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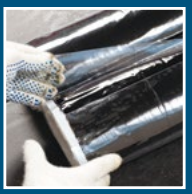





Manual

for installation of self-adhesive non-reinforced polymer-bitumen membranes for foundation waterproofing

KNOWLEDGE. EXPERIENCE. CRAFTSMANSHIP.

TECHNONICOL

We are proud of what we produce and create. We enjoy seeing how new high-quality materials are produced from plain raw components with our up-to-date equipment, our work and efforts. We are continuously improving ourselves and strive to do the same for the environment. We prefer to address the comprehensive energy efficiency of buildings and structures. Our innovative solutions enable us to create high technology and energy-efficient buildings, improve the quality of buildings under construction, cut down operation and construction costs. We are glad to know that our materials are used in the construction of houses, plants, bridges, social infrastructure facilities and other objects, which improve the level and quality of life of people.

Contents

1.

Introduction

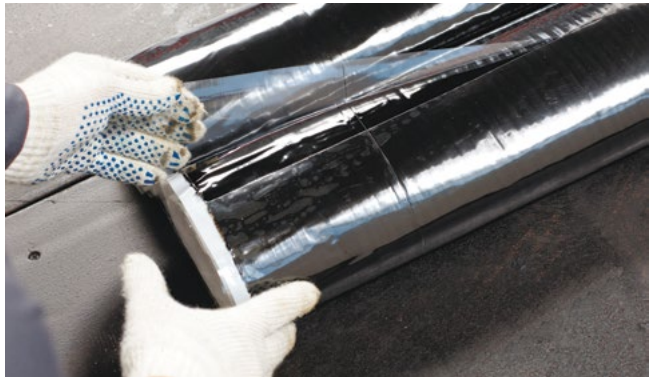
1. Introduction

1.1. General information

This manual has been developed for performing and checking the correctness of installation of self-adhesive non-reinforced waterproofing roll-fed polymer-bitumen membranes with uniform adhesion to the base. The instruction covers the operations executable with the following polymer-bitumen materials: ULTRAFLEX SA 7000-X, ULTRAFLEX SA HDPE, ULTRAFLEX SA STRONG, ULTRAFLEX SA NB.

NOTE: The waterproofing membrane not only protects the internal premises from penetrating water that reduces their operating ability, disturbs the process equipment operation and worsens the microclimatic conditions indoors, but it also prevents the destruction of the facility foundation. Therefore, the correct selection and installation of the waterproofing membrane also ensure the durability of the whole facility.

Self-adhesive polymer-bitumen membranes of TECHNONICOL Corporation are applied for waterproofing of building structures and recommended for use in system solutions developed by the company's experts.



1.1.1. Waterproofing system for a foundation without drainage and thermal insulation

The system is applied to protect underground structures with a technical floor or unexploited premises in sandy grounds with a low level of groundwaters (below the bedplate level).

System composition:

- Ready to use solvent-based BITUMEN-POLYMER PRIME COATING;
- Self-adhesive polymer-bitumen membrane of ULTRAFLEX SA series;
- PLANTER standard – profiled HDPE membrane used for protection of the waterproofing membrane.

1.1.2. Waterproofing system for a foundation with drainage

The system is applied to protect underground structures with a technical floor or unexploited premises in clayey and loamy soils irrespective of the groundwater level, as well as in sandy grounds with the groundwater level above the bedplate level.

System composition:

- Ready to use solvent-based BITUMEN-POLYMER PRIME COATING;
- Self-adhesive polymer-bitumen membrane of ULTRAFLEX SA series;
- PLANTER geo – profiled HDPE membrane used for wall drainage (applied together with drainage pipes).

1.1.3. Waterproofing system for a foundation with drainage and thermal

The system is applied to protect underground structures with operated or living premises in clayey and loamy soils irrespective of the groundwater level, as well as in sandy grounds with the groundwater level above the bedplate level.

System composition:

- Ready to use solvent-based BITUMEN-POLYMER PRIME COATING;
- Self-adhesive polymer-bitumen membrane of ULTRAFLEX SA series;
- Extruded polystyrene TECHNONICOL CARBON;
- PLANTER geo – profiled HDPE membrane used for wall drainage (applied together with drainage pipes).

1.1.4. Waterproofing system for a foundation with thermal insulation

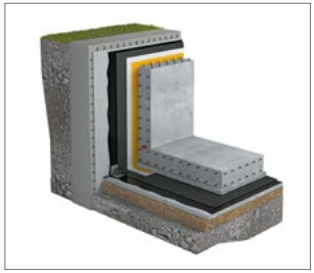
The system is applied to protect underground structures with operated or living premises in sandy grounds with a low level of groundwaters (below the bedplate level).

System composition:

- Ready to use solvent-based BITUMEN-POLYMER PRIME COATING;
- Self-adhesive polymer-bitumen membrane of ULTRAFLEX SA series;
- Extruded polystyrene TECHNONICOL CARBON.

1.1.5. Waterproofing system for a foundation with diaphragm wall

The system is applied to protect underground structures constructed in foundation pits with diaphragm walls.

