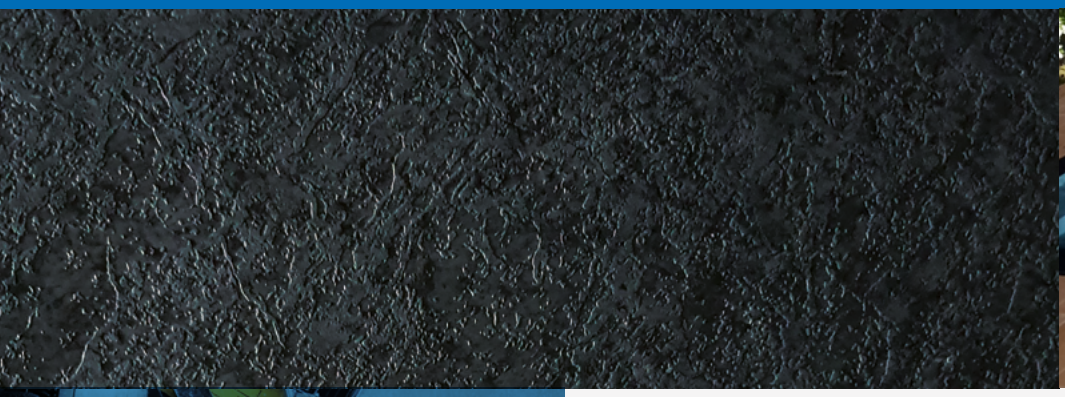

# INSTALLATION MANUAL OF CEFIL POOL

cefil POOL

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# THE INSTALLATION OF THE POOL 0.

This manual for installing PVC membranes in swimming pools is aimed exclusively at installation professionals of this type of projects.

The recommendations and installation techniques included in the manual are applicable to a wide variety of supports, given that Cefil PVC membranes allow their fixation on tiles, ceramics, concrete, etc.

Its compatibility with a large number of materials, together with excellent performance and long life cycle, makes Cefil PVC membranes the best waterproofing alternative, both for public and private pools.


More info in:
www.cefilpool.com

# 1. GENERAL RECOMMENDATIONS

The tips and recommendations included in this guide not only apply to the pool, but also to other elements such as supports, shape details and accessories.

## 1.1 POOL CONSTRUCTION RULES

Before constructing the pool, it is very important to take into account the regulations relating to underground works and their adaptation to professional conditions.

If the pool is watertight by construction, it is necessary to balance the water underpressure that may occur, either due to its own weight or due to the fixed loads that are applied to it. This system makes the work more expensive, since it is necessary to make a reinforced concrete crown of 50 or 60 cm, minimum thickness.

There are two alternatives to building a crown. The first of them, and the most effective, consists of creating an effective drainage that surrounds the foot of the work. The second alternative is to join the pool to a drain with a water extraction pump.

This is a construction formula widely used in lightweight works, such as swimming pools, due to its low cost.

Adopting any of these recommendations will prevent infiltration of groundwater of various origins that can negatively affect the behavior of the coating, as well as its appearance and duration.

### RENOVATION OR TRANSFORMATION OF A SWIMMING POOL

The transformation or rehabilitation of a swimming pool with CEFIL PVC membranes is a very practical and simple alternative. However, it requires some conditioning steps prior to waterproofing.

**As a general rule, it is essential to condition the surface through touch-ups and additions, as well as eliminate fissures and other existing irregularities, such as defective tiles, cracks, protrusions, etc.** For this work it is possible to use a geotextile or pre-treated separating screens (biocides). In any case, the parts that are going to be sealed must be verified and/or replaced if they are not of the “liner” type.

If the pool to be rehabilitated is equipped with a liner, the existing membrane will have to be removed before replacing it with a new one.

**It is useless to carry out renovations or patching even if the old pool has been done following the previous waterproofing rules.**

## 1.2 APPLICATION SUPPORTS

There are two essential construction elements in a swimming pool: the crown and the walls.

The crown will be made of reinforced concrete (dosed at a minimum of 350 kg) with a minimum thickness equal to or greater than 12 cm. and should receive a finely smoothed protective finishing layer.

For this purpose, protective layers incorporated into the crown or thin protective layers are not recommended since they do not provide the recommended smooth appearance. The walls and bottom of the pool must be constructed of materials compatible with CEFIL PVC membranes.

The bottom of the pool must be completely flat and rigorously leveled (maximum tolerance: 1 cm/10 m), so that the widths of the pool can be placed plumb and on smooth surfaces. For their part, the walls will be made and placed plumb, so they should not have cracks or chips greater than 2 mm.

With respect to construction materials, the possibilities are also diverse.

### REINFORCED CONCRETE

It must be covered with a well-smoothed flat plaster. If oil is used for formwork, it must be neutralized with the application of the plaster.

