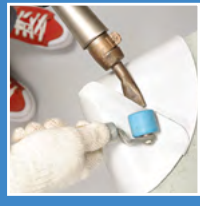
TN international.



INSTALLATION MANUAL

Application of single-ply synthetic waterproofing membranes

THE SCIENCE OF BUILDING OPTIMISATION

Content

1.
Introduction

1. Introduction

This manual represents a brief guide to proper use on site. It contains basic principles and recommendations for the installation of TECHNONICOL single ply synthetic weatherproofing membranes.

TECHNONICOL synthetic membranes, made under the LOGICROOF brand, are state-of-the-art roofing and waterproofing materials. These membranes are made of high-quality plasticized PVC (PVC-P). This multi-component material contains the latest generation of plasticizers and other additives that make the roofing long-lasting, resistant to ultraviolet radiation, and highly safe from fires while maintaining plasticity even under sub-zero temperatures, in addition to the other benefits it offers.

LOGICROOF synthetic roofing is manufactured using the most advanced extrusion methods. The production takes place in a state of the art manufacturing facility, making it possible to produce consistent material with a homogeneous structure and without internal defects, thus achieving high quality and long service life.

Certificates and test reports issued by European independent organisations confirm the high quality of **LOGICROOF** synthetic membranes.

1.1 Identification of synthetic membranes from TECHNONICOL

Product name	Composition	Area of application
LOGICROOF V-RP	PVC membrane with polyester fabric reinforcement and with UV protection. Installation in temperatures at or above –20 °C.	For mechanically attached systems.
LOGICROOF V-SR	PVC membrane without reinforcement; resistant to UV radiation.	For detailing such as waterproofing around penetrations and the reinforcement of inner and outer corners.
LOGICROOF V-GR	This PVC membrane has a high resistance against punctures; it contains fungicidal additives, and is resistant to UV radiation. Installation at or above –15 °C.	For inverted roof systems.
LOGICROOF V-GR FB	Material based on non-flammable fabric with a special synthetic layer on the underside.	For fully adhered roofing systems.
LOGICROOF V-GR FB SA	Glass fiber reinforced PVC membrane with laminated geotextile fleece on the bottom surface, which is pre-impregnated at the plant with a special adhesive and protected by a release film. Its upper layer provides high resistance to precipitation and ultraviolet rays (which is very important in high altitude conditions, where UV radiation is especially intense).	For inverted roof systems.

1.2 Transport and storage

LOGICROOF synthetic waterproofing membranes are delivered in an opaque foil that reliably protects the roll from dirt and ultraviolet radiation. Each roll is labelled with the date of manufacture and a batch number.

ATTENTION! Keep the rolls in a horizontal position in the factory packaging on pallets, stacked in up to two layers of pallets, at least 1 m away from a heat source.

Protect the rolls from direct sunlight and moisture.

It is NOT recommended to store pallets with waterproofing membrane on inclined surfaces (with an incline of more than 3 %).

In winter, store the PVC membrane for at least 12 hours prior to installation in a room with a temperature at least +10 °C. It can be stored, for instance, in a heated area on the roof.

One simple way to ensure protection against low temperatures is to create a closed space from unused thermal insulation packaging. A radiator can be used as a heating source.

1.3. Overview of PVC membrane roofing systems

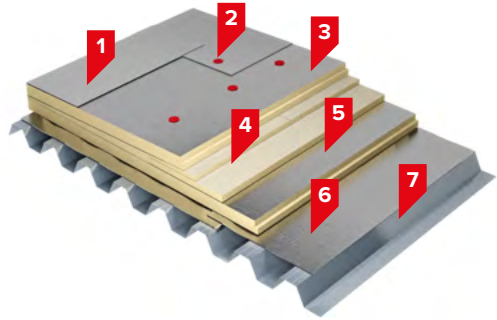
1.3.1. Mechanically attached roofing systems

These systems use mechanical fasteners to secure both the roofing and thermal insulation to the substrate.

TN ROOF PVC STEEL SMART

Non-accessible roof system on a corrugated steel sheet base with mechanical fastening of PVC membrane and thermal insulation of PIR boards.

This solution is ideal for large area roofs, as well as for the roofs of pre-fabricated buildings and structures. The system is characterized by high strength and rigidity, which allows it to be used on roofs with a large amount of equipment.
The use of materials with high fire resistance provides additional safety and durability of the building.

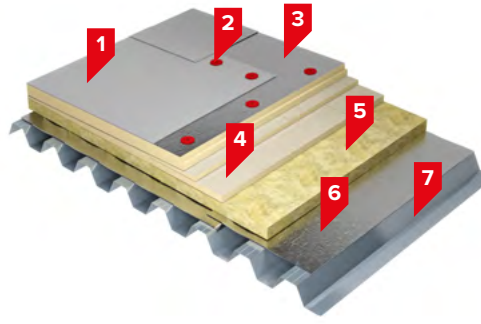


1. Polyester reinforced PVC membrane
2. Telescopic fastener
3. PIR boards (Aluminium facing) / (Glass tissue with mineral binder)
4. Tapered boards of PIR / XPS
5. PIR boards (Aluminium facing) / (Glass tissue with mineral binder)
6. Polymer-bitumen self-adhesive membrane (vapor barrier)
7. Corrugated steel sheet

TN ROOF PVC STEEL COMBI PIR

Non-accessible roof system on a corrugated steel sheet base with mechanical fastening of PVC membrane and thermal insulation composed of stone wool and PIR boards.

This solution is ideal for large area roofs, as well as for the roofs of pre-fabricated buildings and structures. The use of PIR thermal insulation with low thermal conductivity, low weight and high density allows to significantly reduce the weight and thickness of the roofing system without losing heat-saving properties. The use of materials with high fire resistance as a lower thermal insulation layer provides additional safety and durability of the building.

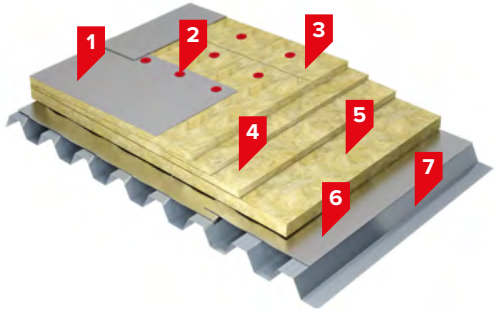


1. Polyester reinforced PVC membrane
2. Telescopic fastener
3. PIR boards (Aluminium facing) / (Glass tissue with mineral binder)
4. Tapered boards of PIR / XPS
5. Stone wool, CS(10)40 / CS(10)30
6. Polymer-bitumen self-adhesive membrane (vapor barrier)
7. Corrugated steel sheet

TN ROOF PVC STEEL CLASSIC

Non-accessible roof system on a corrugated steel sheet base with PVC membrane and thermal insulation of stone wool.

The system is ideal for large area roofs, as well as for the roofs of pre-fabricated buildings and structures. The solution is applied when the speed of construction and reliability of the entire roofing construction are important.
The use of materials with high fire resistance provides additional safety and durability of the building.

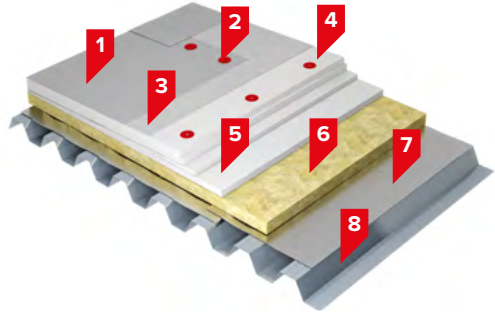


1. Polyester reinforced PVC membrane
2. Telescopic fastener
3. Stone wool, CS(10)60 / CS(10)70
4. Tapered slabs of stone wool, CS(10)40 / CS(10)30
5. Stone wool, CS(10)40 / CS(10)30
6. Polymer-bitumen self-adhesive membrane (vapor barrier)
7. Corrugated steel sheet

TN ROOF PVC STEEL COMBI EPS

Non-accessible roof system on a corrugated steel sheet base with mechanical fastening of PVC membrane and thermal insulation composed of stone wool and EPS boards.

This solution is ideal for large area roofs, as well as for the roofs of pre-fabricated buildings and structures. The solution is applied when the speed of construction and reliability of the entire roofing construction are important. Combining two types of thermal insulation reduces the weight and cost of the system.

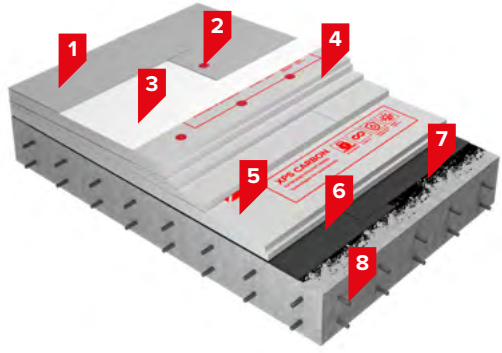


1. Polyester reinforced PVC membrane
2. Telescopic fastener
3. Separation layer (Fiberglass ≥ 120 g/m^2)
4. EPS thermal insulation
5. Tapered boards of EPS
6. Stone wool, CS(10)40 / CS(10)30
7. Polymer-bitumen self-adhesive membrane (vapor barrier)
8. Corrugated steel sheet

TN ROOF PVC CONCRETE SMART XPS

Non-accessible roof system on a concrete base with mechanical fastening of PVC membrane and thermal insulation of XPS boards.

This is a practical solution for pre-fabricated buildings and structures on a concrete base. The system is used when the speed of construction and reliability of the entire roofing construction are important. The high-strength and density thermal insulation allows to construct an almost perfectly flat base for roofing material.

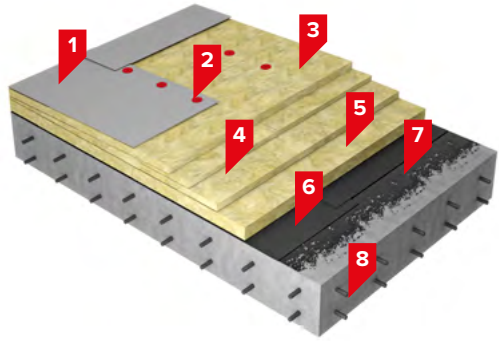


1. Polyester reinforced PVC membrane
2. Telescopic fastener
3. Separation layer (Fiberglass ≥ 120 g/m2)
4. Tapered boards of XPS
5. XPS boards, CS(10\Y)300 / CS(10\Y)500
6. Polymer-bitumen membrane (vapor barrier)
7. Bitumen prime coating
8. Reinforced concrete base

TN ROOF PVC CONCRETE CLASSIC

Non-accessible roof system on a concrete base with mechanical fastening of PVC membrane and thermal insulation of stone wool.

The system is ideal for large area roofs on a concrete base. The system is used when the speed of construction and reliability of the entire roofing construction are important. The use of materials with high fire resistance provides additional safety and durability of the building.



1. Polyester reinforced PVC membrane
2. Telescopic fastener
3. Stone wool, CS(10)60 / CS(10)70
4. Tapered slabs of stone wool, CS(10)40 / CS(10)30
5. Stone wool, CS(10)40 / CS(10)30
6. Polymer-bitumen membrane (vapor barrier)
7. Bitumen prime coating
8. Reinforced concrete base

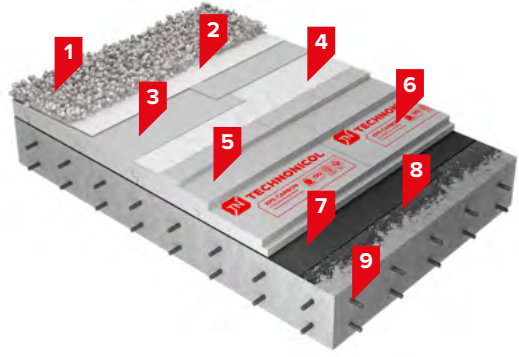
1.3.2. Ballasted roofing systems

In this system, roofing layers are loaded with ballast or paving. The roofing is mechanically fixed only around the perimeter and large penetrations such as rooflights. This system can be used on roofs with a slope of less than 3%.

TN ROOF PVC CONCRETE BALLAST

Non-accessible ballasted roof system on a concrete base with PVC membrane and thermal insulation of XPS boards.

This is a traditional solution for installing a ballasted roof on in-situ concrete slabs. The advantage of this system is greater protection of the waterproofing membrane from mechanical damage and ultraviolet radiation, as well as the moisture resistance of the thermal insulation layer.

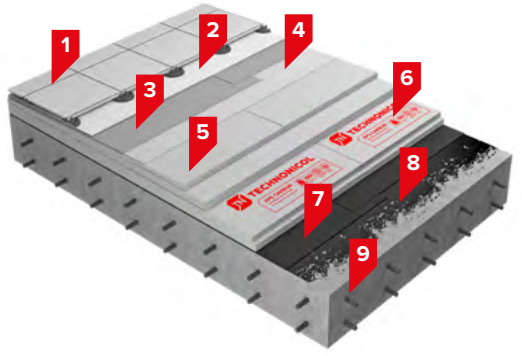


1. Gravel (fraction of 16-32 mm)
2. Geotextile 300 g/m^2
3. Glass fiber reinforced PVC membrane
4. Separation layer (Fiberglass ≥ 120 g/m^2)
5. Tapered boards of XPS
6. XPS boards, CS(10\Y)300 / CS(10\Y)500
7. Polymer-bitumen membrane (vapor barrier)
8. Bitumen prime coating
9. Reinforced concrete base

TN ROOF PVC CONCRETE TERRACE

Lightweight accessible roof system resistant to foot traffic with plastic supports, a waterproofing layer of PVC membrane and thermal insulation of XPS boards.

