APPLICATION OF DISTILLED POLYMER-BITUMEN MEMBRANE

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

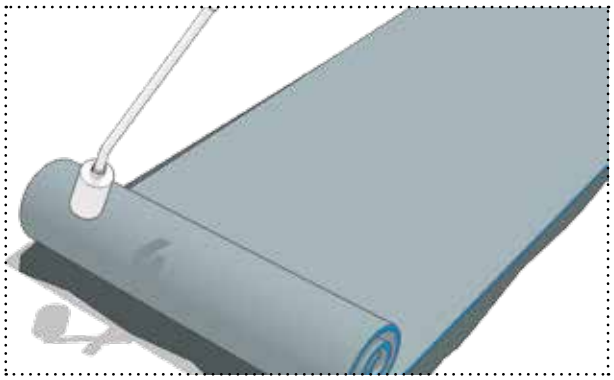
- **THE LABOUR**
- **THE MATERIAL**
- **THE TECHNICAL SOLUTION**

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.

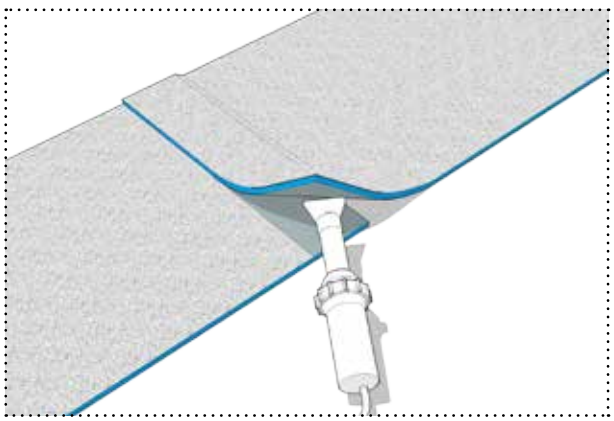
WATERPROOFING SYSTEMS

The 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.



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 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.

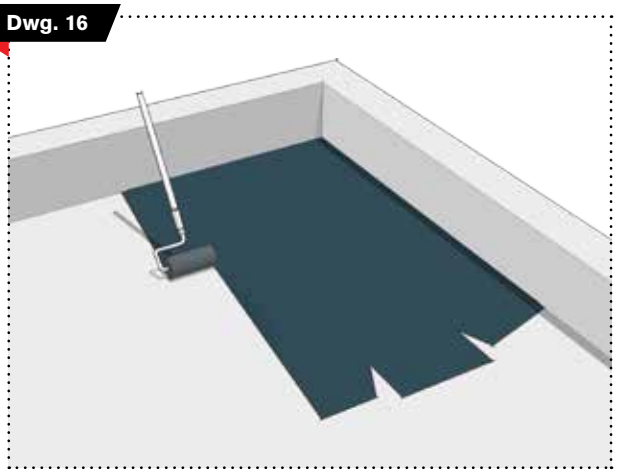
Failed waterproofing system adhesion also promotes other problems such as:

- 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

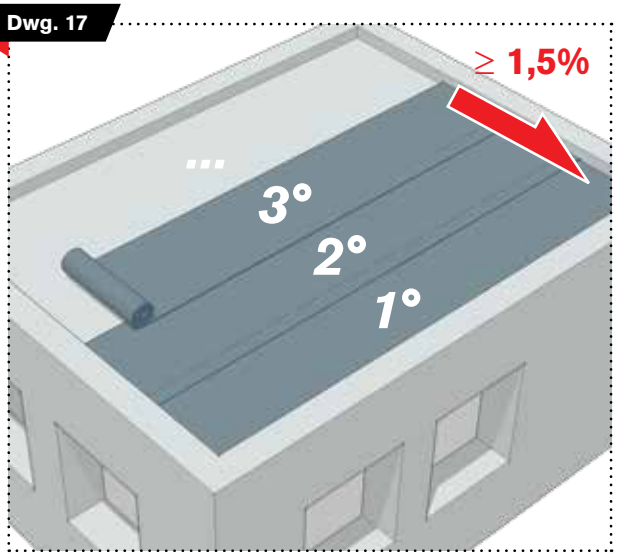
- On cement or similar surfaces, apply by roller or airless suitable bitumen primer approx. 300 gr/m^2 **(Dwg. 16)**.

Dwg. 16



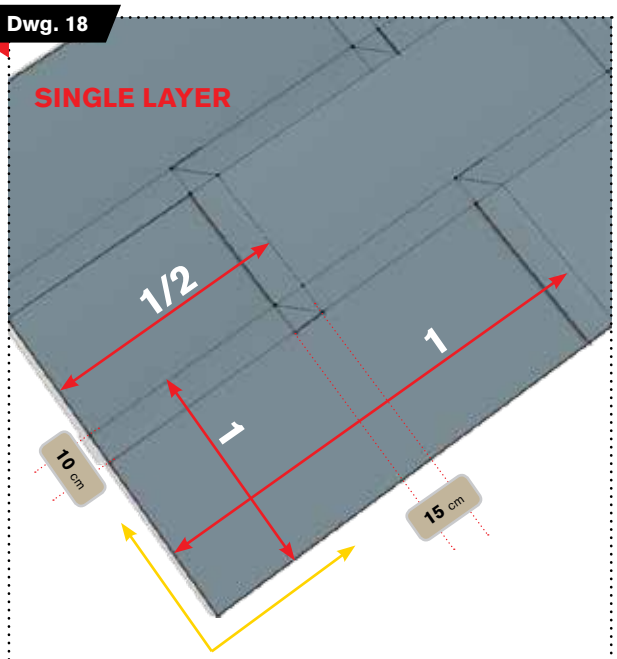
- Apply by torch a 25 cm strip of polyester reinforced bitumen membrane on all vertical app-stand corners.
- To promote the slope, always start placing the membrane sheets from the lowest point **(Dwg. 17)**.

Dwg. 17



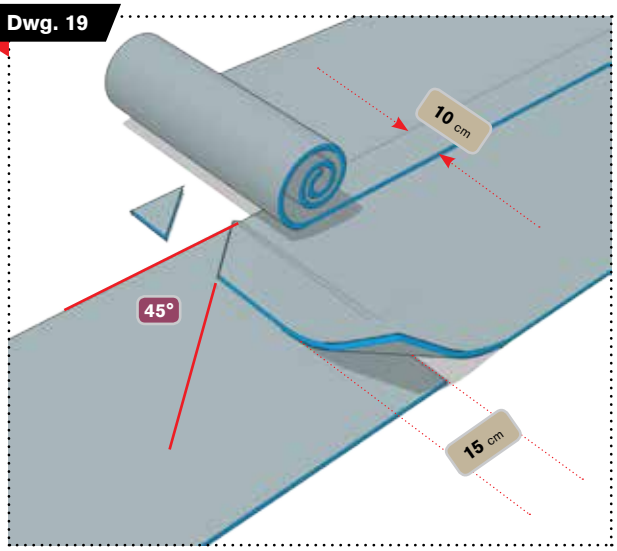
- Place the sheets alternating the overlapsto avoid creating joints against the slope towards the drais **(Dwg. 18)**.
- Cut membrane corners that would overlap with the next sheet at 45° angles (10 x 10 cm) **(Dwg. 19)**.

Dwg. 18

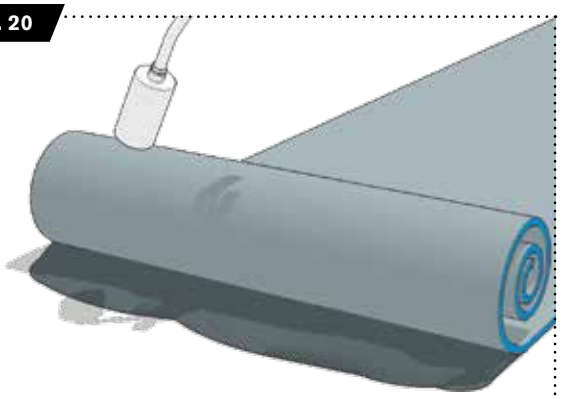


- Joins between the sheets, side & head, must respectively have at least 10 and 15 cm overlaps. **(Dwg. 19)**.
- After aligning the sheets with adjacent ones, roll them from the ends towards the centre to then weld the two portions.
  Use a propane gas or hot air torch to apply the bitumen membrane to 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



