



INSTALLATION GUIDELINES

TECHLINE 1mm PP

IG:GMB/1MMPP/A04/0118/V001

INSTALLATION MANUAL TECHLINE 1mm PP

1-INSTALLATION RECOMMENDATIONS.

* Techline PP sheets should be applied in a way that does not come into contact with chemically incompatible materials. Unlike other waterproofing membranes, the Techline PP geomembrane is chemically compatible with any type of support, and allows its placement in contact with bitumen, asphalt, expanded polystyrenes and any type of polyurethane.

* The surface of the support must be uniform, without peaks, angles or projections. Irregularities of a height greater than 1 mm may be admitted if an anti-kicking auxiliary layer is inserted. This layer is also recommended when the support is made of prefabricated concrete, in which case the separation of these elements will be less than 5 cm to avoid the risk of mechanical damage.

* The wall where Techline PP is to be applied must not have mortar burrs or any protrusions of material that could pose a risk of punching.

* For Techline PP joints, the minimum overlaps prescribed in the corresponding application specifications must be observed.

* Weldability and quality of welding depend on atmospheric conditions (temperature, humidity), welding conditions (temperature, speed, pressure, previous cleaning) and the surface state of the membrane (cleaning, humidity). Therefore, the welding equipment must be adjusted according to these conditions to obtain a correct assembly.

2-WELDING

Welding, in waterproofing, consists of permanently and resistant joining two sheets of the same nature. The welding of the sheets is achieved by a thermal process.

The thermal process consists of applying heat to the surface of the sheets that will melt the material and that by applying sufficient pressure will achieve a tight and resistant bond between the sheets.

The purpose of a weld is to join different sheets in order to avoid the leaks that may occur between two overlapping sheets.

Theoretically, the properties of the sheet and of the weld should be identical, but the reality is that there is always a loss of properties in the Weld with respect to the properties of the sheet.

It is very important that the training and qualification of the Installers who are going to carry out the welds is adequate. In waterproofing work, the key process is the realization of the welds, both between the sheets themselves and with the different singular points that can be found.

2.1-PREPARATION OF THE WELDING AREA

Environmental conditions.

Environmental conditions play a key role in the welding process and therefore in the quality of the welding process.

Welds should not be made:

1. In areas where water exists permanently.
2. Neither during nor immediately after rain, without adequate protection (a tent, a canopy ...). **A wet surface does NOT ensure good welding.**
3. Neither during nor after periods with high humidity, as the water will condense on the surface causing bubbles and / or air voids inside the weld, that will cause its subsequent failure.

In all the polymeric materials the physical process of diffusion of the water molecules towards the polymeric matrix can take place. These water molecules, absorbed, with a subsequent heating can appear towards the surface and can produce the bubbles or the air voids described previously.

Before welding, therefore, the area must be dried for a suitable time to completely remove the water.

4. When there are strong winds, since:
 - The lifting of the sheet may occur. (Unless the sheet is adequately ballast).
 - The set temperature is reduced in the Welding Machine and in the weld sheet.
 - The welding area is contaminated with dust
5. When there is a strong solar radiation, it causes:
 - Surface overheating of the membrane and the parameters must be re-adjusted in the welding machine. (Temperature, Speed and Pressure).
 - The appearance of waves that can complicate or even prevent the welding process and can increase the stresses in the same welding.

In order to avoid this phenomenon, it is possible that the welding has to be done either in the first hour of the morning or late in the evening.

1. TCS Geotechnics is a trading name of Technical Civils Solutions Ltd.
2. TCS Geotechnics Ltd reserves the right to alter product specifications without prior notice.
3. It is the responsibility of all users to satisfy themselves that the above data is current.
4. The above figures are average values obtained from testing to current EN ISO standards.
5. TCS Ltd cannot accept responsibility for the performance of these products as the conditions of use are beyond our control.
6. Installation details are available on request.

TECHNICAL DATASHEET

TECHLINE 1mm PP INSTALLATION GUIDE

DO NOT WELD BELOW AN AMBIENT TEMPERATURE OF +5°C

As a General Measure, peel and / or cut weld tests should be performed to check their suitability.

These tests must be carried out:

- Just before starting work
- Whenever there is an interruption
- Whenever there has been a sudden change in weather
- When there is any circumstance that is suspected to affect the quality of the welds.

In addition to the above, these tests must be performed by each of the welding machines used and always under the same conditions, to verify that the equipment and the conditions set are the right ones:

- Temperature
- Speed
- Pressure

No equipment used during the installation of the waterproofing membrane should damage the membrane, whether by manipulation, excessive heat, chemical leakage or other ...

Installers should NOT smoke, wear shoes that could damage the membrane, or perform activities that could damage it.

The welding area must be clean and dry, so it is advisable to carry out conditioning work just before welding.