The roof terrace is a modern and popular solution in architecture. This type of roof allows to use the building area as efficiently as possible, using the roof as a relaxation area or creating an original office space. The reliable and dense thermal insulation material will withstand the load exerted against the plastic supports, which hold the deck tiles or decking.

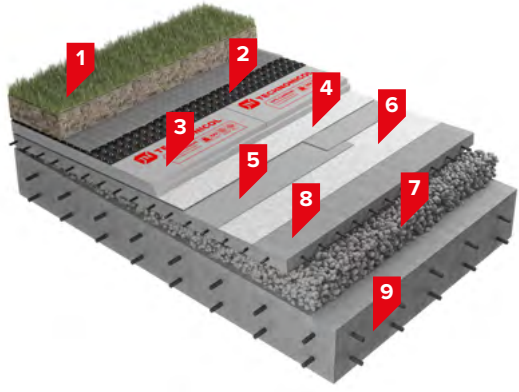


1. Paving slabs on adjustable supports
2. Heat-treated non-woven geotextile ≥ 300 g/m²
3. Glass fiber reinforced PVC membrane
4. Separation layer (Fiberglass ≥ 120 g/m²)
5. Tapered boards of XPS
6. XPS thermal insulation, CS(10\Y)300 / CS(10\Y)500
7. Polymer-bitumen membrane (vapor barrier)
8. Bitumen prime coating
9. Reinforced concrete base

TN ROOF PVC CONCRETE GREEN

Inverted accessible roof system with green areas, a waterproofing layer of PVC membrane and insulation of XPS boards.

The green roof is a modern solution that makes it possible to extend the building boundaries and create an outdoor relaxation area. The use of the system with gardening provides effective heat insulation, protects the building from exposure to wind, precipitation and variations in temperature. The application of one-layer waterproofing from a polymer membrane will allow to install the green roof faster than the classic solution provides for.



1. Soil with plants
2. Drainage membrane with geotextile
3. XPS thermal insulation, CS(10\Y)300 / CS(10\Y)500
4. Geotextile 300 g/m2
5. Glass fiber reinforced PVC membrane
6. Geotextile 300 g/m2
7. Reinforced cement-sand screed
8. Slope-forming layer - expanded clay
9. Reinforced concrete base

2.

Preparatory work

2. Preparatory work

2.1. Work safety rules

The installation of synthetic roof waterproofing membranes must be carried out in accordance with the following rules:

- Before starting work with electrical equipment powered from 220 V or 380 V, check the voltage. If stable voltages cannot be achieved, we recommend using regulators, or single and three-phase generators.
- If stable voltages cannot be achieved, it is recommended to cease welding until the voltage is stable again to avoid poor weld quality.
- Connect the welding equipment to an electrical outlet combined with a protective grounding device. The use of an extension cable with grounding is also permitted. When using such equipment, use an automatic switch with differential protection.
- Hot air gun nozzles (both for manual and automatic equipment) must be free of deposits, and air must pass freely through all nozzle holes. Do not work with deformed nozzles.
- Do not switch off the equipment while it is in heating mode, as it may cause the heating element to overheat and fail. Before switching off, set the temperature controller to the “0” position and wait until the air at the outlet of the nozzle cools down (with models Triac S, Triac PID, Herz Laron), or switch the device to cooling mode by holding the temperature control button followed by automatic shutdown (with Triac AT models; the corresponding indication appears on the display).
- When working with welding equipment, use gloves or other PPE for protection against potential burns.
- Do not use electrical equipment if the power cord is damaged or coiled. Before starting work, always extend the entire length of the power cable.

- After finishing work with the electrical equipment, disconnect all extension cables from the voltage sources and store them in a closed room or cover them with a waterproof material. After finishing work, store the electrical equipment in a closed room.

- In case of insufficient lighting, measures must be taken to ensure adequate lighting in the required places as well as other safety measures related to the safety of the work of the personnel.

- Do not install roofing membranes without calculating the wind load and considering wind zones and the number of fasteners for each individual area (fastener plan).

- The implementation of the roof without considering the wind loads can lead to the destruction of the roofing! For the requirements of dividing the roof into wind zones, see section 5.3.

2.2. Equipment and tools

Use the following equipment and tools to ensure the fast and high-quality installation of the roofing membrane.

- Hand held welding apparatus (hot air gun);
- Narrow nozzle with a width of 40 mm;
- Narrow nozzle with a width of 20 mm;
- Silicon and Teflon rollers (40 and 28 mm);
- Narrow brass roller (8 mm);
- Soft metal brush for cleaning the nozzles of the welding equipment;
- Seam tester for the quality control of welds;
- Knife with interchangeable blades for membrane cutting;
- Sheet metal shears;
- Electric screwdriver;
- Roofing knife;
- Tape measure;
- Gloves (cotton or leather);
- Cotton cloths;
- LOGICROOF PVC cleaner;
- LOGICROOF Liquid PVC Coating.

2

Silicone roller - main pressure roller for manual welds;

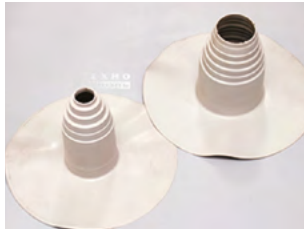
Teflon roller - harder than a silicone roller; can be used to ensure the better clamping of uncoated membranes;

Narrow brass roller - for welding joints at the points of transition between horizontal and vertical welds as well as welding joints inaccessible to a wide roller.

PVC cleaner - special agent for PVC membrane cleaning. This is used to remove dirt and grease from the surface of the membrane around welds and to activate the old surface when performing repairs before applying LOGICROOF Liquid PVC Coating.

Pressure-activated glue - serves to bond the PVC membrane to masonry, concrete, wood, and metal surfaces. It cannot be used for the installation of fully-adhered roofing systems.

Liquid PVC Coating - serves for the additional sealing of welds; eliminates the capillary suction of moisture into the reinforcement layer.



Prefabricated pipe flashings for sealing around penetrations.

PVC fittings for the reinforcement of internal and external corners - serve to ensure the fast and high-quality reinforcement of edges and corners on the roof.

Polyurethane Putty – serves for sealing termination bars.

Termination bars made from aluminium and magnesium alloy - used to fasten the edges of the waterproofing the membrane to the upstand.

Fastening bars - made from aluminium and magnesium alloy are used to fix waterproofing membrane when changing angles between horizontal and vertical welds and when finishing at the top of the upstand. This can be used to replace the termination and fixing bars. It is highly durable in bending and torsion, as well as resistant to corrosion.

Double-sided adhesive tape - serves to seal the overlapping seams of the vapour barrier layer.

Butyl-rubber tape - serves to connect the vapour barrier layer at temperatures below freezing.

2.3. Hot air equipment for welding waterproofing membrane

For welding synthetic roofing, use special hand held, semi-automatic, and automatic hot air welding equipment.

The recommended models of manual welding equipment include the following: Leister Triac S or PID, Triac AT, HerzRion, HerzEron, Weldy by **Leister** supplied with a set of nozzles and pressure rollers.
A narrow nozzle with a width of 40 mm serves for normal welding on horizontal and vertical surfaces.

A narrow nozzle with a width of 20 mm serves for welding in difficult-to-access places during the creation of joints.
Energy 1600 set for welding synthetic membrane with overlaps - this is a compact and economical tool for manual hot air welding.
The recommended model for semi-automatic welding is **Leister Triac Drive**.

The semi-automatic equipment is used to weld overlaps on horizontal, vertical, and inclined surfaces, as well as on surfaces with a slope exceeding 30°.

For welding typical overlaps, the following automatic welding devices are recommended:
Leister Varimat (230 V – 4600 W; 380 V – 5700 W), VARIANT T1 (230 V), or **Herz Laron** (230 V – 4600 W; 438 V – 5700 W) with a weld width of 40 mm.

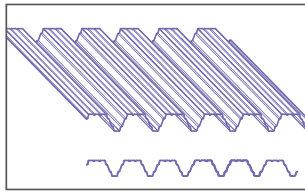
3.

Installation of roof components

3. Installation of roof components

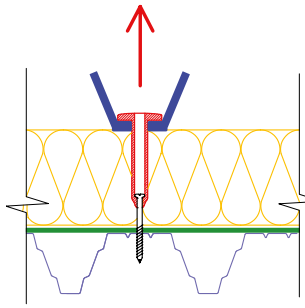
3.1. Preparation and laying of the load-bearing roofing substrate

The durability and resistance of the entire roof depends on the quality of the load-bearing roofing substrate. Pay special attention to its laying and ensure that it meets the requirements of the design documentation.



The thickness of any corrugated steel sheet should be at least **0.7 mm**. When laying the corrugated steel sheet, its wide crown should be placed up.

ATTENTION! Check the compliance of the corrugated steel sheet anchoring to the load-bearing structure along the entire roof area. Longitudinal connections of the corrugated steel sheet must be riveted or joined with self-tapping screws.



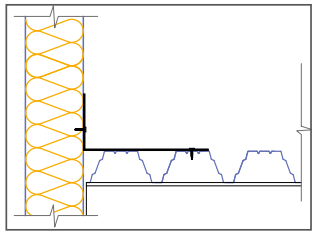
The anchor material used for the roofing layers must be sufficiently resistant to stress.

A simple procedure for checking the load-bearing capacity of the roofing substrate (decking) is as follows: mechanically fasten the membrane (**V-RP, 50 mm** wide) and expose it to the vertically-acting load by pulling.

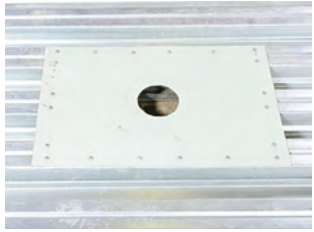
If the load-bearing capacity of the roof is sufficient, the membrane will crack before the fastener gets ripped from the roofing substrate.

3

Around the perimeter of the corrugated steel, in areas where the steel sheet is adjacent to the vertical structures, it is recommended to consider the necessity of mounting L-shaped reinforcing profiles from galvanized steel with a minimum thickness of **0.7 mm**.



The dimensions of the L-shaped profile should be determined on site based on the type of the corrugated steel sheet used.
The main requirements are as follows: the horizontal section of the L-shaped profile must extend over the horizontal section of at least two corrugated steel crowns (see figure opposite).



Penetrations/holes in the corrugated steel for roof outlets etc should be reinforced with plates of galvanized steel sheets with a thickness of at least 0.7 mm.

If necessary, fill the corrugated steel sheet troughs with a non-flammable material to a length of **250 mm**.

It is not recommended to fill the corrugated steel sheet troughs with loose thermal insulation material.

Prior to laying the vapour barrier, it is necessary to:

fill all joints between prefabricated reinforced concrete structures;

remove construction waste, water, snow, or ice from the trapezoidal profile surface and troughs.

To remove snow from the troughs of the corrugated steel sheet, a special shovel corresponding to the corrugated steel sheet profile can be used.

3.2. General recommendations for carrying out roofing work

To prevent the roofing system from getting damaged by foot traffic etc, empty pallets can be used to cover and protect it.

Unsecured holes in the roof must be covered with an operational load-bearing material or fenced in order to prevent people from falling.

Place loaded pallets evenly over the entire roof area so as not to deform the trapezoidal profile.

When moving equipment on the roof, a footpath should be laid using either prefabricated LOGICROOF WalkWay Puzzle parts or plywood over the separation layer / geotextile with a weight of at least **300 g/m²**.

3.3. Installation of the vapour barrier layer

The first phase of laying the roofing membranes includes the installation of the vapour barrier layer. It fulfils an important function of protecting the thermal insulation against the penetration of condensation.

Vapour protection can be achieved by the use of a bituminous vapour control membrane such as **TECHNOELAST VB 500** or plastic sheets. A special polythene vapour control membrane is most often used on corrugated steel decks.

When installing, pay attention to its integrity and follow the installation procedure.

When installing a vapour barrier along the corrugated steel sheet, the overlaps should be connected to the top crown.

To ensure the bonding of the vapour barrier overlaps at temperatures above +5 °C, use double-sided adhesive tape.

The longitudinal and transverse overlaps of the vapour barrier must be at least 100 mm.

In the event of damage, it is necessary to seal the damaged part with double-sided adhesive tape.

To seal the seams of the vapour barrier at temperatures below **+5 °C**, use a butyl-rubber tape.

When installing the vapour barrier perpendicularly to the crowns of the corrugated steel sheet, temporarily place a piece of plywood or OSB board under the surface being sealed to ensure the quality of the joint.

Where the roofing is close to an upstand, roof skylight, shafts, and other structures, the vapour barrier layer must be brought to at least the height of the thermal insulation layer.

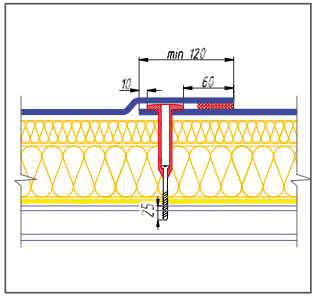
For the correct functioning of the vapour barrier, glue the vapour barrier layer to the vertical structure when laying thermal insulation and additional sealing layers.