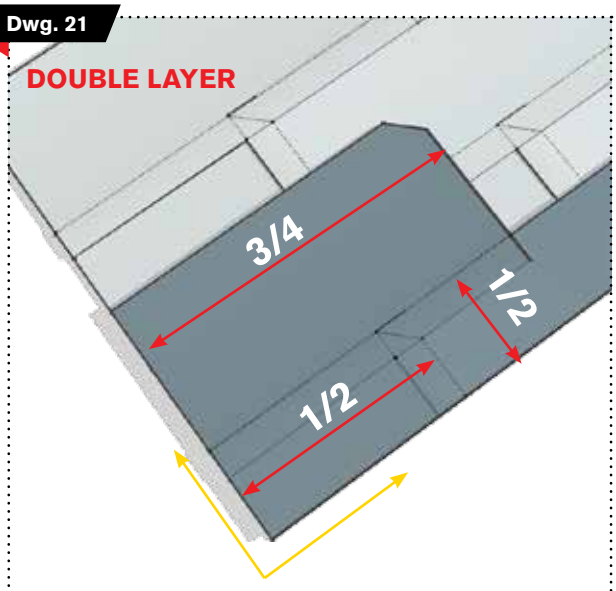
Dwg. 20



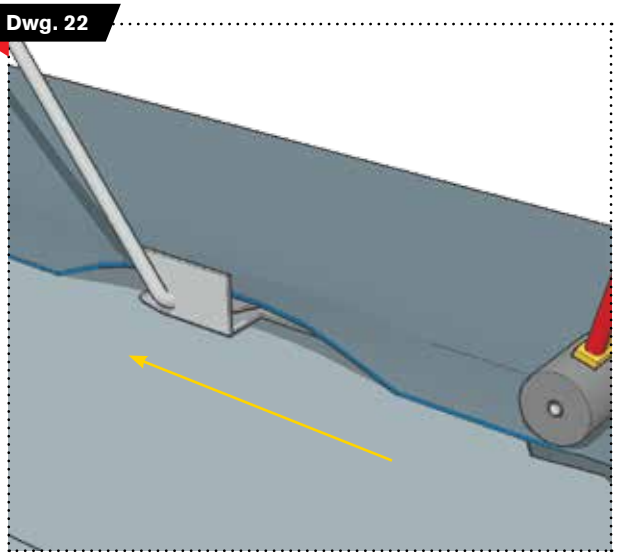
in front of the roll to saturate all support pores. **(Dwg. 20)**.

- 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)**.

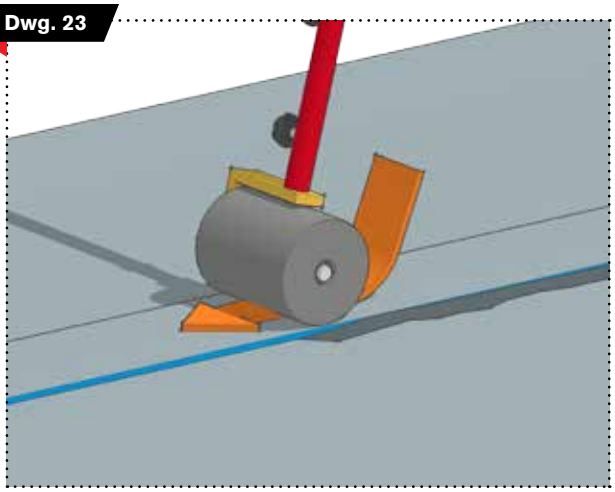
Dwg. 21



Dwg. 22

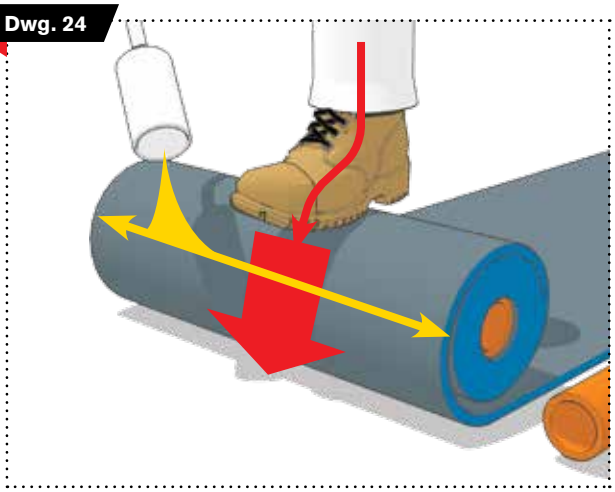


Dwg. 23



- 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)**.

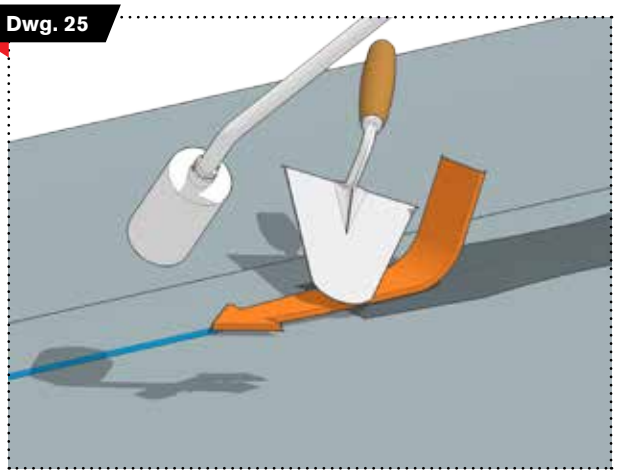
Dwg. 24



"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

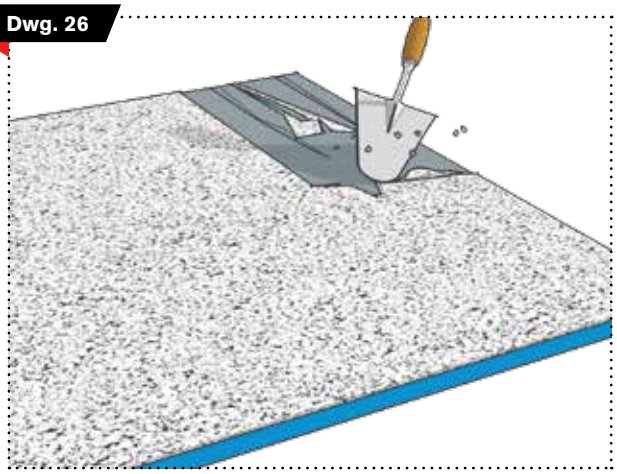


- Apply vertical up-stand membrane with the same characteristics as the horizontal area and dimensions equal to the roll width, which will overlap the horizontal surface by at least 10 cm, and heat welded by gas torch or hot air, pressing laps with a hot trowel to have the melted compound protrude to 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

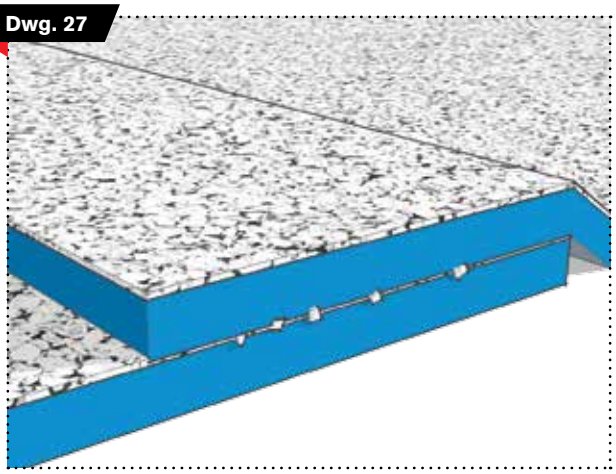
On the upper face of the self-protected bituminous membranes a selvedge side lap is provided, generally 10 cm wide, constituted of a strip of polyethylene burn-off film, which frees the torching area of the mineral slates.
The head joint, however, must be made on the edge of the self-protected membrane 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



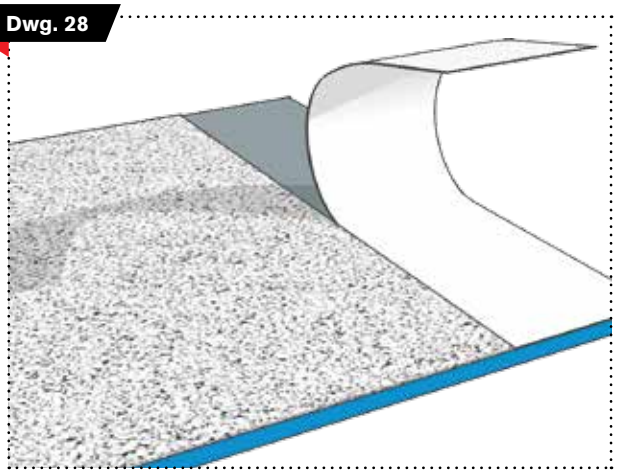
This technique has several drawbacks, in fact the mineral slates that with heat sink into the compound stop at the level of the reinforcement and create discontinuities in the mass **(Dwg. 27)**.