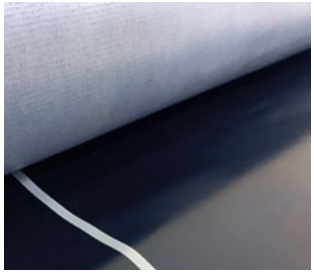


System composition:

- Ready to use solvent-based BITUMEN-POLYMER PRIME COATING;
- Self-adhesive polymer-bitumen membrane of ULTRAFLEX SA series;
- Extruded polystyrene TECHNONICOL CARBON;
- Needle-punched geotextile;
- PE film.

NOTE: Before starting the operations, please read carefully the present manual, as well as design recommendations, design drawings and technical datasheets for applied materials.

1.2. Materials applied



Self-adhesive non-reinforced membrane of ULTRAFLEX SA series
SBS-modified bitumen membrane designed for the creation of the single-layer and multilayer waterproofing system.

NOTE: One of the main conditions for the absence of primary strains in the roll-fed polymer-bitumen materials is their correct transportation and storage. It is necessary to store the rolls in a vertical position, by protecting them from moisture and direct sunlight.

Ready to use solvent-based BITUMEN-POLYMER PRIME COATING
Intended for preparation (prime coating) of the surface before installation of the self-adhesive waterproofing membrane.

NICOBAND DUO double-sided self-adhesive sealant tape:

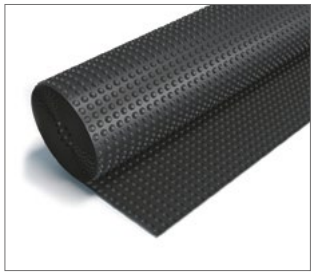
- **150 mm** wide for fixing PLANTER geo wall drainage to concrete structures;
- **75 mm** wide for sealing joints of PLANTER geo wall drainage rolls and overlap splicing of geotextile of the wall drainage.

NICOBAND self-adhesive sealant tape
150 mm wide for sealing joints of PLANTER standard profiled HDPE membrane.

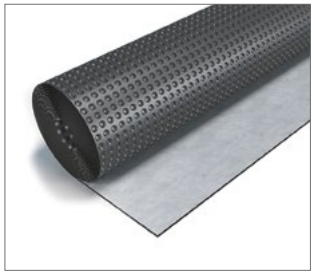
Edge strip with a folded flange
Used for mechanical fixing of the waterproofing membrane at the basement level.

TECHNONICOL polyurethane sealant
Used for additional sealing of separate units (e.g., metal clamping gaskets in penetration piping).

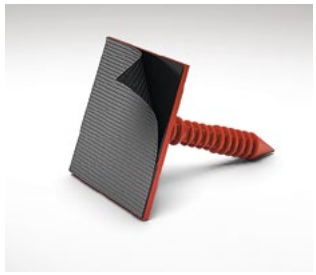
XPS TECHNONICOL CARBON
Slabs used for installation of thermal insulation of the foundation and for protection of the waterproofing membrane from mechanical damage.



PLANTER standard
Profiled HDPE membrane used for protection of the waterproofing membrane from mechanical damage.



PLANTER geo
Profiled HDPE membrane used for protection of the waterproofing membrane from mechanical damage and installation of wall drainage.



Fixture
For boards of XPS and for intermediate fixing of the profiled membrane.

Self-tapping screw with clamping washer or concrete nail
For fixing the profiled membrane at the basement level.

Edge profile
For protection of the profiled membrane cavities from various waste.

1.3. Equipment used

- Knife with replaceable blades;
- Silicone roller;
- Measuring tape;
- Marker or pencil;
- Construction gloves;
- Level;
- Fur roller with a tray;
- Paint brush;
- Brush for cleaning the base;
- Gun for sealant.

2.

Surface preparation

2. Surface preparation

2.1. General information

The surface preparation before applying the waterproofing membrane is one of the most important and often the most difficult and labour-consuming technological operations.

NOTE: Failure to meet the requirements to surface preparation will result in low quality of the whole waterproofing system.

The concrete surface preparation methods are selected depending on the required surface evenness, the extent of destruction of the structure, type and amount of damages, as well as the type of material intended for performing the operations for the elimination of defects.

There are four main methods of concrete surface preparation:

- Mechanical: with the use of perforators, jackhammers, wire-needle pneumatic hammers, picks, sandblasting and shot blasting machines, grinding machines and milling cutters, etc.;
- Hydraulic: with the use of water jet systems with pressure from **180** to **1,200 atm.**;
- Thermal: with the use of propane or acetylene-oxygen torches;
- Chemical: with the use of hydrochloric or phosphoric acids.

2.2. Surface preparation quality requirements

- Absence of friable, easily peeling elements;
- Absence of cracks (especially parallel to expansion joints), spalls and blowholes, sections of non-vibrated concrete, etc.;
- Surface evenness – **5 mm** for **2 m** length in any direction;
- Concrete compressive strength – at least **1.5 MPa**;
- Removal of all pollution and materials hindering adhesion (dirt, dust, cement slurry, form oil, etc.);
- Mass humidity of the base concrete – no more than **4 %**.

