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membrane 

# PVC GEOMEMBRANE

Geomembranes are waterproof covers with high quality and high polymer properties. Used in tunnels, subbasement, Underground railway stations, water conveyance canals etc. For molding of highly waterproof polymers, plasticizer, anti-ultraviolet agent, anti-aging agent, stabilizer, and other process aids are added to PVC resin.

Does not crack and keeps flexibility properties under cold climate conditions. Keeps general properties between -40°C and 70°C. Two different colors in two sides provide detection of any defect, tear or puncture. Commonly used in tunnel applications with ease handling and rapid welding.

## Advantages in tunnel insulation:

- Durability and flexibility under low temperature
- Fire resistance
- Resistance against sustained compression,
- Sustainable tensile stresses during service time
- Ease of application to wide surfaces
- High chemical resistance against underground and ground water



**PLASTFLEX GLSO/SL 2,0 mm**  
**PVC SIGNAL LAYER MEMBRANE FOR TUNNELLING AND UNDERGROUND WATERPROOFING JOBS**

**TDS**  
**Allegato F**  
**Rev.0**

### DATA SHEETS

TEST	SPECIFIC	UNIT	VALUE
Thickness	EN 1849-2	mm	2,00 ± 5%
Tensile strength	UNI EN ISO 527-3	N/mm <sup>2</sup>	17
Elongation at break	UNI EN ISO 527-3	%	300
Aeric mass	EN 1849-2	Kg/m <sup>2</sup>	2.70 ± 0.05
Resistance to impact	UNI EN 12691	mm	≥ 2000
Resistance to tearing	UNI EN 12310-2	N	≥ 100
Static puncture	EN ISO 12236	kN	≥ 4
Resistance to tearing	ISO 34-1 Method B;	kN/m	≥ 50
Peel resistance of joint	EN 12316-2	N/50 mm	≥ 400
Deformation to the warm (Long,Trasv)	EN 1107-02	%	< 2 %
Water permeability	UNI EN 14150	< 10 <sup>-6</sup> m <sup>3</sup> /m <sup>2</sup> /d	
Adsorbability (7 days in water)	UNI EN ISO 62	%	≤ 1
Cold bending	EN 495-5	°C	≤ - 40
Watertightness (1 Mpa for 24 h)	UNI EN 1928	No dripping or water loss	
Resistance to oxidation UNI EN 14575-UNI EN ISO 527/3: 90 days at 85°C	Percentage of tensile strength retained	%	≥ 90
	Percentage of elongation at break retained		≥ 90
Resistance to acid solutions H2SO3: DIN 16726 5.18 (28 days at 23°C)	Change of tensile strength	%	≤ - 10
	Change of elongation at break		≤ - 10
	Folding at T of -20°C	No break or crack	
Resistance to salt solutions (NaCl): DIN 16726 5.18 (28 days at 23°C)	Change of tensile strength	%	≤ - 10
	Change of elongation at break		≤ - 10
	Folding at T of -20°C	No break or crack	
Resistance to Alkaline solution Ca(OH)2: DIN 16726 5.18 (23 days at 23°C)	Change of tensile strength	%	≤ - 10
	Change of elongation at break		≤ - 10
	Folding at T of -20°C	No break or crack	

Resistance to heat	General appearance	No visible changes	
DIN 16726 5.13	Dimensional stability (6h, 80°C)	%	≤ - 3
	Change of tensile strength(7 days, 80°C)		≤ - 10
	Change of elongation at break (7days,80°C)		≤ - 10
	Folding at T – 20°C	No break or crack	
Burst strength	DIN 61551	kPa,%	Stress ≥ 6000 kPa Strain ≥ 50 %
Fire resistance	UNI EN ISO 11925-2	Class	E
Root resistance	UNI CEI/TS 14416	Conform	
Shear resistance when applied with a bituminous	DIN 16726 5.10	N/50 mm	≥ 600
Compressive strength at 20% strain	UNI EN ISO 604	N/mm <sup>2</sup>	≥ 4
Resistance to weathering	EN 12224 UNI EN ISO 527-3	%	Tensile strength retained: MD 97%,CD 98% Elongation at break retained: MD 99%,CD 99%
Product conform to the norm EN 13491 and EN 13967			
Color : Black and Blue (signal layer)			

Thickness	Width	Length
1,0 - 3,5 mm	2,10 mt	As request

## HDPE GEOMEMBRANE

Polyethylene membranes with high UV resistance, high anti-oxidane and chemical resistance and high density.