3.4. Mechanical fasteners

Mechanical fasteners are an important component of the roofing. The mechanical resistance and stability of the roofing depend on the correct choice of fasteners. Always use only suitable fasteners to ensure the reliable fixing of the roof components.

ATTENTION! When using compressible thermal insulation as a substrate for the membrane, use telescopic tube washers and fasteners to secure the insulation and membrane.

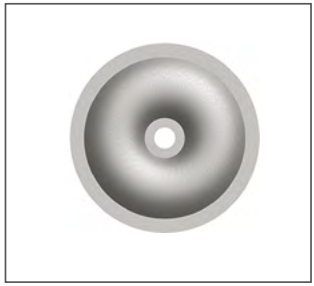
Only use approved fasteners to secure the membrane and thermal insulation boards to the corrugated steel sheet.



The length of the screw should be determined so that its tip protrudes at least **25 mm** under the steel sheet.

Longitudinal overlaps must be at least **120 mm** as long as the diameter of the telescopic anchor plate is no more than **50 mm**.

ATTENTION! The length of the telescopic element must be at least 20 mm shorter than the thickness of the thermal insulation layer.



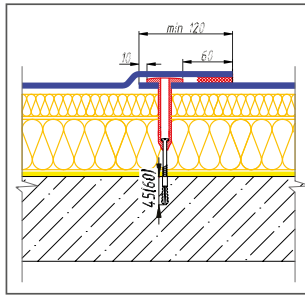
Use a circular or oval-shaped washer with dimensions of **40x80 mm**, **Ø 50 mm**.

Use a self-tapping screw, **Ø 5.5 mm**, without a smooth section, to fasten the membrane and pressure elements (laths) to the OSB boards, cement-bonded or asbestos-cement slabs.

A self-drilling screw, **Ø 4.8 mm**, is used for anchoring into the corrugated steel sheet with a thickness of more than **0.9 mm**.

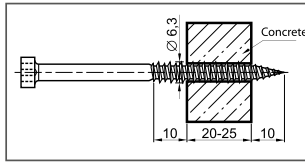
A self-tapping screw, **Ø 4.8 mm**, is used for anchoring into thinner steel sheets.

Use an approved fastener to fix the membrane to a concrete substrate.



Fixing a self-tapping screw with a polyamide plug into a pre-drilled hole.

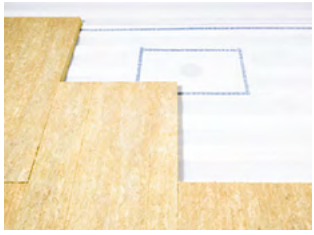
For fixing to heavy concrete we recommend using a suitable self-tapping screw. The screw has a special Torx head that ensures high drivability when fixing.



ATTENTION! When installing the membrane directly on the substrate without an insulating layer, secure it using a flat metal pressure plate with a corresponding self-tapping screw.

3.5. Installation of thermal insulation

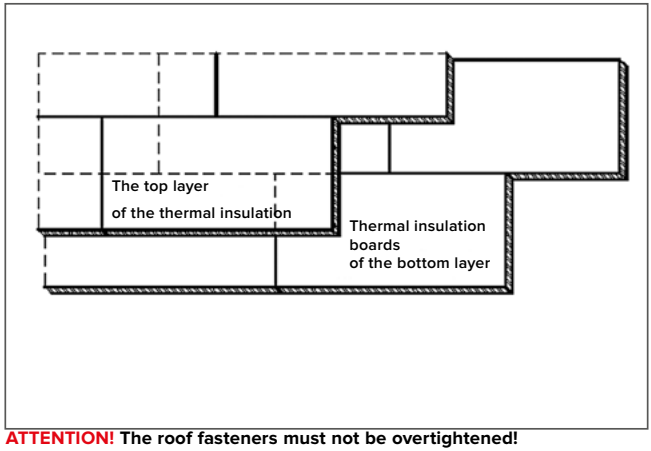
Generally, two layers of insulating boards with uniform overlaps are used to ensure the thermal insulation of the roofing system.



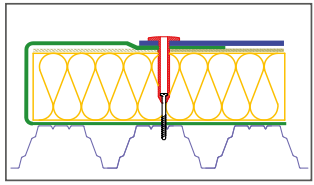
Insulation boards need to be laid on the vapour barrier layer. The surface of the vapour barrier layer must be dry.

If a corrugated steel is used as the load-bearing substrate of the roofing, the longer side of the insulation board must be oriented perpendicularly to the crowns.

The layout diagram of thermal insulation material in 2 layers



ATTENTION! The roof fasteners must not be overtightened!



To protect the installed material from the rain, wrap the thermal insulation at the end of each working day with a vapour barrier layer and place its ends under the roofing, then secure the layers mechanically.

During shorter work breaks, you can similarly overlay this layer and load it.

At the beginning of the next working day, release the vapour barrier layer from the anchors and continue working; leave the damaged part of the vapour barrier layer for overlapping.

The thermal insulation material should be fixed independently of the membrane.

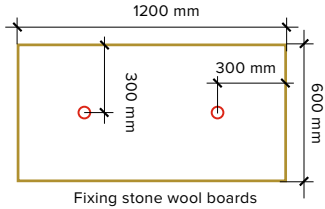
ATTENTION! When installing the thermal insulation material in several layers, it is not necessary to individually fix each layer! The insulation material can be fixed in a one-off manner.

ATTENTION! When installing the PVC membrane on a porous substrate (i.e. foam glass, PSB-S foam construction block, expanded polystyrene foam (EPS), XPS) it is necessary to install a fibreglass separation layer with a weight of 120 g/m² or geotextile layer with a weight of at least 300 g/m².

The separation layer must be laid with overlaps of at least **100 mm**.

ATTENTION! When installing the PVC membrane onto bituminous materials, it is necessary to use a geotextile / separation layer with a weight of at least 300 g/m².

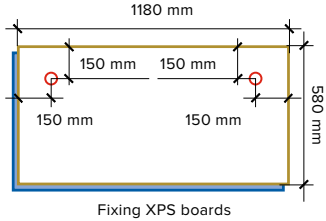
3



Fixing stone wool boards

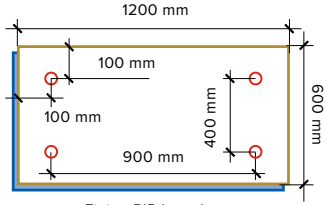
Use a minimum of fasteners to fix a sheet of 1200×600 mm.

The fastening element must not be placed in the join between the boards because such fixing is not reliable.



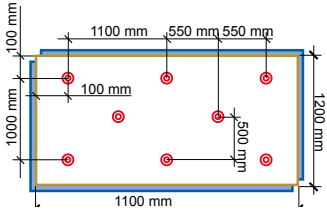
Fixing XPS boards

If the L-shaped edge of the board with fixed loads presses against the previous board, we recommend that you place the fastener on one edge.



Fixing PIR boards

Use a minimum of four fasteners to fix an insulation board with dimensions **1200×600 mm**.



Fixing PIR boards

Use a minimum of 6 fasteners to fix an insulation board with dimensions **2400×1200 mm**.

4.

Welding

4. Welding

4.1. Hand welding

Hand welding should be carried out with a special hot air gun. The use of a conventional hot air gun is forbidden as it generates unstable air temperatures at the outlet of the nozzle.

ATTENTION! Before welding, refer to the welding equipment manufacturer's instructions.

Before starting welding, check the following parts of the equipment:

- the nozzle opening must be clean and unobstructed, i.e. free of deposits,
- the air intake openings must be clean and unobstructed for the passage of air.

If necessary, clean the intake holes with a soft brush.

The operating air temperatures can be set on the temperature controller in the range of 50 to 600 °C.

For welding the PVC membrane set the temperature between 450–550 °C according to the weather and the speed of welding. After switching the gun on, wait 7–10 minutes before the air and nozzles heat up (longer in cold weather).

To remove dirt from the surface of the membrane in the welding area or to activate the old membrane during repair, clean the surface using LOGICROOF PVC Cleaner and a cotton cloth.

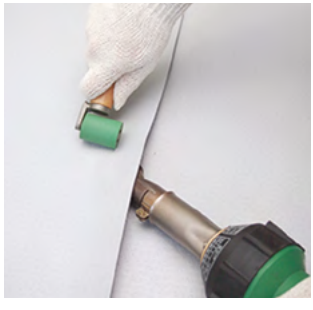
ATTENTION! Before starting welding, remove any excess cleaner from the surface of the membrane with a cotton cloth.

4.1.1. Spot welding the membrane

Lay the membrane with a 60 mm overlap and make stitches to hold the membrane at several places. To do so, put the heated nozzle to the overlap at a distance of more than 40 mm, while simultaneously pressing the membrane with your finger at the nozzle outlet.

Proper stitching must be easily torn off without leaving obvious traces on the membrane.

4.1.2. “Back welding or preliminary welding”



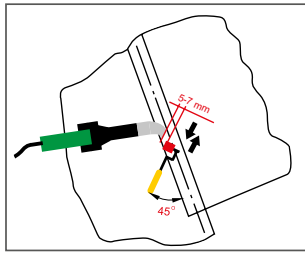
“Back welding or preliminary welding” eliminates air leakage from the welding zone; this is done by quickly inserting the nozzle and moving it along the seam with one stroke, while simultaneously pressing the roller towards the edge of the nozzle.

A properly done back or preliminary weld must keep the hot air in the welding zone.

4.1.3. Final Welding

To perform the final weld, insert the hot air gun to the remaining overlap at an angle of approximately 45°. At the same time, the tip of the nozzle must protrude 1–2 mm from the overlap.

To avoid melting the bottom layer, lift the end of the nozzle by 1–2 mm. Run the silicone roller along the edge of the nozzle at a distance of 5–7 mm.



Shift the gun along the overlap and simultaneously move the silicone roller over the joint; the roller must “jump” over the edge of the membrane. When moving the roller toward the weld (to the outer edge of the membrane), press it harder.

ATTENTION! Apply this three-step manual welding to all welds and roof connections.

We recommend that you apply Liquid PVC Coating (the top membrane is shown in green) to all “tear” welds (when the membrane is torn and not cut and the reinforcing grid remains exposed).

Liquid PVC Coating is not meant for repairing poor quality welds and may only be used after successful welding.

The nozzle must be properly attached to the welding gun.

4

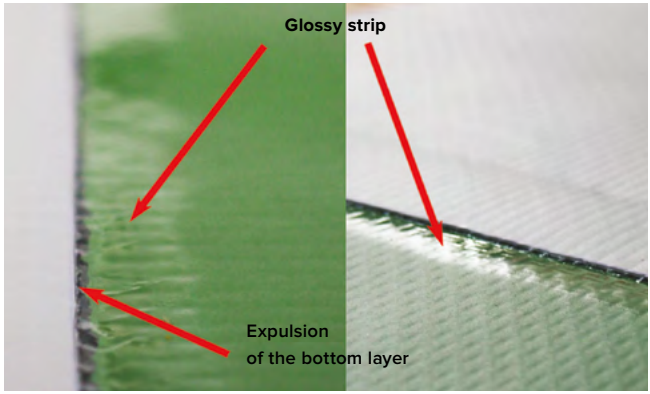
ATTENTION! The nozzle attachment may be replaced only after complete cooling.

ATTENTION! It is forbidden to roll the weld since it prevents welding tests using a tester.

If dirt has accumulated on the nozzle, remove it with a copper brush.

4.2. Criteria for making high-quality welds

Main indicators of a high-quality weld:



- The width of the final weld must be at least 30 mm;
- A glossy strip along the outer edge of the weld, about 5 mm wide (this strip may be missing in the winter);
- The cohesive burst of the weld.

Visual indicators:

- A glossy strip along the outer edge of the weld, about 5 mm wide (this strip may be missing in the winter);
- Minor leakage of the material (so-called “bead”) from the bottom layer along the weld;
- No creases on the surface of the overlap;
- No overheating of the material (i.e. changes in the membrane colour, occurrence of deposits, scales, and carbon traces).

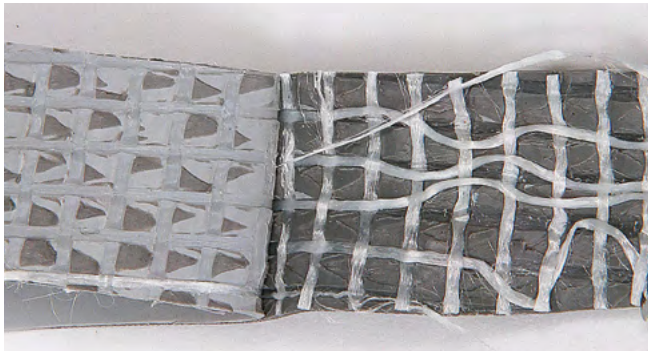
Major possible errors in hand-held welding:

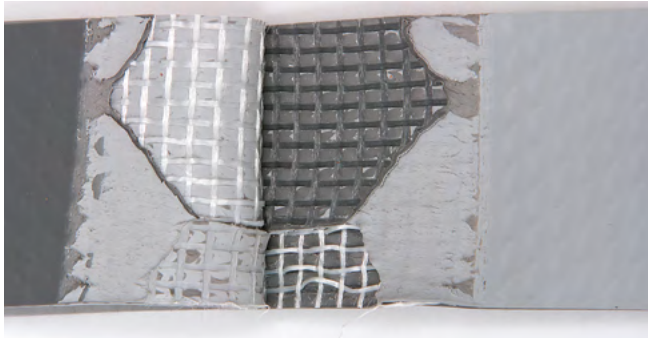
- Absence of an “air pocket” in the weld overlap;
- Incorrect welding parameters (air temperature, gun speed, and roller pressure) which may ignite the material or cause insufficient melting - see section 4.6 for details.
- Incorrect membrane surface preparation in the welding overlap (i.e. impurities, dirt, etc.);
- Hot air gun lifted too high (in this case, only 2–3 mm of the membrane edges are welded);
- Early stopping of the roller away from the edge, i.e. the roller does not reach the outer edge of the overlap (this may lead to the edge being not welded);
- The roller movement is not guided along the edge of the nozzle (at an angle) or along the overlap.