### PREFABRICATED REINFORCED CONCRETE PANELS

Its assembly will be plastered.

### MASONRY

With horizontal and vertical joints: it must be covered with a smoothed plaster.

### METAL PANNELS

They must be placed rigorously level and well fixed or sealed to the crown. These panels can be made of flat or profiled sheets, stainless steel or galvanized or hot-coated CEFIL PVC and even aluminum alloy.

If the panels are to be treated against corrosion, it is advisable that the treatment be compatible with the CEFIL PVC membrane.

### WOOD PANNELS

They will be mounted and fixed on the crown and their treatment must be compatible with the membrane;

When treating wood DO NOT USE products made from tar or asphalt.

### PANNELS OR BLOCKS

Made of thermoplastic materials (PE, PVC, PS) or composites (PRFV) assembled and fixed to the crown.

When choosing these materials, you must take into account the possible risks of migration of components such as pigments and/or plasticizers that are added to the base resins. In this case, it is advisable to apply a separating layer to the walls and the bottom.

Finally, we remind you that for better conservation of CEFIL PVC membranes, it is advisable to treat the walls and bottom (disinfection, preventive biocidal treatment) before assembly and installation.

## 1.3 MAKING ANGLES AND EDGES

The correct construction of the walls and crown is essential for the proper waterproofing of a pool. To do this, the dihedral formed by the walls and the bottom must be equal to or greater than 85º. If any of the walls form a dihedral angle with the bottom of less than 85º, we recommend NOT PLACING the membranes until they are corrected.

For its part, the joints of the vertical walls will be made at a sharp angle, with rounding or on cut faces. Finally, the angles at the foot of the wall and the edges will be made at a sharp angle.

It should be noted that it is easier to apply the reinforced coating when working with sharp angles. If the pool has a ladder incorporated, the angles formed by the steps and risers must be made at a sharp angle; while the corners of the steps must be slightly rounded (maximum radius: 5 mm).

First of all, it should be noted that all accessories intended to pass through the support and the covering must have two sealing gaskets and a fixing flange (figure 1). If possible, these pieces will be placed exposed on the finished pool walls and bottoms (gaskets and flanges not included).

Regarding the adhesion method, the first joint will be glued to each of the pieces that are to be sealed before the application of the reinforced coating. The second gasket, which will go above the liner, and the fixing flange will be placed as the pool is filled, taking care that the sealing is done before the water level reaches the different pieces. Once the flanges are in place, you will need to cut the portion of the liner included on the inside of the flange.

Figure 1A: Discharge pipe

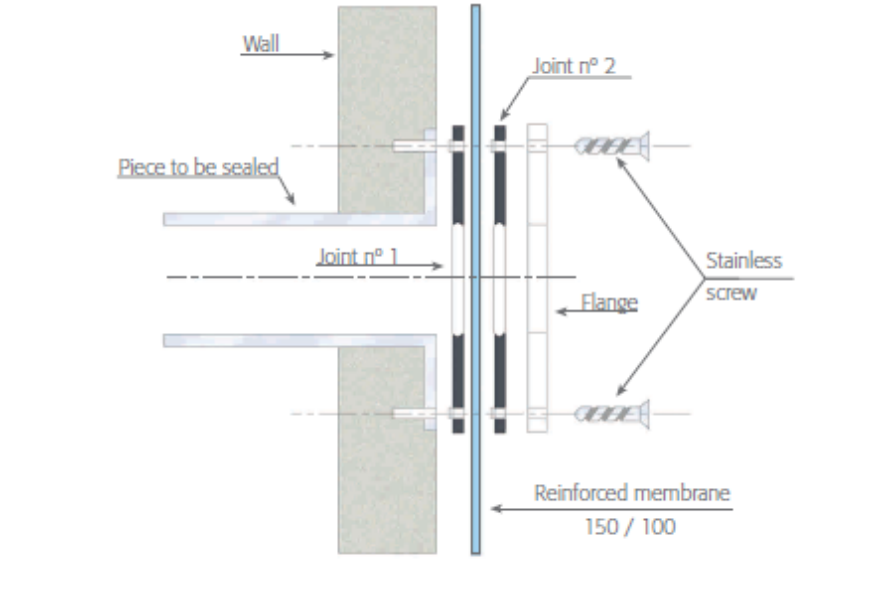
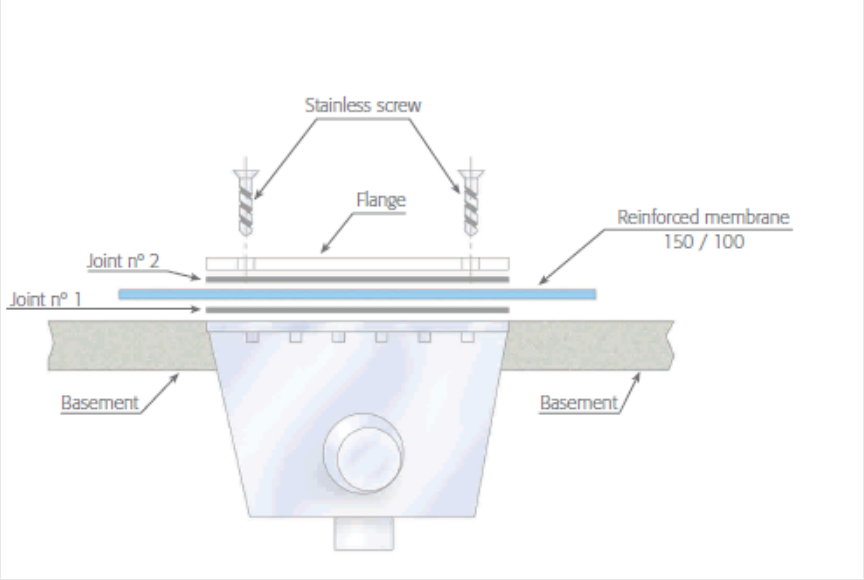


