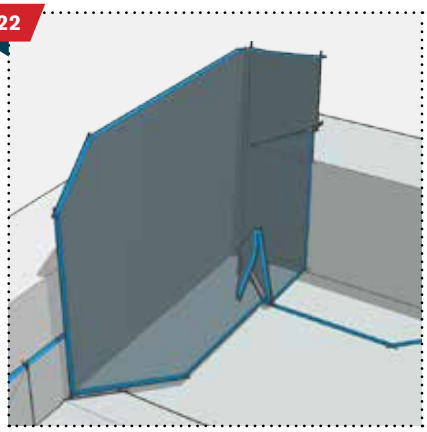


For all the steps in this application, see sequence 3A on ***page 25***

21



22



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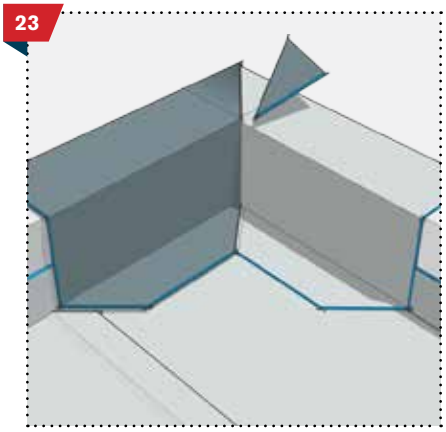
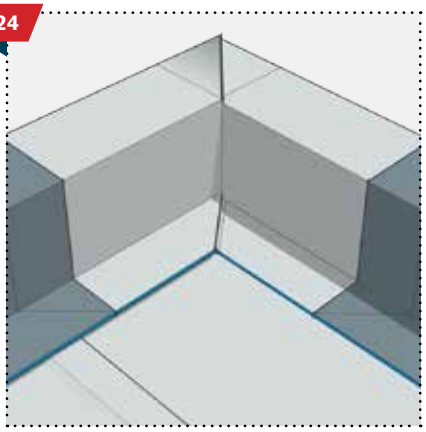
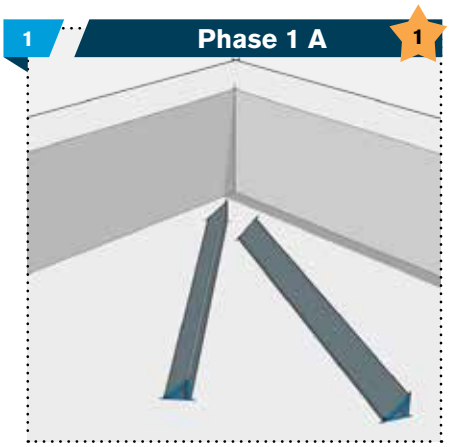


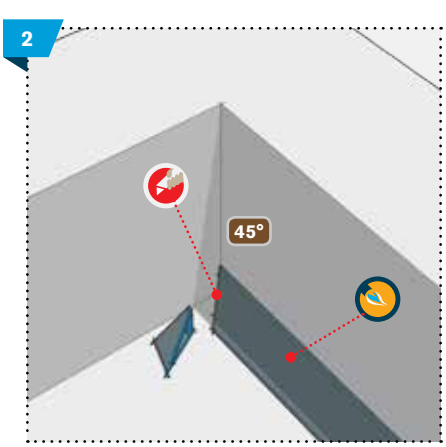
24

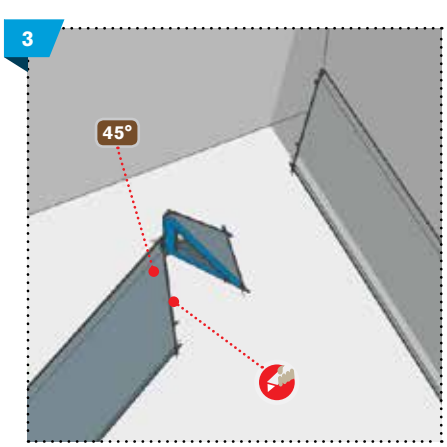


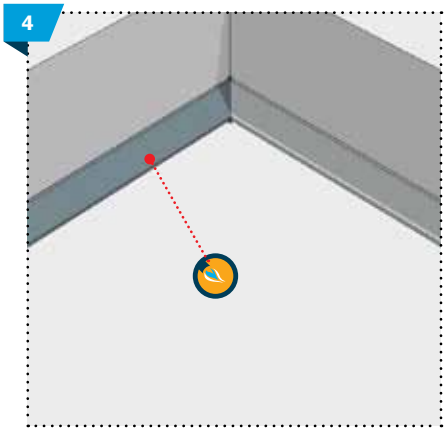
SINGLE LAYER SYSTEM WITH CANT BIT ANGLE FILLETS

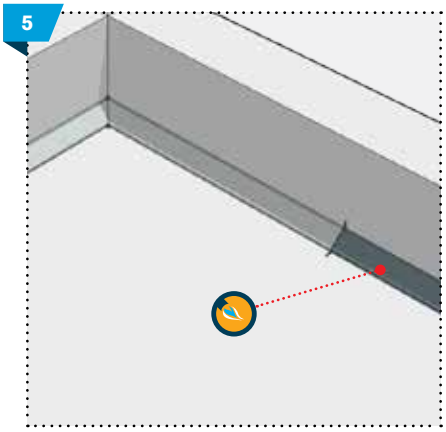
Phase	Procedure	Illustration number reference
Phase 1	**CANT BIT angle fillet application**	
A	▪ Internal corner construction	from 1 to 5
B	▪ External corner construction	from 6 to 10
Phase 2	**Waterproofing element application**	
A	▪ Internal corner construction	from 11 to 14
B	▪ External corner construction	from 15 to 16
Phase 3	**Doubled corner application**	
A	▪ Internal corner construction	from 17 to 25
B	▪ External corner construction	from 26 to 31

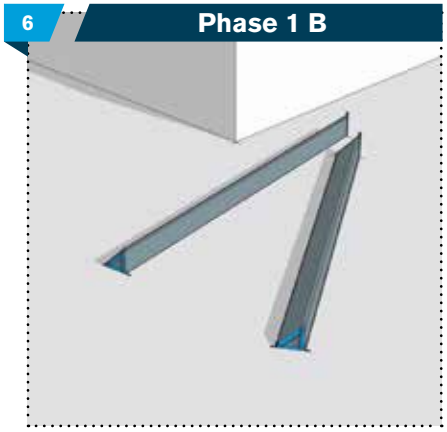












Cut

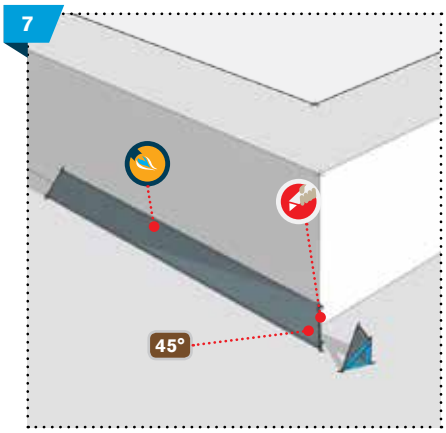
Heat this surface with a torch

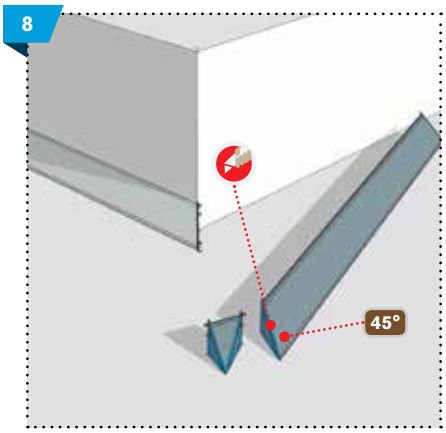
Heat the back with a torch before applying to the substrate

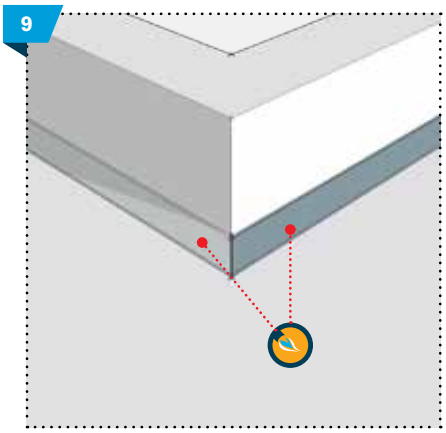
Linear cut or surface **measurement**

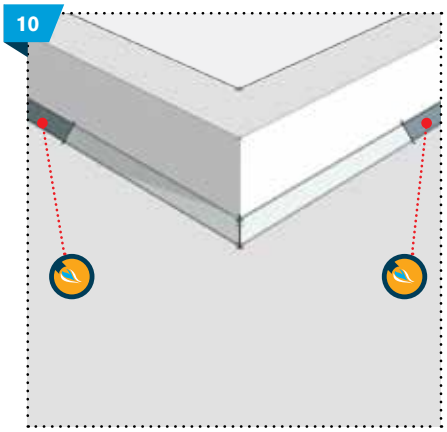
Corner measurement

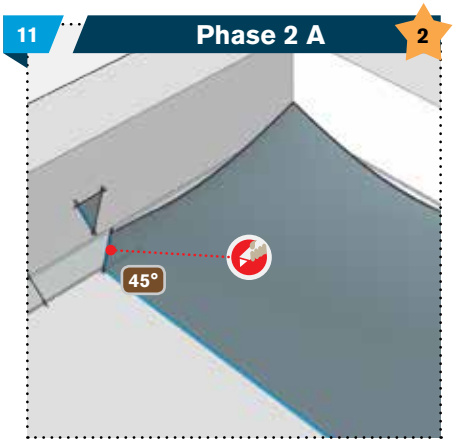
SINGLE LAYER SYSTEM WITH CANT BIT ANGLE FILLETS

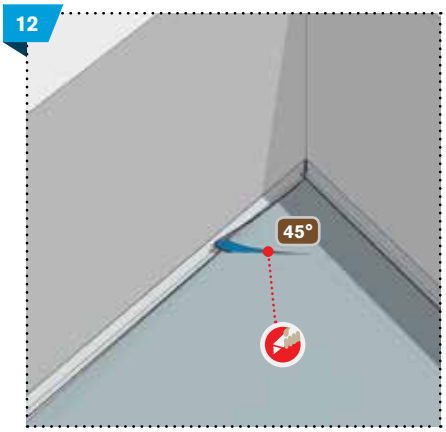


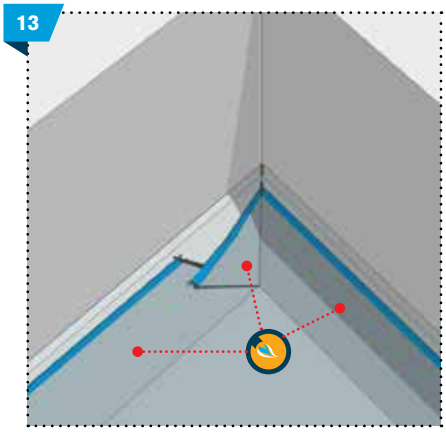


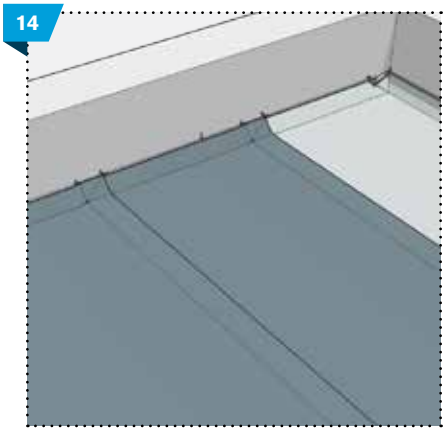


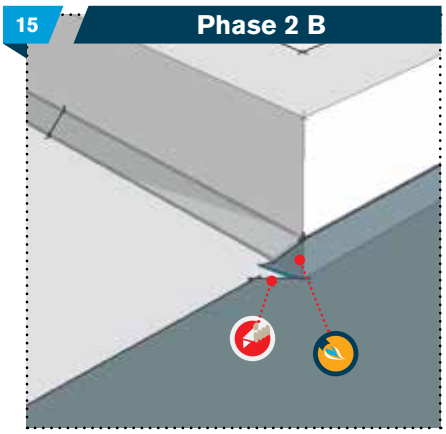












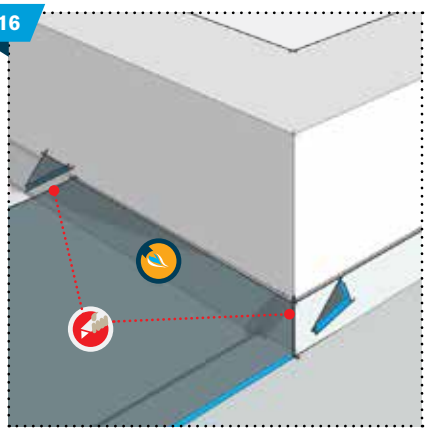
1 Apply the corner fillet CANT BIT pre-formed from bitumen membrane, sized 45x35 mm, heat with torch or hot air, at all vertical up-stands.

2 The horizontal waterproof membrane must rise at least 10 cm on the vertical and will be applied by heat torching or hot air. Joint grouting is not necessary for this procedure.

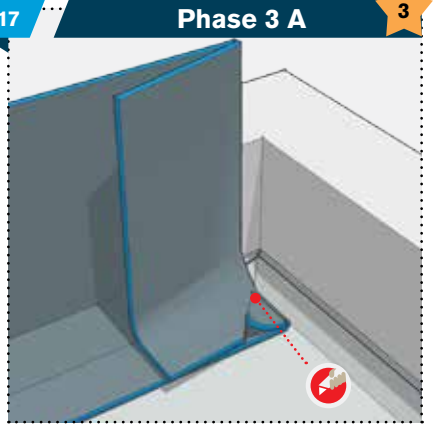
note

SINGLE LAYER SYSTEM WITH CANT BIT ANGLE FILLETS

16



17 **Phase 3 A** 3



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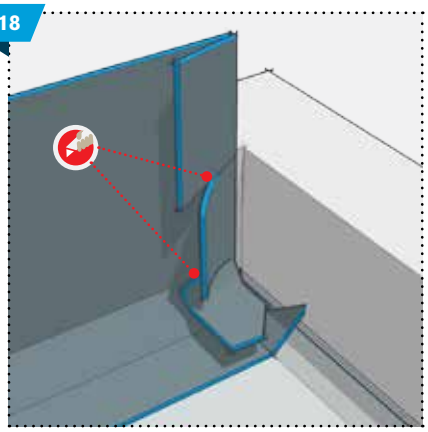

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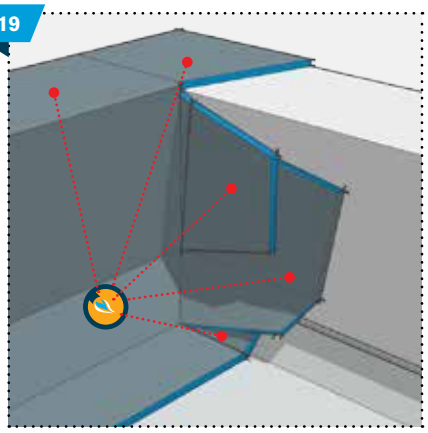

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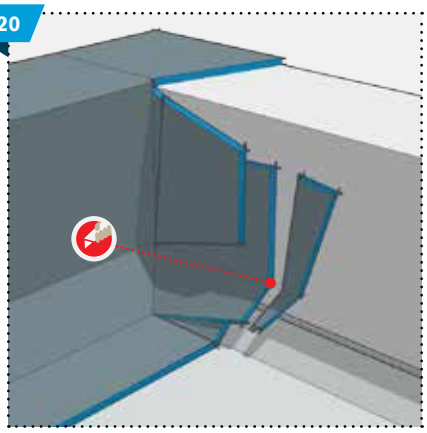

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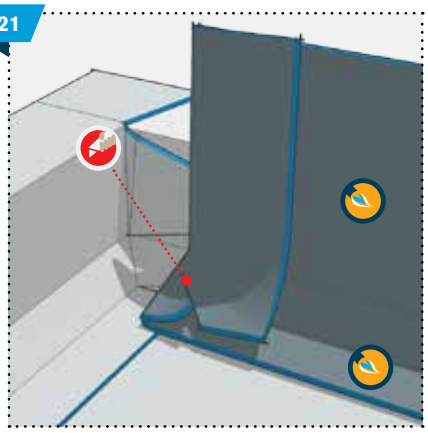

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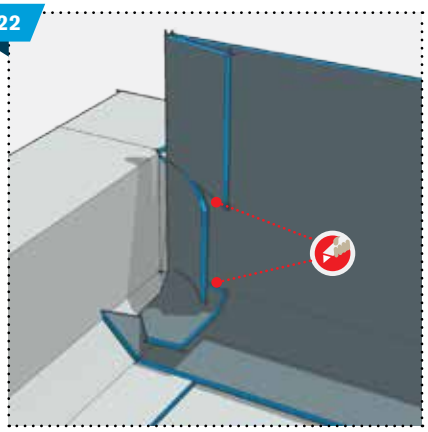