4.3. Cohesive burst of the weld

The cohesive bursting of the weld is a burst when the reinforcement grid of one of the welded parts is exposed or one of the layers over the entire width of the weld has peeled off.

Examples of good quality cohesive bursts of welds:





4.4. Quality control of welds

High quality welds are key to the durability of roofs using synthetic waterproofing membranes.
Check the quality only after the welded joints have completely cooled.

ATTENTION! At the end of each shift, we recommend that you carry out a check of the welds using a seam tester and control cut-outs (control cut-outs are made at least 3 times during a work shift).

Check the quality of a weld by moving the tester along the outer edge using mild pressure.
The tip of the tester must not penetrate the weld.

The weld strength may be determined by a tensile test of a **50 mm** wide cut-out sample; this test can be performed on a Leister Examo portable tensile device or on a stationary device.

To carry out quality control without the above-mentioned devices, a strip of the welded membrane with a width of **20–30 mm** can be used (Peel Test). Tear the strip of the welded membrane with your hands.

When tearing a high-quality weld, the reinforcement insert of the material should become exposed. Measure the width of the welded joint; it must not be less than **30 mm**.

4.5. Automatic welding equipment

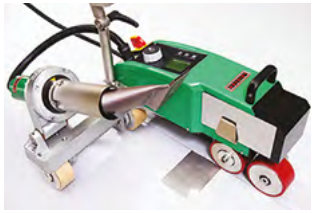
To achieve a high-quality weld on the main roof area, use special automatic hot air welding equipment.

ATTENTION! Before welding, refer to the manufacturer's instructions for automatic welding.

ATTENTION! The rollers of the automatic welding equipment must be complete and undamaged.

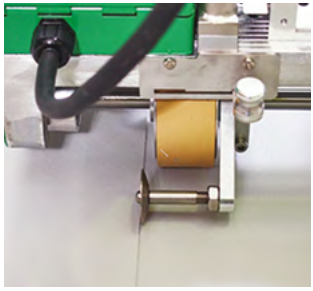
Before the start of welding, set the required parameters (air temperature and speed of the welding machine).

For details on selecting parameters, see section 4.6.



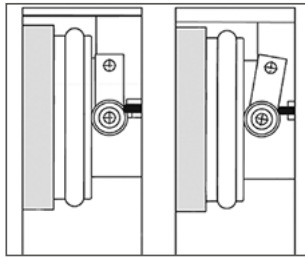
To achieve a smooth edge and easier additional welding, insert a metal plate with machined edges with a thickness of **0.3–0.5 mm**, made of galvanized or stainless steel, at the beginning of the weld.

Place the welding equipment so that its wheel is halfway along the beginning of the metal plate.



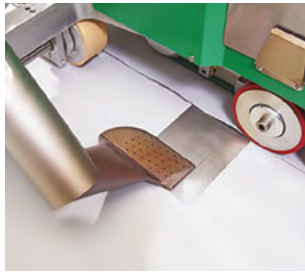
The metal guiding roller must be positioned along the edge of the overlap in the lowered position.

It is necessary to comply with the above requirement to maintain the correct position of the device during welding.

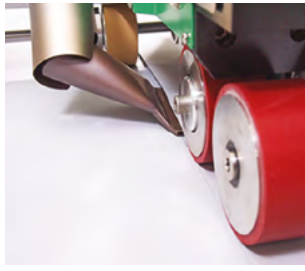


If it is necessary to weld across the slope of the roof, set the screw to compensate for the angle of incline.

Before the start of welding, pull the edge of the top membrane to make it easier to insert the welding nozzle into the overlap.
Caution! Do not touch the hot parts of the device.



Insert the nozzle into the overlap area. The movement of the device starts automatically.



Make sure that the nozzle tip extends beyond the outer edge of the weld by **2–3 mm**.

Install the second metal plate at the end of the weld. Once the pressure wheel hits the plate, remove the nozzle from the overlap area; the machine stops automatically.

Remove all dirt/deposits from the nozzle with a soft metal brush.

4

Continue to weld the membrane with the automatic welding equipment.

The nozzle must be cleaned every time it is removed from the weld, while the device is still at its operating temperature.

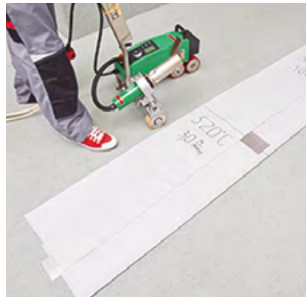
4.6. Choosing the parameters for the automatic welding equipment

Welding parameters, such as air temperature and speed, are not fixed; they depend on a number of factors: ambient temperature, wind strength, etc.

Incorrectly setting the welding parameters makes it impossible to obtain durable, high-quality welds. Suitable parameters can be determined by performing a test weld.

To determine or refine welding parameters, a test weld is required at the beginning of each working day or in the case of a significant change in the weather. If necessary, use PVC cleaner.

To do this, use two membrane strips of a sufficient length and width.



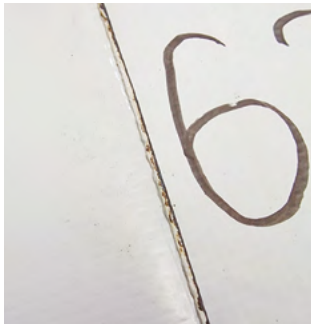
Weld the membrane strips and change the speed of the welding machine in length sections of at least **50 cm**.

For easier work, you can mark the membrane strips in advance with a marker.

When the weld cools down completely (cooling can take up to **20 minutes** at high ambient temperatures), cut a test strip of the welded membrane from the centre of each section with a width of **20–30 mm**, and tear the weld.

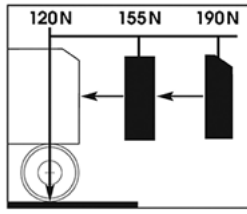
The main indicators of quality welding are given in section 4.2.

The membrane becomes detached (i.e. the seam separates without the use of force); cohesive tearing is not observed. To achieve a high weld quality, either reduce the welding speed or increase the welding temperature.



Indicators of poor quality welding are as follows: visible traces of ignition; change in the membrane colour; melting of the surface of the bottom layer of the membrane.

To achieve quality welding, increase the welding speed or reduce the welding temperature.

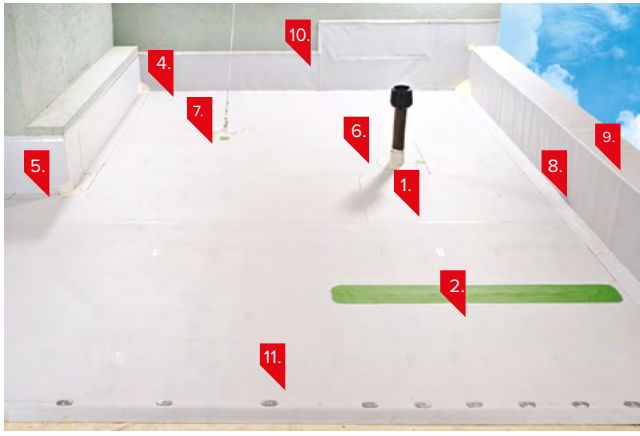


In addition to speed and temperature, another parameter can be adjusted—weld pressure; this parameter depends on the weights installed on the welding equipment.

General recommendation: install **two** weights if welding takes place on stone wool thermal insulation. When welding on a rigid surface (i.e. EPS, concrete, etc.), it is permissible to use a single weight or to weld without weights.

If sediments from a contaminated nozzle penetrate into the welded area, adopt the following important steps to avoid any ongoing problems:

1. Clean the weld from impurities, perform additional welding of the defective area with a manual hot air gun; we recommend treating the weld with Liquid PVC Coating;
2. After pre-cleaning the surfaces to be welded with PVC cleaner, weld a membrane patch over the defective area. To improve durability, we recommend that you treat the welds with Liquid PVC Coating.



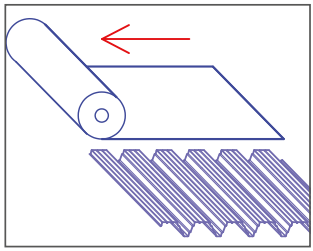
4.6.1. Various details

5.

Membrane installation on main flat roof field areas

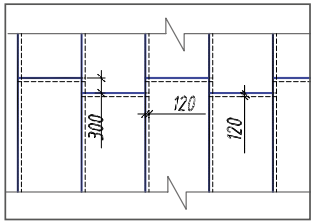
5. Membrane installation on main flat roof field areas

5.1. Installation of waterproofing membrane in systems with mechanical fastening



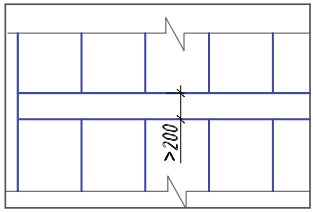
It is always necessary to place the membrane perpendicularly to the crowns of the corrugated steel sheet!

When installing the rolls, start from the valley or from the anti-slope along the upstand.



The longitudinal and transverse overlaps of the membrane must be at least 120 mm.

Shift the ends of each strip so that its distance from the adjacent strip is at least one crown of the corrugated steel sheet in order to avoid the weakening of the sheet due to the fastening of the membrane on one crown.

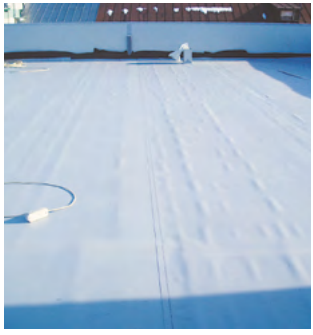


If the membrane cannot be installed in this way, place a separate membrane across the main surface.

The width of the individual strip must be at least 1 m.

The quality installation of the waterproofing membrane can only be ensured as long as you avoid creating folds and waves during installation.

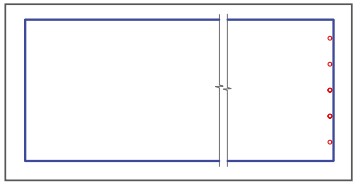
If necessary, use roofing pliers to ensure a tighter membrane tension between the fastening points.



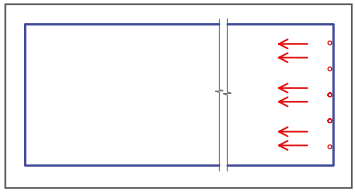
If you install the membrane at subzero temperatures, small undulations may form on its surface. These may be caused by the characteristic properties of the material (due to the differences in the shrinkage of the PVC and its reinforcing grid) and usually disappear after the membrane is stretched in the summer.

5

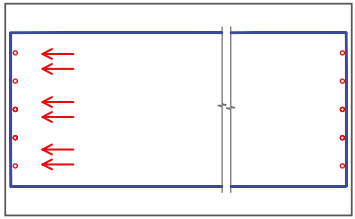
ATTENTION! The tension of the membrane depends on the temperature. The membrane should not be tensioned too much if the ambient temperature exceeds +30 °C, as this could lead to excessive membrane tension at subzero temperatures in the winter.



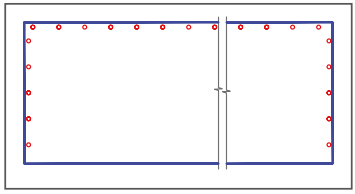
Unwind the roll on the substrate. First, secure one end of the membrane.



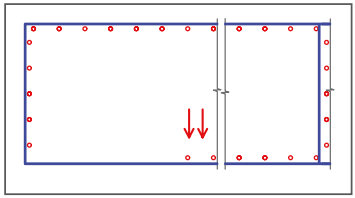
Stretch the membrane along its entire length to avoid creases.



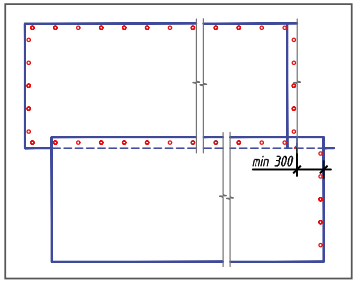
To prevent the membrane from winding back, step on it and secure the other end of the membrane.



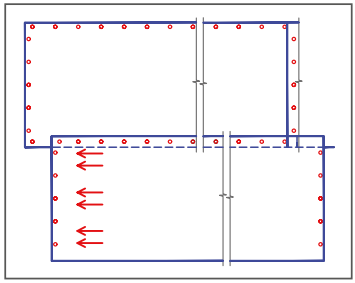
Then install the fasteners on the longitudinal side of the membrane.