CLEANING

The degree of cleanliness will depend on the degree of contamination. It is usually sufficient to remove any dirt and / or adhering dirt using a cloth (dry or wet with water or soapy water) or by means of an air nozzle.

In any case the surface to be welded must be totally dry and without residue after cleaning.

Exposed sheets may present problems when welding them, due to:

- Industrial pollution.
- Acid rain.
- The existence of a very thin layer of oxidized material, the thickness of this layer will depend on the exposure time.

In the case of more severe contaminations will require deeper cleaning.

The general cleaning procedure to be followed on an exposed sheet is:

1. Wipe the welding area with a dry cloth and / or soaked in water or a soapy solution (detergent). After cleaning, the area must be thoroughly dried before welding. Once the welding has been carried out, it must be verified by the relevant tests, shear strength and/or peel strength.
2. If the results of the operation in point 1 are negative, the area to be welded with "acetone" or "ethyl acetate" type solvents shall be cleaned following the same procedure as described in point 1.

Once the welding has been carried out, the strength of the welding will be checked by means of the relevant tests, shear and / or peeling strength.

3. If the results are still not optimal, a cleaner of the "D-Limonene" type, for example "Citroclear" or similar, can be used, which will be applied to the area where the welding is to be carried out and with the help of a cloth will be rubbed on the membrane. Subsequently, in order to eliminate the fatty residues that may originate, "Ethyl Acetate" will be applied immediately to the application of the Citroclear. Once the welding has been carried out, the strength of the welding will be checked by means of the relevant tests, shear and / or peeling strength.

"D-Limonene is an excellent cleansing agent, it diffuses deep inside the polymer matrix. However, it tends to swell to the polymer and produce a very thin grease layer on the surface, which is why additional cleaning with "ethyl acetate" is necessary. "D-Limonene" has the same effects as "xylan" on TPO's, that is, it can dissolve them but with the advantage that it is not as aggressive to Human Health as "xylan". However, protection is also required when used against fire, against inhalation, and contact with the skin and eyes must be avoided. "

"The cleaning efforts must at all times be adjusted to the actual situation of the work and it must be verified by suitable welding tests that the performance has been adequate."

4. Finally and if no action described in the previous points has had the expected effect will be passed to "Mechanical Abrasion". Mechanical abrasion (sanding of the surface to be welded) removes surface dirt and / or oxidized surface.

Due to the flexibility and softness of the material, mechanical abrasion could cause some difficulties.

Do not use any tool that could damage the sheet by giving it excessive heat.

Particular care must be taken when removing the thin outer layer of the sheet so as not to damage the membrane. The abrasion should be performed just before the welding is done.

1. TCS Geotechnics is a trading name of Technical Civils Solutions Ltd.
2. TCS Geotechnics Ltd reserves the right to alter product specifications without prior notice.
3. It is the responsibility of all users to satisfy themselves that the above data is current.
4. The above figures are average values obtained from testing to current EN ISO standards.
5. TCS Ltd cannot accept responsibility for the performance of these products as the conditions of use are beyond our control.
6. Installation details are available on request.

TECHNICAL DATASHEET

TECHLINE 1mm PP INSTALLATION GUIDE

2.2-CHOICE OF WELDING PARAMETERS.

The parameters that are fixed in the welding machine and as they can vary by the meteorological conditions, play a critical role in the resistance, and therefore in the quality of the welds.

- The temperature at which the welding is performed determines the plastification as well as the diffusion coefficients and therefore the intramolecular diffusion, which, in turn, give us the Welding Resistance.
- The speed at which the welding is performed determines, together with the temperature applied, the thermal energy. The amount of melted material will be low if the speed is high. On the other hand, if the speed is low affects the polymer or can even cause the welding machine to stop, since the conductive wheels can be locked with the molten material.
- The pressure of the rollers is necessary to ensure intimate contact and molecular diffusion between the sheets. A too low pressure DOES NOT guarantee full contact between the two cast parts. Too high pressure leads to transverse orientations in the melt, which will cool off outside the welding zone and create a large bulge.

In any case, the formation of slight undulations along the weld is not an indication of poor welding, however when these undulations are small and many indicate that the material has been subjected to excessive heat.

2.3-MAKING THE JOINTS BETWEEN SHEETS.

The transverse overlap shall be at least 5 cm.

The longitudinal overlap will be between 8 and 10 cm.

The placement of the sheets should be done in such a way that no transverse overlap of each row is aligned with any of the adjacent rows.

Not more than three sheets should be joined at one point.

For T-joints (three blades crossing at a single point) the bottom sheet will be chamfered to prevent capillary leakage or will be re-examined with the manual hot-air welder.

The vertex of the angle forming the transverse and longitudinal edges of the piece will be cut as a curve.

2.4-TESTS ON THE WELDING.