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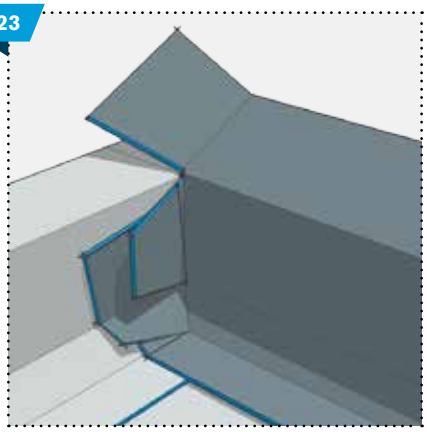

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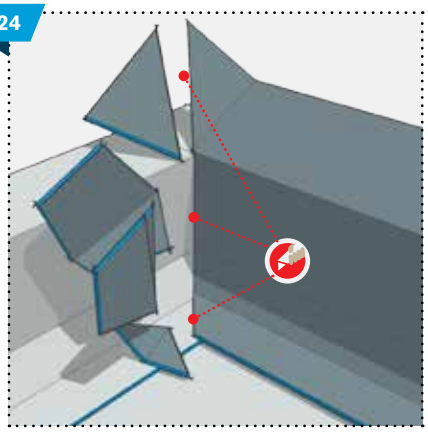


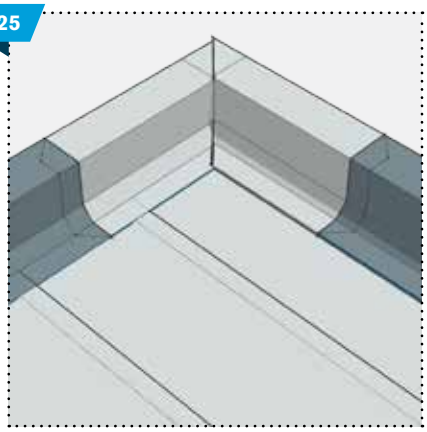
3

note

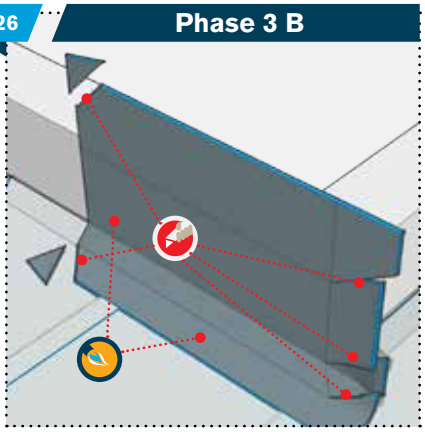
Apply the vertical waterproofing membrane strip with the same characteristics as the waterproofing on the horizontal surface and dimensions equal to the roll width, which will overlap the horizontal surface by at least 10 cm, and bonded by heat torching or hot air, pressing the laps with a hot trowel to have the melted compound protrude to finish the edges.
Vertical height will be greater than or equal to 15 cm above the upper roof finish layer.

SINGLE LAYER SYSTEM WITH CANT BIT ANGLE FILLETS

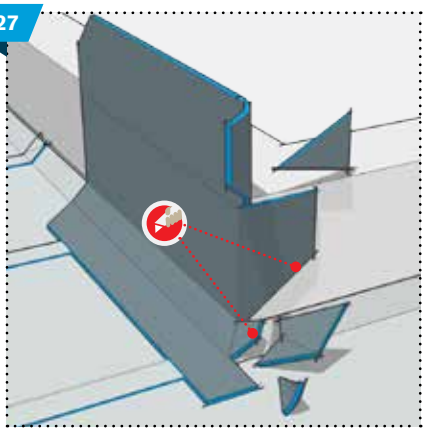
25



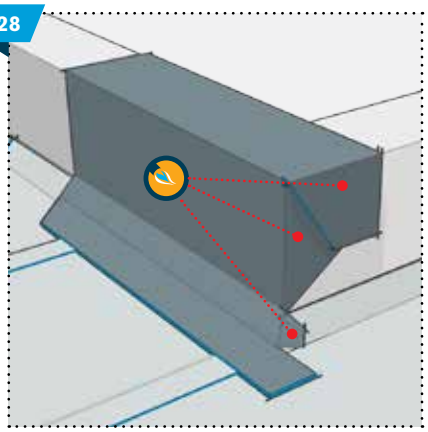
26 **Phase 3 B**



27



28



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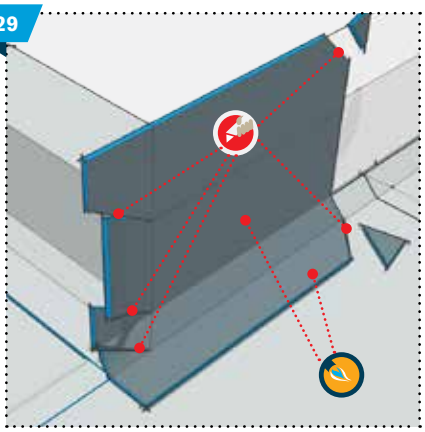

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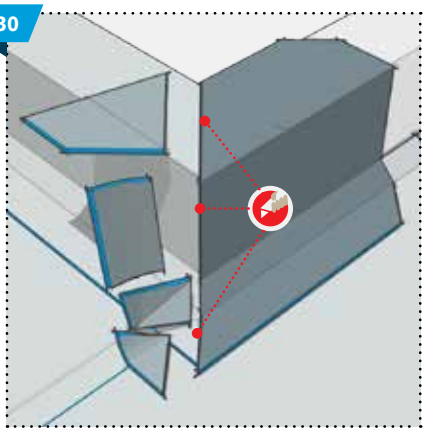

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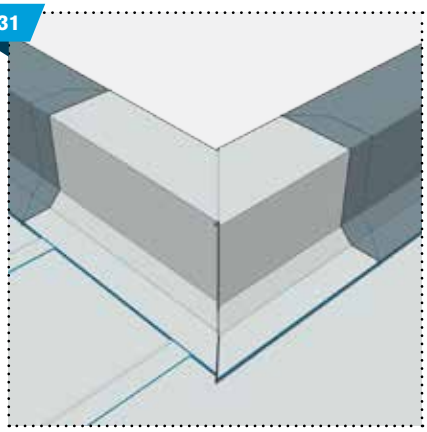
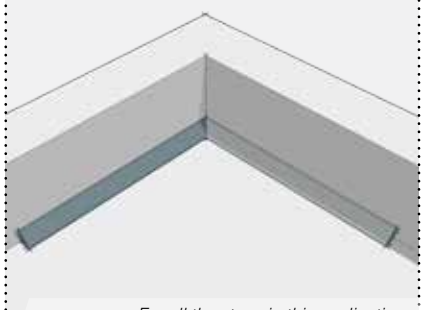


DOUBLE LAYER SYSTEM WITH CANT BIT ANGLE FILLET

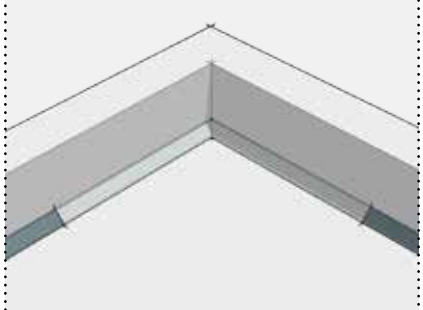
Phase	Procedure	Illustration number reference
Phase 1	**CANT BIT angle fillet application**	
A	▪ Internal corner construction	from 1 to 2
B	▪ External corner construction	from 3 to 4
Phase 2	**Waterproofing element application**	
A	▪ Internal corner construction	from 5 to 6
B	▪ External corner construction	7
Phase 3	**Protection element application**	
A	▪ Internal corner construction	from 8 to 11
B	▪ External corner construction	from 12 to 14
Phase 4	**Doubled corner application**	
A	▪ Internal corner construction	from 15 to 23
B	▪ External corner construction	from 24 to 29

1 **Phase 1 A**

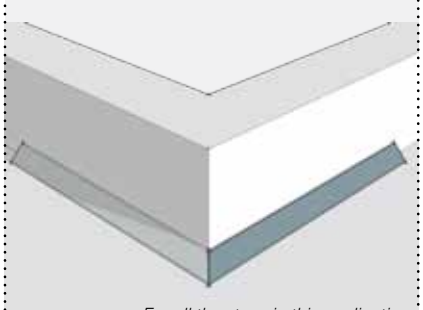


For all the steps in this application, see sequence 1A on ***page 32***

2

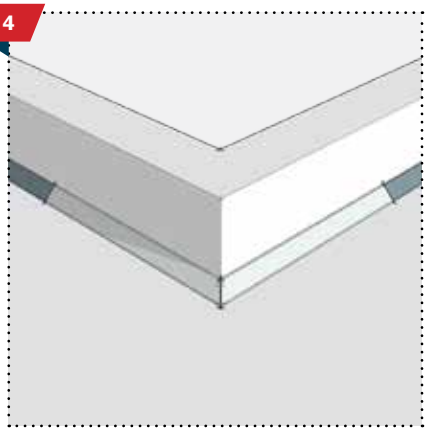


3 **Phase 1 B**

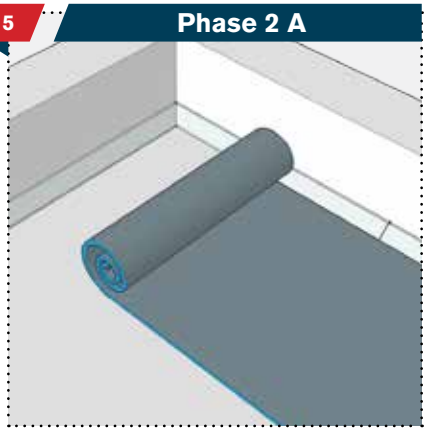


For all the steps in this application, see sequence 1B on ***page 32***

4



5 **Phase 2 A**



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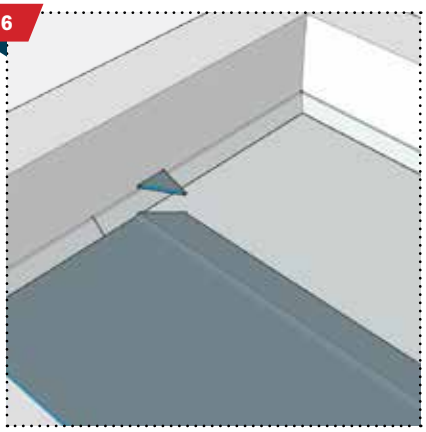


Cut

Heat this surface with a torch

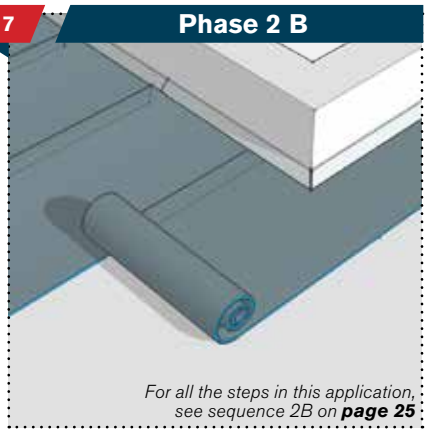
Heat the back with a torch before applying to the substrate

Linear cut or surface **measurement**

Corner measurement

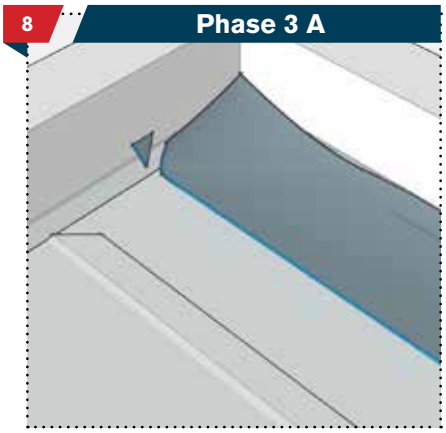
DOUBLE LAYER SYSTEM WITH CANT BIT ANGLE FILLET

7 **Phase 2 B**

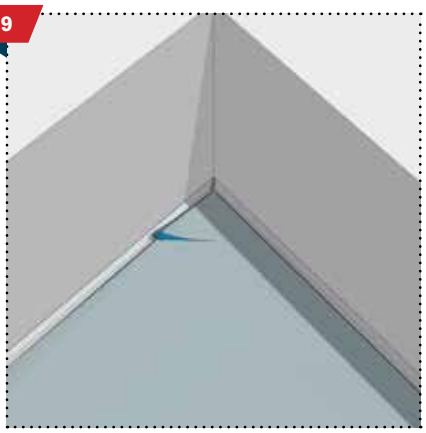


For all the steps in this application, see sequence 2B on ***page 25***

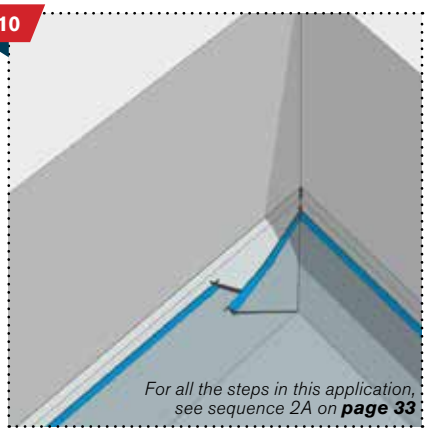
8 **Phase 3 A**



9

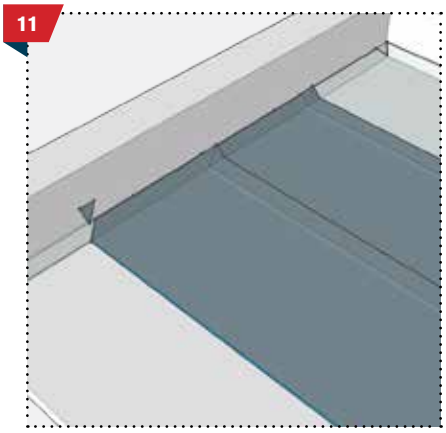


10

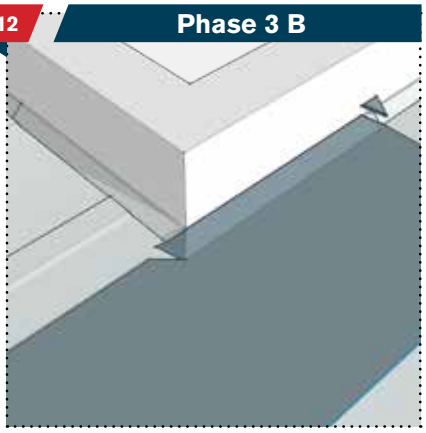


For all the steps in this application, see sequence 2A on ***page 33***

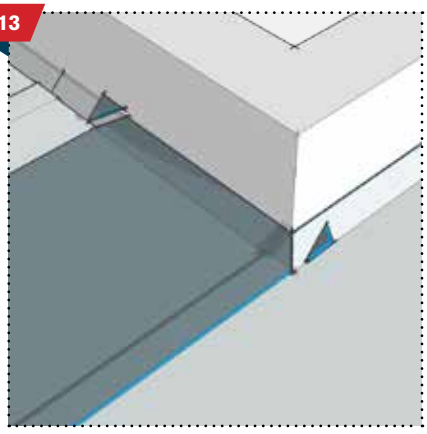
11



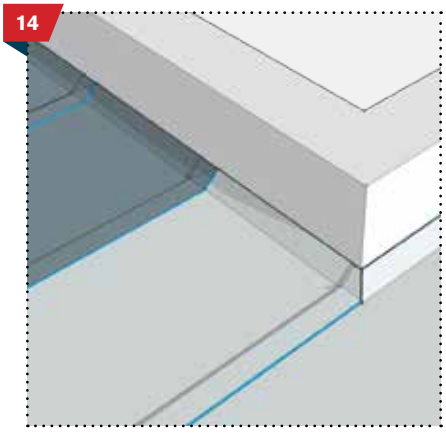
12 **Phase 3 B**



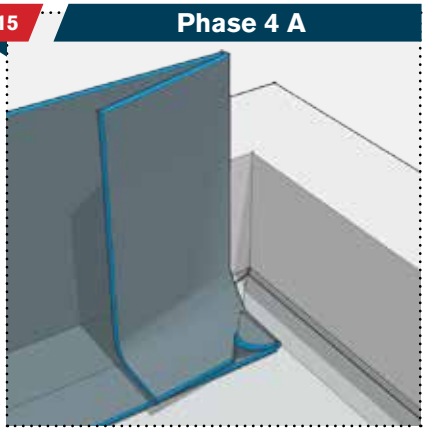
13



14

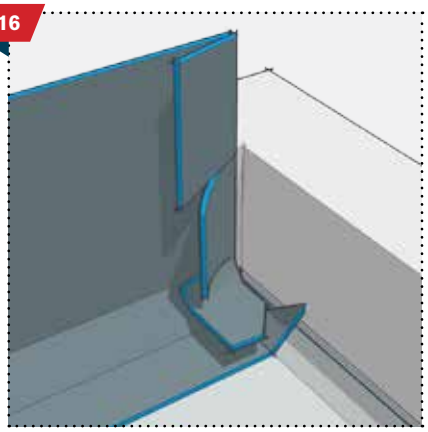


15 **Phase 4 A**



DOUBLE LAYER SYSTEM WITH CANT BIT ANGLE FILLET

16



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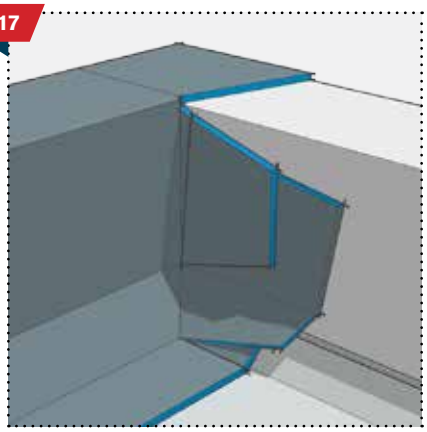

