TÜRGABE

Waterproofing of road and rail tunnels

waterproofing system

Materials

Geotextile minimum 500 g/m² Polypropylene
Urfoil G PVC membrane
Fixing elements.
Reinforcement strips to protect the geomembrane in the area where shuttering for concrete shell finishes
Anchors if necessary to hold the reinforcement

Support

The surface of the support has to be as flat as possible, the used granulates should not be greater than 16 mm. An irregular surface of the support can lead to folds of the geomembrane during concreting of the inside shell what could harm the waterproofing.

Installation of the bottom drainage

This type of tunnels needs drainage at the bottom of the it to evacuate infiltrating or temporary water.
The technical solution has to guarantee that the water will not infiltrate between the waterproofing system and the inside concrete shell.

installation

Before starting the installation, surface must be controlled to follow the specification.

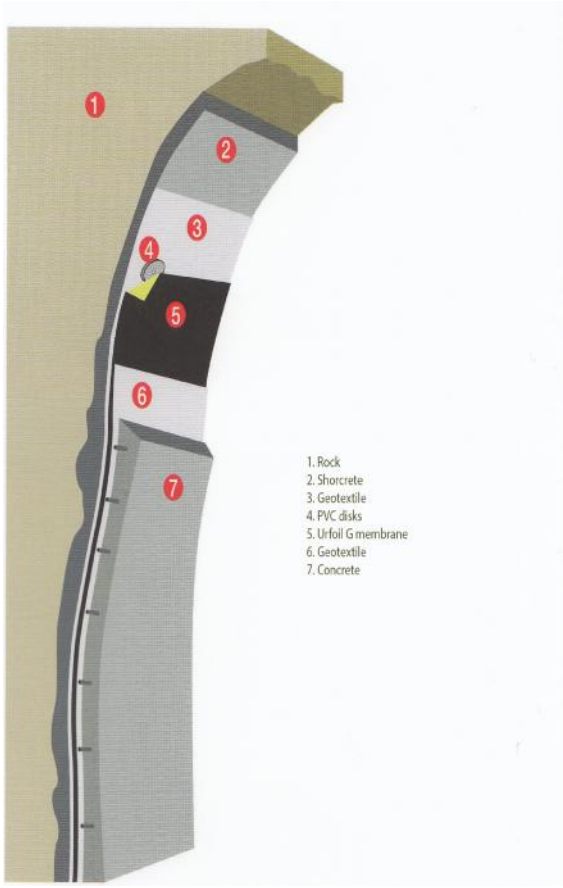
The scaffolding for the installation can be built on to the slab of the tunnel. Depending on the type of scaffolding used, the geotextile and the geomembrane will be installed from one side of the tunnel to the other or from the highest point of the tunnel to both sides.

Installation of the Geotextile

The geotextile will be fixed with fixation roundels: The number of theses disks vary from 2 in the wall to 3 in the vault. The geotextile is lifted to the scaffolding, unrolled and fixed with the fixation roundels to the shotcrete surface leaving a minimum overlap of 10 cm.

Fixation roundels

Roundels or disks must be made out of PVC as, apart from assuring the fixation og the geotextile, the PVC waterproofing membrane will be welded on these disks.