Figure 1B: Bottom plug




## SEALING PARTS

**Below we list the parts that must be sealed in a pool. All of them must be of the "liner" type:**

- Skimmer(s)
- Bottom plug(s)
- Discharge mouth(s) and brush intake(s)
- Projector(s), window(s)
- Swimming device against the current
- Any accessory that passes through the support and liner

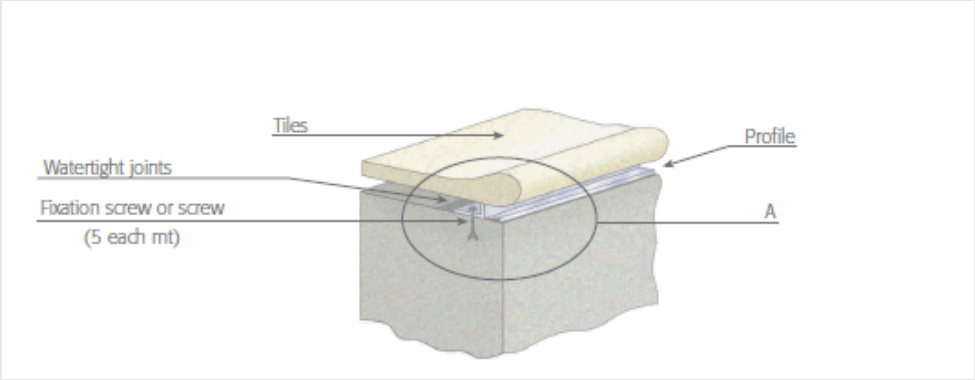
## 2.1. MEMBRANE FIXING ACCESSORIES

### 2.1.1"HUNG" FITTING

For this fixing system any of the following special profiles can be used:

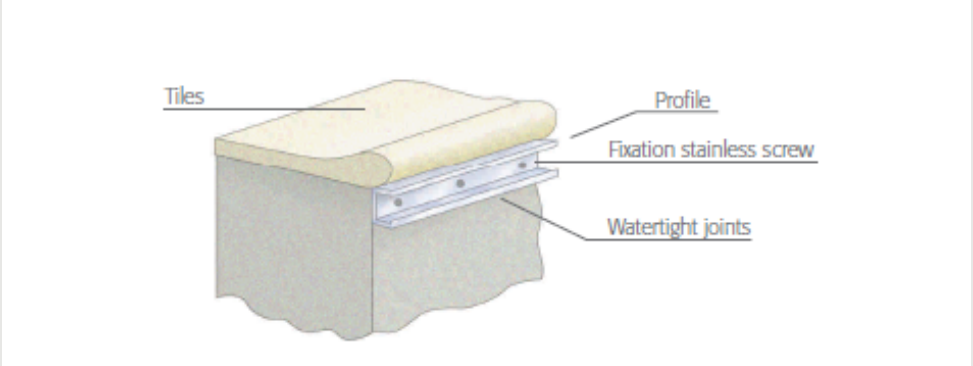
. A profile placed horizontally and edged on the pool trim, under the pool capstone

Figure 2A: Fixation "Hung" on tiles




. A profile fixed to the vertical wall of the pool, especially indicated for rehabilitation work on pools with curbs:

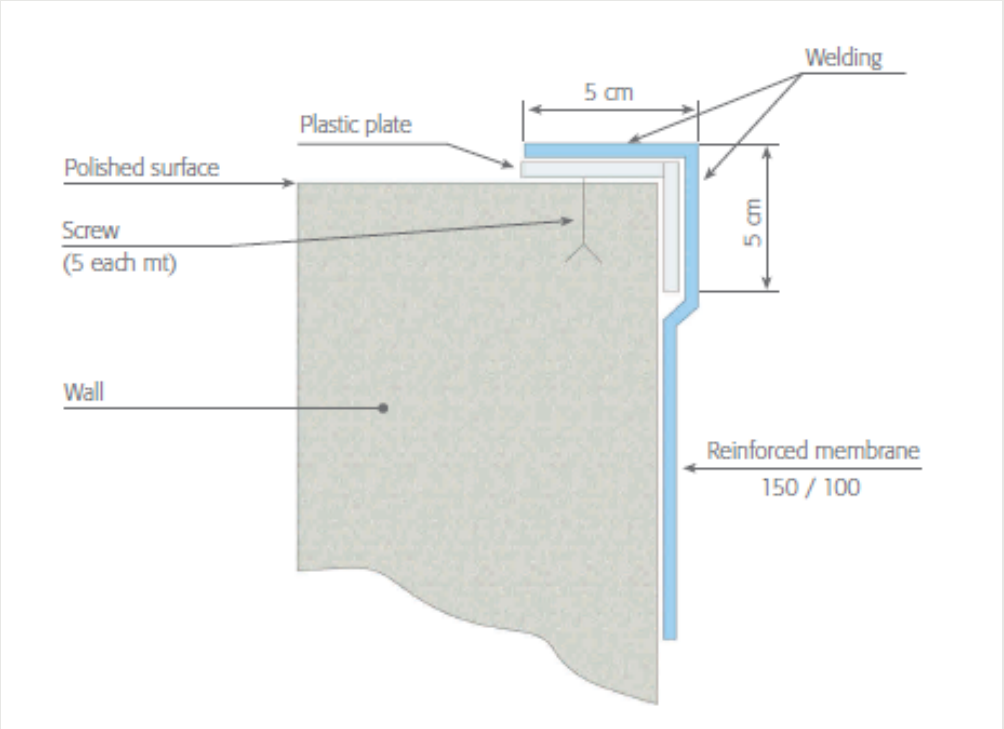
Figure 2B: Fixation "Hung" on the wall



## 2.1.2. SQUARE PROFILES IN COLAMINATED SHEETS

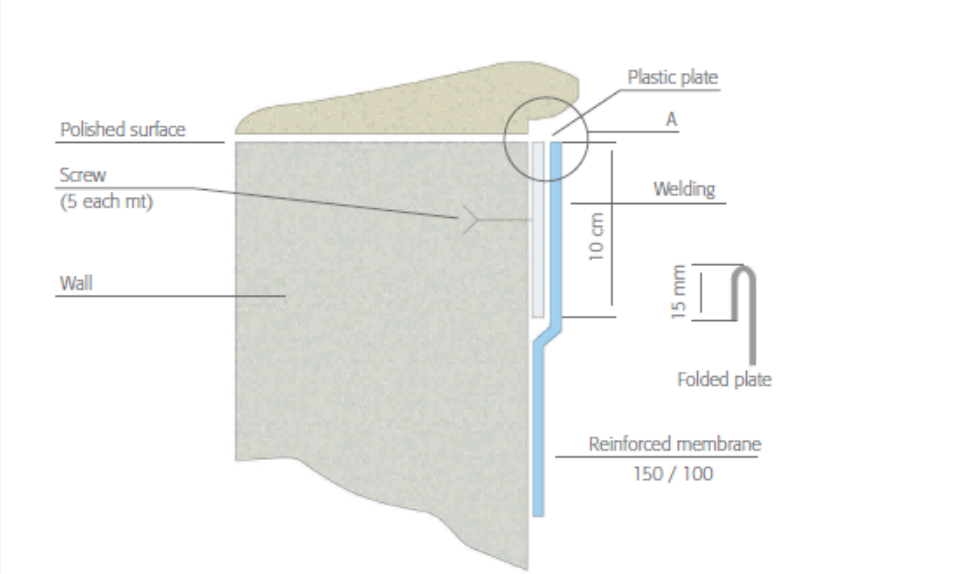
If the fixing is carried out using angle profiles in hot-rolled PVC-coated steel sheet (called plastic sheet), it must comply with the manufacturer's prescriptions and comply with the principle indicated in figure 3. All sheets must be sealed with MS or similar on the lower face against the support during their placement and in the case of plates, a second seal must be applied on the outer face between the sheet welded to the sheet metal and the crowning stone.

Figure 3A: Fixation on polished surface



## 2.1.2. SQUARE PROFILES IN COLAMINATED SHEETS

Figure 3B: Fixation on vertical wall (renewals)



## 3.1. MEASURES. SIMULATIONS

Measurement is one of the most important phases in the pool construction process. Therefore, measurements greater than 2 m must be made. between two operators to reduce calculation errors due to unnecessary displacements and movements.

The dimensions will be taken with tolerances of – 0 mm to + 5 mm, both for the dimensions taken on the supports and for the dimensions of the membranes that must be cut. In this way, the different measures taken will allow cutting plans and simulations to be prepared.