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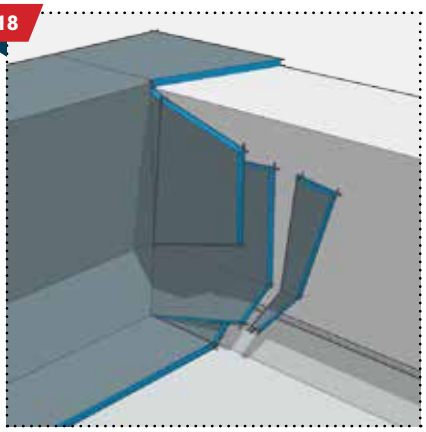

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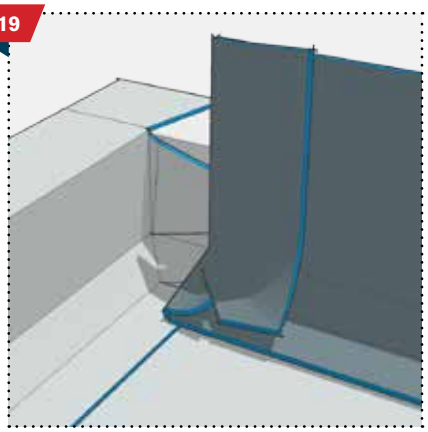

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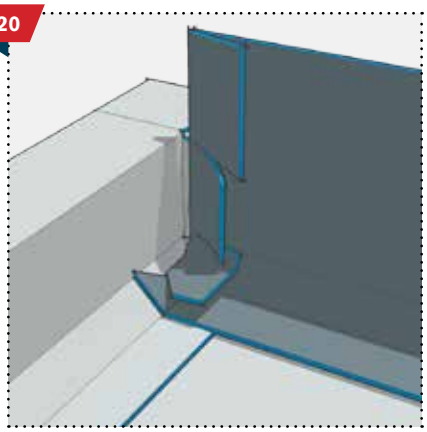

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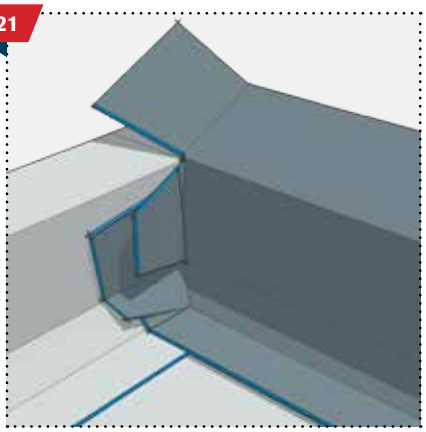

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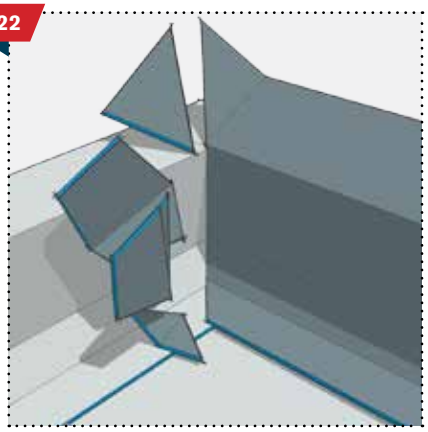

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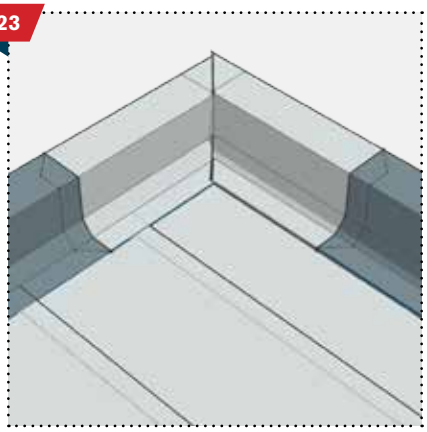
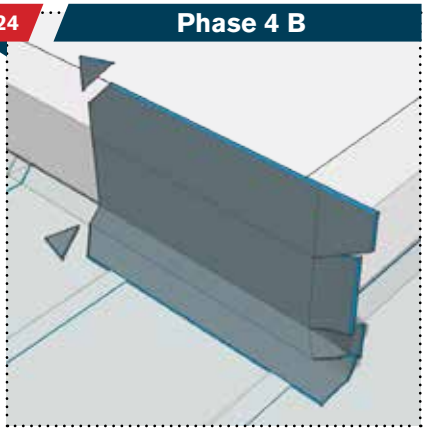
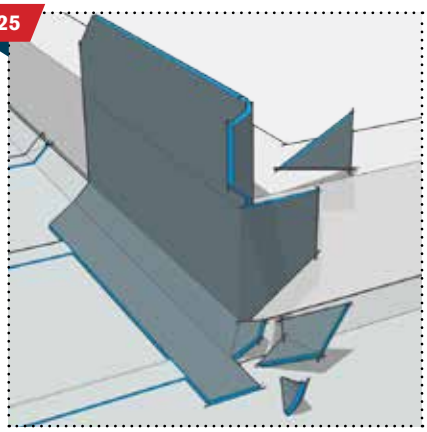


24 **Phase 4 B**



DOUBLE LAYER SYSTEM WITH CANT BIT ANGLE FILLET

25



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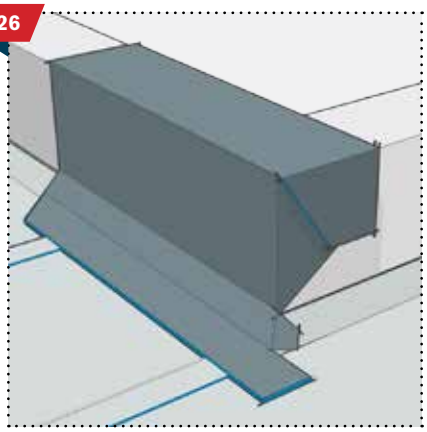

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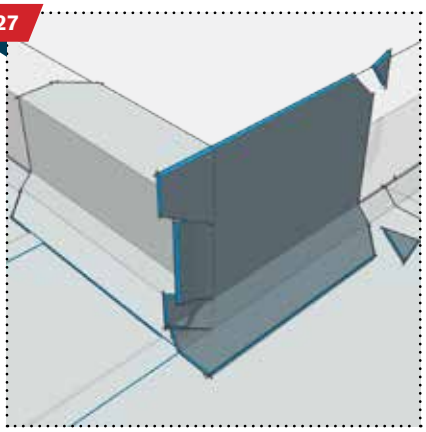

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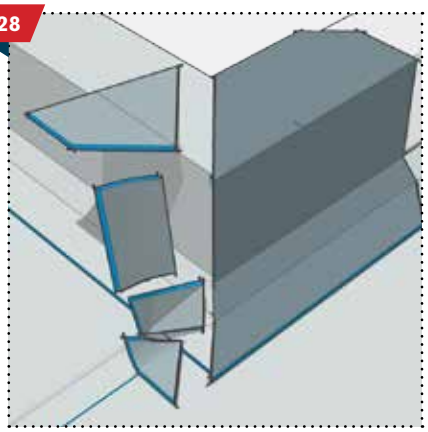

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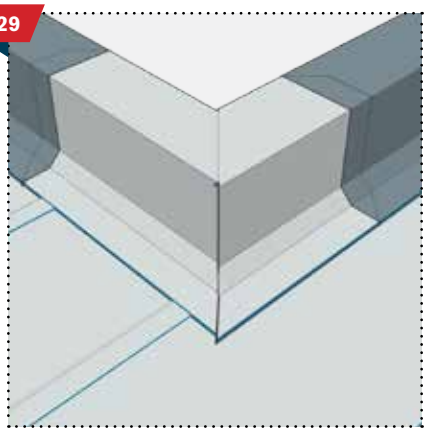


DRAINS

Case	Procedure	Illustration number reference
Case 1	**Single layer drain outlet**	from 1 to 7
Case 2	**Warm roof coaxial drain outlet**	from 8 to 19
Case 3	**Double layer drain outlet**	20
Case 4	**Green roof draining drain outlet**	21
Case 5	**“Overflow” drains**	22

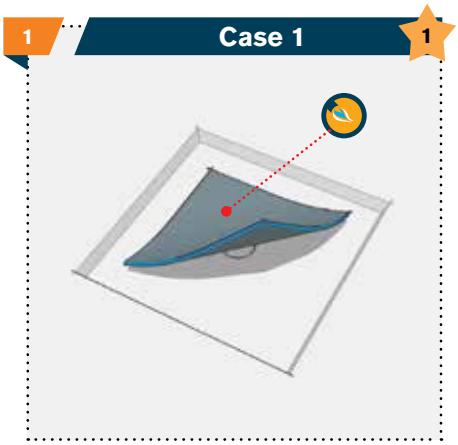
Cut

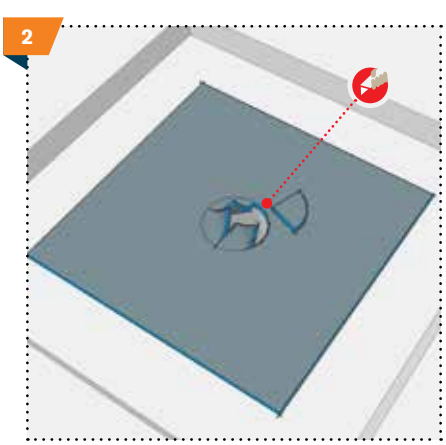
Heat this surface with a torch

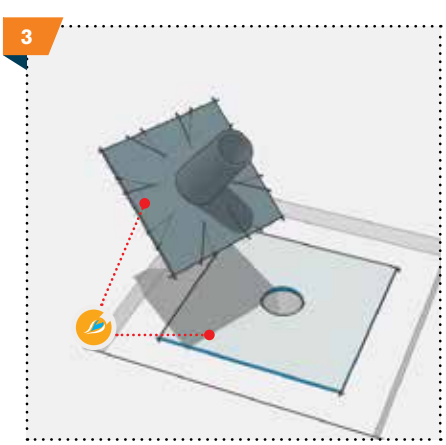
Heat the back with a torch before applying to the substrate

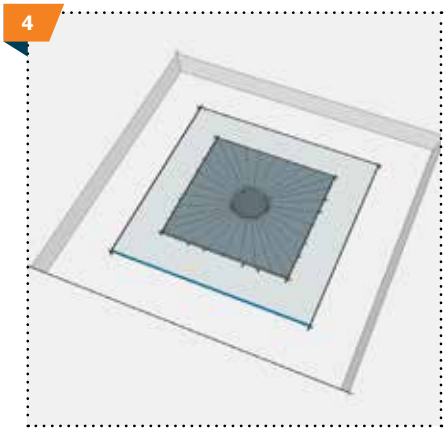
Linear cut or surface **measurement**

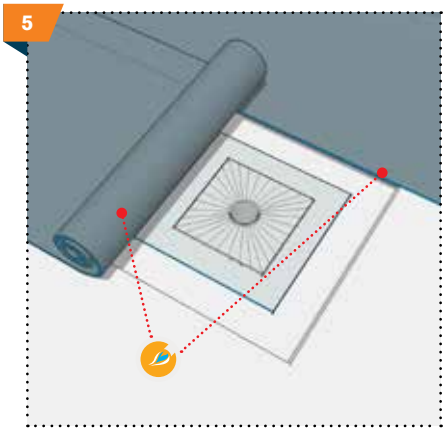
Corner measurement

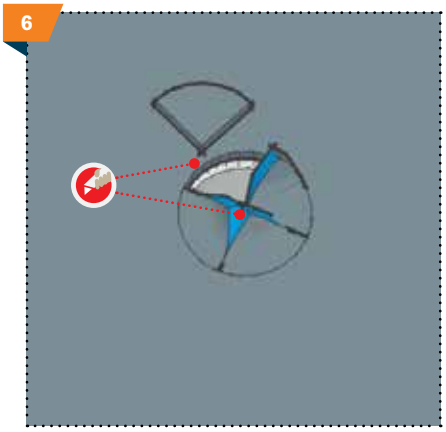












1

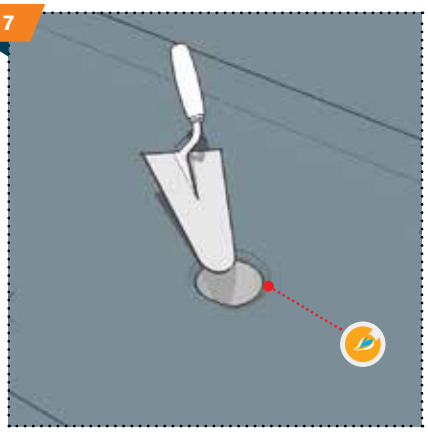
- The drain base must be at least 5 cm recessed in a 0.25 square metre area.
- Apply a piece of membrane sized 50x50 cm.
- Apply the prefabricated drain outlet after spreading PRATIKO MASTIC on the lower flange.
- We recommend treating the upper part of the drain outlet with solvent or bitumen primer, since prefabricated drain outlets are covered with release substances that prevent perfect bitumen membrane adhesion.
- Push the outlet into the housing.

note

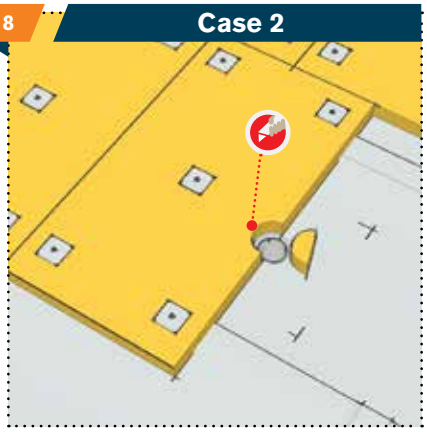
These procedures are not required when using Pluvitec distilled polymer-bitumen membrane prefabricated outlets. Only apply the prefabricated bitumen drain outlet by heat torching the lower flange surface.

DRAINS

7



8 Case 2



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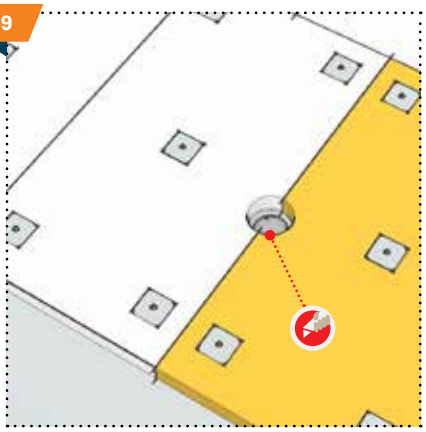

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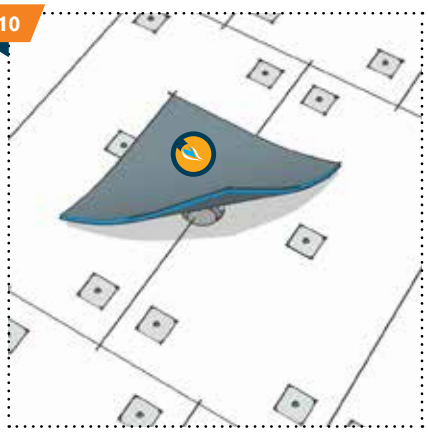

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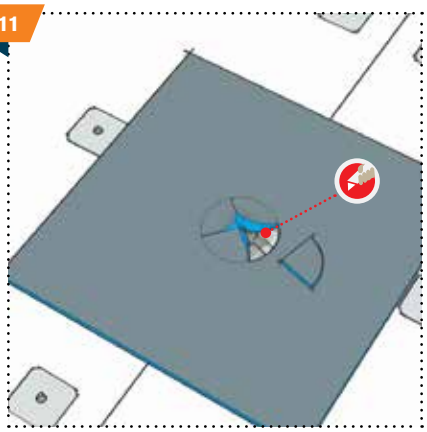

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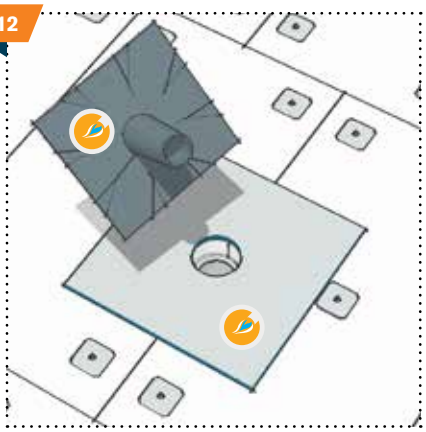