2.3. Installation of transitional fillets and coves

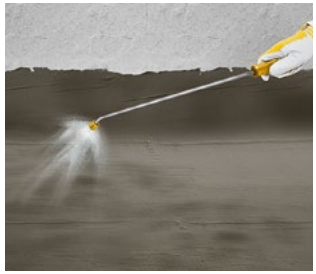
Before applying the polymer-bitumen roll materials, it is necessary to eliminate all sharp protuberances, corners, etc. to avoid the material crushing or static punching of the waterproofing membrane (e.g., when filling of a foundation pit with backfilled soil and in process of operation of a building), for which it is necessary to arrange transitional fillets or coves. Fillets are usually made of cement-sand grout of at least **M150** grade or polymer-cement slurry with fast strength setting. In any case, the size of fillets should be around **100×100 mm**.

Clean the place to arrange the fillet (cove) from cement slurry, dust and dirt.

Carefully spill the surface with water until full saturation.

Prepare the mix for installation of fillet (cove), by using mechanical stirring means. It is forbidden to prepare the mix manually.

Apply the prepared mix onto the surface, by forming a fillet (**100×100 mm** size) or a cove (**R=100 mm**).



Ensure moisturizing of the laid material (pouring with water, wet bagging, etc.) during the necessary time (indicated by the producer of specific material and usually making **2-3 days** under the temperature of **+20 °C**).

Allow the laid material to stand during the time necessary for setting the demanded strength and moisture content.

3.

Surface priming

3. Hot air welding of membranes

3.1. General information

When installing the self-adhesive polymer-bitumen roll-fed membrane, it is necessary to ensure proper adhesion of the material to the base. For this purpose, the concrete base should be primed with ready to use solvent-based BITUMEN-POLYMER PRIME COATING. The primer consumption makes approximately **0.25÷0.35 l/m²** depending on the base coarseness and absorption capacity.

NOTE: Solvent-based bitumen primers are applied to the base with mass humidity of no more than 4 % (determined by means of moisture meters).

3.2. Primer application

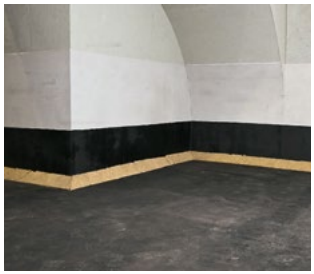
Before applying the primer, clean the concrete surface from dirt and dust. In case of using a compressor for this purpose, it is necessary to ensure that it is equipped with a moisture and oil separator.

Carefully mix the primer by a low-speed drill with the special nozzle.

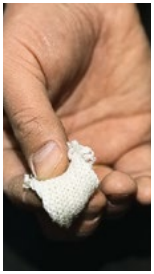
NOTE: It is not recommended to apply the primer by air or airless sprayers, even with great volumes of works.

Apply the primer manually onto the cleaned surface with brushes, sweepers or paint rollers.

Corners and other hard-to-reach spots must be daubed with a hard-bristle brush.



Allow the treated surface to stand until the full drying of the primer. The primer drying time depends on its type and environmental conditions during the work.



It is possible to check whether the primer has dried by pressing a dabber to it: there should be no bitumen traces on the dabber pressed to the dried primer.

NOTE: Self-adhesive polymer-bitumen membrane is installed on a primed surface after at least one hour from the primer complete drying.

4.

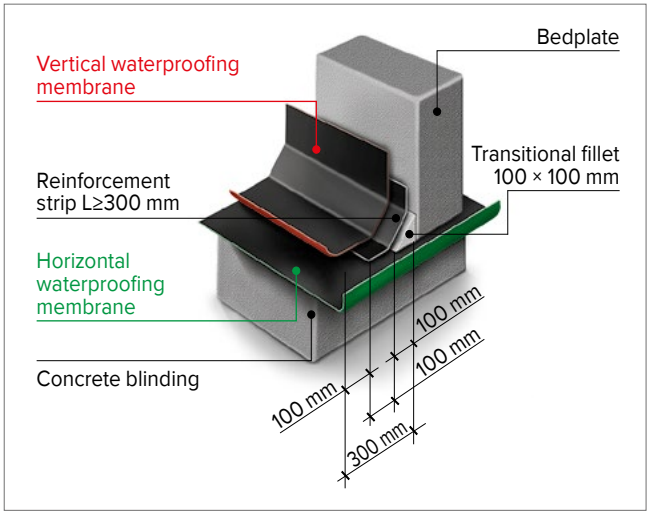
Installation of self-adhesive waterproofing membrane

4. Installation of self-adhesive waterproofing membrane

4.1. General information

The most widespread materials for the creation of the waterproofing are polymer-bitumen roll-fed membranes. This is due to the simplicity of installation, the popularity of the technology and stability of the factory-set technical parameters of the materials. Self-adhesive non-reinforced polymer-bitumen waterproofing membranes combine all the advantages of torch-on applied materials and non-torch-on installation, which helps to avoid issues associated with the use of flame.