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 head selvedge

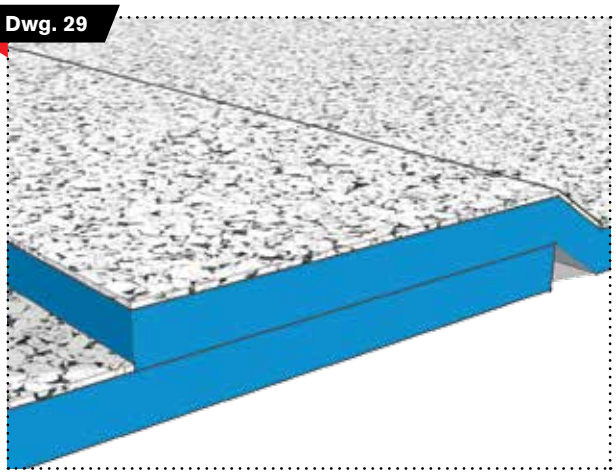
There are distilled polymer bitumen membranes self-protected with mineral slates having a removable strip, which leaves the entire corresponding waterproofing mass exposed, without any slate residue and with a precise line of separation between the exposed and self-protected area **(Dwg. 28)**.
With this solution we have important and numerous

Dwg. 28



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.

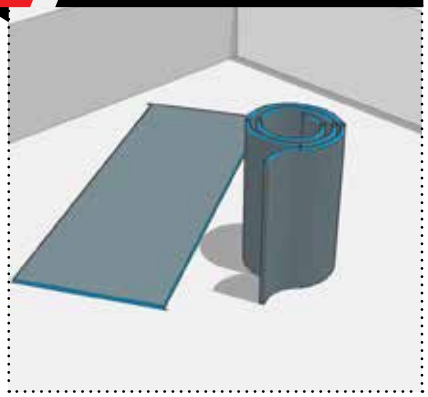
Dwg. 29



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

1 **Phase 1 A**



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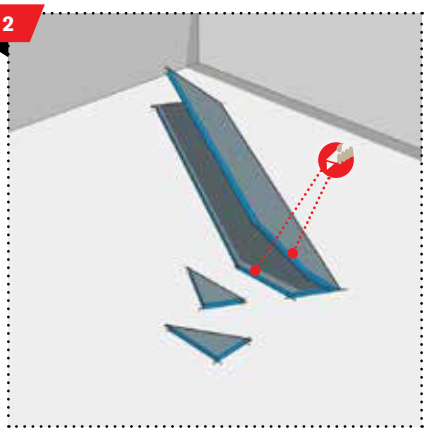

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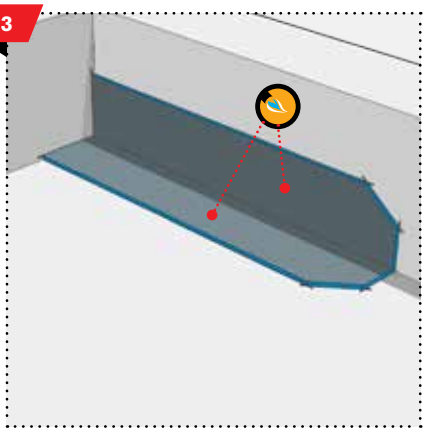

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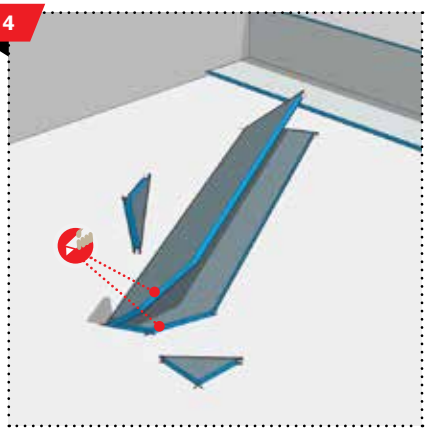

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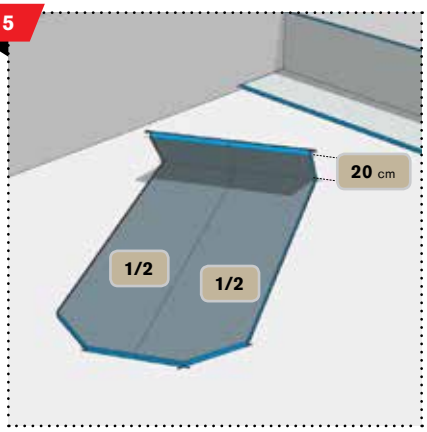

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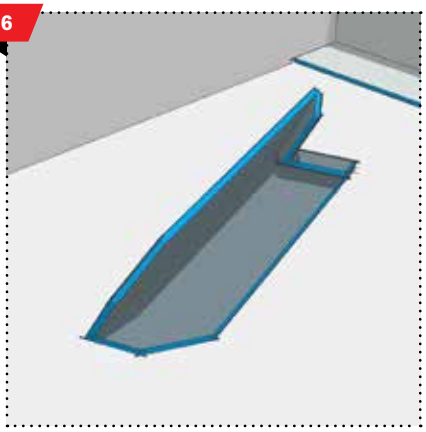


Cut

Heat
this surface
with a torch

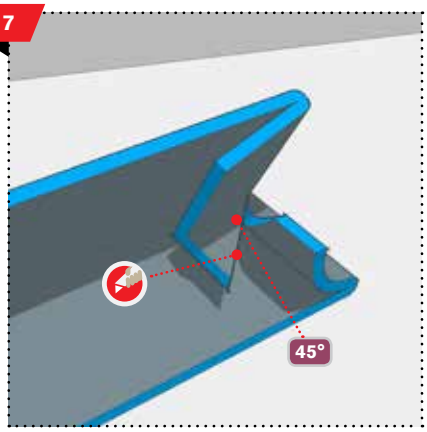
Heat
the back with
a torch before
applying to the
substrate

Linear cut
or surface
measurement

Corner
measurement

SINGLE LAYER SYSTEM

7



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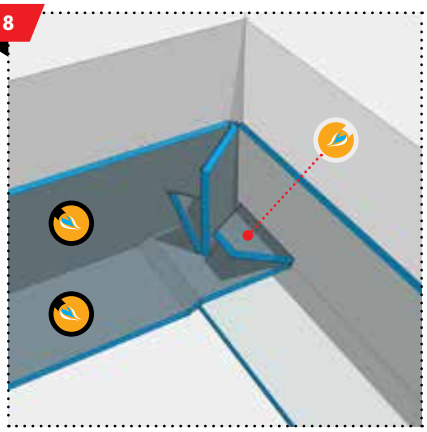

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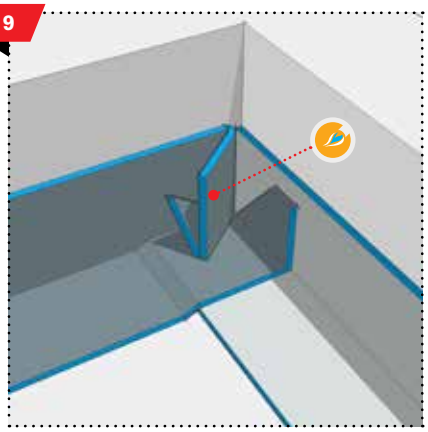

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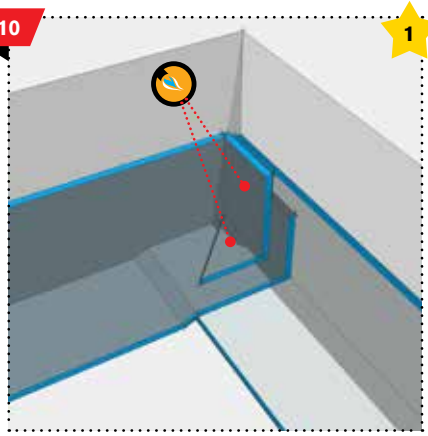
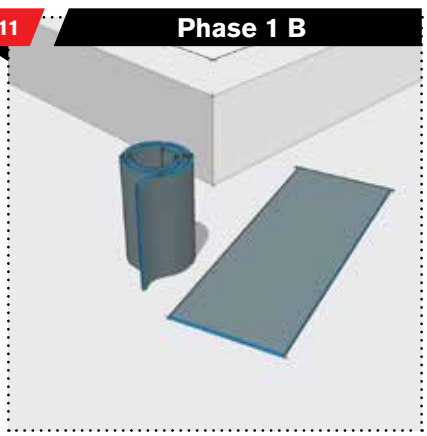


11 **Phase 1 B**



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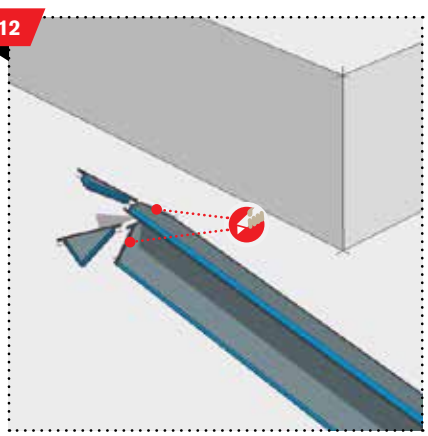