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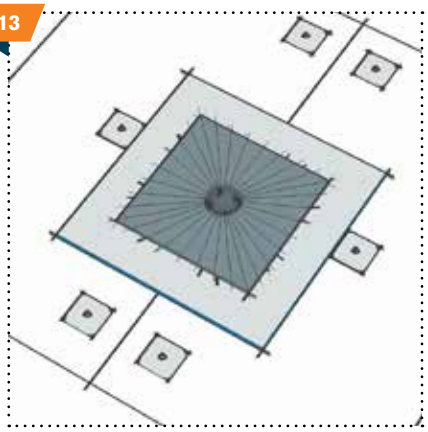

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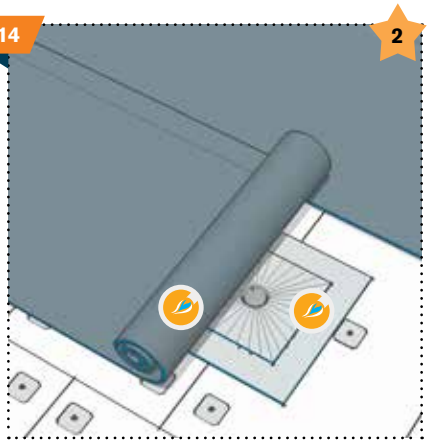

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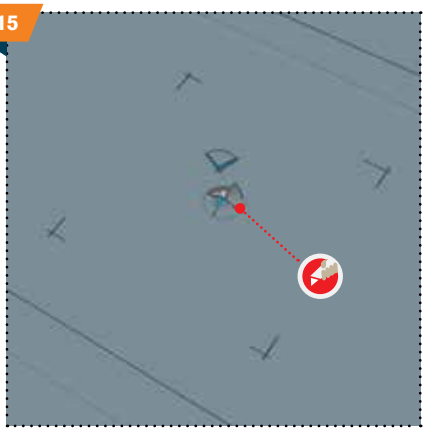


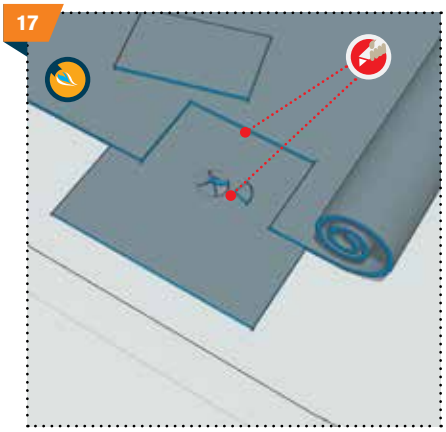
2 note

Heat torch the horizontal surface of the distilled polymer-bitumen membrane by torch or hot air, being careful to have the membrane adhere to the drain outlet and protruding piece of membrane. Restore the drain hole with a cutter. Finish edges with a hot trowel. Protect the drain with the leaf guard or gravel guard for reversed roofs.

DRAINS

16

17



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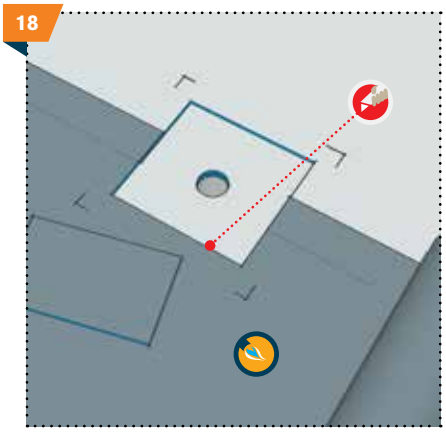

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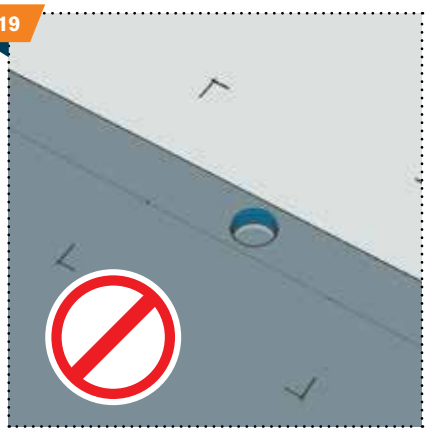
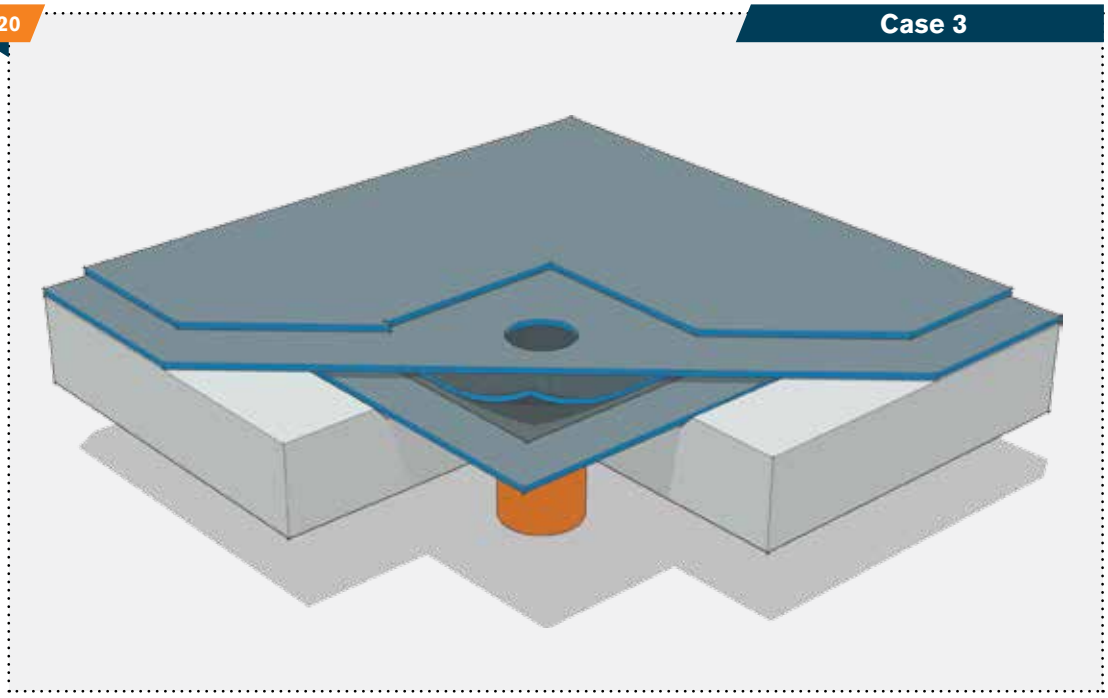


20

Case 3

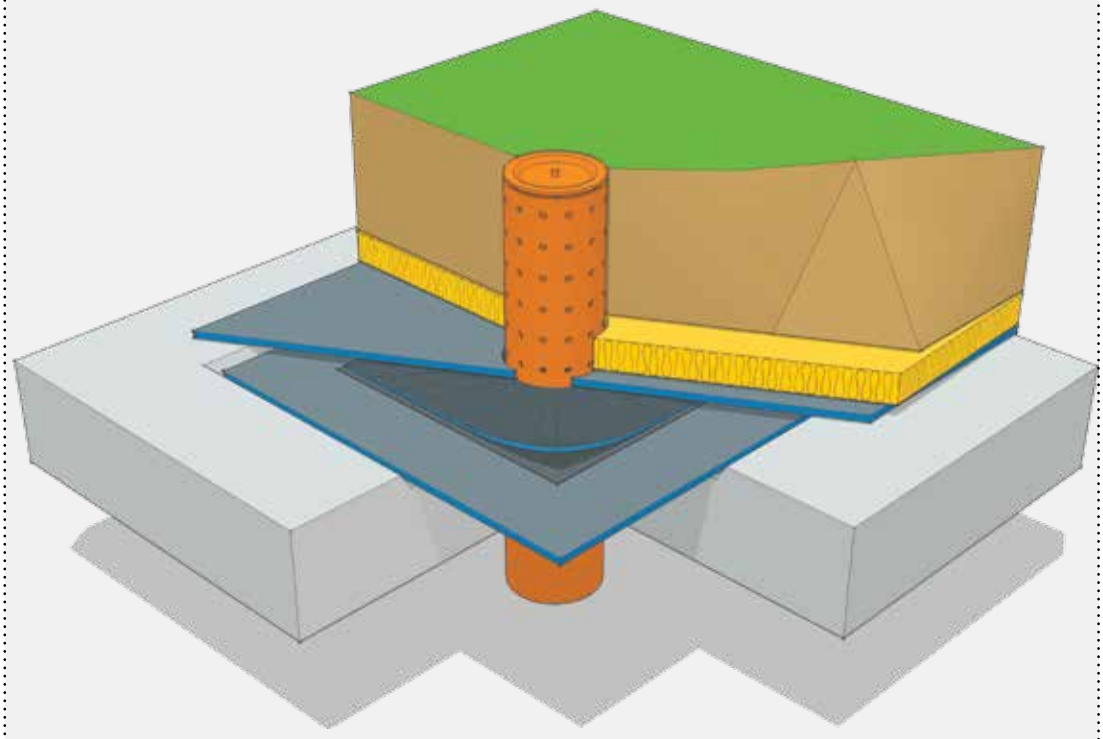


Double layer drain outlet

DRAINS

21

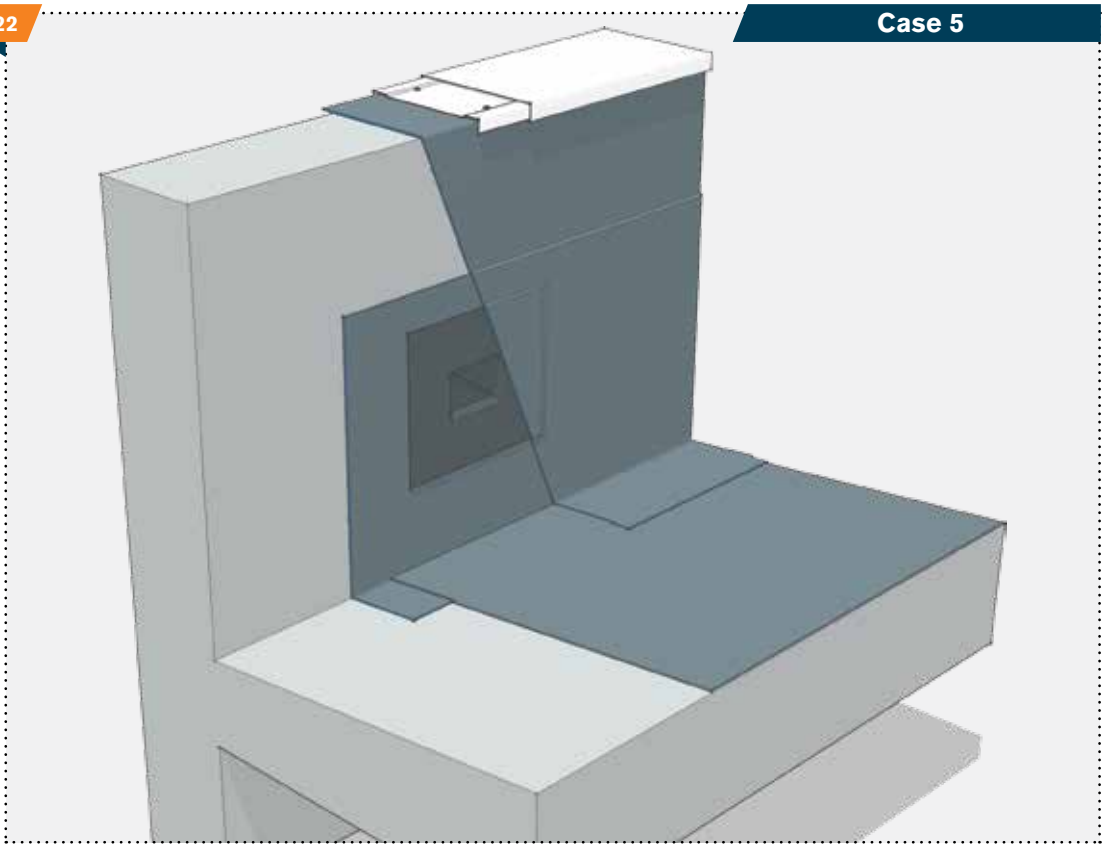
Case 4



Green roof draining drain outlet

22

Case 5



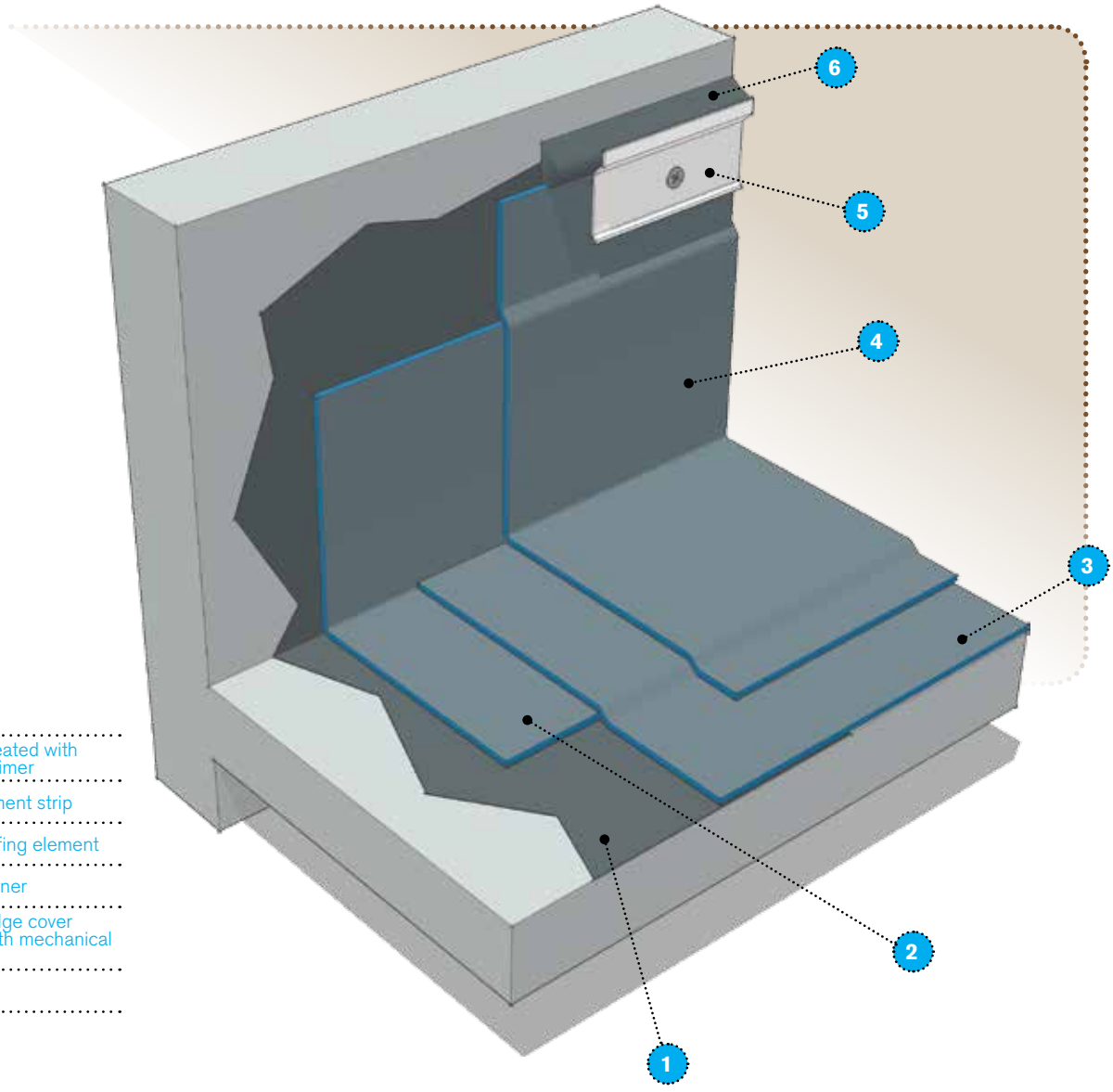
“Overflow” drains

note

“Overflow” drains must be installed to guarantee rain water removal in the event of accidental drain clogging. The drain must be placed midway between the drain and highest point on the surface.