NOTE: Application of self-adhesive non-reinforced polymer-bitumen membrane onto horizontal surfaces is carried out on the concrete blinding. It is necessary to consider that the plan dimension of the concrete blinding should exceed the size of the bedplate at least by 300 mm (see the figure below). This is necessary for correct joining of the horizontal and vertical waterproofing membranes.



4.2. Installation of the material on a horizontal surface

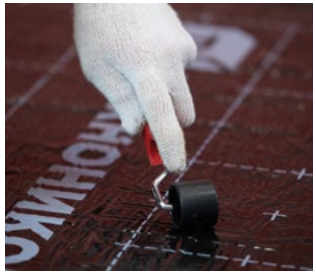
Before the installation of the waterproofing membrane onto horizontal surfaces, measure, cut and align it on place by ensuring the demanded width of overlapping on the longitudinal and transversal edges.

The longitudinal overlap should be minimum **100 mm**, transversal – not less than **150 mm**. Transversal overlaps of adjacent rows should be displaced for at least **500 mm**.

Start installing the first row of the membrane. Carefully cut and remove the protective film in **10-15 cm** from the beginning of the roll.

Attach the material to the base.

Then install the remaining part of the material by gradual removing the film and rolling out the membrane. Avoid shifting the roll from its desired position.



Make sure that no cavities or air bubbles occur between the material and the base. For that, use the silicon roller during installation.

Install the following rolls of the membrane in a similar manner.

For better adhesion, it is recommended to clean the overlap zone from dust just before the installation of the following roll and press the material with the roller after its' attachment.

NOTE: Before arranging constructions of the foundation, it is necessary to protect the membrane from mechanical damage. To do so, one may use fiber-cement boards or cement-bonded particleboards, or install a protective screed.

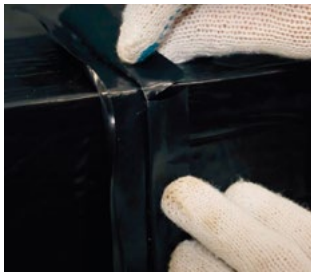
4.3. Installation of reinforcement elements

Before installing the main waterproofing membrane on a vertical surface, it is necessary to install the reinforcement elements in places of complex junctions: transitions from the horizontal to the vertical surface (and vice versa), external and internal corners, penetration piping, see section 5.1., expansion joints, see section 5.2., etc.

Reinforcement elements should be installed on the entire perimeter of the foundation and are made from the main non-reinforced self-adhesive waterproofing membrane. The width of each reinforcement element should not exceed **1 m**.

NOTE: All reinforcement elements should be thoroughly flattened and pressured with a silicone roller.

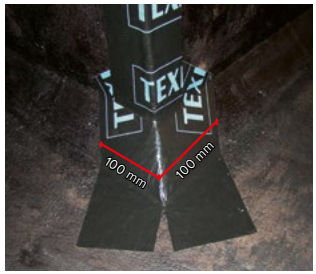
The places of transition from the vertical to the horizontal surface are reinforced with overlaps of **100 mm** on both sides from the bend line.



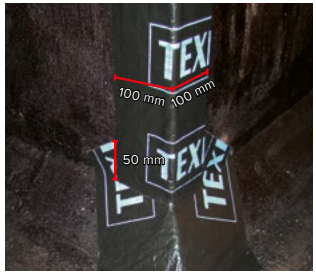
The next reinforcement element made from the main non-reinforced self-adhesive polymer-bitumen membrane is installed toe-to-toe to the previous one without any overlap.

The places of transition from the horizontal to the vertical surface are reinforced for the height of the fillet plus overlaps of **100 mm** on both sides from the fillet.

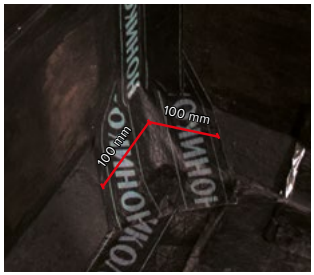
Never forget to thoroughly flatten and pressure every reinforcement element with a silicone roller.



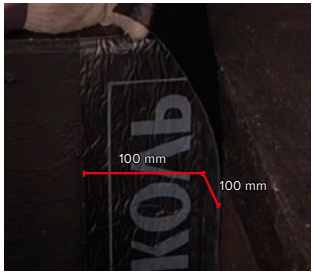
The reinforcement of the external corner is performed in two steps. At first, one should reinforce the lower part of the corner adjacent to the horizontal surface. For this, make a patch from the main waterproofing membrane with special cutouts so that the element can be installed without waves and folds. The element should overlap both sides from the corner axis for **100 mm**.



Then reinforce the vertical part of the external corner with **50 mm** overlap on the lower element and **100 mm** overlaps on both sides from the corner axis.



The reinforcement of the internal corner is done in a similar manner. Start with the installation of the patch with cutouts in the lower part of the corner adjacent to the horizontal surface. The element should overlap both sides from the corner axis for **100 mm**.



Then reinforce the vertical part of the internal corner with **50 mm** overlap on the lower element and **100 mm** overlaps on both sides from the corner axis.