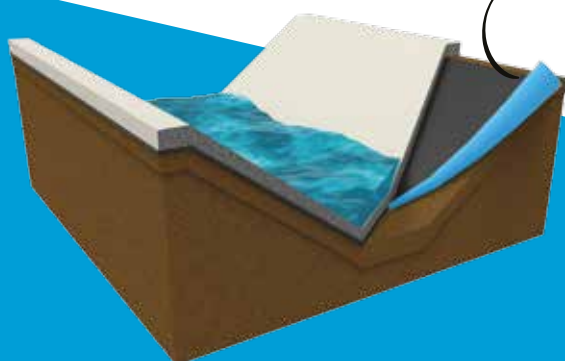
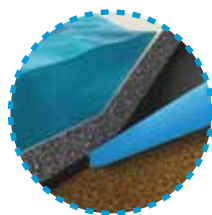
### Fields of Use

- Solid waste storage areas
- Mining waste storage areas
- Acid pools
- Tank basement
- Irrigation chanel

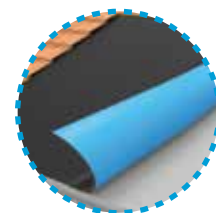
### Advantages

- High chemical resistance

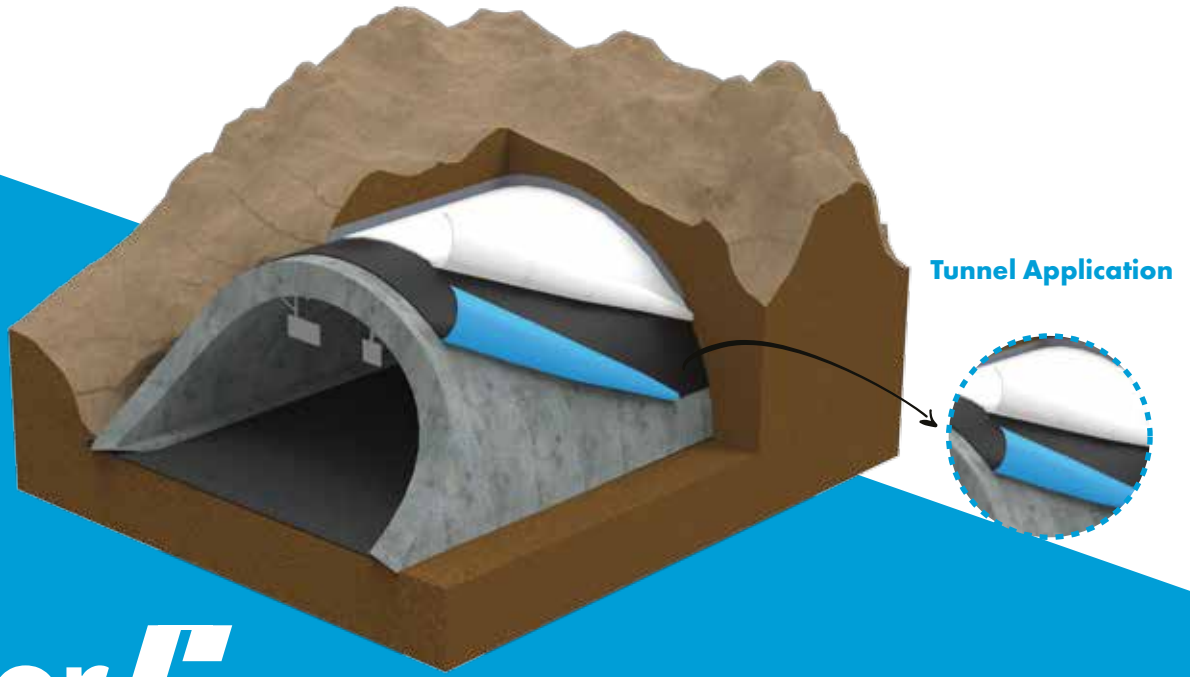
- High tearing resistance
- Low permeability
- High UV resistance
- High strength against mechanic effects
- Resistant against oxidation and wearing
- Resistant against plant roots
- High flexibility
- Available for applications with hot welding source



**Irrigation Canal Application**



**Roof Application**



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**Table 1 (b) - High Density Polyethylene (HPDE) Geomembrane - Smooth**