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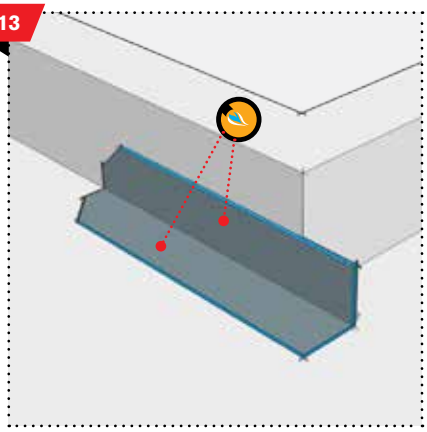

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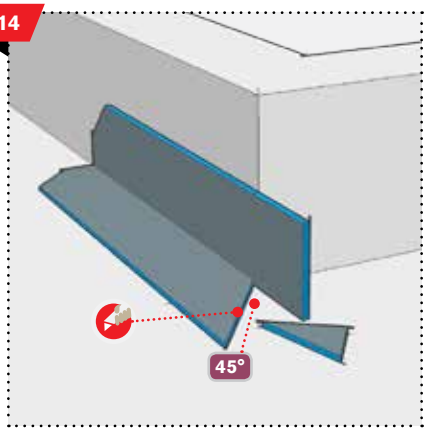

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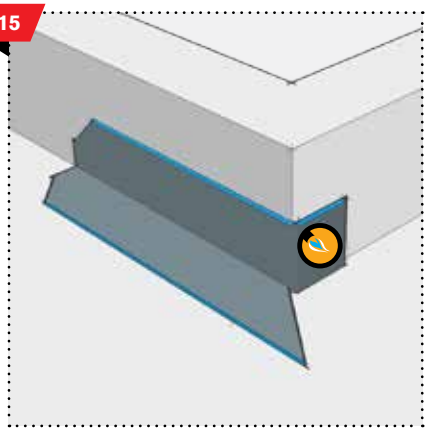

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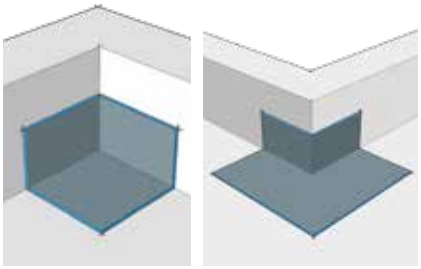
Apply a 25/30 cm high strip of distilled polymer-bitumen membrane by heat torching or hot air at the horizontal/vertical building connection corner.

note

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



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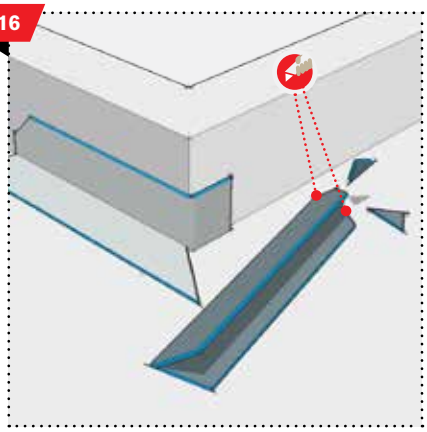

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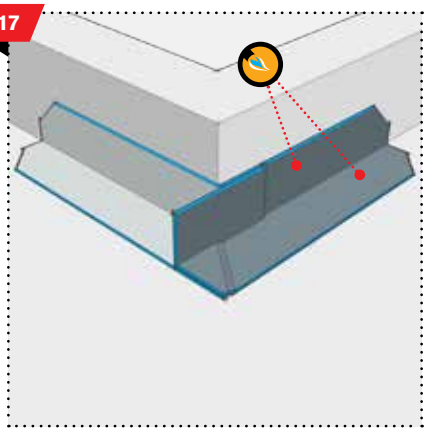

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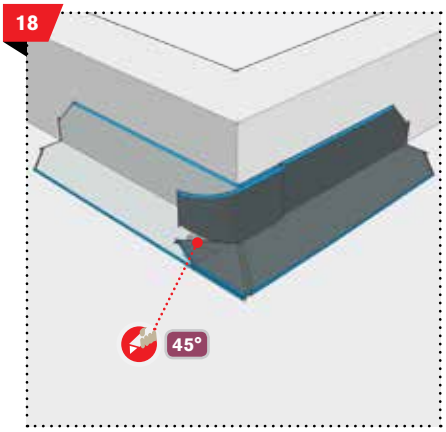

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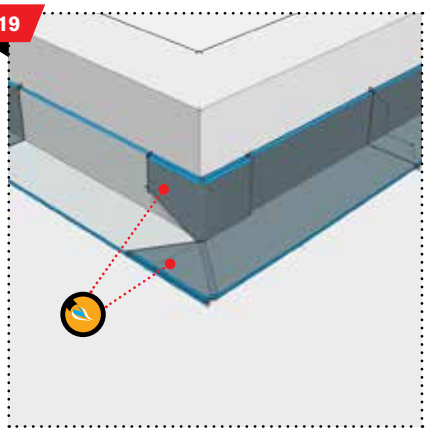

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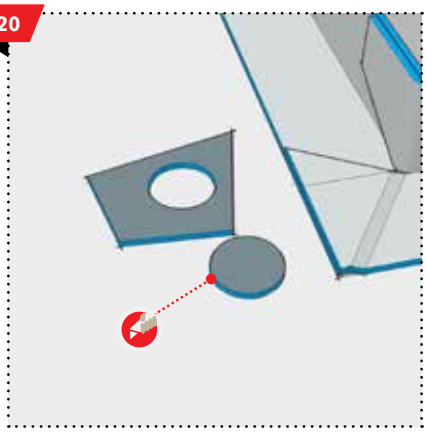

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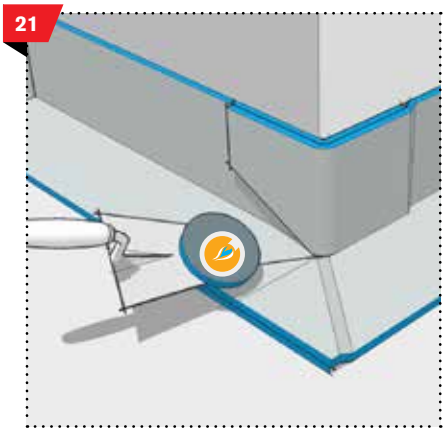

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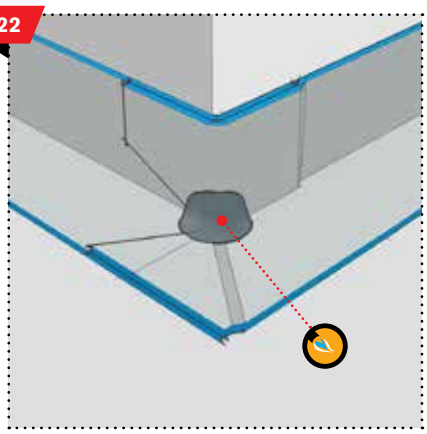
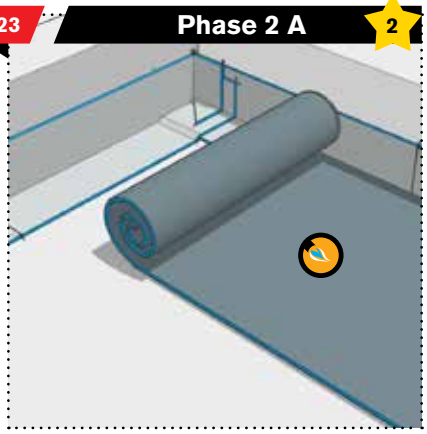


23 Phase 2 A 2



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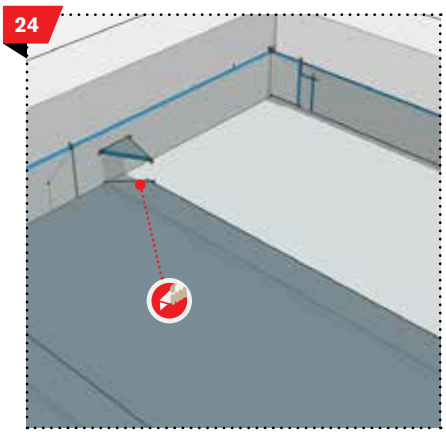


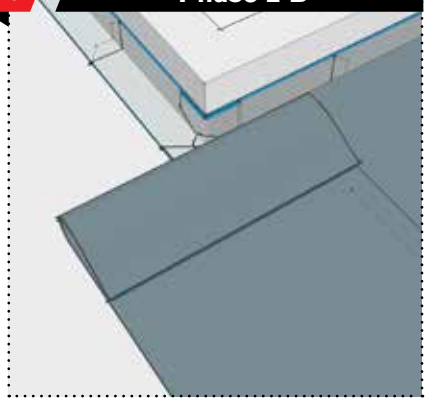
2

note

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.