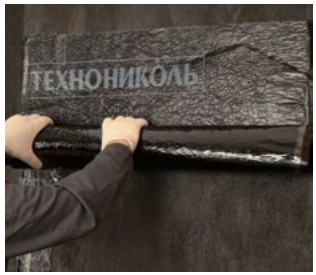
Reinforce the free area of the corner with another small patch overlapping the underlying element.

The finished look of installed reinforcement elements.

4.4. Installation of the material on a vertical surface

After all reinforcement elements are installed, proceed with the installation of the main waterproofing membrane on a vertical surface.

NOTE: Unlike torch-on polymer-bitumen membrane, the self-adhesive material is installed from the top downward.



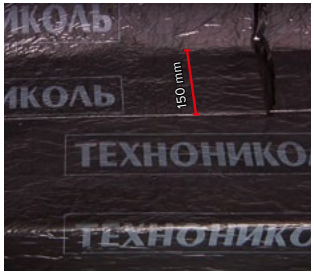
At first, carefully cut and remove the protective film in **10-15 cm** from the beginning of the roll and attach the material at the top. Then install the main part of the roll by gradual removing the protective film, unrolling the membrane and smoothing it on the surface.

Always use the silicone roller to ensure reliable adhesion of the material to the surface and avoid the formation of air bubbles and creases, which can worsen the waterproofing properties.

NOTE: It is strongly recommended to avoid installing the single roll by changing the direction of installation more than twice as it may lead to the formation of zones with poor adhesion and further exfoliation of the membrane.

In this case, one should cut the material into shorter segments and first install the material on the lower part of the foundation on its' entire perimeter.

Then install other segments of the material on vertical walling.



Transversal overlaps of **150 mm** are arranged on the horizontal part of the foundation slab.

The longitudinal overlaps should be minimum **100 mm**.

For better adhesion, clean the overlap zone from dirt and dust with the clean and dry cloth just before the formation of transversal or longitudinal overlap and press it with the roller after the installation of the material.

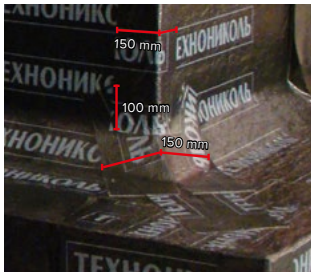
The longitudinal overlaps of upper and lower segments of the vertical membrane should be displaced for at least **300 mm**.

4.5. Installation of additional reinforcement elements in the corner zones

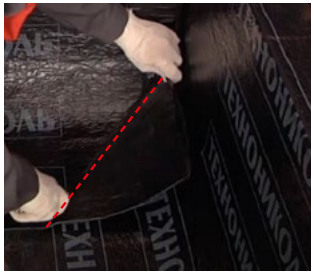
NOTE: The installation of all additional reinforcement elements in the corner zones is to be performed from the bottom upwards in order to provide the cascading. So, one should stick to the following sequence of installation: horizontal surface – vertical part of the foundation slab – horizontal part of the foundation slab – vertical walling.

While arranging the external corner, the main waterproofing membrane is installed without overlaps in a toe-to-toe manner.

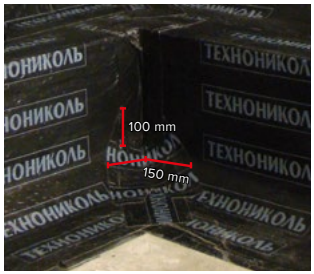
Then additional reinforcement elements made from the main non-reinforced self-adhesive waterproofing membrane are installed on all joints of the corner starting from the bottom.



For that, one should prepare patches, similar to those mentioned see in section 4.3. In this case, however, each patch should overlap both sides from the corner axis for **150 mm**, while overlapping the lower element for **100 mm**.



Waterproofing of the internal corner is arranged similarly. The main waterproofing membrane is installed without overlaps.



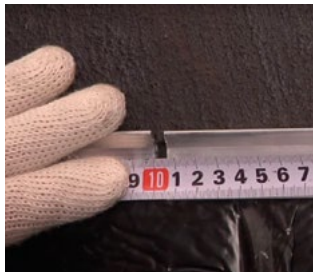
Then additional reinforcement elements are installed from the bottom upwards overlapping both sides from the corner axis for **150 mm** and the lower element for **100 mm**.

The finished look of installed additional reinforcement elements in the corner zones.

4.6. Mechanical fixation of the material on a vertical surface

One should finish the installation of the self-adhesive waterproofing membrane on a vertical surface with mechanical fixation. To do so, fix the upper edge of the waterproofing membrane to the structure at the basement level with profiled metal edge strips along the entire perimeter of the construction.

The fastening span is **200 mm**. In the areas of external and internal corners of the construction, as well as while fixing the edge of the metal strip, the fastening span should be reduced to **50 mm**.



Leave the expansion clearance of **5-10 mm** between contiguous edge strips.

Fill in the space between the wall and the folded flange of the edge strip with a polyurethane sealant.