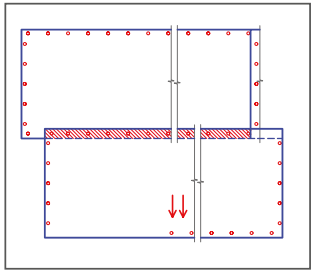
Weld a longer part of the membrane.
Then stretch the membrane across the area and fasten the membrane on the second longitudinal side.



Unwind another roll of the membrane and shift it by at least one crown of the corrugated steel sheet.
The overlap width must be at least **120 mm**. Secure the end of the membrane.



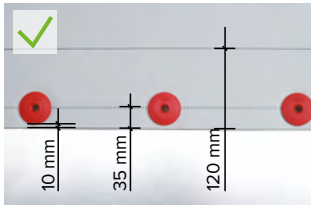
Secure the other end of the membrane and stretch the strip in the same way along the whole length.



Weld the longitudinal side of the membrane surface with the automatic welding equipment.

Wait for the weld to cool down. Stretch the membrane away from the welded edge; then fasten the opposite edge of the membrane with fasteners. Continue the installation by repeating the same procedure. After an interruption to handheld or automatic welding, pull the weld slightly before starting new welding, as the weld might not be welded up to **5 mm**.

5

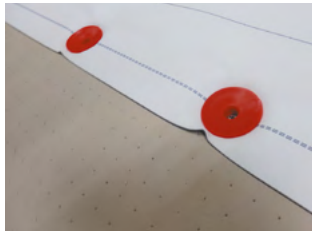


Make sure that the fasteners are positioned on the line (fixing line) marked on the longitudinal edges of each **LOGICROOF** roll.

Example of fasteners not place on the marked line.

Positioning fasteners near the edge of the membrane may cause the membrane to rupture due to wind load.

Beware of over-fixing as this will ruck the membrane.



Example of over-fixed tube washers.

Perform welding using the automatic welding equipment.

Remove the metal plates from the beginning and end of the weld, and weld the remaining part of the overlap manually.

After an interruption to hand-held or automatic welding, pull the weld slightly before starting new welding, as the weld might not be welded up to 5 mm.

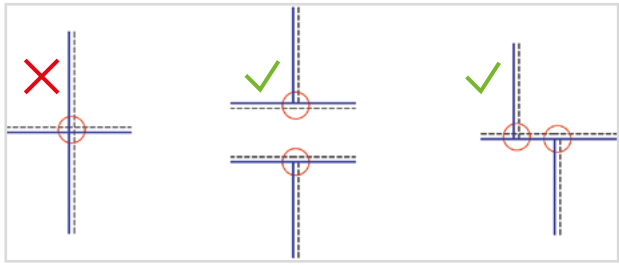
In places where the horizontal surface is connected to the vertical roof elements, it is preferable to start welding using a narrow brass roller.

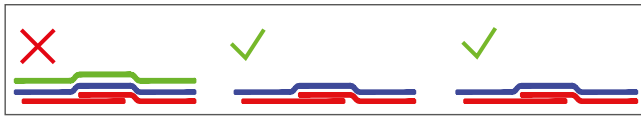
5

Make sure that the vertical part of the overlap between the adjacent strips is welded.

5.2. Making T-joints

Avoid joints in the shape of **X**, containing **4** membrane layers.
Make joints in the shape of T and linear welds.





In the case of an X joint, a membrane patch needs to be welded over.

ATTENTION! When installing the synthetic waterproofing membrane, it is necessary to round all of its outer corners!

Weld the corner of the upper membrane to the lower membrane. Weld the end of the next strip with the automatic equipment.

Use scissors to round the corner of the top corner of the surface. To make work easier, mark the beginning of the weld overlap.

Taper the edge of the bottom membrane into the depth of welded overlap (at least 30 mm) with a blade or special tool. Tapering can be done using a hot air gun.

Weld the remaining part of the weld.

5

Check the weld quality with a tester.

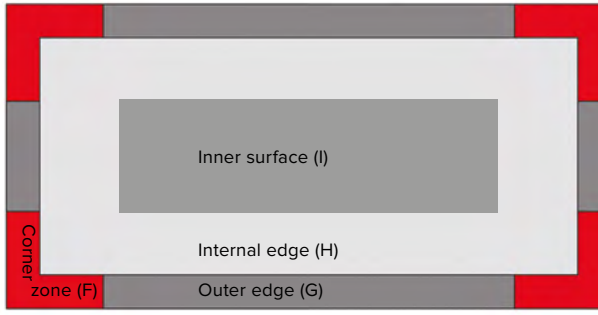
We recommend treating the manually welded areas with Liquid PVC Coating.

Shift the ends of each strip so that its distance from the adjacent strip is at least one crown of the corrugated steel sheet in order to avoid the weakening of the sheet due to the fastening of the membrane on one crown.

ATTENTION! When making T-joints, taper the middle membrane layer to ensure high-quality welding during automatic welding. Additionally, run the T-joints over with the brass roller immediately after using the automatic welding equipment.

5.3. Areas loaded by wind

Wind load is a significant factor affecting the durability of the roof.
A wind load calculation in accordance with EN1991:1:4 and the relevant National Annexe must be carried out prior to commencement of the roofing project.



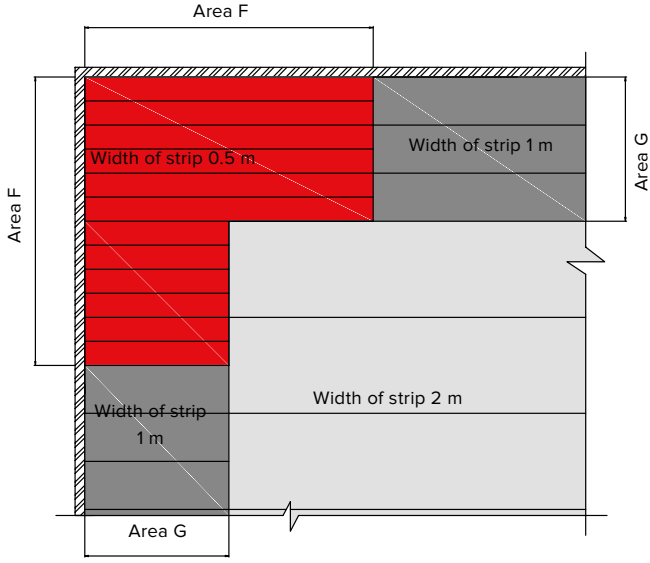
Generally, each flat roof is divided in terms of wind action into zones according to wind load, i.e. into the corner zone (F), outer (G) and inner (H) edge, and inner surface (I).

- The most significant effect of wind load is evident in the corner and outer edge zones, so an increased amount of fasteners must be used.
- The dimensions of the wind zones and the amount of required fasteners must be stated by the fastener plan.
- The minimum distance between fasteners in a row is 120 mm.
- The pitch of the fasteners is also limited by the crown pitch of the corrugated steel. Accordingly, it may limit the number of fasteners applicable to one conventional meter of the membrane.

ATTENTION! The PVC membrane should be fixed to every part of the roof according to the wind-load calculation.

If a two-metre wide membrane is used, 1 m2 can be installed with a maximum of 2.77 anchors. If the fastener plan requires a larger amount of anchors (usually in a corner zone), it is necessary to use membrane with a width of 1.05 m or 0.525 m (see picture), or another row of fasteners needs to be inserted into two-metre strips over which the cover strips with a width of 20 cm are welded (see section 5.4).

5.3.1. An example of membrane layout in the corner and edge zones using a membrane with a reduced width:



5.4. Centre fixing membrane

An increase in the number of fasteners in the corners and edge zones can be achieved by inserting rows of fasteners to the centre of the standard membrane with a width of 2 m.

Secure the fasteners through the centre of the membrane. Weld the reinforcing element from a round piece of the V-RP membrane (highlighted in green) under the last anchor located at the edge of the membrane.

Cut a **200 mm** wide strip from the **LOGICROOF V-RP** reinforced membrane (highlighted in green).

Stitch the strip to ensure its position, so that an even alignment is achieved and it is prevented from moving.

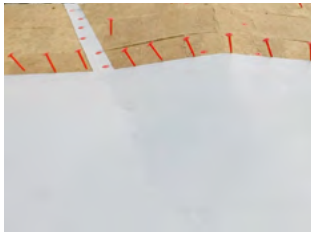
Weld the membrane to the substrate using the automatic welding equipment.

Weld the strip end manually.
Test the welding quality with a tester.

We recommend treating the manually welded areas with Liquid PVC Coating.

5.5. Detailing valleys

To eliminate the slackening of the membrane in valleys and around the adjacent sloped roof areas, it is necessary to create a hidden pocket or use a pre-mounted membrane strip to which the base layer of the membrane is further welded.



Firmly fix the membrane strip with a width of 10 cm to the substrate of the valley area with a standard telescopic fastener.

Manually weld the underside of the field membrane to the pre-fixed waterproofing membrane.

6.

Membrane installation on steep / pitched roofs

6. Membrane installation on steep / pitched roofs

When working on steep roofs, great attention must be paid to work safety, especially regarding the use of safety ropes.

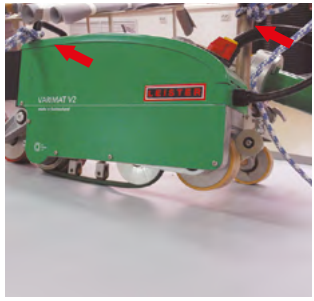
Fix the membrane with a pitch of the anchor elements according to the wind load calculation.

The side and end overlaps of the strips must be at least **125 mm** (i.e. 5 mm more than the standard overlap, which is due to the material shrinkage allowance based on the point fastening along the seam).

ATTENTION! Failure to observe the 5 mm reserve can cause small wrinkles around the weld.

To eliminate writhing and wrinkling during subsequent welding using the automatic equipment, snap the membrane along the entire length of the weld.

Fasten the welding equipment with ropes, using self-tightening hitches.



Fasten the welding equipment with ropes at the handles, otherwise, the equipment will not be stable due to the displaced centre of gravity, which may result in insufficient pressing or slipping of the moving device or to its overturning.

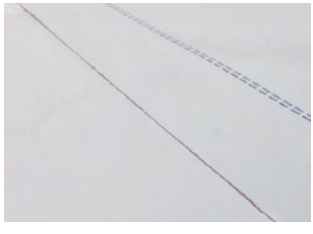
For comfortable operation and high-quality welding, weld the membrane at the lowest speed, selecting the appropriate temperature.

Hold the welding equipment, tighten the rope and start welding.

6

Make sure that the pressure roller of the automatic welding machine does not deviate from the overlap and that the nozzle tip protrudes 2–3 mm from the joint.

When installing membrane, observe work safety.



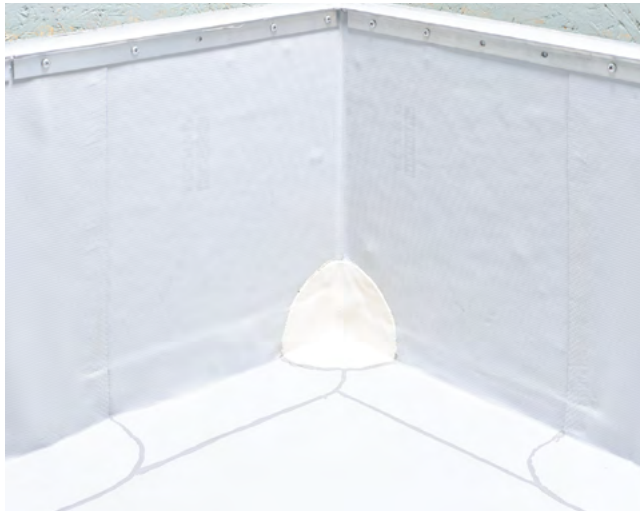
Finished weld.

7.

Forming edges and corners

7. Forming edges and corners

7.1. Forming internal corners



7.1.1. Installation of the waterproofing membrane in a corner

Roofing layers must be protected from water penetration.

Turn up the long side and end of the membrane strip on the vertical structure to a height of **50–80 mm**.

Fold the membrane as shown.

Weld the inside of the folded part.

Weld the folded part to one of the sides of the turned-up membrane.

7

7.1.2. Installation of the waterproofing membrane in the corners of intermediate upstands.

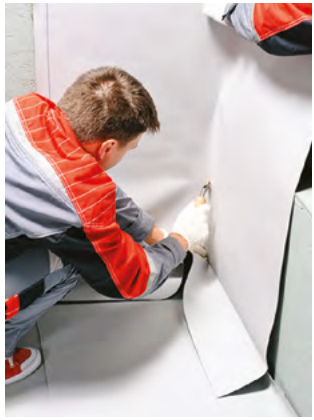
For comfortable work, while making the corner, glue the membrane strip to the upstand.

3Fold the bottom overlaps created for the corner. It is advisable to place a piece of the membrane below this part so that the adhesive does not soil the substrate backing.

Pour a small amount of Contact Adhesive into a bowl.

Using a roller, apply a thick layer of the contact adhesive to one upstand.

Then apply the adhesive to the appropriate part of the membrane. Be careful not to apply the adhesive in the area where welding is going to be done.



First, press the membrane in the corner using a narrow brass roller.

Then press the membrane against the surface of the upstand with a silicone roller.

Cut the membrane as shown.