SINGLE LAYER SYSTEM

25 **Phase 2 B**



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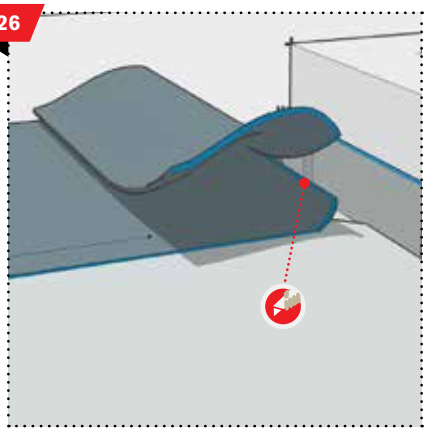

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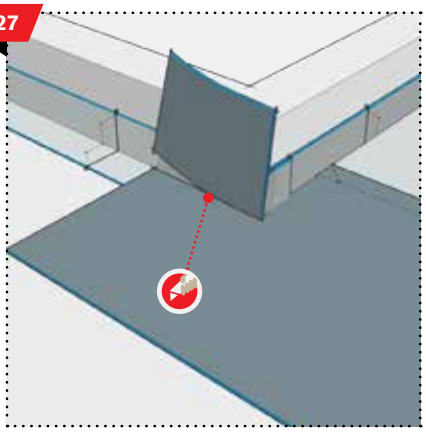

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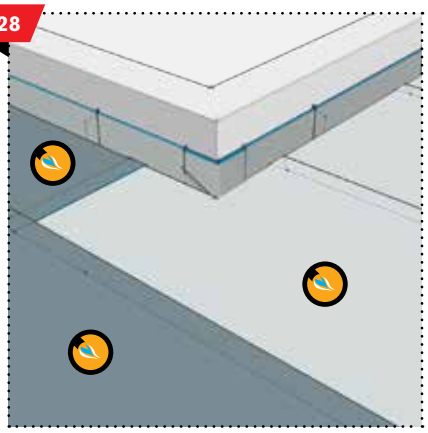
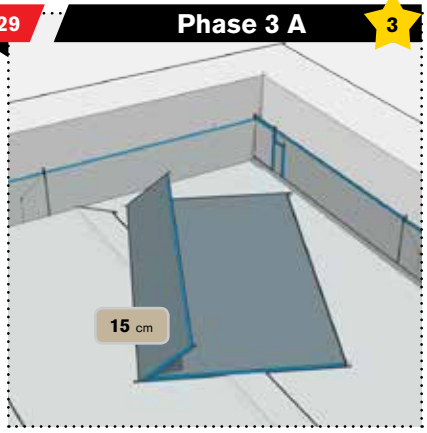


29 **Phase 3 A** 3



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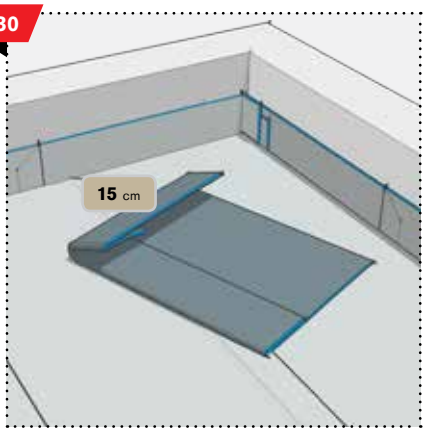

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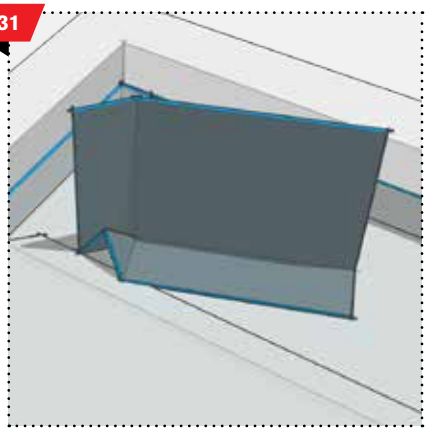

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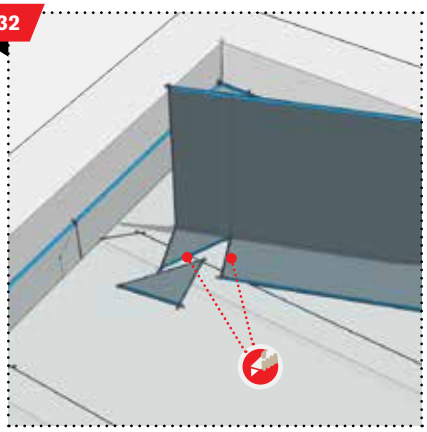

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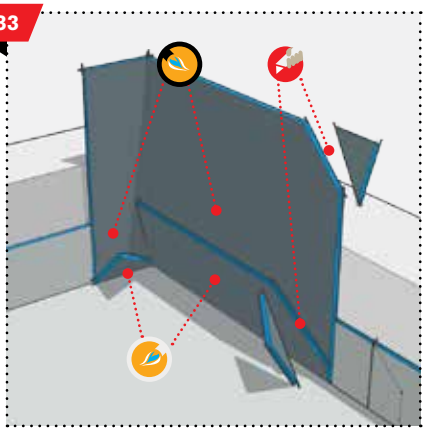
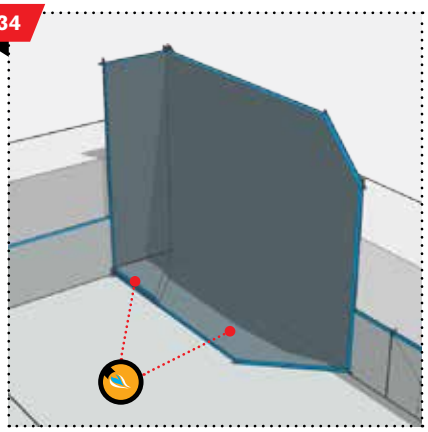


3

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.

34



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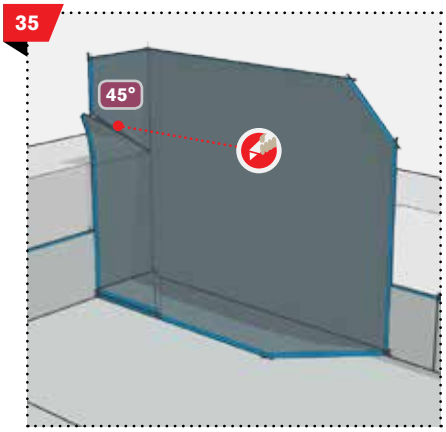

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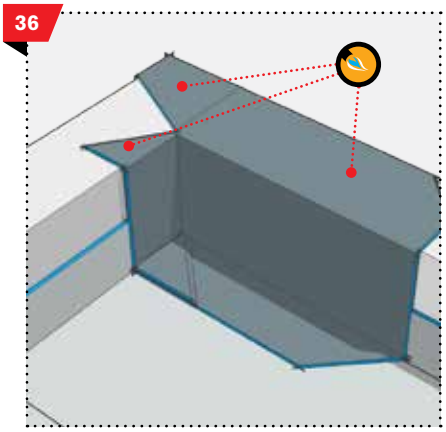

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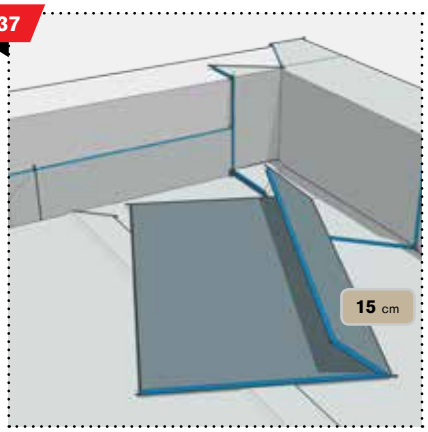

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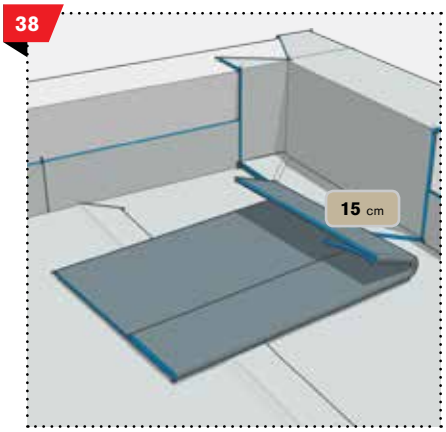