The organization of the membrane cuts must take into account the following aspects:

- The available width and length of the rolls.
- The coatings required for welding.
- The implementation, the shape of the pool and the aesthetic aspect sought.

## 3.2. CUTTING OPERATIONS

As a general rule, you should look for the external face that will be exposed to contact with water.

Once this point has been determined, the cuts will be made following a line previously drawn on the membrane.

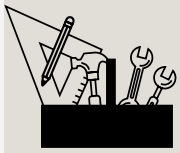
A pair of scissors can be used for small cuts; and a cutter and a ruler for large cuts.

Make geometrically complex cuts directly on your support (pyramid trunks, stairs, free shapes, etc.).

In the case of non-reversible or varnished membranes, the external face must be marked or defined from the moment of production..

## NECESSARY MATERIALS

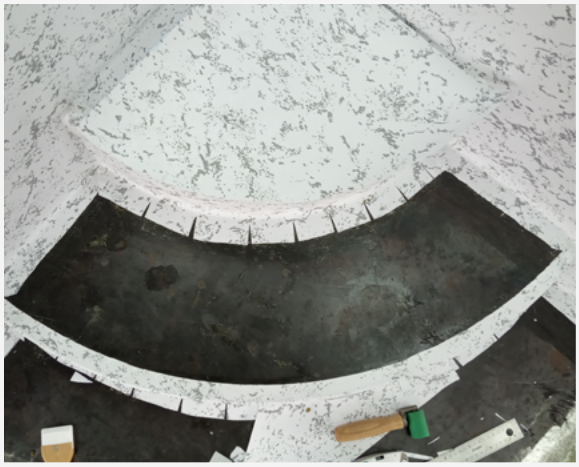
The materials necessary for waterproofing a pool with CEFIL PVC membranes are divided into two groups: tools and auxiliary products. Below, we offer a general list of the utensils and products of each of the groups.



- Brush.
- Mixed water and dust industrial vacuum cleaner.
- Concrete scraper or spatula.
- Triple measuring tape.
- Double 10 m tape measure.
- Pair of scissors and Stanley knife for straight and curved sheets.
- Stainless steel upholsterer ruler. Lengths: 0.8 m and 2 m.
- Tracing cord (pay attention to the compatibility of the pigments with the membrane).
- Plumb-line.
- Large spirit level (approx. 80 cm).
- Clean white cloths.
- Container for applying Liquid PVC
- Pencils (NOT ball-point or felt-tip pens).
- 3 G 1.5 PVC extension cable.
- Electrical power supply with 30 mA trip switch.
- Wire brush.
- Tracing point or screwdriver
- Standard, well equipped toolbox.
- Hot-air type welder with a range of flat nozzles (15-40 mm) and a press roller for sticking silicone rubber linings. This device should include a power regulator to control the air temperature at the nozzle exit (400 - 600ºC)
- Spares for welder
- Protective equipment (gauntlets, goggles, mask).
- Punch.

## NECESSARY MATERIALS / AUXILIARY PRODUCTS

- Solvent: THF (Tetrahydrofurane) to adjust the viscosity of Liquid PVC.
- Liquid PVC (solution) for finishing joins at around 1 Kg per 100 m2 of pool surface area, or 25 g/linear metre of join.
- Cleaning solvent (ethyl acetate).
- Long, flat-head aluminium expansion edge trims (5 mm diameter, L=25 mm): expect to use around5 trims per meter of fixing.
- Sheets of plastic-covered plate (2 m x 1m ). Steel thickness: 0.6 mm ± 0.1 mm
- PVC coating 0.8 mm ± 0.2 mm on one side, anticorrosion lacquer on the other.
- Fixing sections (as per skect in Fig. 2).
- Fixing strips to suit the sections used.
- Locking rings where necessary.
- Heat-set PVC corner-pieces (inside&outside).
- Adhesive compatible with liners for use on concret supporting.
- Biocide and/ or fungicide solution compatible with PVC membranes




For more information, please contact **info@cefilpool.com** for **installation training courses**.

## 3.3. WELDING TECHNIQUES

All welding must be carried out on clean and dry pieces, so all traces of water or adhesive must be eliminated.

### 3.3.1. HOT WELDING

Hot welding requires that the widths have been overlapped with a 5 cm covering along their entire length and spot welded with small welds at 0.5 m intervals. For welding, a 20 mm nozzle will be used. The welding will be double, first carrying out an internal welding or pre-welding, leaving approximately 2.5 cm free. of the end of the overlap to then proceed to the final welding.

When welding horizontally, a soft pressure roller will be used and in the angular areas, where there is not enough space for this type of roller, the brass roller should be used.

The weld must have a minimum width of 25 mm and the linear travel speed must be about 0.5 m/min. The air temperature of the duct (between 400 and 550º C) and the welding speed will be adjusted according to the ambient temperature and humidity at the time of welding.