7

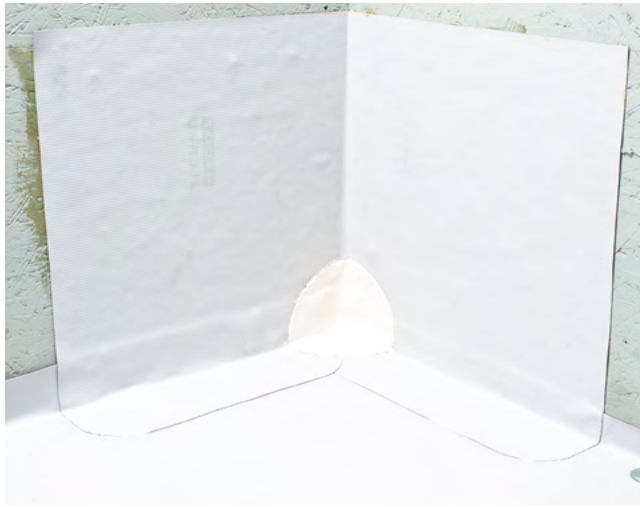
Apply the adhesive to the other face of the upstand and the membrane.

Using the same procedure, attach the waterproofing membrane to the upstand.

ATTENTION! Do not use the Contact Adhesive for the surface bonding of the synthetic waterproofing membrane to a horizontal substrate.

7.1.3. Installation of prefabricated corner pieces

To ensure a fast, high-quality corner, use a prefabricated corner piece. It is made of non-reinforced PVC of a greater thickness and is easily weldable to the surface of the PVC membrane. The finished element must be consistently welded to the membrane without the creation of cavities and through non-welded areas.



Fix the centre of the finished element.

Weld the edges of the element using a brass roller.

Weld the central part of the prefabricated element.

Weld the edges of the element using a narrow brass roller.

Similarly, weld the element in all its planes. Check the quality of the welded joint with a tester; we recommend treating the horizontal part of the welded joint with Liquid PVC Coating.

7

7.1.4. Making corners using the “envelope method”

When corners are correctly made using the “envelope method,” it is not necessary to make a reinforcement element.

Fold the material in the inner corner into a “loop.”
The beginning of the fold must lie exactly at the top of the corner between the upstands.

For more comfortable work, press the membrane along the edges of the corner with a brass roller and stitch it to the roofing using a hot air gun.

Bend the membrane loop to one side and press the bend with the roller.

Fold the loop to the other side and do the same from the opposite side.

Shift the membrane so that the line of the bend line is in the middle of the loop.

Place the membrane loop horizontally and run the roller over the place again.

To prevent damage to the lower layers of the material, put the loop on a metal plate with machined edges with a thickness of **0.3–0.5 mm**, made of galvanized or stainless steel, and make a stitching.

Weld the seam as shown in the photo.

Weld the contact points of the “envelope” that was created, to the field membrane using the narrow brass roller.

Weld the joint at the place of crossing of the envelope to the overlap using the brass roller.

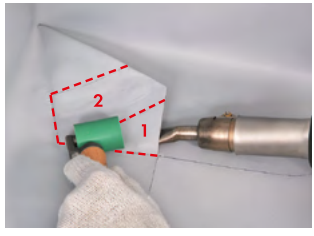
7

Then weld the membrane overlap to the field membrane using the usual procedure with the silicone roller.

Using the narrow brass roller, weld the place where the membrane overlap is crossed into the envelope.

Carefully weld the joint edges and the beginning of the weld between the overlap and the field membrane.

Then weld the membrane overlap to the field membrane using the usual procedure with the silicone roller.



Gradually weld the segments of envelopes **1** and **2**.

Stitch the free part of the envelope with a hot air gun.

Picture of the finished connection.

7.2. Forming external corners

7.2.1. Installation of the waterproofing membrane around the outer edge

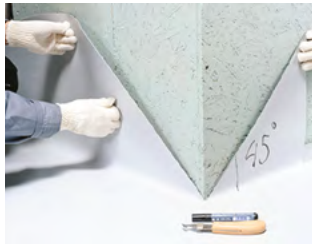
7

To ensure water tightness, weld the corner fitting from a non-reinforced membrane.

Pierce the membrane with the roofing knife at the point of contact between the membrane and the base of the corner.

Mark the line at an angle of **45°** from the bottom corner towards the top edge of the membrane and cut the membrane along the line.

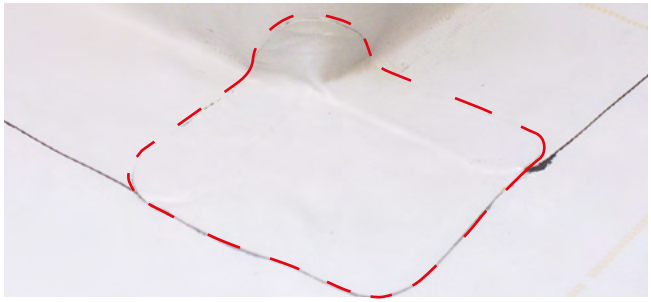
7



Place the membrane as shown and anchor it around the circumference.

Cut off excess membrane sections. The extension of the horizontal membrane onto the parapet must be at least **50 mm**.

7.2.2. Forming external corners using a non-reinforced V-SR membrane



BCut out a piece of the LOGICROOF V-SR membrane; it should be large enough to overlap the vertical and horizontal overlap of the membrane by at least **30 mm**.

Use a hot air gun to heat one of the corners and shape it by pulling it to achieve the shape as shown in the picture.

Place the corner fitting. It must tightly adjoin to all sides of the isolated corner.

Weld the part along the edges of the corner using your fingers and a hot air gun with a narrow nozzle.

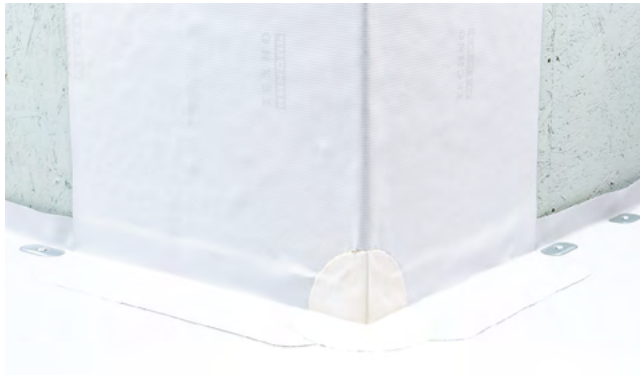
Simultaneously weld only the part that you can press with your finger. Then turn the corner to weld the non-welded part. Repeat this operation until the whole corner is completely welded.

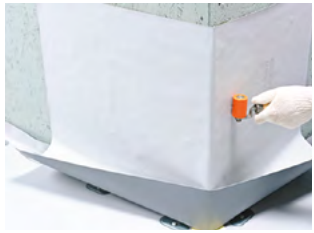
Carefully weld the crossing of the membrane using a narrow brass roller.

Then weld the remaining surface with a wide silicone roller.
Check the weld quality with a tester.

7.2.3. Forming corners using prefabricated corner pieces

To ensure a fast and high-quality external corner, use the corresponding prefabricated element. It is made of non-reinforced PVC and has a greater thickness; it is easily welded to the PVC membrane.





Glue the prepared **LOGICROOF V-RP** membrane to the external corner.

Cut through the bend of the membrane in the corner using the roofing knife.

Round all corners with a pair of scissors. Weld the edges to the horizontal membrane.

Attach the fitting and mark its outline with a marker.
Taper the edge of the membrane to the depth of the required weld (at least **30 mm**).

Stitch the corner piece to the field membrane.

Start welding the part along the corners from the centre of the patch and proceed to the edges. Use a narrow nozzle hot air gun with a width of **20 mm** and a brass pressure roller.

7

Weld the inner part of the fitting from the centre towards the edges, ending approximately **30 cm** from the edge.

Finally, weld the outer edge of the part. Proceed likewise with the vertical sections of the part. Check the weld quality with a tester.

8.

Detailing around penetrations with a small diameter

8. Detailing around penetrations with a small diameter

ATTENTION! For reliable and durable detailing, we recommend using round or square metallic pass-throughs on roof penetrations.

8.1. Installation of the waterproofing membrane around penetrations

Fasten the membrane to the substrate around the penetration.

Mark the place of contact with the membrane.

Firmly press the membrane over the penetration and cut through it vertically.

Cut the membrane around the penetration base as shown in the picture.

Anchor the end of the membrane to the substrate and round the corners of the membrane with a pair of scissors.

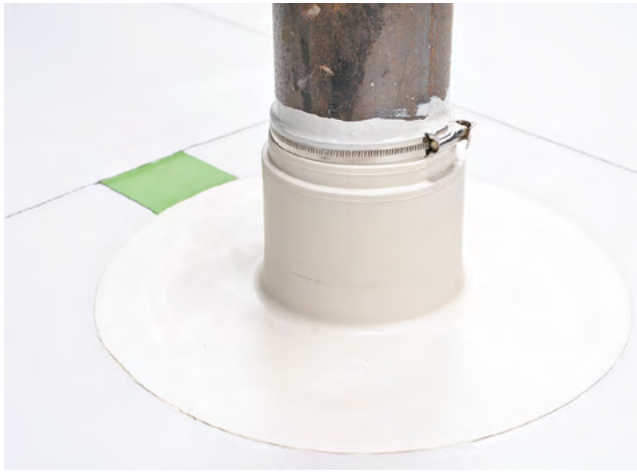
8

Weld a patch (highlighted in green) over the cut-through area.

Check the quality of the welds with a tester.

8.1.1. Detailing around penetrations using prefabricated parts

For fast and reliable detailing around penetrations, use the corresponding prefabricated PVC part.



Cut the top of the prefabricated part to the required diameter of the permeable structure. Fill the gap between the prefabricated part and the penetration with a geotextile (to eliminate sagging).

Pull the prefabricated part over the penetration and stitch it to the field membrane in several places.

Taper the edges of the patch to the width of the weld (at least **30 mm**).

Weld the flange of the prefabricated part around the edges using a silicone roller.

Check the quality of the welded joint with a tester.

Fill the gap between the prefabricated part and the penetration with Polyurethane Putty.

8

Tighten the joint with stainless steel banding.

ATTENTION! Never use plastic tightening rings to tighten the PVC membrane.

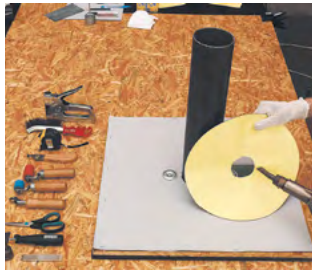
8.1.2. Detailing around penetrations using a non-reinforced membrane

Cut a round patch from a non-reinforced **LOGICROOF V-SR** membrane (highlighted in yellow).

Its diameter must ensure an overlap of at least **40 mm** over the installed fastening system.

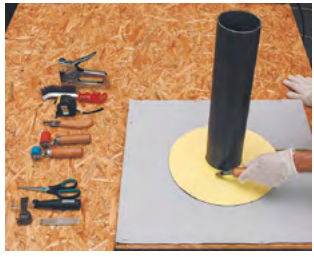
Fold the patch in half and press the fold with a roller. Then fold it into quarters and press the fold again.

Cut the top of the patch so that the inner opening is **50 mm** smaller than the diameter of the penetration.



Heat the patch on both sides around the hole with a hot air gun to soften the membrane.

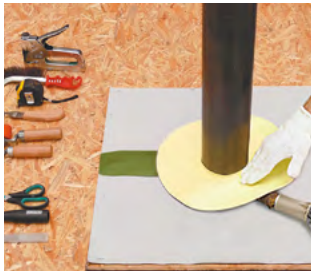
To ease the installation of the penetration patch, you can stretch the inner opening with your fingers.



To prevent the cooling of the patch; stretch it quickly and vigorously onto the pipe, and run over the “rollover” at the bottom section with a brass roller.

Weld an inner collar part of the patch around the penetration with a hot air gun while pressing with a brass roller.

Taper the edge of the patch to the width of the desired weld (at least **30 mm**).

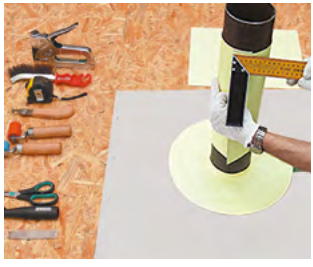


Manually weld the inner part of the resulting flange to the main membrane with the hot air gun.

Finally, weld the patch around the outer edge.

Check the weld quality with a tester.

8



Cut out a piece of the non-reinforced **LOGICROOF V-SR** membrane with a width of 30–40 mm. The length of the strip must be **40 cm** bigger than the perimeter of the penetration to ensure an overlap for the weld.

Wrap part of it around the pipe, pull it with your fingers and stitch it in several places where it overlaps with a hot air gun. Use a narrow nozzle with a width of 20 mm.

Remove the part from the penetration and round the bottom corner of the membrane in the overlap.

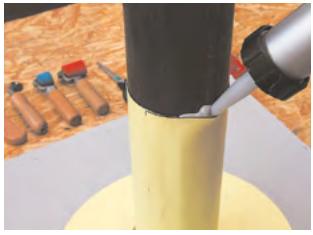
Manually weld the overlap with the hot air gun and smooth it out with a teflon or silicone roller.

To make work easier, an auxiliary horizontal tube can be used (especially where there are large number of similar circular penetrations with the same diameter).

Heat the lower section of the part with the hot air gun to make the membrane softer.