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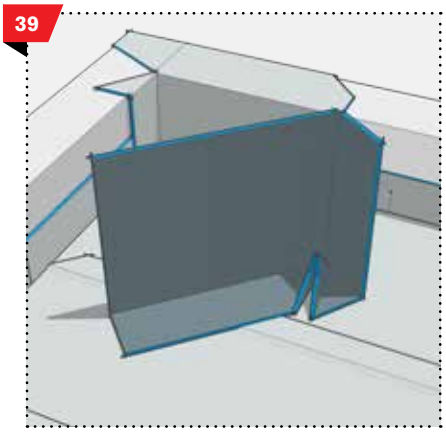

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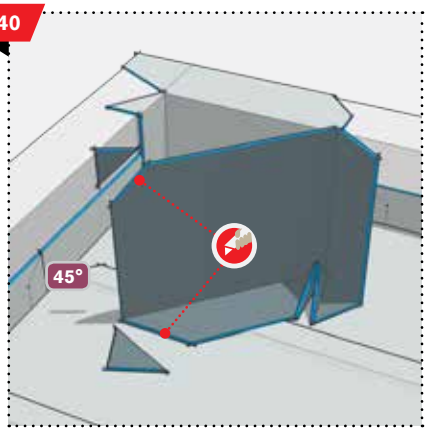

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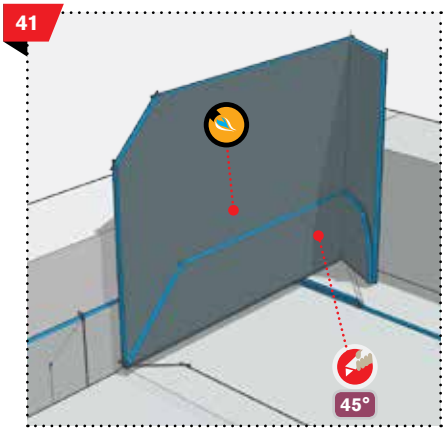
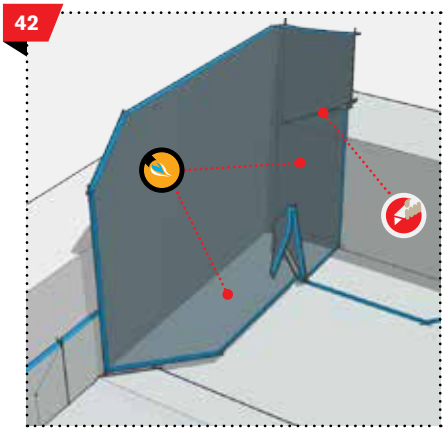
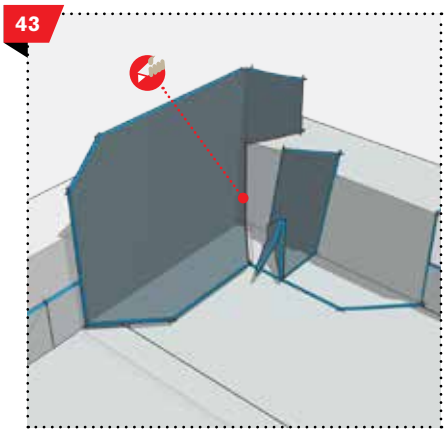
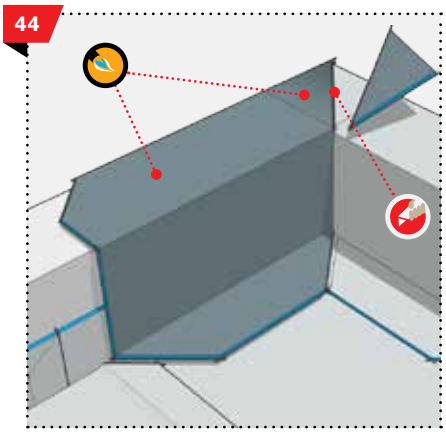


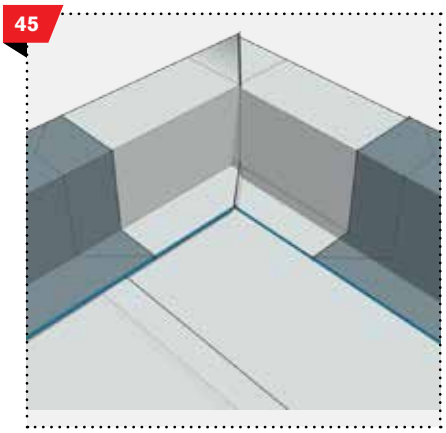
42

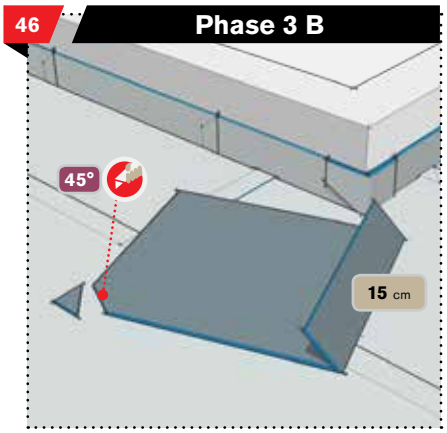


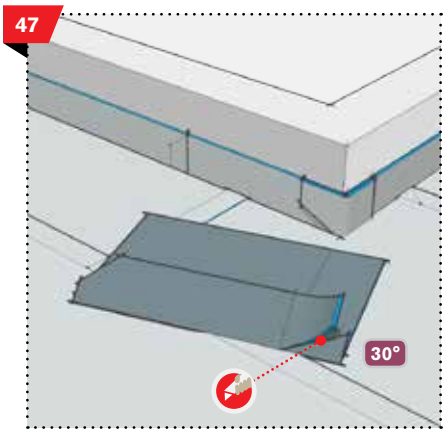
SINGLE LAYER SYSTEM

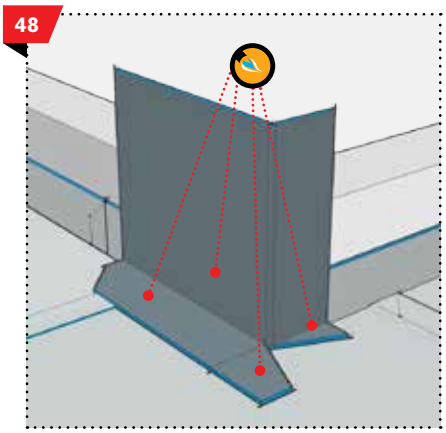


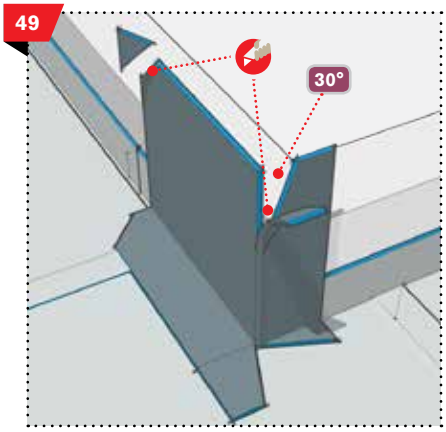


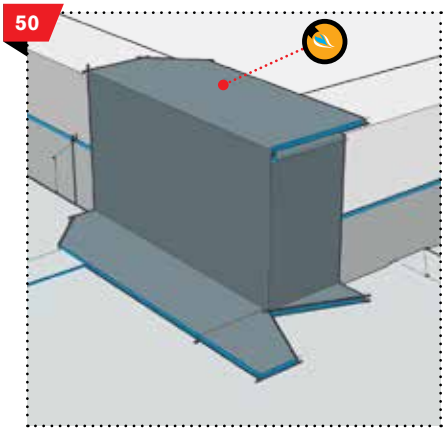


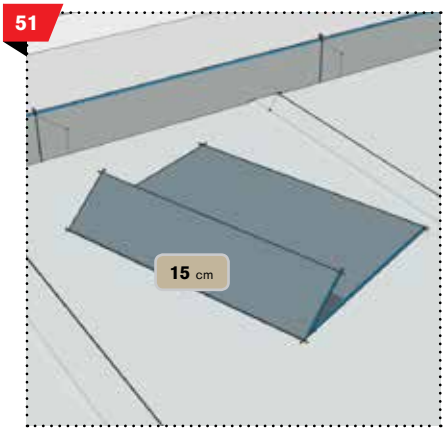












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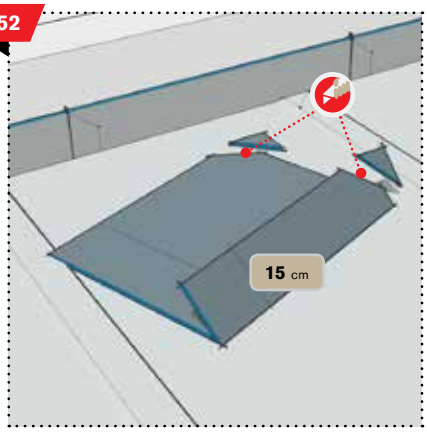