## 3.4.CHECKING OF WELDS

### 3.4.1. CHECKS

All welds must be controlled one by one and along their entire length.

To check the welds, a tool marketed for this purpose or a metal tracer is used, sliding while applying pressure with the tip on the welded overlap, trying to insert it into the weld.

This operation should not be carried out on newly welded and still hot overlaps, but rather after a few minutes when the weld is already cold.

### 3.4.2. TOUCHING UP

All welding faults detected will be retouched only when hot, as the control operations are carried out.

As a precautionary measure, perform a final check after finishing the weld touch-ups.

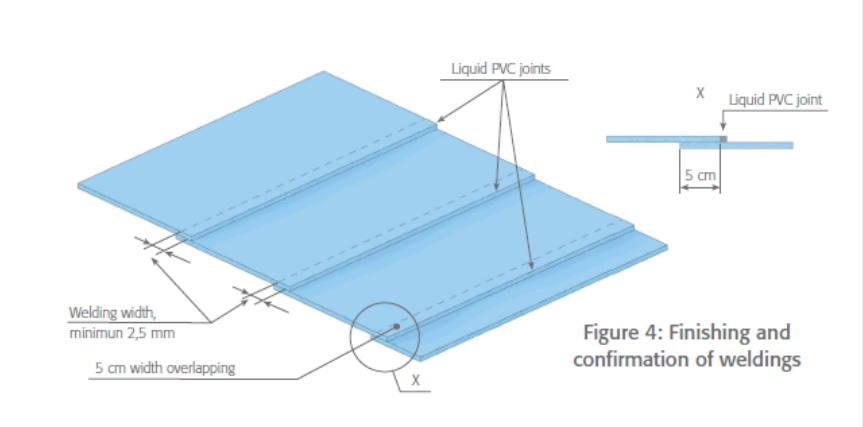
### 3.4.3. FINISHING AND CONFIRMATION OF WELDS

This operation consists of placing a PVC cord in solution on the clean and dry welded edges. To avoid possible contamination, this operation must be carried out extremely quickly.

The PVC cord in solution, of the color chosen for the membrane, infiltrates by capillarity into the groove of the membrane and perfects the tightness.

Wait until it is completely dry before adding water. This time can vary from a few minutes to several hours depending on atmospheric conditions.

Figure 4: Finishing and confirmation of weldings



## 4.1. FITTERS

The team must have at least one qualified technician authorized to perform the welding operations necessary for the assembly of the membranes.

## 4.2. PREPARATIONS

Rolls of membranes previously protected and stored flat will be brought to the construction site in their original packaging at the time of installation.

They should be placed in a clean and dry place, always flat.

If possible, use rolls from the same manufacturing lot. If this is not possible, check the uniformity of the colors by examining them in daylight.

Previously, the walls and bottom of the pool must be washed and dried.

Next, a final visual and tactile check will be carried out to ensure that all surfaces are smooth and impeccable.

If necessary, touch up the places where there is a defect by polishing, covering, smoothing, etc.; and check and clean the fixing profiling.

All elements that are to be sealed must be checked and cleaned to eliminate mortar particles that may have fallen during the execution of the preceding operations (cleaning the screw holes).The first joint of each piece that is sealed must be previously glued (see fig. 1)

For their part, the vertical parts and the bottoms should preferably be treated with an adapted biocide solution, according to the instructions of the manufacturers of this type of product.

## 4.3. FITTING OF WALLS

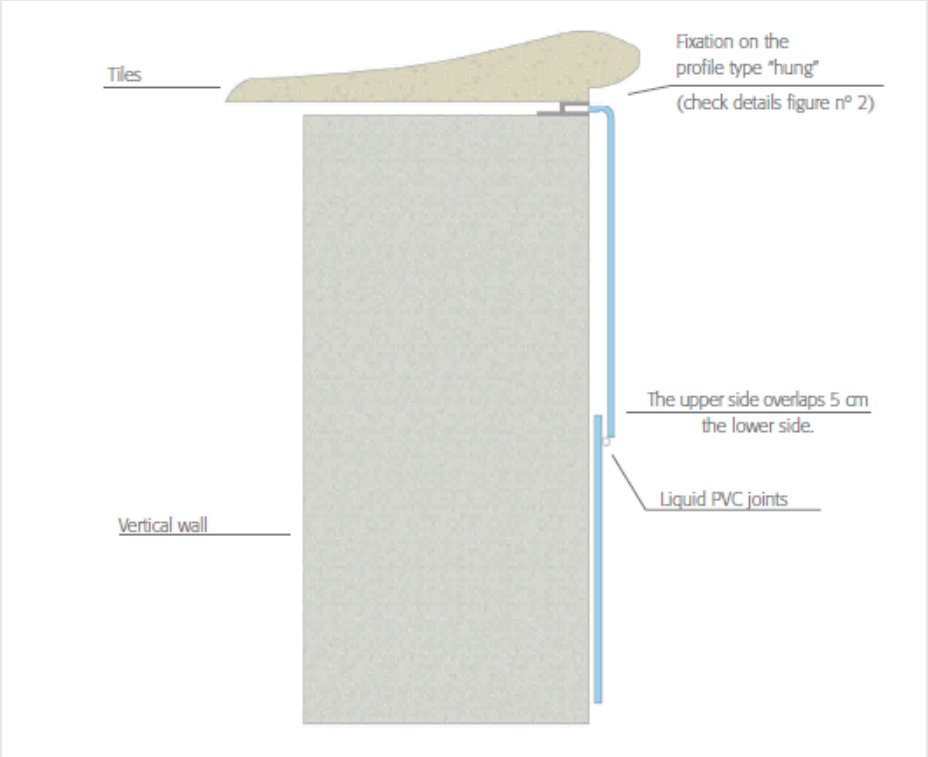
The arrangement methods differ depending on the fixing means used, either with special profiles (2.1.1.) or with plastic sheets (2.1.2.).