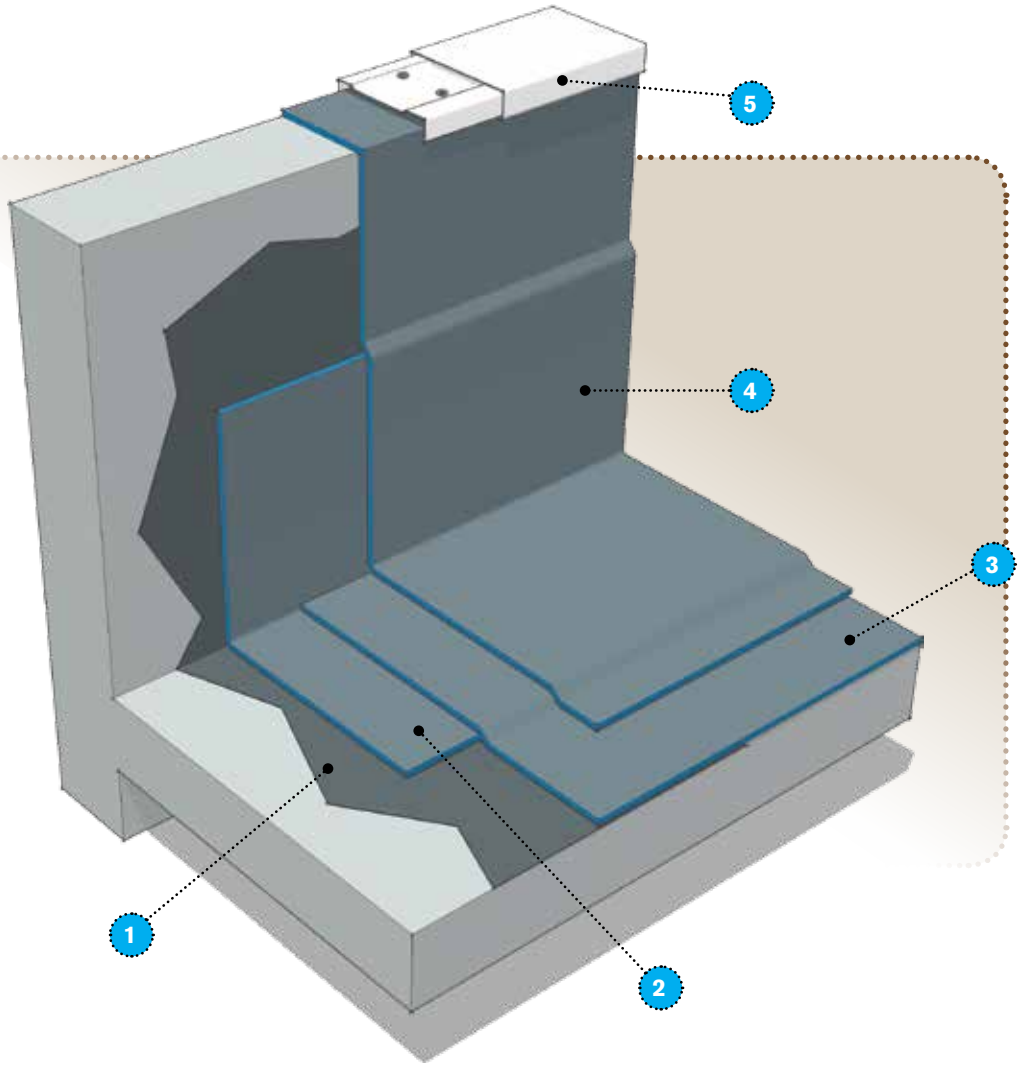
FINISHES

1 Vertical lap finish with flashing



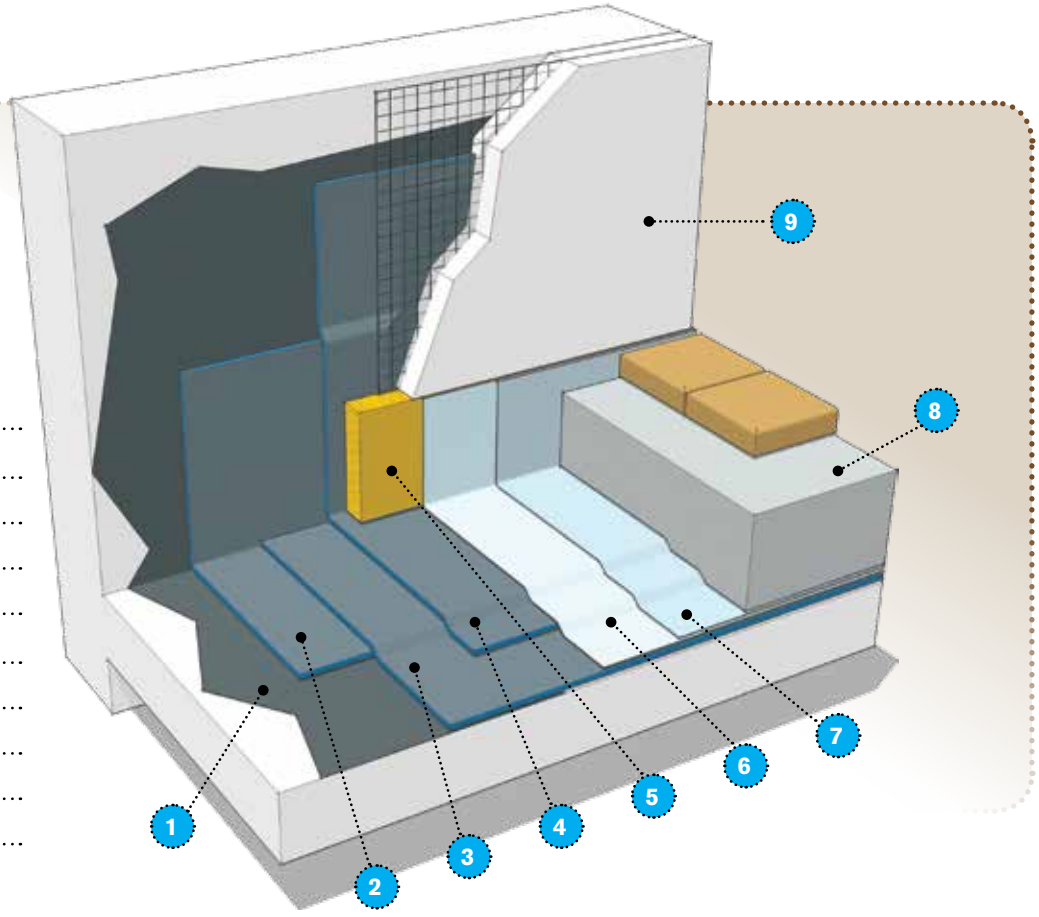
1. Support treated with bitumen primer
2. Reinforcement strip
3. Waterproofing element
4. Double corner
5. Locking ridge cover flashing with mechanical fastening
6. Sealant

2 Vertical lap finish with gutter locking ridge cover



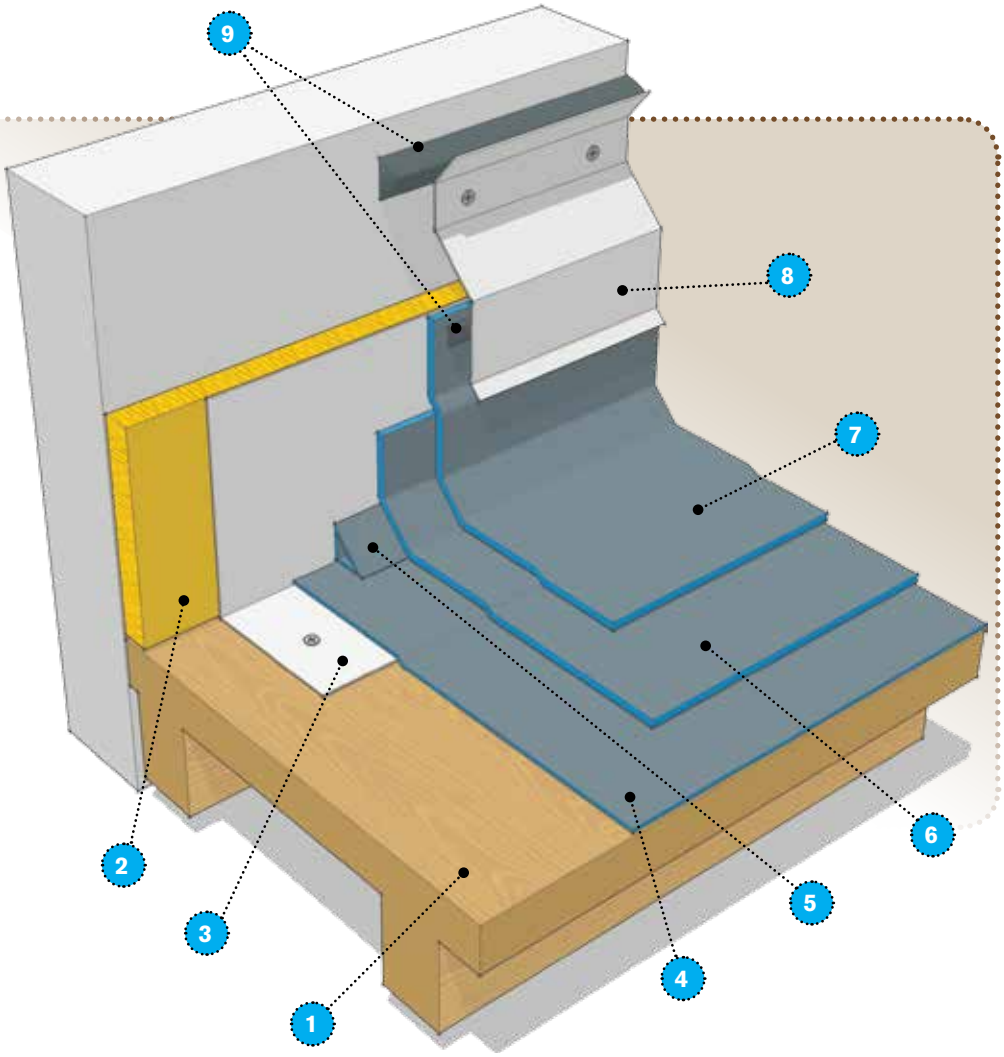
1	Support treated with bitumen primer
2	Reinforcement strip
3	Waterproofing element
4	Double corner
5	Locking ridge cover flashing with mechanical fastening

3 Vertical lap finish under plaster



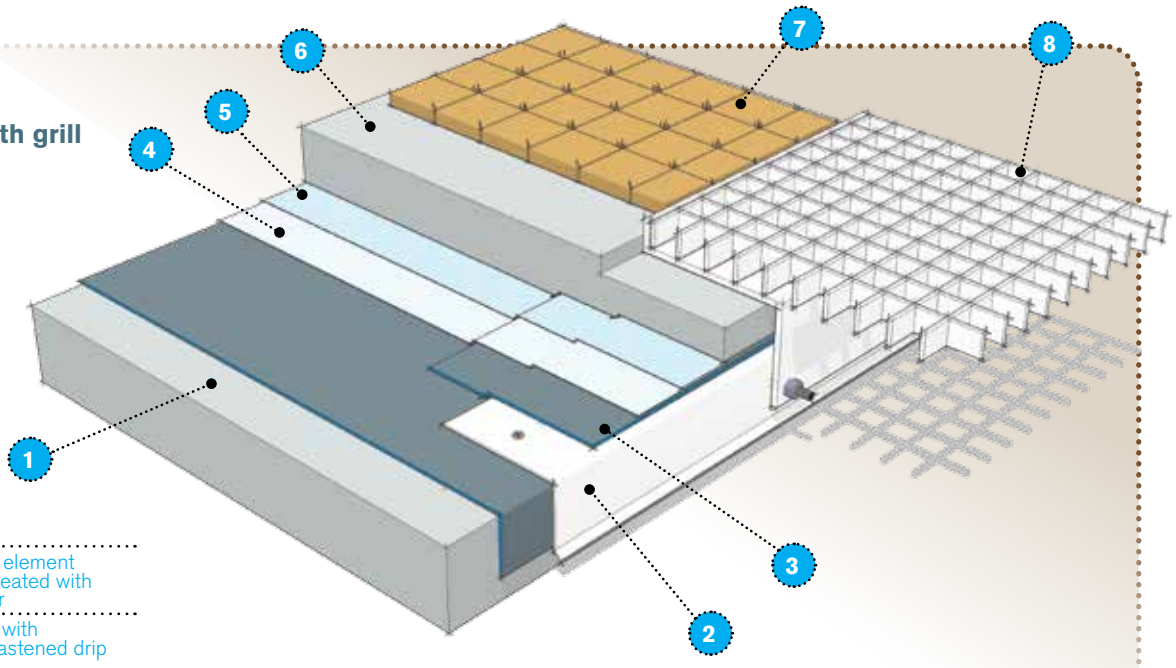
1	Substrate treated with bitumen primer
2	Reinforcement strip
3	Waterproofing element
4	Double corner
5	Perimeter protection collapsing element
6	Anti-puncture element
7	Release element
8	Floor
9	Plaster with mesh

4 Vertical lap finish with wall joint



1	Support
2	Perimeter protection insulation element
3	Metallic profile mechanically secured to the support
4	Waterproofing element
5	CANT BIT angle fillet
6	Waterproofing element
7	Double corner
8	Metallic flashing with joint functions and mechanical fastening
9	Seal

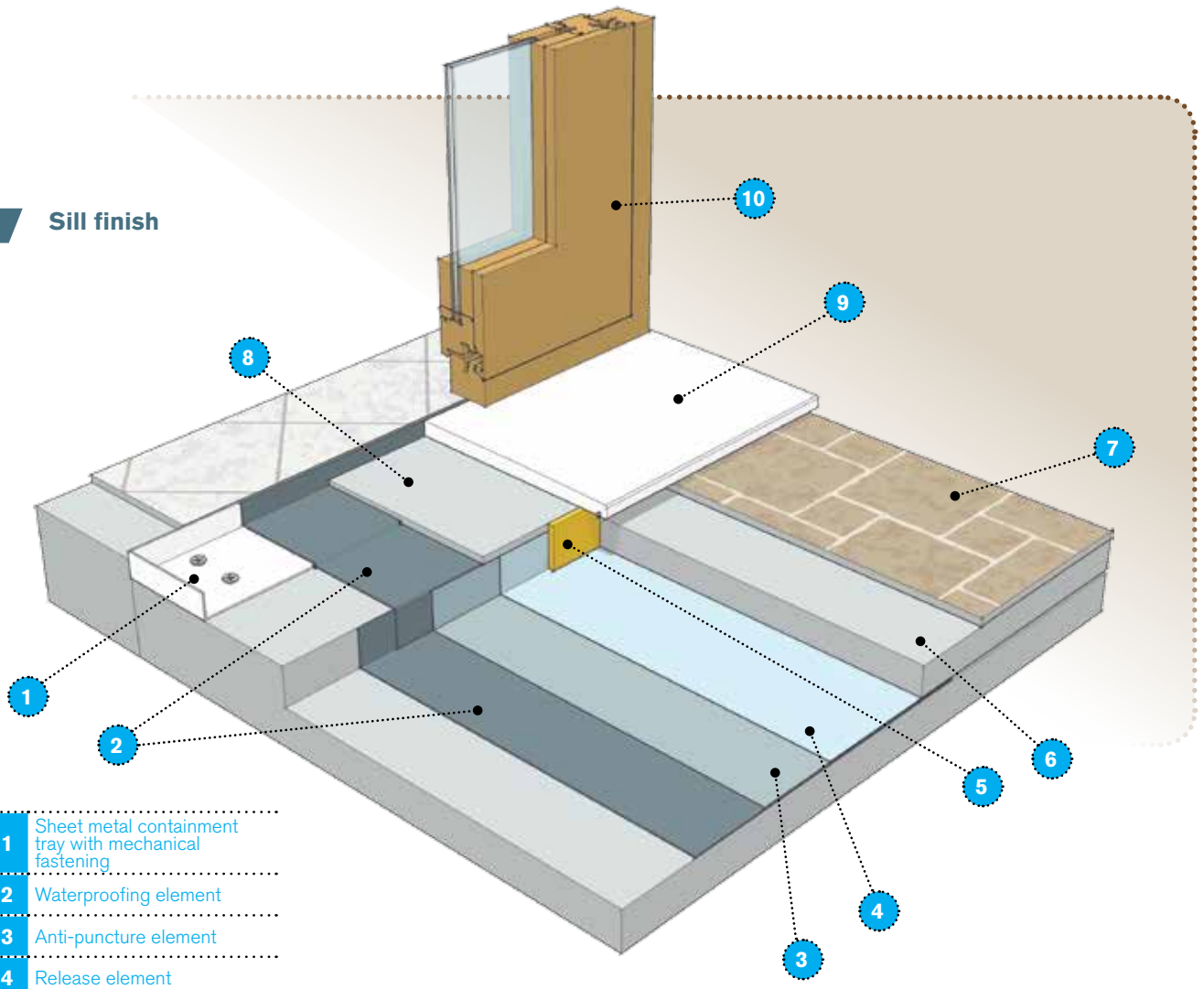
5 Finish with grill



1	Waterproofing element on substrate treated with bitumen primer
2	Support sheet with mechanically fastened drip guard
3	Bitumen membrane closing strip
4	Anti-puncture element
5	Release element