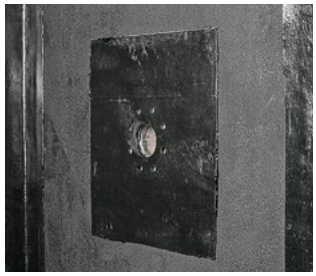
In the places of interruption of the edge strip, apply the sealant in a continuous layer.

5.

Execution of elements

5. Execution of elements

5.1. Waterproofing of penetration piping



Reinforce the penetration with the patch made from the self-adhesive polymer-bitumen membrane before installing the main waterproofing layer on the vertical walling. Do not forget to thoroughly flatten and pressure the reinforcement element with a silicone roller to avoid the formation of air bubbles and creases.

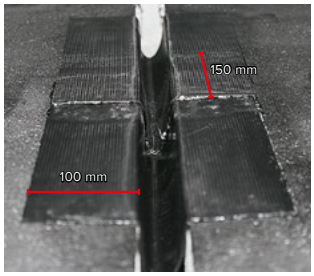
NOTE: The reinforcement element size should be equal to the external diameter of penetration piping plus minimum 250 mm in each direction. The diameter of the hole in the reinforcement element should be equal to the internal diameter of penetration piping.

Proceed with the installation of the main waterproofing membrane on the vertical walling. Make the holes for anchor bolts in the main waterproofing membrane only after its' installation.

Fix the clamping plate with anchor bolts. Before definitive tightening of bolts, apply a polyurethane sealant to the place of adjunction of the clamping plate to the waterproofing membrane.

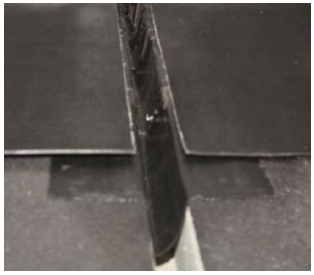
Also treat the anchor bolts with polyurethane sealant before tightening them.

5.2. Expansion joint sealing



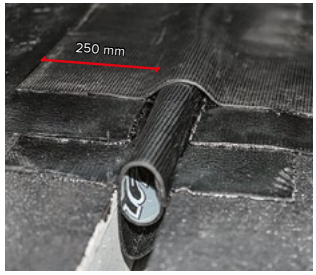
Reinforce the expansion joint area with patches made from the self-adhesive polymer-bitumen membrane before installing the main waterproofing layer. The expansion joint with a compensating loop should look as shown in the picture. Each element should overlap both sides from the expansion joint for **100 mm**, while overlapping the lower element for **150 mm**.

Do not forget to thoroughly flatten and pressure every reinforcement element with a silicone roller.



Proceed with the regular installation of the main self-adhesive waterproofing membrane while not overlapping the expansion joint itself.

Form the compensating loop by using the main waterproofing membrane wound into the roll.



Finally, install additional reinforcement elements made from the main non-reinforced self-adhesive waterproofing membrane on top of the formed compensating loop. Each additional reinforcement element should overlap both sides from the expansion joint for **250 mm**, while overlapping the lower element for **150 mm**.

NOTE: Depending on the operation conditions of the structure, the roll, which forms the compensating loop, can be either completely submerged in the seam hollowness or be visible over the surface.

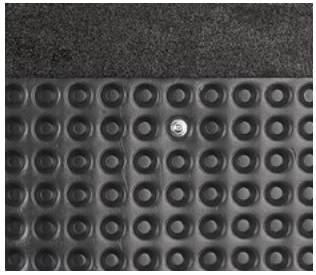
6.

Protection of the waterproofing membrane

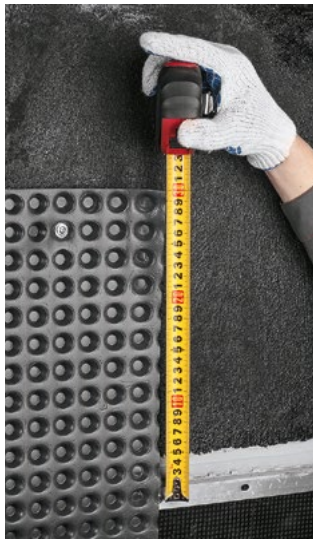
6. Protection of the waterproofing membrane

After the complete installation of the polymer-bitumen waterproofing layer, it has to be protected from mechanical damage by means of profiled HDPE membrane, extruded polystyrene slabs or other high-strength materials.

6.1. Protection with PLANTER standard profiled HDPE membrane



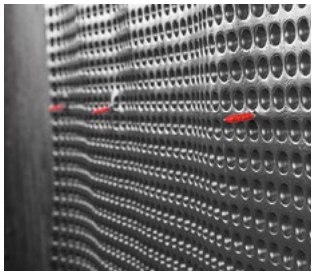
Fix the profiled HDPE membrane with conic studs towards the enclosing structure by means of concrete nails or self-tapping screws with clamping washers.



PLANTER standard profiled HDPE membrane is fixed at the basement level with a distance of **200-300 mm** from the waterproofing membrane.

If necessary, perform intermediate fixing of the profiled membrane at its height by using a mechanical fixture attached directly to the waterproofing membrane. To install the fixture, it is necessary to remove the protective film on its platform and stick the fixture to the waterproofing membrane.