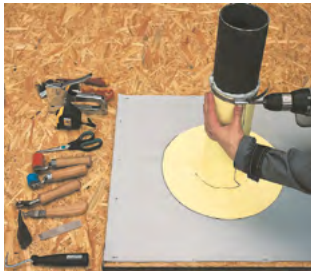
Stretch the heated part with your hands as shown in the picture. Then, if the heated membrane does not form a so-called “skirt” around the structure, start heating and stretching the adjacent section of the bottom part of the penetration. The horizontal size of the skirt must be 20 mm.

Pull the patch over the penetration. Weld the seam to the flange base.

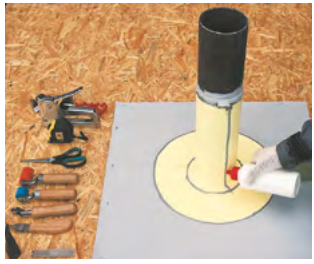


Fill the gap between the prefabricated part and the penetration with Polyurethane Putty.

8



Tighten the joint with stainless steel banding.



Check the weld quality with a tester. We recommend treating the welds with Liquid PVC Coating.

8.2. Detailing around penetrations with a small diameter

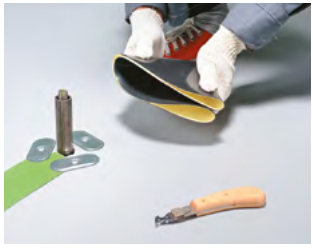
Cut out a hole in the membrane area in order to apply it around the small diameter of the penetration.

Weld a strip of the reinforced **LOGICROOF V-RP** membrane (highlighted in green).

You can continue to lay standard membrane strips.

Secure the membrane to the substrate around the small diameter penetration.

Cut a round patch from the non-reinforced **LOGICROOF V-SR** membrane (highlighted in yellow). The minimum patch diameter must be equal to the diameter of the penetration plus 150 mm.
To preserve the shape of the penetration, it is necessary to fill it, for instance, with stone wool thermal insulation.



Fold the patch four times as shown in the picture.

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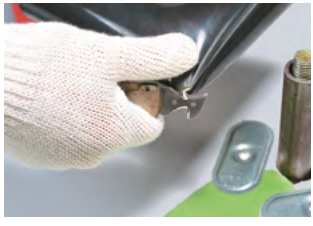


Cut out the centre of the circle.

Heat the patch evenly with a hot air gun until the hole softens.

Quickly insert the patch onto the penetration before the membrane cools down.

Stitch the patch at several places. Taper the edges of the patch to the width of the weld (at least 30 mm).

Weld the patch to the field membrane; pay special attention to areas where the patch comes into contact with the reinforced membrane strip.

Check the joints with a tester.

Cut out another round patch from the non-reinforced **LOGICROOF V-SR** strip.

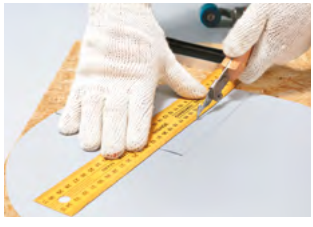
Fold the patch **four** times.

Use the roofing knife to create a hole to determine the center of the circle.

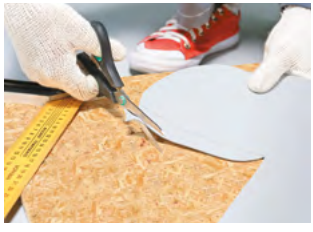
Make a cut from the center to the border of the circle.

Fold the cut-out segment and press it with a roller.

8



Use the roofing knife to make a cut **20 mm** from the folding line.



Round the corners with a pair of scissors.

Join the edges of the circle to form a conical shape with a welding width overlap of approximately 20 mm.

Attach the produced part to the corner, pull both its sections together with your fingers, and stitch them together in points using a hot air gun.

Then weld the joint.

Turn the part inside out and weld the seam from the inside. Check the weld quality with a tester.

Then heat the small area around the outer part of the cone by moving the nozzle until the membrane softens.

Stretch the heated surface in order to create a rim. Use your hands as shown.

Gradually heat and pull the cone along the whole circumference of the base.

Using a roofing knife, make a cut in the top of the cone.

8

Heat the membrane around the hole with a manually operated hot air gun.

Quickly pull the cone onto the penetration before the membrane cools down.

Stitch the rim (“skirt”) of the cone to the main field membrane.

Perform a back/preliminary weld using a brass roller. During this step, push the brass roller outwards to ensure the tension needed for the membrane.

Weld the outer edges to the main area of the membrane.

Check the weld quality with a tester.

Tighten the cone at the top with stainless steel banding and fill it with Polyurethane Putty.

8

9.

Connection to the upstand and its crown

9. Connection to the upstand and its crown

9.1. Detailing to the upstand using a “hidden pocket”

When creating a sandwich panel connection, it is necessary to remove the membrane from the sections where the terminating bar is secured.
The reason behind this is that the membrane degrades when exposed to UV rays and the tightness of the joint could be compromised.

From the point of view of lifespan and the quickest installation time, the most reliable option is to pull the membrane onto the upstand using the so-called “hidden pocket”.

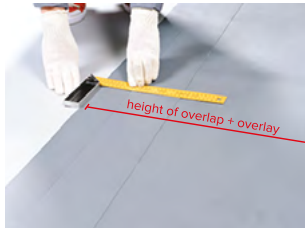
Cut out a strip of reinforced **LOGICROOF V-RP** membrane.

To speed up the work, the side strip may be torn off; to do so, cut the membrane with the roofing knife, then tear off the strip. Thanks to its special mesh, the discontinuity reveals itself along the reinforcing fibres.

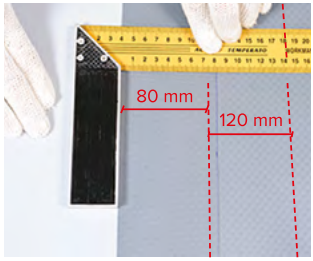
It is necessary to place the torn-off edge of the membrane so that it is, after installation, protected from moisture—place this edge on the vertical surface of the upstand or under the overlap.

ATTENTION! Do not tear off the membrane when it is cold during the winter season. Prior to cutting, the membrane should be kept at a temperature of at least + 10 °C for at least 12 hours.

The width of the strip must correspond to the height of the membrane overlap on the upstand (or the length of the membrane to wrap the upstand) plus the size of the membrane overlap on the horizontal surface (at least **150 mm**).

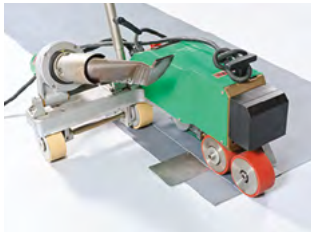


Also prepare a narrow strip of the reinforcing **LOGICROOF V-RP** membrane with a width of **120 mm** to create a “pocket.”



Mark a line on the reverse side of the membrane for the upstand at a distance of 80 mm from the bottom edge of the membrane and sketch the strip for a “pocket” along this line. You can use a special jig to create the pocket.

Stitch the pocket strip in several places along the opposite edge.



Using automatic welding equipment, weld the pocket strip to the bottom edge of the patch.

Release the stitches.

Insert the fixing bar into the hidden pocket and use the roofing pliers to pull out the pocket membrane while pressing the bar with the pliers.

When fastening, place a metal plate under the material to avoid damaging the membrane.

9

If you need a fixing bar that is smaller than the standard lengths, cut it from both sides with sheet metal shears.

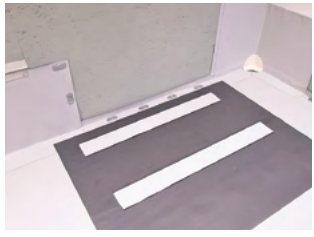
Then break it at the site of the cut.

Cut the steel bar using an angle grinder.
For more comfortable work, place the bar across the corrugated steel sheet.

ATTENTION! Do not cut the bar with the angle grinder on installed waterproofing, thermal insulation, or the vapour barrier.

The distance between the fasteners and the fixing bar must be **200 mm**.

Lift the free edge by pulling the waterproofing up the upstand.



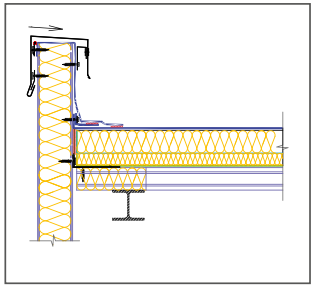
If the height of the membrane is greater than **450 mm** or it is necessary to create an upstand with another layer of insulation, use another hidden pocket with a fixing bar to enable fastening.

Place the additional bar in the pocket. When securing the edge fastener, pull the corner of the membrane diagonally so that no folds are formed on the membrane.

In the case of a low upstand (usually a height of 350 mm), place the membrane over the upstand; pull the outer side of the membrane with one hand and smooth it with the other hand in the upward direction so that it does not form folds.

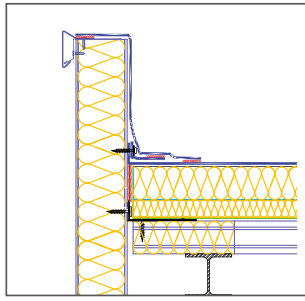
Anchor the membrane mechanically to the outer side of the upstand.

9



Install steel sheets on the horizontal part of the upstand with the membrane (for sandwich panels) to protect the facade from water. The sheeting of the upstand has to be done tightly.

Contact between the sheeting and the upstand should be lubricated with a polyurethane putty, or sealed with hydrophobic materials or using neoprene rubber sealing.



With high upstands, you can install a weatherboard system made from steel sheet laminated with PVC. Refer to section 9.2 for working with PVC laminated steel sheets.

With upstands larger than **350 mm**, use the end with a termination bar. In order to evenly stretch the membrane along the length of the upstand, it is necessary to install the bar from the centre. Use roofing pliers to ensure the adequate tension of the membrane.

To fasten the termination bar to the upstand made from sandwich panels, use fasteners with a diameter of at least 5.5 mm.

To make a connection to the upstand using a laminated steel sheet, cut metal strips with a width of 50 mm using the manual or electrical sheet metal shears. You can also use finished bars.

ATTENTION! Place a 2–3 mm expansion gap between each bar.

Apply Polyurethane Putty to the centre of the inner side of the laminated sheet metal bars.

Fasten the bar in the vertical position with self-tapping screws.

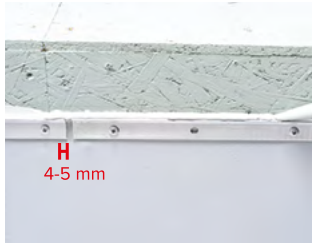
Position the polymeric waterproofing membrane at the same level as the edge of the laminated bar.

For additional sealing, apply Polyurethane Putty to the edge of the laminated bar.

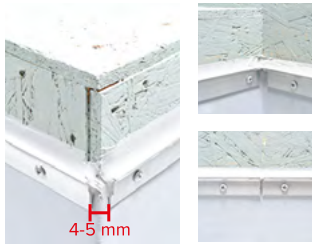
Round all corners.
Weld the strip to the horizontal main waterproofing with the automatic welding equipment.

Weld all overlaps. Before this step, taper the horizontal edge of the bottom membrane.

9



Cut the excess membrane above the termination bar with a sharp knife and apply the putty to the gap between the rail and the wall.



When fixing the membrane to the external and internal corners, leave a gap of 4–5 mm between the termination bars. Reinforce the bar edges with additional fasteners.

A possible solution to changing the membrane height on the upstand.

Check the weld quality with a tester. We recommend treating the manual welds with Liquid PVC Coating.

As an alternative, fixing steel bar or laminated bar can be used instead of the termination bar.

9.2. Detailing to the gutter upstand

For making gutter profiles on concrete substrate, use laminated steel sheets with a PVC coating with a thickness of at least 800 µm.

ATTENTION! **Before installation, check which side has the PVC finish. Polymeric waterproofing membranes can only be welded to the plastic-coated side.**

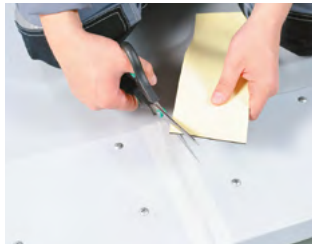
Bend the main roofing over the gutter edge and fix it mechanically. Use metal washers for this purpose.

Cut out the prefabricated fitting at an angle of 45° using sheet metal shears. Fasten the fittings to the load-bearing layer of the roof.

Leave an expansion gap of 2–3 mm between each profile.

Adjust the gap and fasten the next gutter profile.

Overlay the gap with adhesive tape to prevent it welding to the PVC membrane.



Cut a piece of non-reinforced **LOGICROOF V-SR** membrane (highlighted in yellow) and round the corners.

Stitch the PVC membrane to the laminated sheet and then weld the non-reinforced PVC membrane to the gutter profile; use a manual hot air gun and a pressure roller. Cut off the excess non-reinforced PVC membrane at the bottom with a roofing knife.

Cut out a strip of the non-reinforced **LOGICROOF V-RP** membrane (highlighted in green) with a width of **300 mm** and stitch it with a hot air gun to the horizontal waterproofing membrane.

Round the corners with a pair of scissors and cut the end at an angle of **45°**.

On the inside, weld the strip to the main roofing membrane using the automatic hot air welding equipment.

Taper the edges of the non-reinforced membrane to the width of the weld (at least **30 mm**).