6	Concrete block
7	Floor
8	Road grate

6 Sill finish

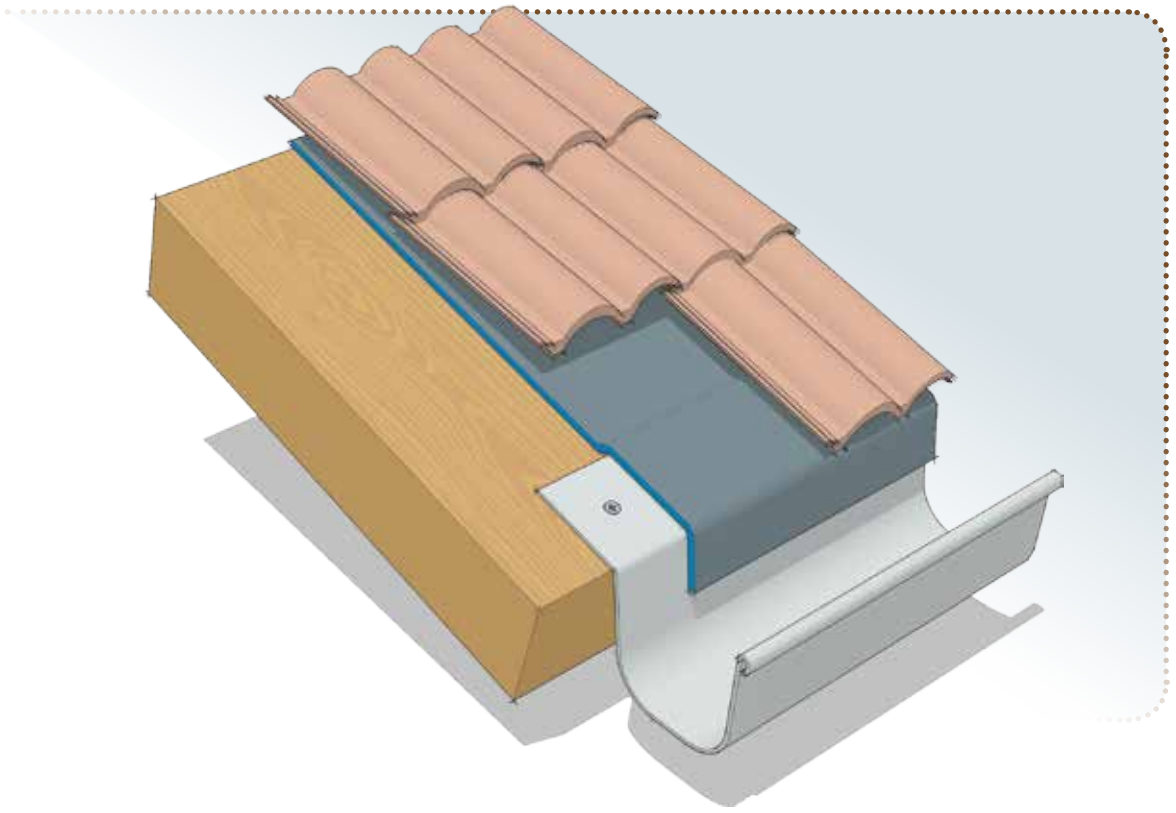


1	Sheet metal containment tray with mechanical fastening
2	Waterproofing element
3	Anti-puncture element
4	Release element
5	Collapsing protection element
6	Cement block
7	Glued floor
8	Mortar bed
9	Sill
10	Frame

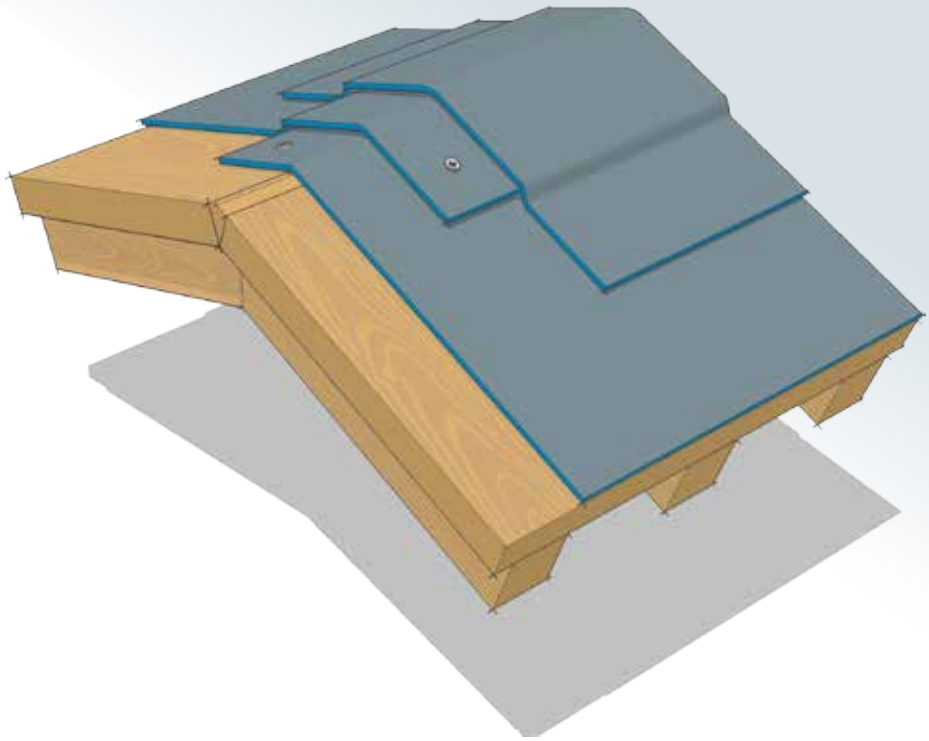
INSTALLATION DETAILS

Details	Individual
1	**Under tile bitumen membrane connection with gutter channel**
2	**Under tile bitumen membrane connection roof ridge**
3	**Double aerator**
4	**Roof joint**
5	**Double roof joint**
6	**Horizontal drain**
7	**U.T.A. support**
8	**Single layer skylight**
9	**Double layer skylight**
10	**Life line rod**
11	**Photovoltaic system fitting**
12	**Recessed tube**

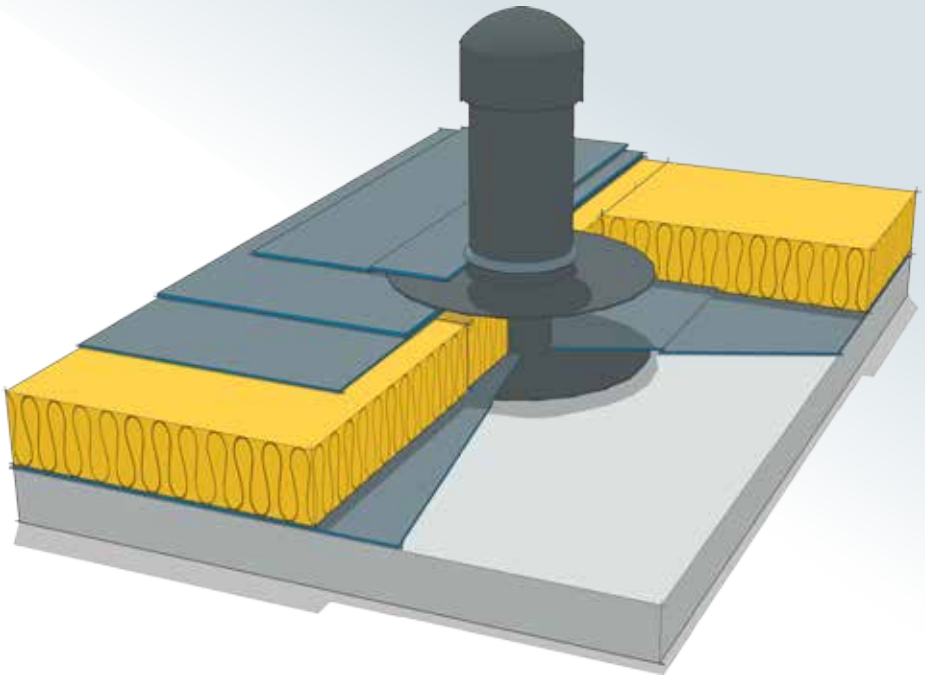
1 Under tile bitumen membrane connection with gutter channel



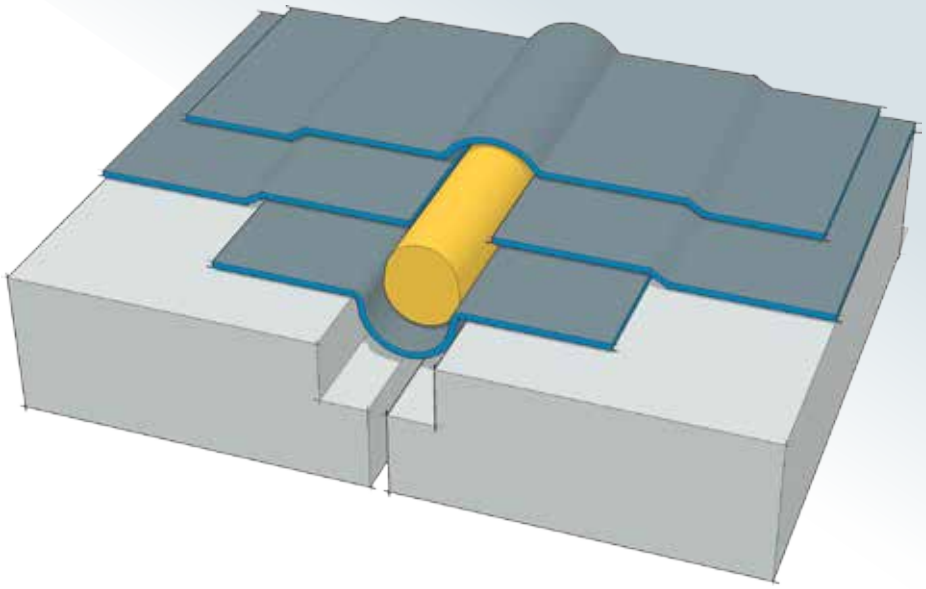
2 Under tile bitumen membrane connection roof ridge