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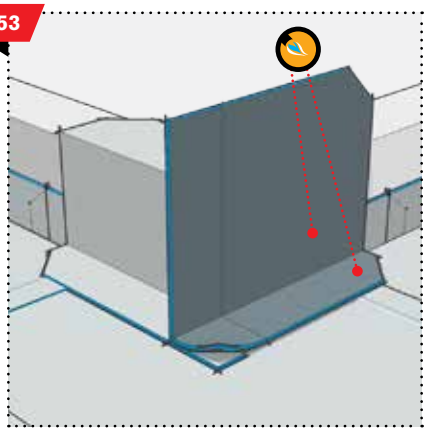

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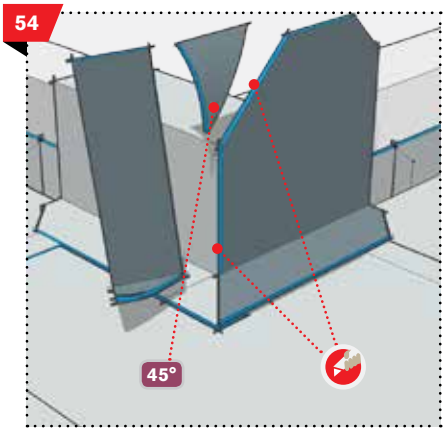

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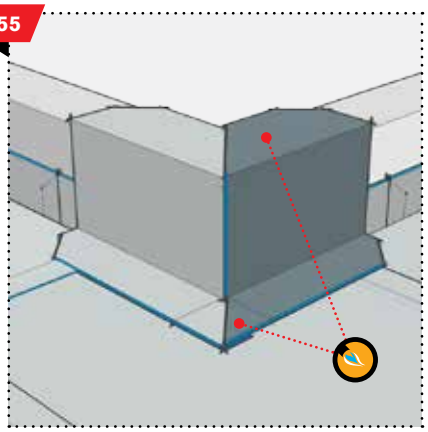

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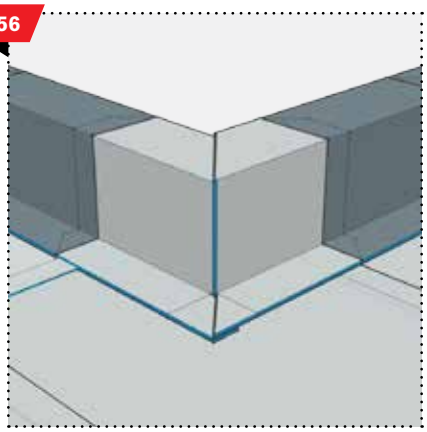
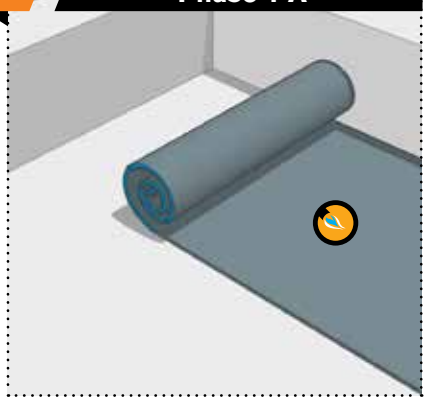


DOUBLE LAYER SYSTEM

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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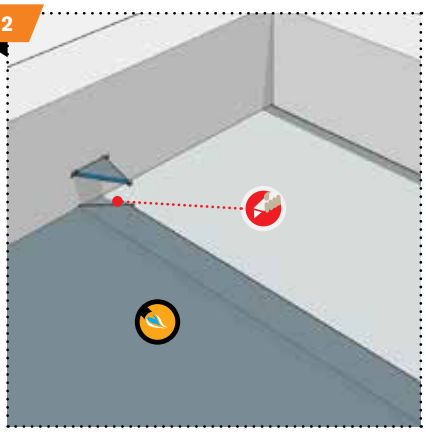
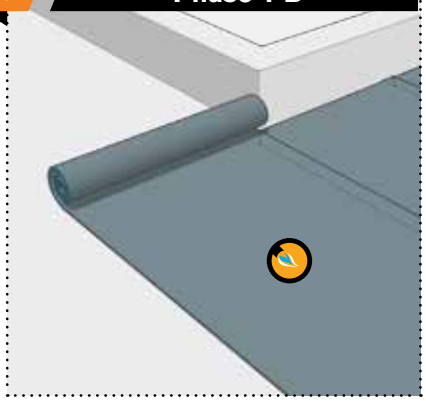
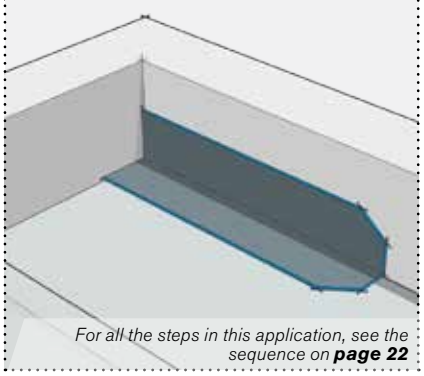


3 **Phase 1 B**

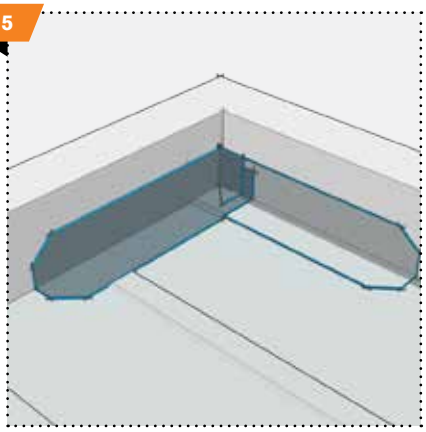


4 **Phase 2 A**



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

5



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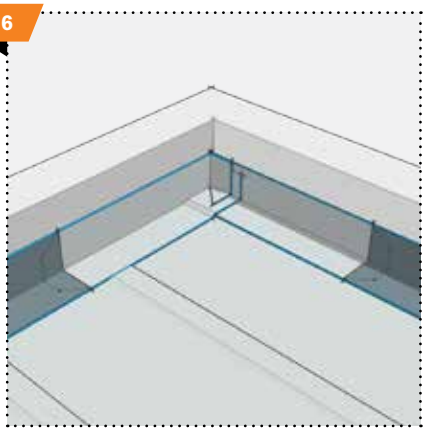