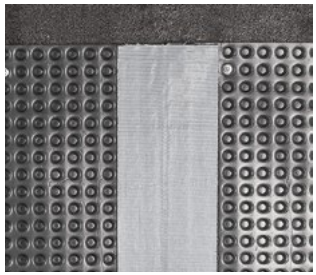
Unwind smoothly the roll of profiled membrane fixed at the basement level in downward direction.



Pierce through the roll of profiled membrane with the tip of the fixture.

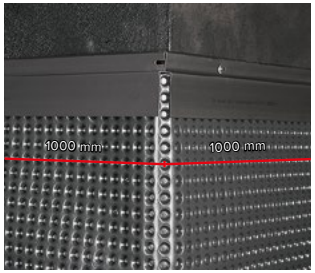
The lateral overlapping of adjacent rolls should make at least **4 studs**.

Seal the obtained joint with NICOBAND self-adhesive sealant tape of **150 mm** wide. Do it by removing the protective film carefully from the self-adhesive surface of the tape, gradually unwinding the roll from top to bottom and smoothing it by hand.

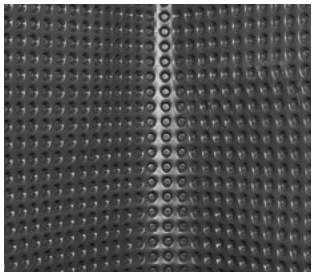


The joint sealing is necessary to avoid outside elements (ground, waste etc.) in the profiled membrane in the course of further operations.

Cover the upper edge of the fixed profiled HDPE membrane with an edge profile.



Cover the external corners with whole rolls so that there should be a strip at least **1 m** wide in both directions from the corner.



The same applies to the internal corner installation.

6.2. Protection with PLANTER geo profiled HDPE membrane used for wall drainage

Prepare the rolls of PLANTER geo profiled HDPE membrane for installation. For this purpose, take off the geotextile carefully from the edges of contiguous rolls for a width of **4-6 studs**.

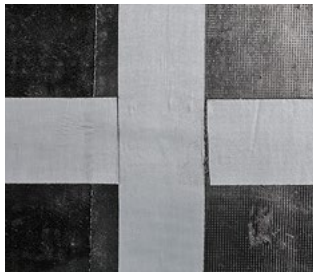
The overlapping of contiguous rolls of the profiled membrane should make **70-100 mm**.

Take off the geotextile carefully from the profiled membrane at the butt ends forming the upper edge of the wall drainage.
Cut off the separated part of HDPE membrane by the entire width of the roll. The free part of geotextile should make **70-100 mm**.

The wall drainage can be fixed at the basement level with double-sided self-adhesive sealant tape NICOBAND DUO **150 mm** wide. For this purpose, stick the tape at the level of **200-300 mm** above the waterproofing membrane.

Or else, fix the profiled membrane mechanically.

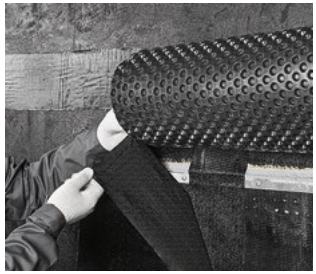
Seal the places of the future vertical junction of contiguous rolls with double-sided self-adhesive sealant tape NICOBAND DUO **150 mm** wide. Do it by removing the protective film carefully from the lower self-adhesive surface of the tape, gradually unwinding the roll from top to bottom and smoothing it by hand.



If the intermediate fixing of the wall drainage at height is required, attach NICOBAND DUO tape **150 mm** wide in the respective places.

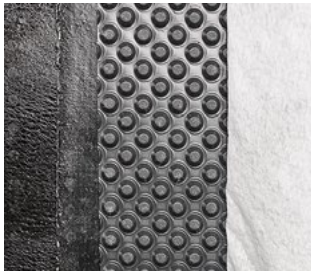
Start fixing the rolls of profiled membrane from the upper point (basement level). At first, remove the upper protective film of NICOBAND DUO.

Fix PLANTER geo profiled HDPE membrane with double-sided self-adhesive sealant tape NICOBAND DUO at the basement level.



After that, wind up the roll of the profiled membrane upwards. In the place of vertical junction of contiguous rolls, remove the upper film of NICOBAND DUO and gradually unwind the wall drainage roll downwards.

In the places of intermediate fixing of wall drainage at height, remove the upper protective film of NICOBAND DUO and continue unwinding the roll downwards.



Unwind the whole roll of PLANTER geo downwards by carefully pushing the places of adhesion of the profiled membrane to NICOBAND DUO sealant tape.

Seal the place of junction of two contiguous rolls with NICOBAND DUO **75 mm** wide.

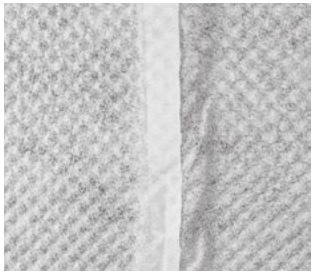
Remove the upper protective film of the sealant tape and fix the next roll of the profiled membrane at the basement level with overlapping width of **4-6 studs**.