The methods also differ depending on the type of wall: flat or non-planar.

### 4.3.1. FITTING OF FLAT WALLS USING LINERS WITH HUNG SECTIONS

Whenever possible, place only one full panel per side. Next, unroll the widths of the membranes horizontally, by one or two widths, depending on the height of the walls. If several widths are used, previously assemble the widths flat so that the upper one overlaps the lower one.

Figure 5: Welding of vertical widths on a flat wall

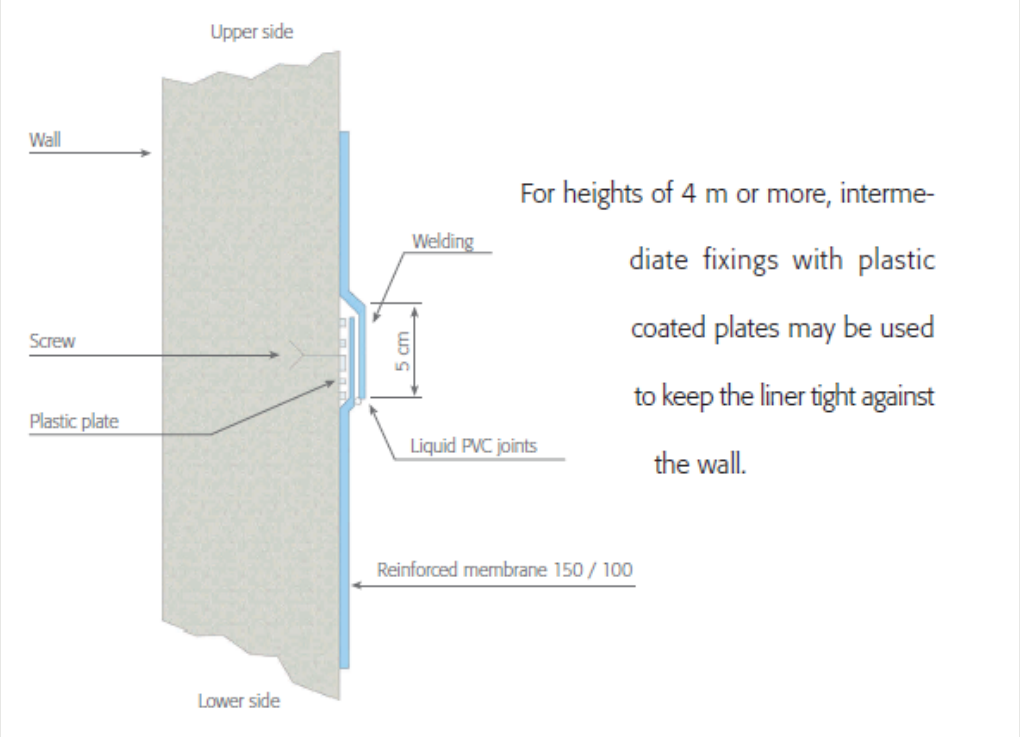



This method of placing a complete panel by horizontal widths allows reducing the linear lengths of necessary welds and gives a more aesthetic appearance to the final assembly.

## 4.3.2. ARRANGEMENT OF FLAT WALLS WITH SUSPENDED MEMBRANES

In the case of a high height (greater than 4 meters), and to keep the membrane applied against the wall taut, it is possible to provide intermediate fixings using plastic sheets.

Figure 6: Intermediate mechanical fixation




## 4.3.3.FITTING OF FLAT WALLS WITH LINERS FIXED TO PLASTIC COATED PLATES (2.1.2)

You must proceed as in point 4.3.1., except in the phase of the previously assembled panel, in which case the lower width (under the skirt) will have to be welded onto the plastic sheet. The assembly must be tensioned (approximately 1% of the total height) during the fixation of the plastic square on the crown.

