

# Geomembranes

Composite Bituminous:  
Teranap GTX



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## Common provisions

### 1. Materials handling

Materials handling is to be limited to avoid damaging the base layer by rutting.

For materials coming on pallets, these are to be brought in using a lifting rig at every point of the jobsite (bottom and top of the slope) so as to correctly position the rolls and be able to unroll them manually. Constructing a cradle can facilitate the positioning of the material.

Installing geomembranes 4m wide and wider requires a lifting rig and a gantry crane (see Paragraph 3). The width of the gantry crane will depend on the width of the rolls being handled.

### 2. Delivery of materials to the jobsite

During loading and unloading operations, make sure to avoid damaging the first turns of the rolls.

For that purpose, geomembrane rolls are to be stored in their original packing, laid flat, parallel, on a plane unobstructed area with sufficient bearing capacity.

The geomembrane rolls will be able to be stored 2 to 3 rolls high.

### 3. Transversal joints on slopes

In principle, the use of horizontal joints on slopes is prohibited except for dealing with

angles. However, in certain configurations such a connection may turn out to be necessary. In such cases, the agreement of the main contracting firm and of its technical inspection body must be obtained in advance.

In particular, make sure to avoid two welds being lined up on two neighbouring strips (at least 1m between two longitudinal welds).

### 4. Transversal joints at the bottom

Quadruple overlap joints (points with four thicknesses of geomembrane) are prohibited.

Triple overlap joints are to be avoided; should they be inevitable, special attention is to be paid to them.

## 1. General description of the products

### Teranap GTX

Geomembrane of elastomeric bitumen SBS<sup>1</sup>, reinforced with a non-woven polyester and associated, by full surface heat bonding, with an anti-puncture geotextile.

The full surface heat bonded geotextile can be of various kinds: polypropylene, polyester, polyethy-

lene and can have various functions: protection, drainage or reinforcement.

This assembly can make it possible to reinforce one or several of the geomembrane's characteristics, such as tensile strength or puncture resistance.

It can also improve certain characteristics, in particular, the friction interaction coefficient.

## 2. Sizing of the geomembrane protection by geotextile

To protect the geomembrane from any puncturing, it is very often necessary to install an anti-puncture geotextile under or upon the geomembrane.

TERANAP	Depth of liquid or height of product stored	Under the geomembrane	
		Mechanical protection	
		Without	With
Smooth concrete (HS < 1mm)	H < 3m	No	No
	H < 10m	No	300
Trowelled concrete (1.0mm < HS <sup>2</sup> < 2.0mm) Macadam	H < 3m	No	No
	H < 10m	300	300
Cement-bound graded aggregate Bituminous-bound graded aggregate	H < 3m	300	300
	H < 10m	400	400
Sand, silt, clay	H < 3m	No	No
	H < 10m	No	No
Topsoil, crusher-run material, crushed materials Dmax = 15mm, rounded materials Dmax = 50mm	H < 3m	No	No
	H < 10m	300	400
Crushed materials Dmax = 31.5mm Rounded materials Dmax = 80mm	H < 3m	300	400
	H < 10m	700	700
Crushed materials Dmax = 5 mm	H < 3m	700	700
	H < 10m	Study	Study

(1) SBS – Styrene Butadiene Styrene

(2) HS – Hauteur de Sable Vraie – True Texture Depth (in sand patch test)

### 3. Installation

#### 3.1. General description

The composite bituminous membrane has a surface that is different from the underface (face covered with geotextile, film covered face).

- The face covered with a geotextile is to be applied on the protection side;
- The film on the other face is particularly resistant to roots.

Professional practice concerning the installation of geomembranes (connection of strips, slopes, etc.) shall be followed.

#### 3.2. Welding bituminous geomembranes

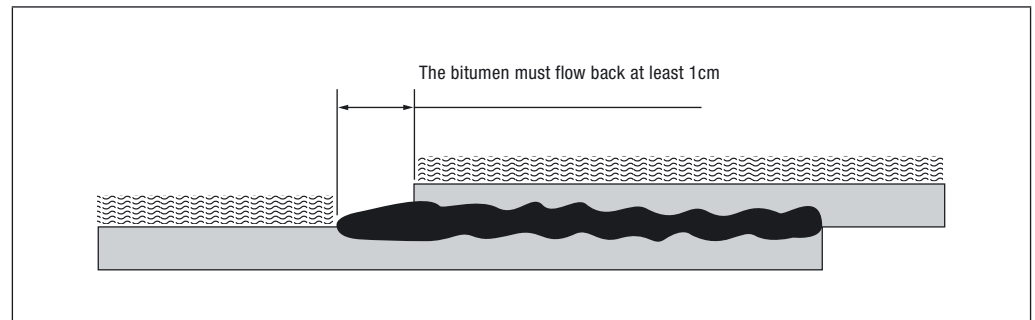
Lateral overlaps

The two strips to be assembled are positioned making sure that there is a minimal lap of 20cm.