Installation of the Geomembrane

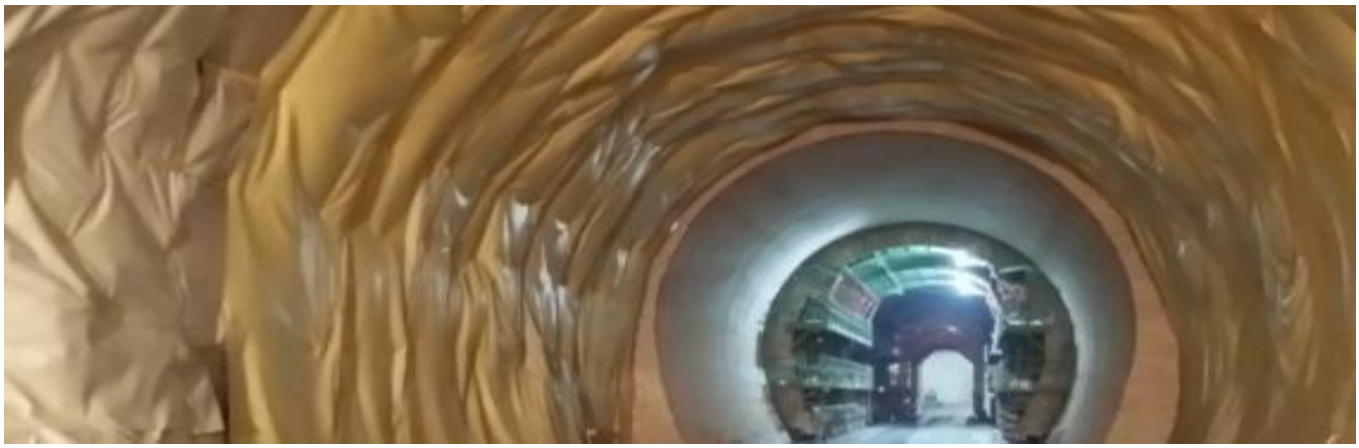
Urfoil G is produced in the correct length following the indications of the installer, which corresponds to the perimeter of the tunnel. Besides the indicated length, there will be a line on one side of the membrane at a distance of 5 to 8 cm. indicating the necessary overlap for the welding.
The installer unrolls the geomembrane on top of the scaffolding, welds it to the fixation roundels on the highest point of the vault and proceeds with this work downwards until the whole geomembrane is attached to the fixation roundels.

Then, geomembranes are welded together, with the help of a double welding machines, producing a double seam with testing canal.
The installer has to take care that the machine is well adjusted concerning temperature, speed and pressure. Therefore it is crucial to adjust the machine through trial welding every day before starting the initial welding works.

Welding Machines

Automatic hot air welding machine
The machine is a combination of hot wedge and of hot air automatic welding machine.
The hot air temperature, the pressure, and the speed welding are adjustable in a step less way and are electronically controlled.

Hand welder
The hand welder works with hot air and is indispensable on an underground project. All details have to be done with this well known device.



DESCRIPTION

URFOIL G150 is a flexible PVC-P membrane. Not compatible with asphalt. Non UV resistant.

FIELD OF USE

URFOIL G150 is suitable for tunnels and tanking.

MAIN PROPERTIES

- High level of waterproofing even under permanent deformation.
- Highly puncture resistant.
- Root resistant
- Excellent dimensional stability and mechanical properties.
- Easily welded using hot air, even several years after installation.
- Can be recycled.
- Excellent flexibility at low temperatures.

PACKAGING AND STORAGE

Colour	Yellow/Black
Dimensions	2,1 x as per request
Rolls / pallet	As per request

INSTALLATION

- URFOIL G150 waterproofing systems must be installed by experienced and qualified personnel.
- Surfaces must be clean and dry and free from sharp obtrusions.
- Membrane joins should be made using a hot air welder and should be checked. In case of double channel welding, checking can be made with air pressure test
- Before starting welding adjust the parameters for speed and temperature according to the ambient conditions and the surfaces of the membrane.

PROPERTY	NORMS	UNITS	AVERAGE DATA
Nominal Thickness	JIS K 6773	mm	1,5
Thickness Variance	JIS A 6008	%	± 5
Speciphic Gravity	JIS K 6773	g/mm³	1,35 ± 2%
Tensile Strength	JIS K 6773	N/mm²	≥ 16
Elongation (L, T)	JIS K 6773	%	≥ 280
Tear Strength (L, T)	JIS K 6301	N/cm	≥ 475
Flexibility at low temperature	JIS K 6773	-35°C	No cracks
Weight change (Alkali resistance)	JIS K 6773	%	± 1
Seam Strenght	JIS 703	%	≥ 35

Urgabe

Juan Bautista Zabala 12 3 p 8
48991 Getxo (Spain)
+3494 403 03 29
mj@urgabesolutions.com

Approved Distributor:

30 Toh Guan Road
#07-05
Singapore 608840
Tel: +65-68611177
hitchins@hitchins.com