Cut

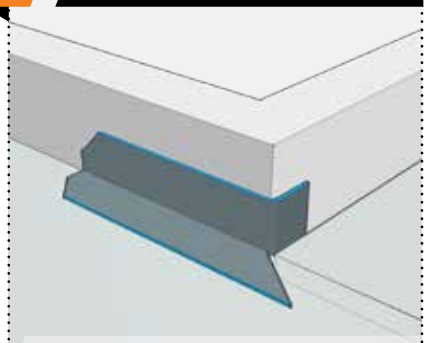
Heat
this surface
with a torch

Heat
the back with
a torch before
applying to the
substrate

Linear cut
or surface
measurement

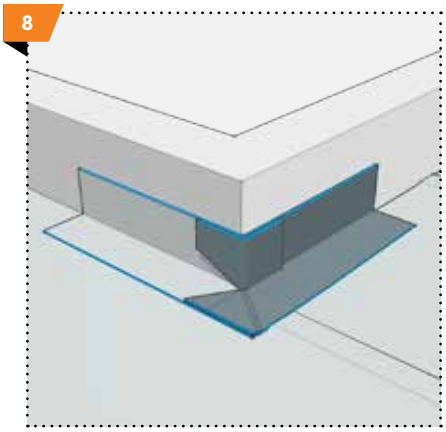
Corner
measurement

7 **Phase 2 B**

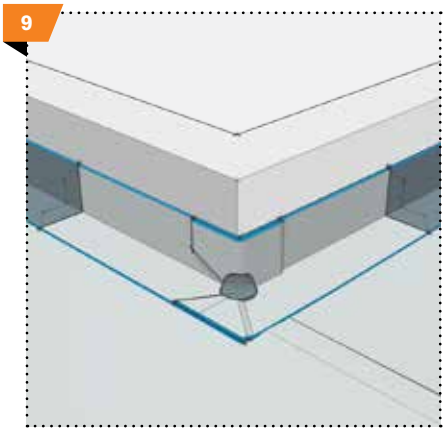


For all the steps in this application, see the sequence on ***page 23***

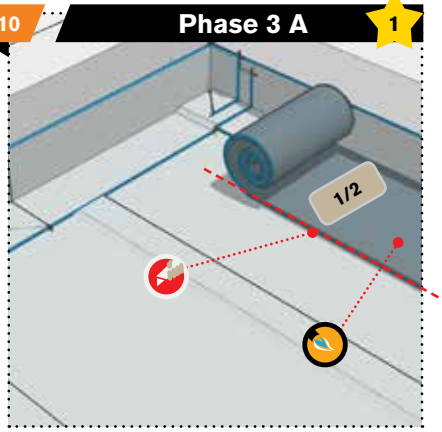
8



9



10 **Phase 3 A** 1



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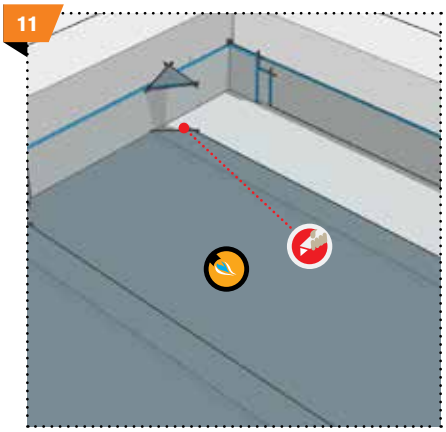
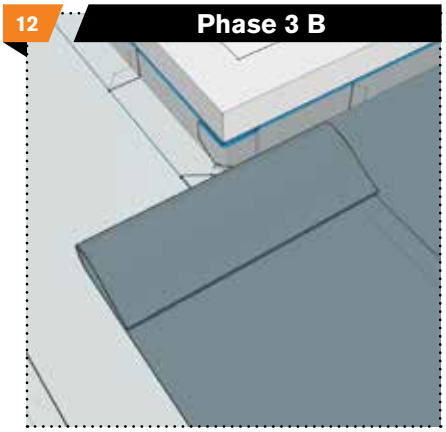


12 **Phase 3 B**



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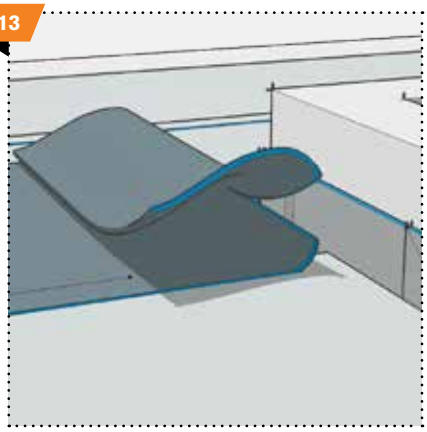

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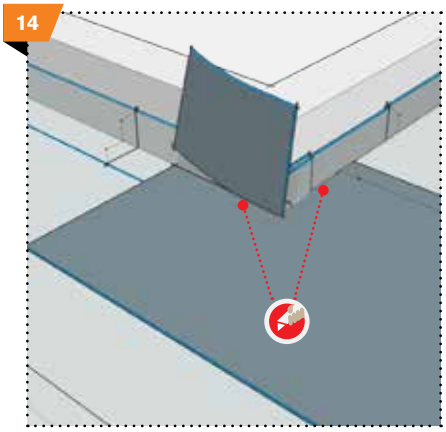

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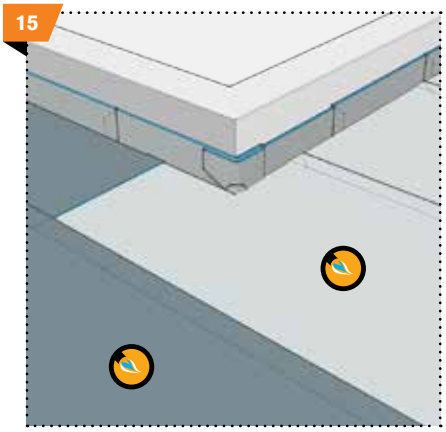
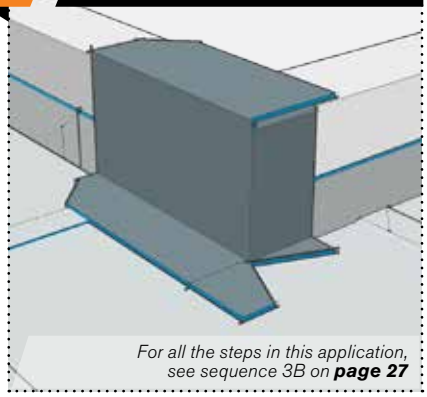


1 **note**

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.

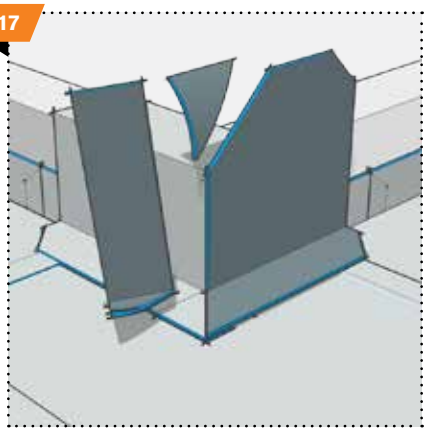
DOUBLE LAYER SYSTEM

16 **Phase 4 A**

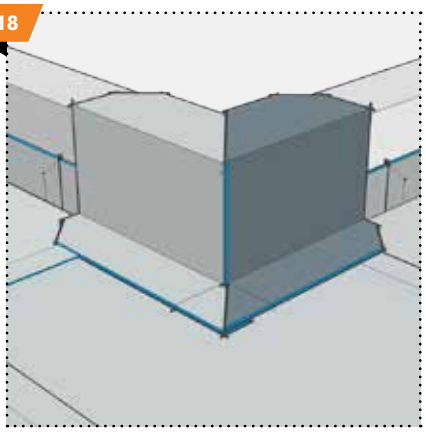


For all the steps in this application, see sequence 3B on ***page 27***

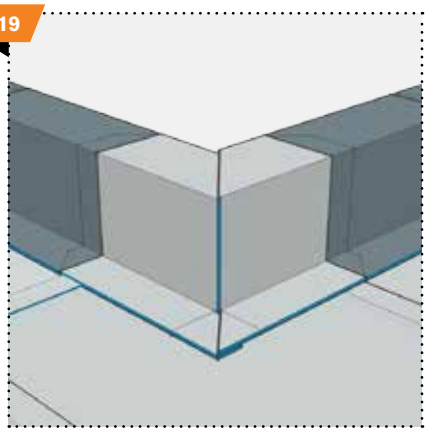
17



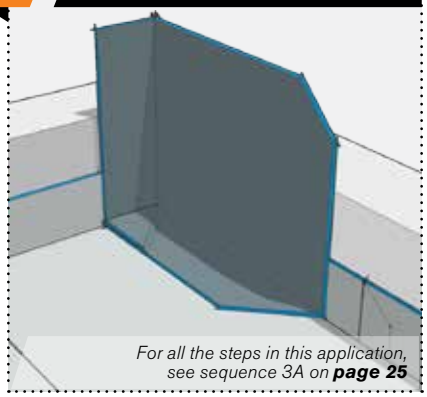
18



19

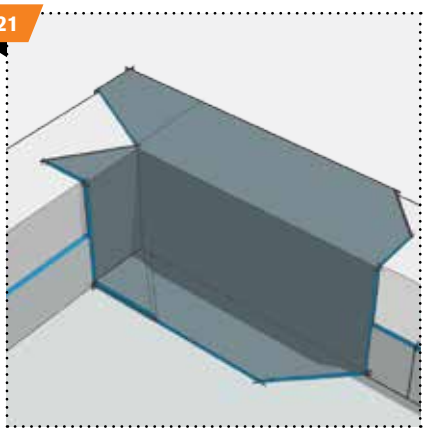


20 **Phase 4 B**



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

21



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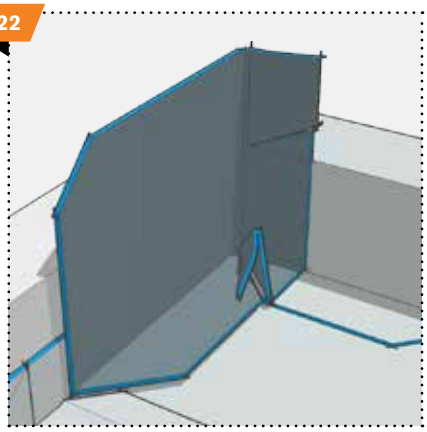
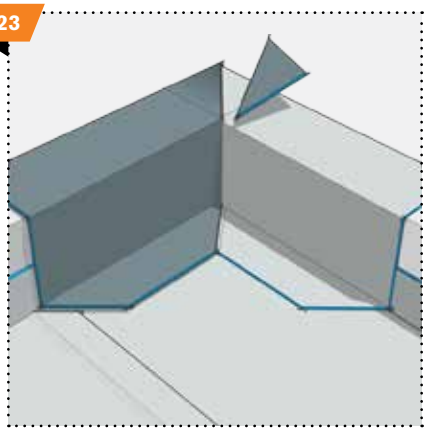


23



24