Weld the membrane to the laminated sheet metal with a hand-held hot air gun.

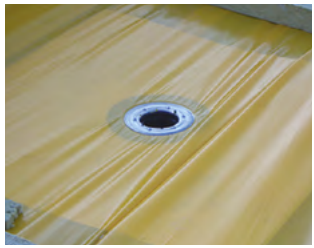
Check all welds with a tester; pay special attention to places where the reinforced coating overlaps the non-reinforced membrane. We recommend treating all connecting welds to the weatherboard system with Liquid PVC Coating.

9

10.

Installation of roof outlets

10. Installation of roof outlets



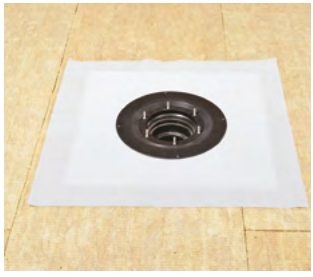
It is recommended to use two-stage roof outlets. The bottom flange of the roof outlet allows the vapour barrier layer to be properly sealed and function correctly.

To achieve a smooth and firm base around the roof outlet, we recommend using XPS thermal insulation boards - with a higher compressive strength.

The dimensions of this area must be at least **1×1 m**.

For single-stage roof outlets, it is preferable to use a butyl-rubber band to seal the vapour barrier along the perimeter of the reinforcing board. Press the XPS board firmly to the tape.

Create a hole for installing the roof outlet to the board. To ensure a tight connection of the roof outlet flange, taper the edge of the hole, for example by surface melting the XPS board with a hand-held hot air gun.



As a separating layer, insert a fibreglass section with a weight of at least **120 g/m²** between the XPS board and the membrane and insert the roof outlet into the hole.

For a more thorough seal, apply PU putty along the outer edge of the roof outlet; apply the putty around all screws.

Place a piece of the **LOGICROOF V-RP** membrane with the dimensions of 1×1 m over the roof outlet; using a knife, cut holes for the screws in the membrane and press the membrane over the pins.

To make this operation easier, you can use a prefabricated part with the factory laminated membrane.

10

To improve the reliability of the joints, apply PU putty around the outer edge of the roof outlet.

Tighten the flange with nuts. After tightening all the nuts, a small amount of putty should be pushed out around the flange.

Lift a piece of the membrane and secure the roof outlet to the substrate with long self-tapping screws.

Fasten the part to the load-bearing layer so that the anchoring material penetrates the reinforcement membrane (see section 3.1).

10

Continue to install the membrane on the main surface in the standard way. After the membrane is fastened, place the centre of the roof outlet under the membrane. Determine the centre with screws.

Mark the hole on the membrane using a strip of the membrane and a marker. Use a pair of compasses to draw a circle with a radius **6 mm** larger than the radius of the flange.

Carefully cut through the membrane with a pair of scissors along the marked line to avoid damaging the bottom membrane.

Make the back weld and then finish welding the outlet to the substrate membrane.

All welds should be treated with Liquid PVC Coating.

10

11.

Procedure for cleaning the equipment

11. Procedure for cleaning the equipment

For the perfect and reliable operation of manual welding devices, carry out their regular cleaning at least once per year. The Leister manual welding equipment does not have special inlet filters, so the dust gets inside and into the device's hard-to-reach places. There is no need for special tools to maintain the equipment. A brush, compressed air, and a set of screwdrivers with replaceable bits are quite sufficient. Such maintenance can be carried out directly on site.

Cleaning is best done at an ordinary table where it is possible to take apart the hot air gun and accessories.

11.1. Cleaning the hot air gun

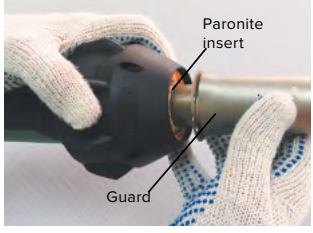
Use a metal brush to remove dirt from the nozzle of the hot air gun.

Remove the screw holding the nozzle using a screwdriver.

Remove the nozzle.

12

Unscrew the 4 screws from the heater guard.



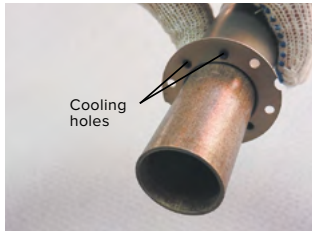
Remove the heater guard together with the paronite / mica insert.

If the paronite / mica insert is damaged and peels, replace it with a new one. Bits of mica may clog the air stream, which may cause the device to malfunction.

Hold the gun at the bottom and remove the heater.

Check whether the heater is dusty and/or dirty. Check the integrity of the spiral; this can be done with a tester. Replace the damaged wire spiral with a new one.

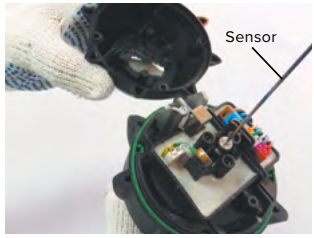
12



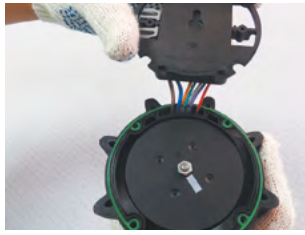
All holes in the metal guard and the paronite / mica insert must be cleaned of dust and dirt.

The air flows through these parts and cools down the metal guard.

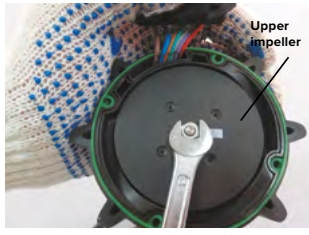
Unscrew the 4 screws along the perimeter of the top lid. Remove the lid. Clean any dust and dirt inside of the lid using a brush and compressed air.



Carefully wipe the temperature sensor.

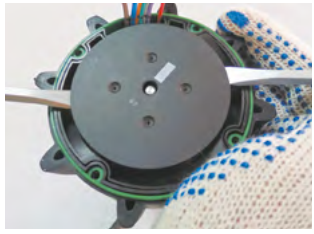


Put aside the sensor panel.



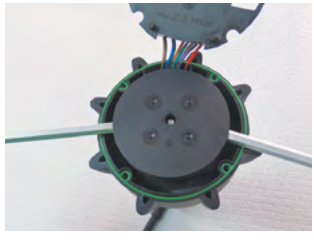
Use a spanner to undo the nut fastening the upper impeller of the electric motor.

12



Use two screwdrivers to remove the impeller from the shaft.

Use two screwdrivers to carefully remove the second wheel.



Remove the plastic insert between the top and bottom wheels.

Remove any dust and dirt by blowing it out.

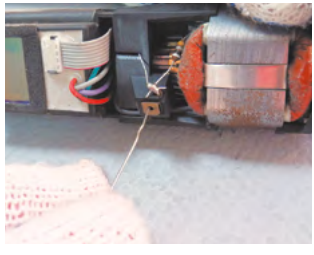
Clean the two wheels and the plastic insert in the same way.

12

Use a paintbrush to clean any impurities from the impeller blades.

Unscrew the remaining 3 screws.

Remove the plastic housing of the gun (handle).



Straighten the staple and use it as a test measure. Using this measure, check the length of the brushes. Place the tip of the staple into the hole behind the brush.

Grasp the staple in one plane with the body. Pull it out of the hole and place it on the outer side - this will allow you to measure the length of the brushes. If less than **3 mm** remain, the brushes need to be replaced.

ATTENTION! When cleaning dust or dirt from the motor, do not use force and do not apply washing or cleaning agents.

Remove the protective grids from the housing (handle) and clean any dust or dirt from them as well using a brush and compressed air.

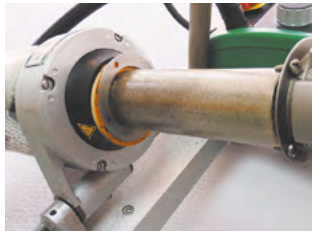
Assemble the welding device in the reverse order.

11.2. Automatic welding equipment cleaning

Use a metal brush to remove any dirt from the nozzle of the hot air gun.

Unscrew the 4 screws from the heater guard.

12



Remove the heater guard together with the mica insert.

If the mica insert is damaged and peels, replace it with a new one. Bits of mica may clog the air stream, which may cause the device to malfunction.

Unscrew the four screws that secure the pressure plate.

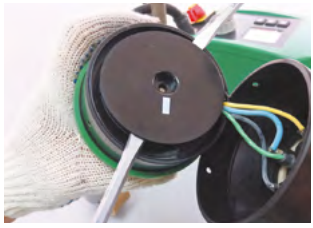
Remove the pressure plate.

Remove the rubber cover from the top part.

12

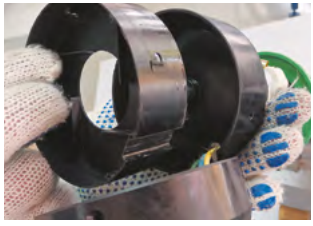
Unscrew the 4 screws fixing the top part.

Pull out the upper part with the heater. Do not remove the heater at this stage, as this could damage the temperature sensor!



Unscrew the nut of the upper impeller of the electric motor and remove it from the shaft using two screwdrivers.

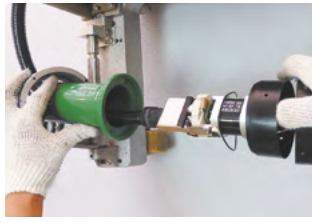
Unscrew the 2 screws fixing the bottom part.



Carefully remove the plastic insert between the upper and lower impellers.

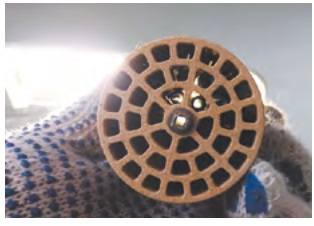
12

Remove the second plastic impeller of the electric motor using two screwdrivers.



Remove the plastic housing (gun handle).

Remove the heater.



Check whether the heater is dusty and/or dirty. Check the integrity of the spiral; this can be done with a tester. Replace the damaged wire spiral with a new one.

If necessary, blow out the heater with compressed air.

12

Also, clean any dust or dirt from the motor with compressed air.

Clean the two impellers and the plastic insert in the same way.

ATTENTION! When cleaning dust or dirt from the motor, do not use force and do not apply washing or cleaning agents.

Blow out the gun housing (handle) with compressed air.

Assemble the welding device in the reverse order.

12

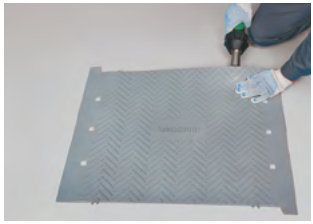
12.

Installation of the LOGICROOF WalkWay Puzzle roof walkway

13. Installation of the LOGICROOF WalkWay Puzzle roof walkway

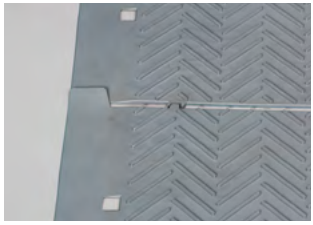
The roof walkway consists of separate finished panels forming a puzzle. The working dimension of one element is **600x600 mm**.
After laying the puzzle, the edges of the finished walkway are welded to the surface of the field membrane using the automatic welding equipment (Variant). For this purpose, the panels include a smooth **80 mm** - wide strip along its edges.

The bottom side of the panels includes channels for water drainage, hence there is no need to make spaces between the panels. The elements are made from the same PVC material as the main field area, so they weld easily to the membrane.



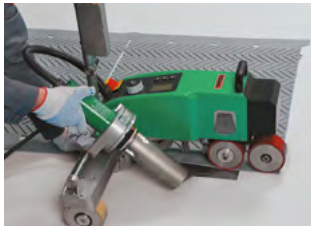
Fasten the first walkway panel on both sides to the field membrane using a hot air gun.

Fit another piece into the previous one as you would a puzzle.



Position the “ears” of the panels so that they do not interfere with the passage of the automatic welding equipment.

The next panel needs to be secured in one place only.
Weld the panel ears manually from both sides.



After completing one row of the walkway, weld the walkway panels to the field membrane with the automatic welding equipment. The smooth strips at the edges of the walkway panels serve this purpose.

Basic rules for the operation of roofs made from synthetic waterproofing membrane

Do not expose the roof to fire, flammable or toxic substances, lubricants, petroleum products,

or asphalt. If this happens, treat the membrane with LOGICROOF PVC Cleaner or replace the heavily-damaged area.

When on the roof, move only across secured routes.

When moving on the roof, operatives must use protective shoes with a flat sole, without sharp or metal heels, etc.

Do not step on the roof and do not move on unsecured roof areas at ambient temperatures below –15 °C.

Avoid mechanical damage to the synthetic waterproofing membrane.

Only remove snow from the roof with a wooden shovel. Leave a protective layer of snow on the roof at least 10 cm high.

It is forbidden to use mechanical equipment for removing snow.

Do not throw snow off of the higher areas of the roof.

If a building is located in an area with a large presence of birds, it is recommended to install electronic or ultrasonic scare-away devices.

Unauthorized persons must not have access to the roof. Keep a list of staff working on the roof.

For complete instructions on the maintenance and operation of the roof with a synthetic waterproofing membrane, please refer to the “Instructions for the Maintenance and Operation of Roofs Made from LOGICROOF synthetic waterproofing membrane” available online at www.technonicol.eu