Properties	Test Method	Test Value							Testing Frequency (minimum)
		0,75 mm	1,00 mm	1,25 mm	1,50 mm	2,00 mm	2,50 mm	3,00 mm	
Thickness - mils (min. ave.) • Lowest individual of 10 values	D5199	nom (mil) -10%	nom (mil) -10%	nom (mil) -10%	nom (mil) -10%	nom (mil) -10%	nom (mil) -10%	nom (mil) -10%	per roll
Formulated Density (min.)	D 1505/D 792	0,940 g/cc	0,940 g/cc	0,940 g/cc	0,940 g/cc	0,940 g/cc	0,940 g/cc	0,940 g/cc	90,000 kg
Tensile Properties <b>(1)</b> (min. ave.) • yield strength • brcak strength • yield elongation • break elongation	D 6693 Type IV	11 kN/m 20 kN/m 12% 700%	15 kN/m 27 kN/m 12% 700%	18 kN/m 33 kN/m 12% 700%	22 kN/m 40 kN/m 12% 700%	29 kN/m 53 kN/m 12% 700%	37 kN/m 67 kN/m 12% 700%	44 kN/m 80 kN/m 12% 700%	9,000 kg
Tear Resistance (min. ave.)	D 1004	93 N	125 N	156 N	187 N	249 N	311 N	374 N	20,000 kg
Puncture Resistance (min. ave.)	D 4833	240 N	320 N	400 N	480 N	640 N	800 N	960 N	20,000 kg
Stress Crack Resistance <b>(2)</b>	D 5397 (App.)	500 hr.	500 hr.	500 hr.	500 hr.	500 hr.	500 hr.	500 hr.	per GRI GM-10
Carbon Black Content - %	D 4218 <b>(3)</b>	2.0-3.0%	2.0-3.0%	2.0-3.0%	2.0-3.0%	2.0-3.0%	2.0-3.0%	2.0-3.0%	9,000 kg
Carbon Black Dispersion	D 5596	note <b>(4)</b>	note <b>(4)</b>	note <b>(4)</b>	note <b>(4)</b>	note <b>(4)</b>	note <b>(4)</b>	note <b>(4)</b>	20,000 kg
Oxidative Induction Time (OIT) (min. ave.) <b>(5)</b> (a) Standart OIT -or- (b) High Pressure OIT	D 3895 D 5885	100 min. 400 min.	100 min. 400 min.	100 min. 400 min.	100 min. 400 min.	100 min. 400 min.	100 min. 400 min.	100 min. 400 min.	90,000 kg
Oven Aging at 85°C <b>(5), (6)</b> (a) Standart OIT (min. ave.) - %retained after 90 days -or- (b) High Pressure OIT (min. ave.) - %retained after 90 days	D 5721 D 3895 D 5885	55% 80%	55% 80%	55% 80%	55% 80%	55% 80%	55% 80%	55% 80%	pear each formulation
UV resistance <b>(7)</b> (a) Standart OIT (min. ave.) -or- (b) High Pressure OIT (min. ave.) - %retained after 1600 hrs <b>(9)</b>	D 7238 D 3895 D 5885	N.R. <b>(8)</b> %50	N.R. <b>(8)</b> %50	N.R. <b>(8)</b> %50	N.R. <b>(8)</b> %50	N.R. <b>(8)</b> %50	N.R. <b>(8)</b> %50	N.R. <b>(8)</b> %50	pear each formulation

- (1)** Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of 5 test specimens each direction  
Yield elongation is calculated using a gage length of 33 mm  
Break elongation is calculated using a gage length of 50 mm
- (2)** The yield stress used to calculate the applied load for the SP-NCTL test should be the manufacturer's mean value via MQC testing.
- (3)** Other methods such as D 1603 (tube furnace) or D 6370 (TGA) are acceptable if an appropriate correlation to D 4218 (muffle furnace) can be established.
- (4)** Carbon black dispersion (only near spherical agglomerates) for 10 different views.  
9 in Categories 1 or 2 and 1 in Category 3
- (5)** The manufacturer has the option to select either one of the OIT methods listed to evaluate the antioxidant content in the geomembrane.
- (6)** It is also recommended to evaluate samples at 30 and 60 days to compare with the 90 day response.
- (7)** The condition of the test should be 20 hr. UV eyele at 75°C followed by 4 hr. condensation at 60°C.
- (8)** Not recommended since the high temperature of the Std-OIT test produces an unrealistic result for some of the antioxidants in the UV exposed samples.
- (9)** UV resistance is based on percent retained valuc regardless of the original HP-OIT valuc.