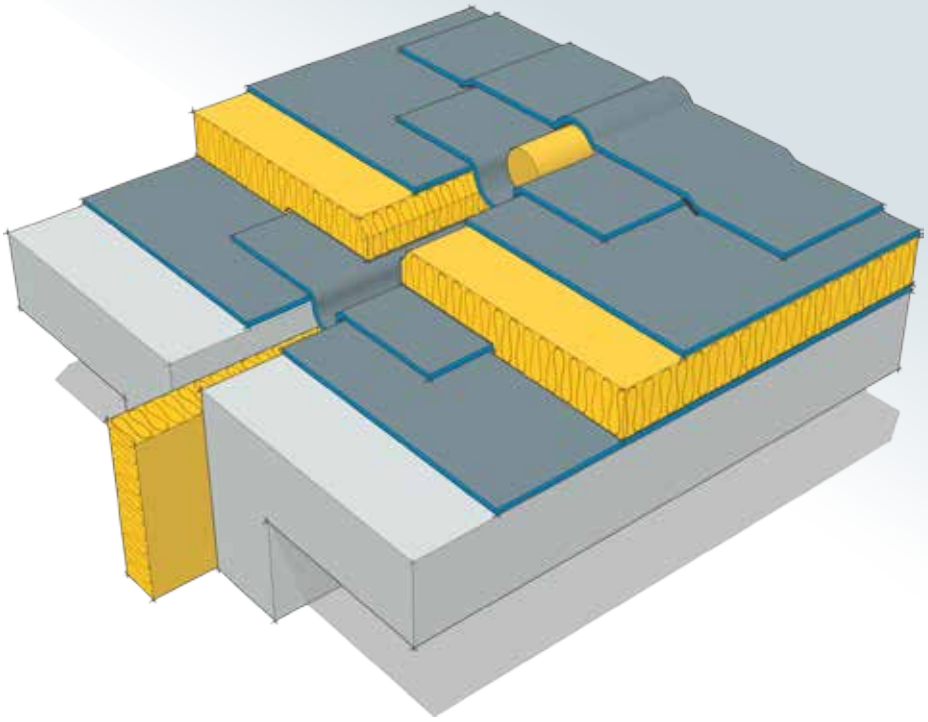
3 Double aerator



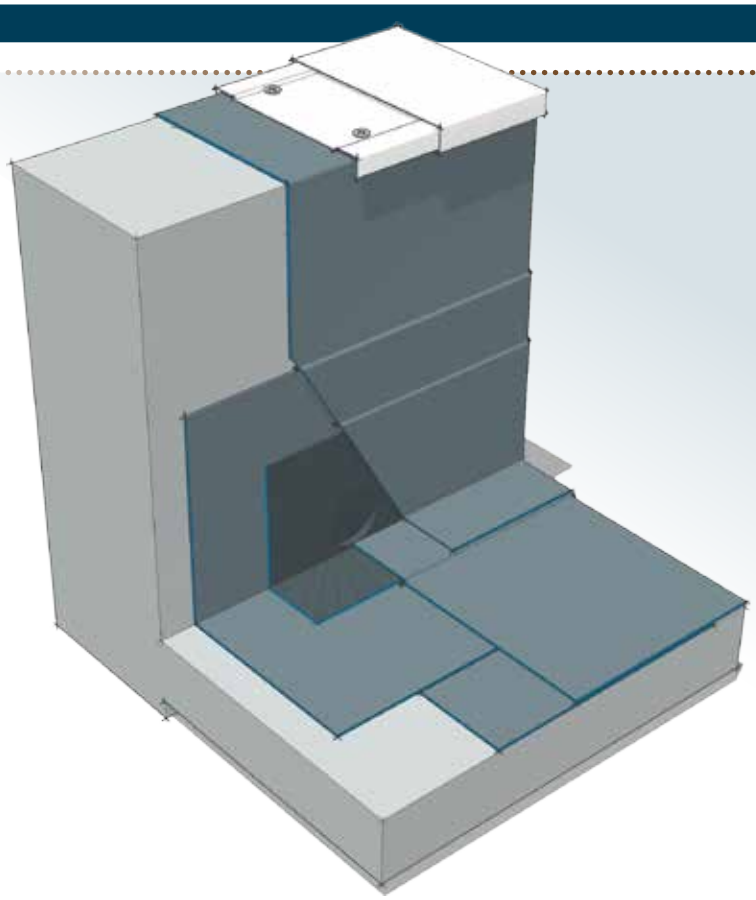
4 Roof joint



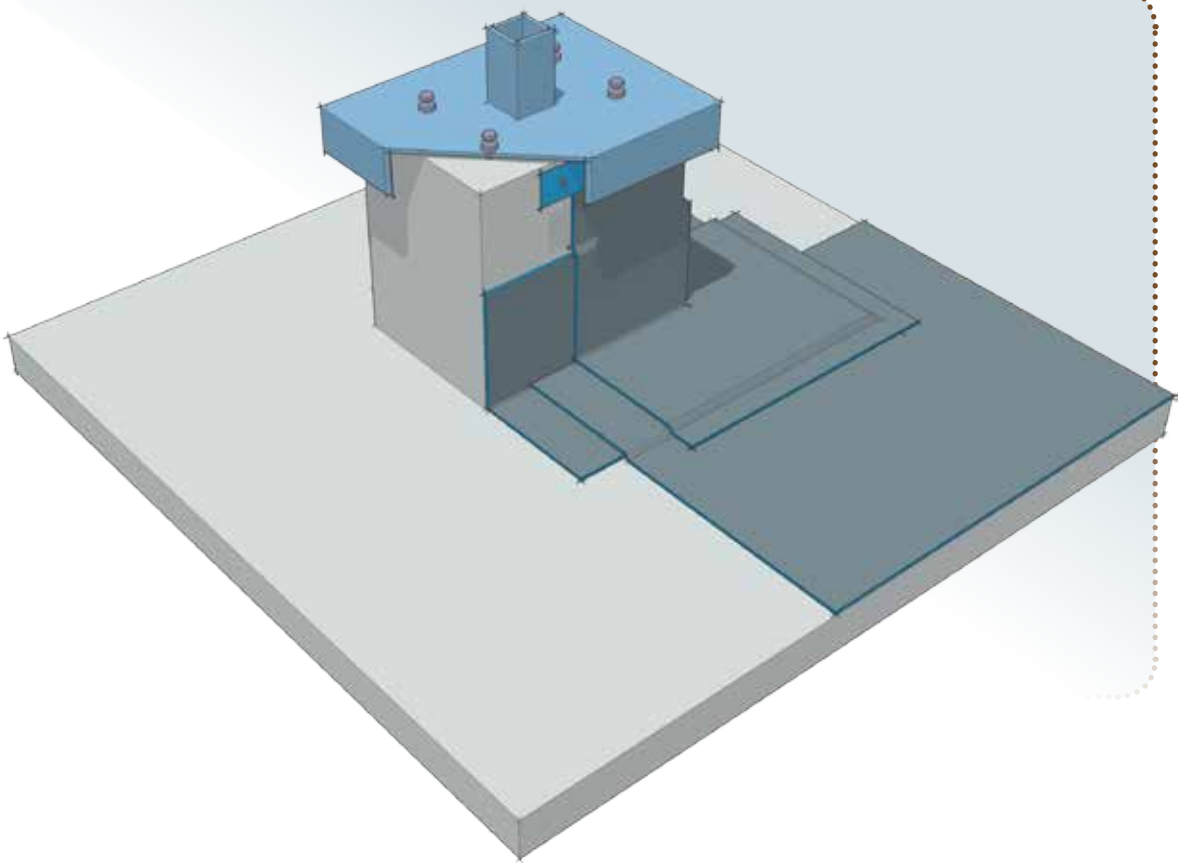
5 Double roof joint



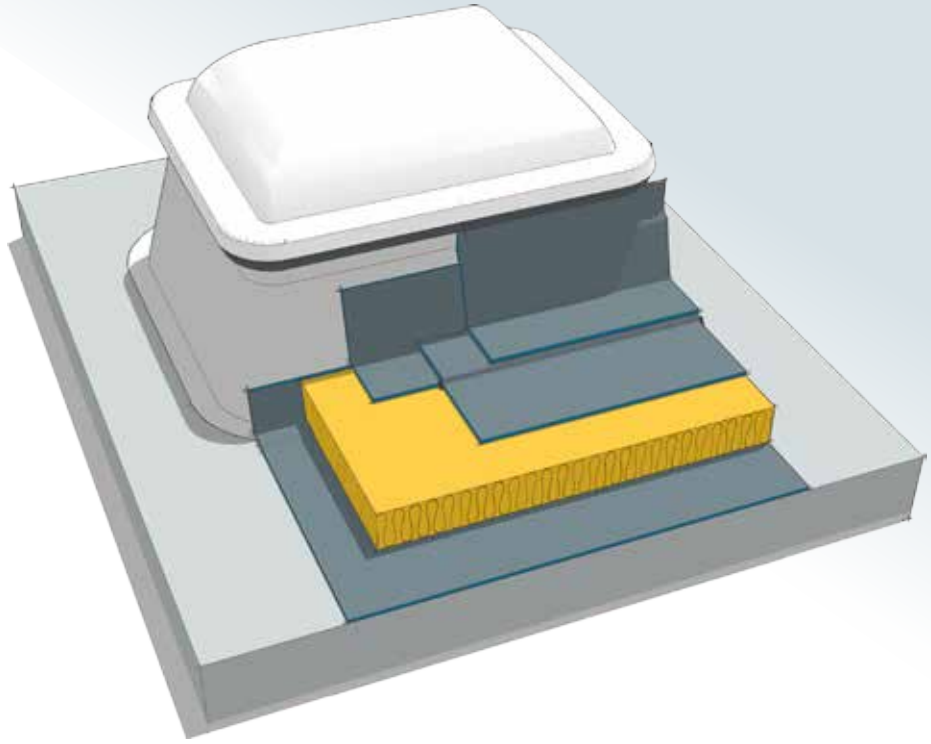
6 Horizontal drain



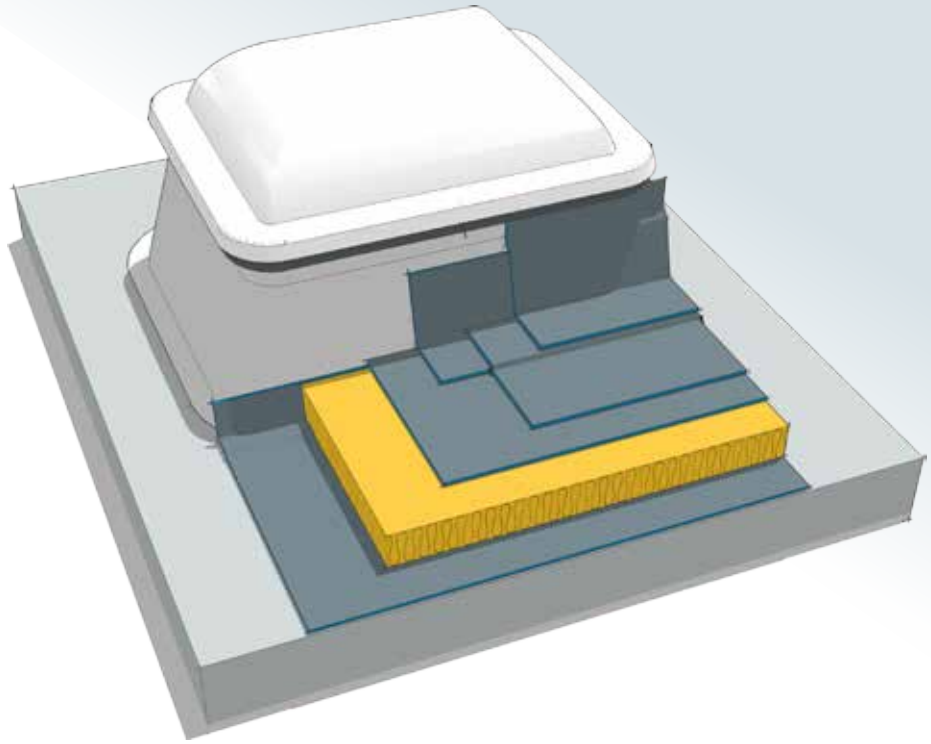
7 U.T.A. support



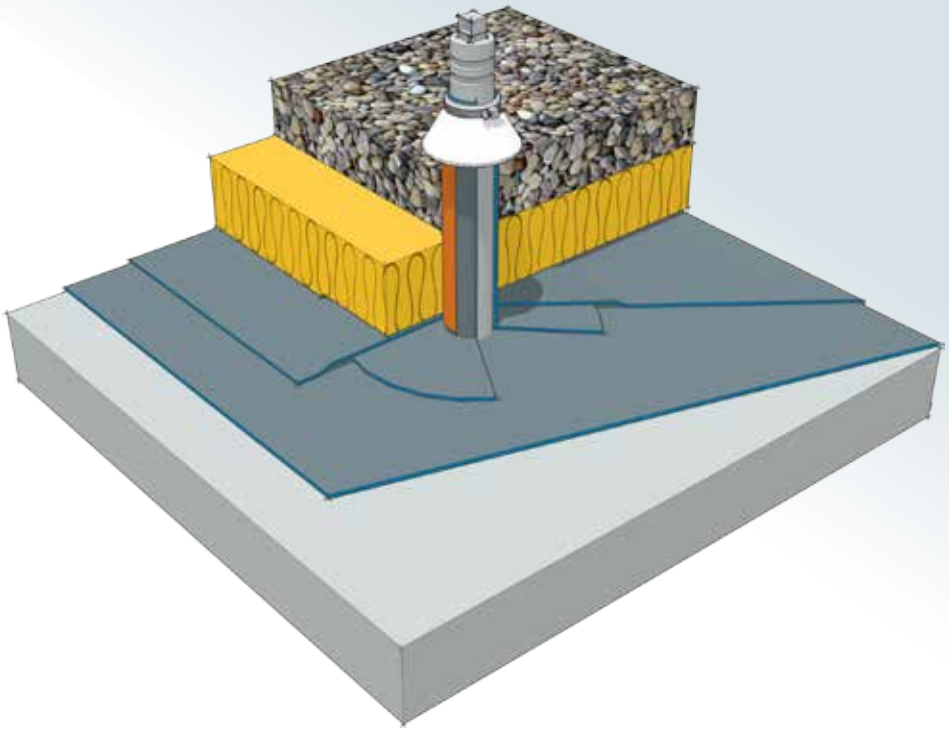
8 Single layer skylight



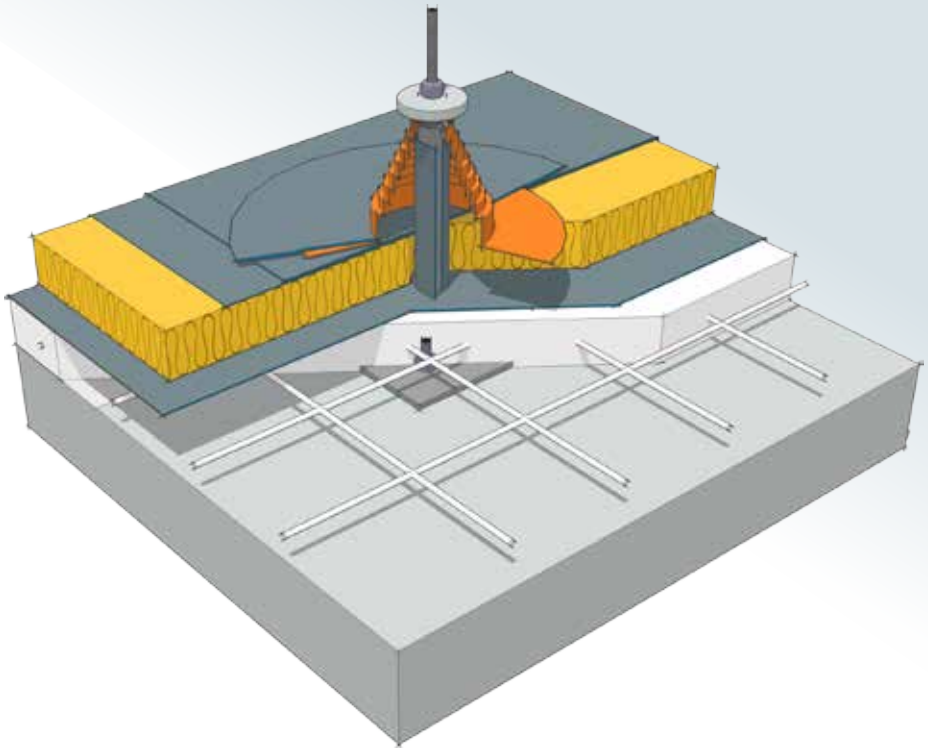
9 Double layer skylight



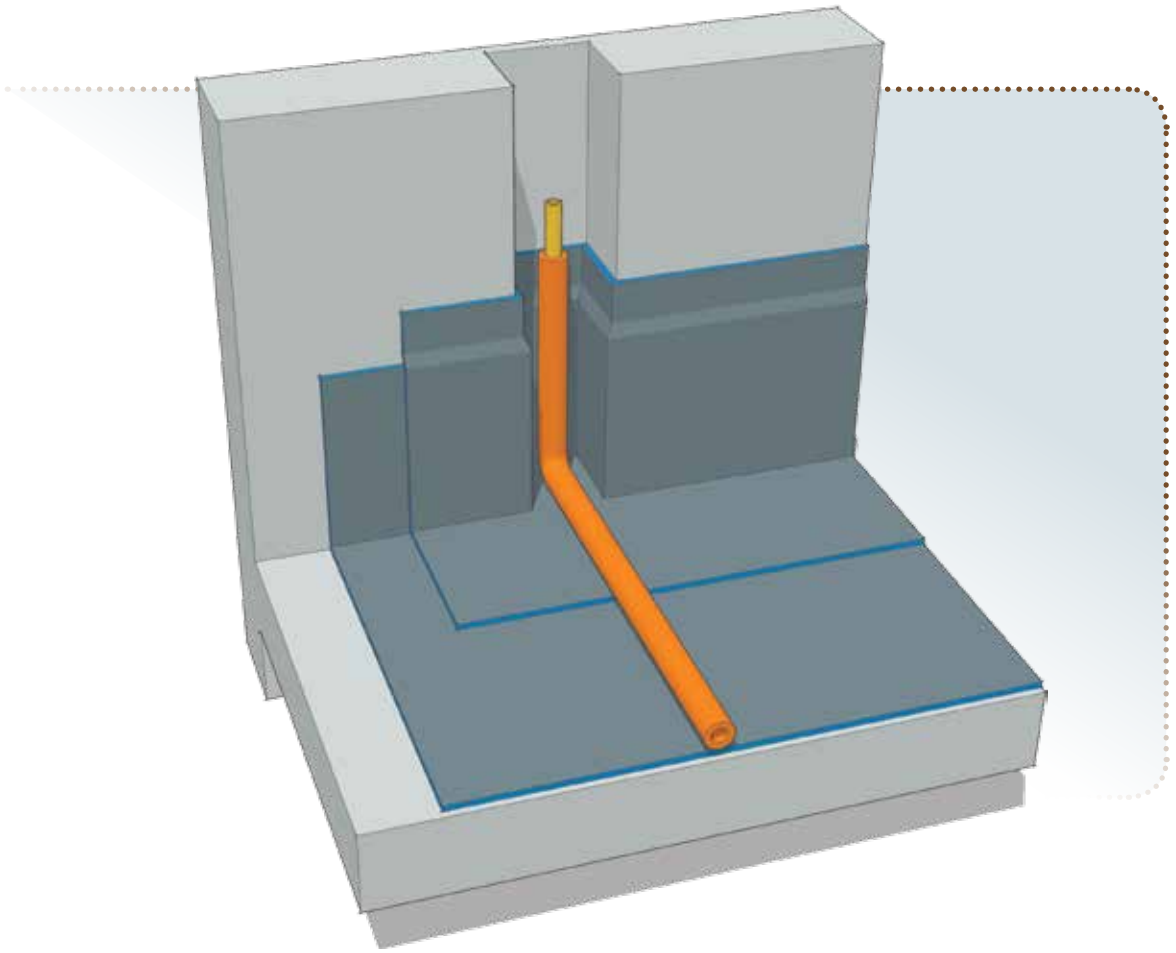
10 Life line rod



11 Photovoltaic system fitting



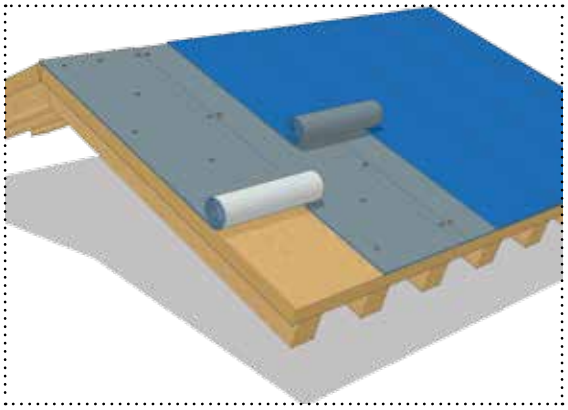
12 Recessed tube



PART APPENDIX
Special torch or hot air applications

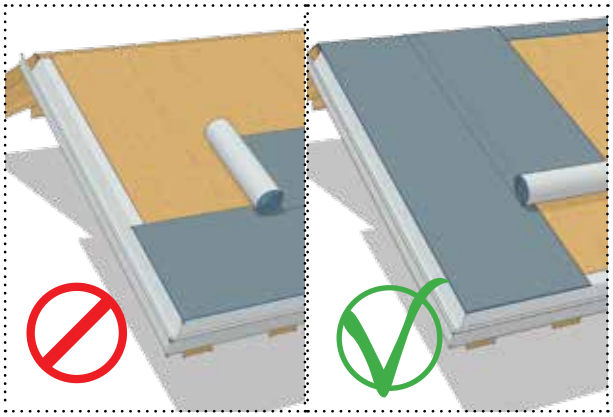
DISTILLED-POLYMER BITUMEN MEMBRANE APPLICATION ON HEAT SENSITIVE & WOOD SUBSTRATES

- For applications on wooden roofs, it is best to place a layer of mono-bitumen such as Monotec between the substrate and the bitumen membrane to act as a fire protection layer; Monotec should be applied loose laid and secured with nails. Continue by fully bonding the bitumen membrane by torch to finish, as indicated in the previous paragraph.
- As an alternative, use the heat activated thermal adhesive membrane from the PLUVITEC range that does not require torch application.



DISTILLED POLYMER-BITUMEN MEMBRANE APPLICATION ON SLANTED ROOFS WITH UNDER TILE FUNCTIONS

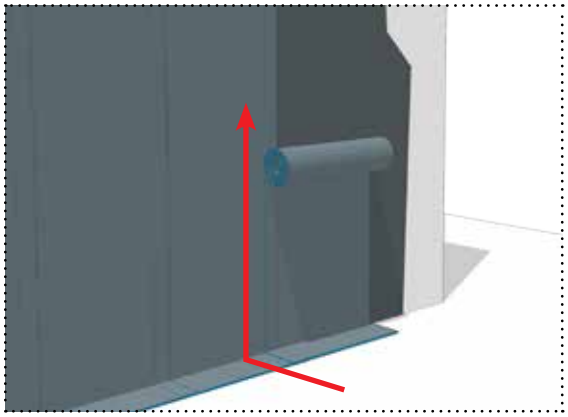
- On ridge, rain and fall lines, waterproofing must be reinforced with distilled polymer-bitumen membrane strips sized 33 cm.
- Place the under tile membrane, unrolling it along the maximum slope line and exceeding the ridge by at least 20 cm.



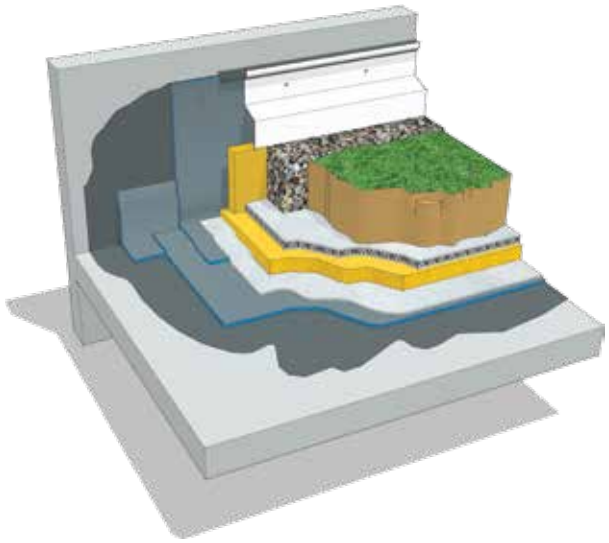
- Apply as indicated in the previous paragraph.
- Install the roof covering (tile, shingles, bitumen tiles, etc.).