The weld is performed while lifting the upper strip at that point and heating the two strips together before smoothing down.

The part of the strips used for making joints shall always be kept clean. For that purpose, the protection paper is to be removed from the weld path just before welding.

After the self-inspection of the weld, the fusion face of the joint is chamfered by heating the upper part of the joint and crushing the fusion face with the gauging trowel.



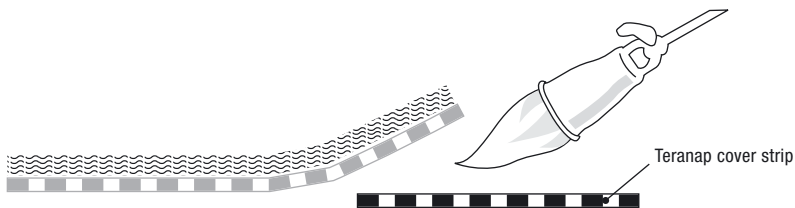
#### ■ Abutting edges of the strips

The abutting edges of the strips are assembled by welding a joint band called the Teranap cover strip

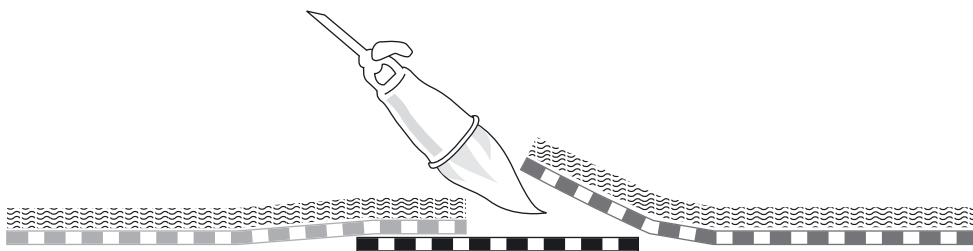
The Teranap cover strip is a band of bituminous membrane, 4mm thick, surfaced on both sides by a macro-perforated heat melting film.

Instructions for welding the abutting edges of the strip:

**Step 1:** Welding one abutting edge of the strip on the joint band, then smoothing down



**Step 2:** Welding the second abutting edge of the strip on the joint band, then smoothing down



**Finished appearance:** abutting edges of the strip, edge to edge



### 3.3. Protecting the geotextile during welding

In case a heat sensitive material is installed under the geomembrane (for example, an anti-puncture geotextile), arrangements need to be made before welding to avoid damaging this material. A heat shield can be used, for example, a strip of Verecran 100, 50cm wide.

### 3.4. Specific connection guidelines

Generally, Teranap GTX connects to concrete structures in the following way:

- Installation on concrete, a Siplast Primer type bituminous impregnation, applied with brush or roller, 250 to 300g/m<sup>2</sup>;
- Torched welding of the Teranap TP onto the Siplast Primer after drying;
- Installing a mechanical fixing on the weld.

#### Note:

For long lines of welding on concrete, it is preferable to use membranes 1m wide which are easier to manipulate and are especially designed to have a good bond on concrete:

- In the case of a connection by simple welding without mechanical fixing, use Parafor Ponts or Verinox S;
- In the case of a connection by welding and mechanical fixing, preferably used Parafor Solo S, a non-surfaced product.

To avoid corrosion of the mechanical fixing, protect it by welding a strip of geomembrane on it.

## 4. Quality Assurance Operations

### 4.1. Destructive tests

Take a weld test specimen and calculate the ratio of the joint's combined tensile-shear stress resistance according to Standard NFP 84502-1 to the tensile strength of the geomembrane in main areas according to Standard NFP 84-501.

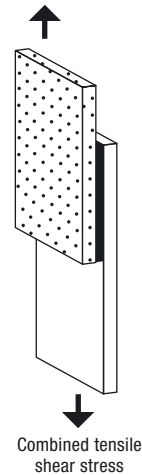
The frequency of this type of test depends on the main contracting firm's specifications.

To the degree possible, the test specimens are taken in zones that are not very sensitive.

Specifications on the welds:

Bituminous geomembrane
<b>Combined tensile-shear stress</b> 16kN/m or FS $\geq$ 80%

Under combined tension-shear stress according to NFP 84-502/1



### 4.2. Non-destructive tests

TERANAP GTX	Test type	Description
Manual welding	Visual	General appearance of the welds
	Guide pin or air lance	Passing a guide pin along the weld. Passing an air lance along the weld (air under 500kPa pressure)
	Vacuum bell	Bringing the weld zone to be inspected down to hypobaric pressure (0.2 to 0.3bars)





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