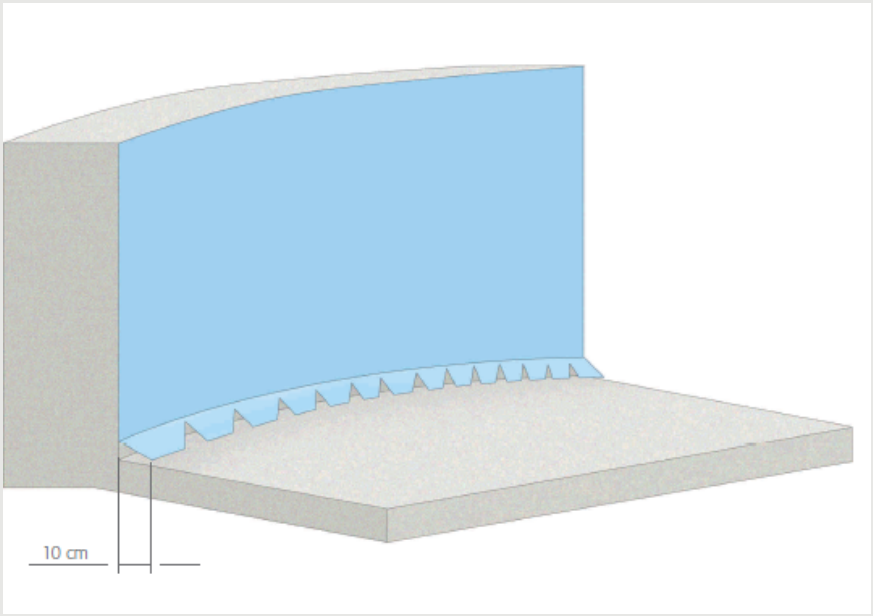
## 4.3.4. FITTING OF CURVE WALLS

This arrangement occurs when one of the walls has a free shape, whether concave or convex, and it is then convenient to glue the support and sheet.

In this case, the heel of the vertical wall membrane will be placed below the bottom membrane with a maximum overlap of 10 cm. This heel should be grooved and the festoons removed in accordance with the shape of the wall.

When a pool includes free-form curved elements, this arrangement technique will beused for all walls as a whole.

Figure 7: Application on a non flat wall




## 4.3.5. FLAT BOTTOMS WITH CURVED WALLS

In this particular case, the bottom widths must be cut exactly following the curved contour at the foot of the walls, ensuring that the bottom thus cut will cover all the slots well by at least 10 mm.

## GENERAL RECOMMENDATIONS

Given that CEFIL PVC membranes lose their flexibility at low temperatures and have a very small elongation in traction, it is advisable to take precautions when the external temperature and that of the supports are below 10 ºC.

To this, we must add that the evaporation of the solvent is very limited (below 10 ºC), so welding speeds must be shortened at low temperatures.

Likewise, and since the membranes have a certain expansion coefficient, the tension of the widths prior to assembly must be adapted to the ambient temperature at the time of installation and carried out according to the manufacturer's recommendations.

At temperatures below 10ºC, it is recommended to cover and/or heat the pool during installation. When it rains or snows, it is recommended not to install without protection.

## COMPLEX SHAPES

Taking into account the low elongation index of CEFIL PVC membranes, concave or convex shapes, whether in walls, backgrounds or accessories, can only be made by applying numerous cuts and welds whose aesthetic effect It is very debatable.

## VARIOUS

In the case of pools equipped with drains and channels, the specific instructions of each manufacturer must be followed.

## PRELIMINARY CLEANING

Before filling with water, completely clean the pool liner by sweeping, or better yet, vacuuming. Then wash with soap and water and rinse the entire surface. If you detect traces or stains, remove them with a non-aggressive cleaning product, especially in the case of printed and varnished membranes.

## FILLING THE POOL

First of all, you must purge the water filling from the water network piping that feeds the pool. Subsequently, fill the pool with water suitable for this use that does not contain metallic salts, according to the following scales:

- **If possible: TH < 20 ºF;**
- **Essential: 7 < pH < 7,8:**

The water used to fill the pool must not be biologically contaminated. To such an extent that it is advisable to take into account the results of the water analysis if it is not water coming from the distribution network..

Therefore, disinfect the water from the beginning of filling, using a chlorinated solution, an anti-algae product, or similar.

If the pool is equipped with a system that electrolyzes the salt in the pool water, you should not introduce the salt until the end of filling.

EDICAR PLÁSTICOS, S.L.
Polígono Industrial de Júndiz
Calle Júndiz, 12
01015 Vitoria-Gasteiz (España)
**Phone:**34 945 290 060
info@cefilpool.com
www.cefilpool.com

WWW.CEFILPOOL.COM