DISTILLED POLYMER-BITUMEN MEMBRANE APPLICATION ON CONCRETE VERTICAL WALLS (RETAINING WALLS)

- Apply PRIMERTEC bitumen primer with a roller or airless, approx. 200/400 gr/m^2.
- Place the rolls to size (the fields should not exceed 3 m) on the installation surface, being careful to mechanically secure the tip of the membrane with a rod and nails.
- Overlap sheet sides by 10 cm and 15 cm on head laps where mechanically secured.
- Fully bond the membrane by heat tempering with a blowtorch or hot air.
- Support the membrane until the compound cools to achieve self-support.
- Apply the embossed polyethylene membrane, with mechanical protection, with embossed side facing out (ground), leaving an excess of about 40 cm at the bottom, mechanically securing the tip of the embossed membrane with a rod and nails.
- Place a drain tube over the excess embossed membrane at the bottom of the excavation.
- Fill after placing a draining material bed over the tube.



DISTILLED POLYMER-BITUMEN MEMBRANE APPLICATION IN ROOF GARDENS

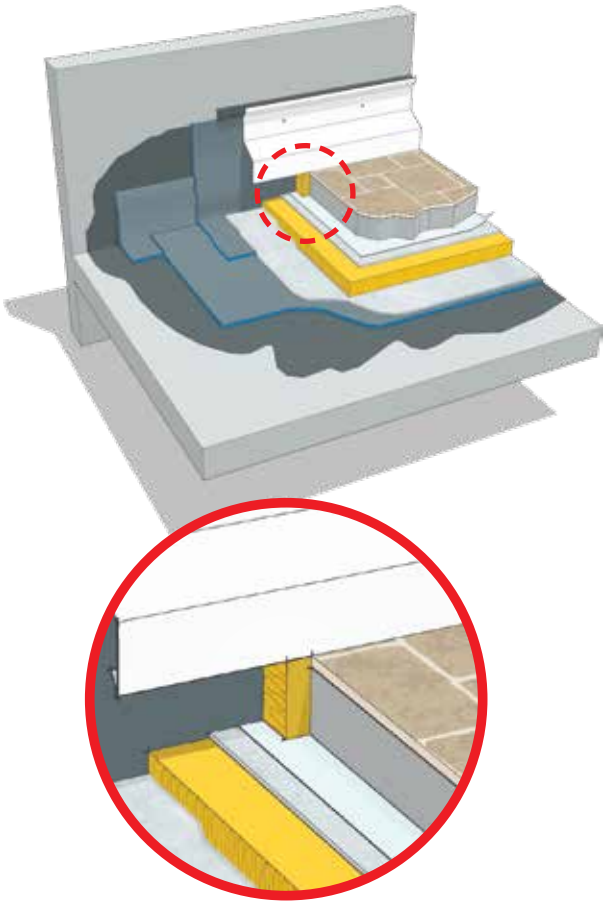


- Use an ANTI-ROOT polymer-bitumen membrane, with special chemical additives (PREVENTOL B2 BAYER) to grant the membrane high resistance to root penetration and aggressive chemical agents such as fertilisers, weed killers, etc.
- The product provides an “anti-root” effect without jeopardising plant life and health in any way.
- Anti-root additives are not washed away by water so the product permanently provides this function.
- Plants such as bamboo, reeds and aggressive hays or high trunk plants or trees are prohibited or discouraged in flower beds or roof gardens.

Other plant species are not suited for roof gardens and the list of plants PROHIBITED by French regulation NF P 84-204-1-1 ANNEX B is provided below.

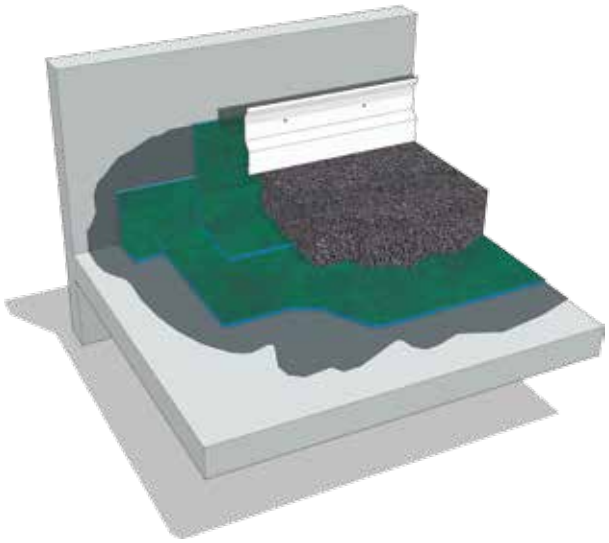
- Bamboo: all varieties.
- Miscanthus and Silver grass.
- Giant aggressive hay; Giant cane, Cord grass.
- Shrubs: Frangula, Black elderberry, Knotweed, Summer lilac, Sandthorn.
- Trees: Willow, Pussy willow, Weeping willow, White poplar, Black poplar, Silver poplar, Canadian poplar, Tree of Heaven, Bald cypress, Pond cypress.
- Evergreens: Acacia, Chestnut, Ash.

DISTILLED POLYMER-BITUMEN MEMBRANE APPLICATION WITH FIXED WALKABLE FLOORS



- In this situation, the waterproofing element cannot be maintenanced, but it is favourably protected from direct sunlight.
- The separation between the waterproofing element and floor, to avoid tangent transmission by friction (due to heat deformations or tangent effects), which could tear the waterproofing element, is guaranteed by the separation release layer (LDPE or equivalent film) and anti-puncture layer (w.n.w. polyester or equivalent).
- The reinforcement in the floor layer must be installed being careful not to hit the waterproofing element.
- Joints filled with collapsible elements must be installed at the perimeter and in protruding bodies to avoid damaging the waterproofing element’s vertical laps.

DISTILLED POLYMER-BITUMEN MEMBRANE APPLICATION ON ROAD DECKS



Use the PLUVITEC distilled polymer-bitumen membrane called VIADUCTS to obtain adequate waterproofing, that should have the following requirements:

- also be applicable on uneven surfaces;
- be resistant to temperature changes;
- be elastic;
- be resistant to static puncture meaning load compression;
- have good adhesion to the support before and after ageing;
- be compatible with the asphalt that will be placed on the viaduct extrados. On this topic, remember that the asphalt application temperature is around 130-150 °C, thus waterproofing must support the weight and mechanical effects of both lorries and the finishing machine;
- be easy to repair in the event of damages due to extraordinary viaduct repairs; have a working life equal to the asphalt.

One of the essential waterproofing assumptions for decks is to have the membrane perfectly adhere to the substrate (fully bonded) and scrupulously ensure that there are not areas were adhesion failed.
This could later create problems for the road asphalt, which would tend to detach in time. Furthermore, on descents or curves, membrane detachment would cause the asphalt to buckle due to underlying waterproof element slippage, dragged by heavy vehicle braking.

SAFETY NOTES (PROPANE/BUTANE GAS TORCH APPLICATION):

- Do not use flames near gas ducts, electrical systems, skylights and flammable surfaces like wooden boards, heat sensitive insulation, etc.
- Before turning off the torch, close the gas valve, then, when all gas has left the pipe, close the torch valve.
- NEVER heat the tank; in winter, use appropriate heating bands.
- Pay special attention near air vents and bored holes, to make sure the flame does not enter the building through these.
- Always keep a suitable number of extinguishers at the work site.
- Rubber hoses are only and exclusively used for gas passage. Using the tube as a cord will break the internal reinforcement, causing it to explode.
- Do not rest the hot bell on the rubber hose.
- Always turn off the torch, even for short breaks.
- Keep the tank vertical; secure it so it cannot move on overhangs.

CEMENT AND METALLIC SUPPORT PREPARATION

Bitumen primers modify the physical-chemical surface properties of the underlying layer. In other words, they block cement dust, close pores promoting correct distilled polymer-bitumen membrane adhesion to the support, making them "mandatory" in exposed bitumen polymer membrane applications or in all applications (retaining walls - vertical and raised) where adhesion is a determinant factor in waterproofing success. They can also be used to prepare metallic substrates as a primer or bond layer.

Substrate preparation

- For best results, the surface to be treated must be clean, without oils, grease, detached parts and must be perfectly dry.

Application

- To create an ideal and even application, we recommend a 200-500 gr/m^2 dose (according to the type of substrate). On set cement with straight edge finish, average consumption is 300 gr/m^2.
- Do not exceed recommended primer quantities to avoid large thicknesses that can cause peeling effects between the treated support and bitumen membrane.
- A roller, brush, broom or spray equipment (airless) recommended for large surfaces can be used to apply the bitumen primer.

Recommendations

- Do not apply primer on wet or very damp surfaces.
- Wait until the primer is completely dry before applying the bitumen membrane.
- Drying time varies according to the temperature: at 20 °C, drying time is 120 minutes for solvent primers on average. For water-based primers, drying time in direct sunlight is 180 minutes at 20 °C or 180 minutes in other conditions.
- For solvent primers, ensure forced ventilation when applying indoors.
- Do not apply at temperatures under 5 °C, in fog or high humidity or before rain.
- Clean tools with aromatic solvents.

PAINT AND VARNISH WITH LIGHT PROTECTION FUNCTIONS FOR WATERPROOFING WITH EXPOSED DISTILLED POLYMER-BITUMEN MEMBRANE

Their purpose

To protect the bitumen membrane from deterioration due to the weather, UV rays and temperature changes.

Support preparation

- Wait until the light bitumen and polymer parts migrate to the surface due to sunlight which then transform into water soluble products and act as a detachment substance. This may vary between 2 and 6/8 months. This phenomenon is more frequent on flat roofs since puddles and stagnated water forms without correct self-cleaning like on slanted roofs.
- Other factors not to be overlooked are the sand or powder used as non-stick finishes on membranes, smog deposits, etc.
- Waiting for the entire indicated period may not be sufficient. At time the roof may require cleaning with water and detergents (10% sodium phosphate solutions); with caution, low pressure washers can be used.
- After cleaning, we recommend waiting at least 2/3 days before painting.
- The above wait times before painting are not required when using PLUVITEC membranes with a polypropylene mat finish on the upper face since they do not require any preparations.

Application

- Apply two coats of paint, preferably intersecting, consuming between 200 and 400 gr/m^2 according to the type of support: for a smooth black membrane about 100/150 gr/m^2 will be consumed per coat, for a slate membrane, 200/250 gr/m^2 per coat.
- Do not exceed the recommended paint quantities to avoid peeling effects or, worst case scenario, MUD CRACKING.
- High solvent paint thickness does not allow for even paint drying; the thickest layer will tend to soften the bitumen, scaling (due to the high thickness) also effecting the bitumen compound.
- Use a roller, brush, broom or spray equipment (airless recommended for large surfaces).

Recommendations

- Even if paint is generally ready for use, we recommend you always mechanically mix the product (drill with mixer).
- Do not apply paint on wet or very damp surfaces.
- Wait until the first paint coat is fully dry before applying the second coat (drying time may vary according to temperature: at 20 °C, drying time is 6 hours on average).
- Do not paint at temperatures under 5 °C, in fog or high humidity or before rain.
- Do not paint during the hottest hours of the day, to prevent the excessively hot membrane from accelerating the paint film process, triggering poor adhesion.
- Paint or varnish cannot be walked on except for ordinary roof maintenance.
- Clean tools with hot water for water based paint and with aromatic solvents for solvent based paints.

Paint duration

- Duration is conditioned by many factors (UV, temperature, smog, pollutants, water stagnation on the surface).
- Even the heat insulation element under the roof effects roof working temperature, thus the paint.
- It is extremely difficult to determine the duration of paint on a roof. The only certainty is that paint will last less than the waterproofing surface thus it must be periodically maintained (ordinary maintenance).

White reflective paints for Cool Roofs

- In addition to extending roof life, the special innovative VOLTAIKA white reflective paint finish reduces the exterior and interior building surface temperatures with significant energy consumption savings.
- Furthermore, high emissivity promotes the dissipation of heat accumulated over night.

Advantages

- Emissivity and light reflection: VOLTAIKA reflects and increases diffused and direct light, increasing photovoltaic system yield.
- Excellent VOLTAIKA emissivity promotes the dissipation of heat accumulated over night.

Temperature

- Significantly reduces the temperature.
- In the summer, the temperature of a black membrane is about 75-79 °C. The temperature of a membrane coated with VOLTAIKA in the same period is 45 °C. The temperature in the intrados drops by at least 5 °C, with significant air conditioning cost savings.
- A roof with a coat of VOLTAIKA is a “cool roof”, thus able to reflect incident solar radiation and with high intrados emissivity values, allow the roof to return most the absorbed solar radiation to the air through heat radiation.

SURFACE MAINTENANCE AND CARE

[Taken from the "Programmed maintenance manual"]

MAINTENANCE

The purpose of waterproofed roof maintenance is to ensure it maintains its main characteristics in time such as:

- correct rain water removal;
- waterproofness;
- durability.

Scheduled maintenance will allow the roof to reach its maximum waterproofing potential over its working life. Maintenance is thus essential and should also be planned for insurance purposes.

Surface waterproof system maintenance.

- The surface waterproofing system is designed according to building use.
- Should use vary, analyse current system conditions to ensure practicality and make necessary changes to suit the new use.

SURFACE MAINTENANCE GUIDE

Have maintenance personnel inspect the surface at least once a year.

1. Inspection includes removing all waste and deposits, especially around drains (gutters, overflow, grooves, etc.).
   Stagnated water on the roof often negatively affect the working life. This occurs for many reasons: in fact stagnation increases the static overload, promoting the growth of vegetation and inducing potentially hazardous stress in alternating freezing/defrosting cycles.
   Also keep in mind that stagnated water creates environments favourable to mould, bacteria and micro-organism growth which can also become aggressive from the chemical and physical standpoints (mud cracking).
2. If the system is protected with varnish or paint, periodic touch-ups are required.
3. Any cut or tear repairs on the system must be performed and/or coordinated by the contractor who installed the roof.
4. Companies other than roof maintenance companies, who work on the roof for different reasons must take all the necessary measures and caution to avoid damaging the surface (i.e.: falling objects, dragging materials, solvent or lubricant leaks, etc.).
5. If there are pass-through holes on the roof, areas not waterproofed with PLUVITEC membrane must be filled with PRATIKO MASTIC non-shrink stable mastic while the upper part must be completed and crowned with the use of straps or special protective caps.
   Matco S.r.l. does not guarantee pass-through hole performance.
6. If the roof is walkable, Matco S.r.l. recommends installing floating floors on specific support feet. Avoid securing ducts or cables directly on the PLUVITEC membrane, anchoring these parts to brick elements or seek advice from specialised personnel.
7. We recommend creating protected pathways to air conditioning units and machinery or elements requiring maintenance in general.
   This can be achieved with an appropriate floating floor, inserting a 200 gr/m^2 polyester or polypropylene non fabric layer.
   We recommend specific elevated platforms for machinery to permit maintenance or inspections of the underlying waterproofing membrane.

MAIN CHECKS

DRAINS

- Drains can be the cause of potential leaks. When inspecting the surface, remove debris from gutters to ensure rain water evenly flows to drain pipes.
- When debris accumulates in gutters, water flow slows causing accumulation and flows over unforeseen paths.
- The best time to inspect the surface, with special focus on drains and rain pipes, is in the autumn, after leaves fall.

WATER STAGNATION

- Check for an improper water draining.

GUTTERS

These are the metal or other rigid material gutters that protect the membrane near verticals like, for example, expansion joints, ridge covers, sun bands.
When inspecting the ends of the roof, check for:

- any missing or loose fasteners;
- any missing or loose joint covers;
- rust on metallic parts;
- bond cracks and/or ageing that could collect and direct water through end joints.

PASS-THROUGH ITEMS

- Pass-through items are pipes, drains, wire raceways, conduits and curbs.
- The improper addition of these items after original waterproofing system installation may cause severe damages to the waterproofing system and thus the entire building. When additional accessories need to be installed after the waterproofing system is completed, only specialised personnel is authorised to cut, remove and bond the pre-existing surface.
- These pass-through items should be secured using gutters to ensure correct bond and waterproofing.
- Non-waterproofed areas around pass-through items should be filled with a sufficient amount of PRATIKO MASTIC. Also inspect and ensure that the Pluvitec membrane fully adheres to the rising item flange.

MEMBRANE CHECKS ON MAIN PARTS

The flat roofing surface is then inspecting, checking for damages due to:

- debris whose movement could damage the membrane;
- any metallic machinery panels on the surface, placed on the flat surface, which could puncture or cut the membrane during inspection and repairs.
- Look for the following defects during inspections: cracks, open joints, membrane or surface lining deterioration, potential membrane stains or holes, partially detached areas, excessive folds, bubbles or ridges. Also check membrane fastening element and support integrity and that water is adequately drained.
- When cleaning the membrane on the surface, avoid using high pressure washers on the membrane which could damage joints.

MEMBRANE REPAIRS

- The membrane surface should be clean and dry before installing a PLUVITEC membrane patch by heat tempering with blowtorch or hot air.
- If these products are not available, use PRATIKO MASTIC sealant until the contractor can perform permanent repairs.

LEAKS NEAR METALLIC GUTTERS

- Loose or missing fasteners should be correctly secured or replaced. Bonding near metallic gutters could deteriorate in time, due to ageing, requiring the application of PRATIKO MASTIC sealant.
- Structural movements could cause sudden gutter deformations, generating openings in the surface that could channel water through joints in the building. Accurately inspect exposed membrane sections where this phenomenon could occur.

Date

Site

Notes

Order

Date

Site

Notes

Order

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Company with certified system

ISO 9001 ISO 14001 OHSAS 18001 ECO 100

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