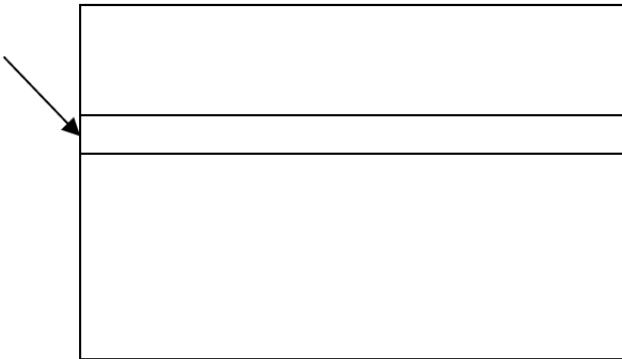
The tests that can be performed on the welds can be of two types:

1.- Destructive Tests.

Samples of approximate dimensions of (40 * 40) cm will be taken.

In the sample, the weld should be in the centre.

WELDING



2.- Non-destructive tests.

It is necessary to have a double weld with a check channel (not the most common type of welding in building).

1. TCS Geotechnics is a trading name of Technical Civils Solutions Ltd.
2. TCS Geotechnics Ltd reserves the right to alter product specifications without prior notice.
3. It is the responsibility of all users to satisfy themselves that the above data is current.
4. The above figures are average values obtained from testing to current EN ISO standards.
5. TCS Ltd cannot accept responsibility for the performance of these products as the conditions of use are beyond our control.
6. Installation details are available on request.

TECHNICAL DATASHEET

TECHLINE 1mm PP INSTALLATION GUIDE

CONCLUSION

- We will ensure the perfect cleaning of the area to weld, either by simple cleaning and / or sanding. In the case of sanding, this sanding will be carried out quickly and lightly on the area to be welded (approx. 6 cm wide), ensuring at all times that a very thin surface layer of the sheet has been removed (the indicator of a good sanding is that the original colour of the sheet must appear and homogeneously throughout the sanded area). Once sanded, the welding will proceed immediately.
- We will adjust the machine conditions (temperature, pressure and speed) depending on the current atmospheric conditions.
- A peeling and / or shear test will be performed on a welding sample in order to determine its resistance, and therefore to approve it or not.
- In the case that the welding test is favourable, welding will be carried out. In case this test is not favourable, the machine conditions will be adjusted again and the tests will be repeated.

3-HANDLING AND STORAGE

- * Do not smoke, eat or drink while handling the product. All possible sources of ignition should be removed from the handling and storage area of the material, especially in the presence of dusty atmospheres.
- * TCS recommends to consult the material Safety Data Sheet of this product, which can be requested from our Technical Department.
- * Special care and caution must be taken when loading and unloading material.
- * Techline PP has a weight per roll of between 44 and 55kg and a width of 2.00m.
- * It is advisable to store the rolls on a floor as flat and smooth as possible, in order to avoid damages caused by the possible existence of sharp elements.

RESUME FOR THE INSTALLER

1) Checking

Check that the air outlet through the nozzle of the Machine is homogeneous throughout its length, i.e. there is NO narrowing or obstruction at the exit of the nozzle either caused by accumulation of dirt or by narrowing of the outlet. To verify, place the nozzle about 5.0 cm from the sheet which will cause a burn on the surface of the same. This burned must be a line of length equal to the width of the nozzle and in addition of equal thickness throughout its length. If a tightening of this burn is appreciated, it will be a sign that there is a narrowing in the nozzle.

A narrowing in the nozzle can cause highs in the air temperature creating areas with high temperature and areas with very low temperature.

2) Cleaning the surfaces to weld.

Only fully clean surfaces ensure safe welding. To ensure that the surfaces to be welded are perfectly clean:

- A... In the case of dust, remnants of other materials, such as fibres ..., it is enough to pass a cloth on the surface to remove this dirt.
- B... If there is oil, bitumen, grease, residue of adhesive ..., the area will be cleaned with acetone, ethyl acetate or D-Limonene solvents.
- C... In case there is a sheet installed in advance it is possible that a very thin layer of the material must be removed by mechanical methods, sanding. The area will be proper to weld when the original colour of the sheet appears homogeneously throughout the area to be welded.

3) Establishing the Welding Conditions.

Weld tests should be carried out on samples of the same material just before welding the sheets, in order to fix the optimum conditions of temperature and speed.

Attention should be paid to:

- A. The temperature and humidity in the environment.
- B. The temperature and humidity in the sheet.
- C. Amount of hot air supplied by the nozzle.

4) Testing

Testing the welding performed by a peeling test and making sure it does not peel off.

1. TCS Geotechnics is a trading name of Technical Civils Solutions Ltd.
2. TCS Geotechnics Ltd reserves the right to alter product specifications without prior notice.
3. It is the responsibility of all users to satisfy themselves that the above data is current.
4. The above figures are average values obtained from testing to current EN ISO standards.
5. TCS Ltd cannot accept responsibility for the performance of these products as the conditions of use are beyond our control.
6. Installation details are available on request.