Unwind the roll downwards by carefully pressing the places of overlapping and intermediate fixing.

In the place of junction of two rolls of the profiled membrane, provide an overlapping of the free edge of geotextile onto the contiguous roll.

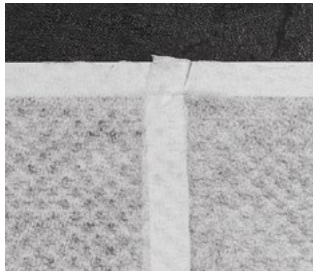
Seal the place of junction of two geotextile sheets with double-sided self-adhesive sealant tape NICOBAND DUO **75 mm** wide or regular double-sided adhesive tape. Remove the upper protective film of the sealant tape.

Stick the geotextile sheet of the contiguous roll to the sealant tape.

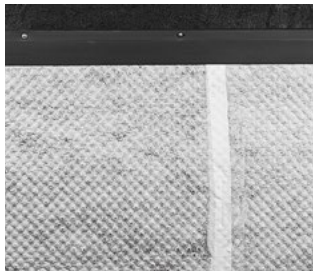


Carefully smooth the places of joints of geotextile sheets by hand for their better adhesion.

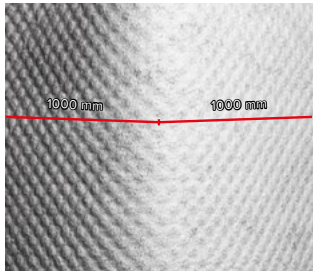
Stick the upper free part of geotextile sheet to double-sided self-adhesive sealant tape NICOBAND DUO **75 mm** wide or regular double-sided adhesive tape.



This operation is required to avoid outside elements (ground, waste etc.) in the drainage system.



Complete installation of the wall drainage at the basement level by installing the edge profile.



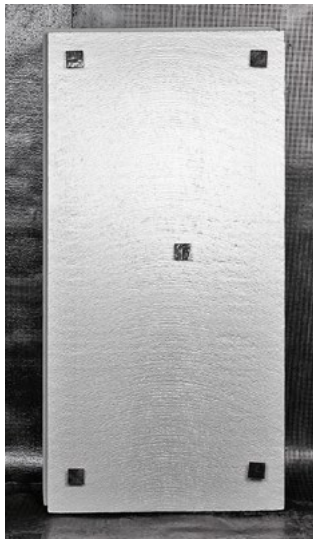
Cover the external and internal corners with whole rolls so that there should be a strip at least **1 m** wide in both directions from the corner.

While protecting the external corners with PLANTER standard and PLANTER geo, it is necessary to keep the profiled membrane edge parallel to the corner of the structure. For this purpose, stretch the upper edge of the membrane and only after that fix it to the base. Otherwise, there will be warping of the profiled membrane.

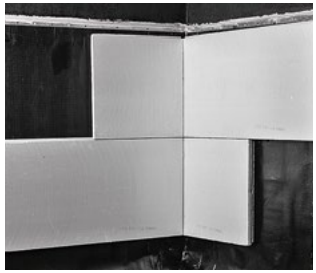
Connect the wall drainage to the pipe drains installed around the perimeter of the structure, arrange the drain fills. Install the inspection and drop wells according to the design.

6.3. Protection with XPS TECHNONICOL CARBON

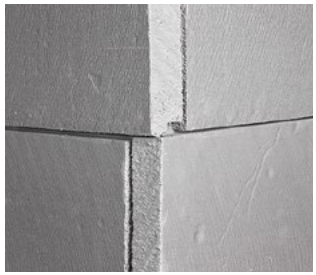
Fix the extruded polystyrene slabs TECHNONICOL CARBON to the waterproofing membrane by means of special mechanical fixtures.



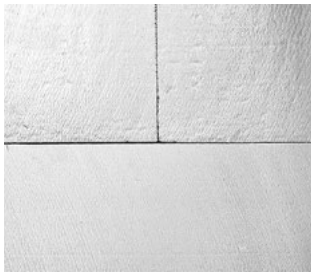
There should be at least **5 fixtures** per TECHNONICOL CARBON XPS slab. It is possible to install the fixtures on the waterproofing membrane first and then fix the extruded polystyrene slabs on them. It is also possible to fix the fixtures in the slab first and then stick it to the waterproofing membrane.



Start installation of XPS slabs from the corners. In order to avoid formation of thermal bridges, install the slabs of adjacent rows with spacing of joints of half the slab size.



Change the direction of XPS slabs connection in adjacent rows in corner area.



Then continue with installation of entire slabs. The spacing of joints in adjacent rows will appear at the middle of the slab.

6.4. Backfill of the foundation pit

Use the backfill soil according to the design.

The backfilling is performed by layers with careful ramming of each layer up to the soil consistency values specified in the design.

NOTE: The sand layer thickness should be no more than 70 cm, clay sand and loam layer – 60 cm, clay layer – 50 cm.

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