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membrane 

# PVC GEOMEMBRAN

Pvc geomembrane is a layer which has high quality and polymer feature. The layer which is applied for tunnel, basement, underground railway stations and such as water channels are to be pressed of high polymer waterproof materials, plasticizer with extrusion, anti ultraviolet agent, anti aged agent, stabilizer and other ingredients are inserted to PVC resin. Tunnels, water stop applications, pools, decorative pools, channels, waste water puring applications.

It keeps high flexibility in the case of cold weather, never cracks and resists the temperatures between -40C and 70 C. Signal layer property works in order to detect any kind of defect or damages on the blue coloured surface of geomembrane. PVC geomembrane which has perfect easy welding and melting performance is commonly used for tunnel projects.

## PVC Geomembrane Advantages in Tunnel Insulations :

- Keeps high elasticity in low weather conditions
- Fire resistance
- Resistance against permanent pressure load
- High performance in tensile strength during service life
- Chemical resistance against surface and underground waters
- Easy to hang on and application on large surface
- Joints are welded with welding robots which can do double inlet welding and easy to test.



## PVC GEOMEMBRANE FOR TUNNEL AND UNDERGROUND STRUCTURE APPLICATIONS

CHARACTERISTICS ÖZELLİKLER	MANUFACTURER'S LIMITING VALUE Üretici Beyan Değeri	TEST RESULT TEST SONUCU 1,50 mm	TEST RESULT TEST SONUCU 2,00 mm	UNIT BİRİM	TEST METHODS TEST METODU	TEST METHODS TEST METODU
THICKNESS Kalınlık	MDV / İBD	1,50 ± %5	2,00 ± %5	mm	EN 1849-2	DIN 53370 ≥ 2 mm
WATER PERMEABILITY Su Geçirimsizlik	Waterproof / Su Geçirimsiz	Waterproof / Su Geçirimsiz	Waterproof / Su Geçirimsiz	-	EN 1928	DIN 53495 % ≤ 2
WATER TIGHTNESS TO LIQUID WATER Yaşlandırma Sonrası Su Geçirimsizlik	Waterproof/ Su Geçirimsiz	Waterproof / Su Geçirimsiz	Waterproof / Su Geçirimsiz	-	EN 1296 and EN 1928	-
RESISTANCE TO STATIC LOADING Statik Yük Dayanımı	≥ 20	≥ 20	≥ 20	kg	EN 12730	ASTM D751 ≥ 10 bars
TENSILE STRENGTH Çekme Mukavemeti	BOYUNA ≥ 15 Machine Direction ENİNE ≥ 15 Cross Direction	BOYUNA ≥ 15 Machine Direction ENİNE ≥ 15 Cross Direction	BOYUNA ≥ 16 Machine Direction ENİNE ≥ 15 Cross Direction	N/mm <sup>2</sup>	EN 12311-2 (Metot B papyon)	DIN 53455 MPa (N / mm <sup>2</sup> ) ≥ 15
ELONGATION AT BREAK Kopma Uzaması	BOYUNA ≥ 250 Machine Direction ENİNE ≥ 250 Cross Direction	BOYUNA ≥ 300 Machine Direction ENİNE ≥ 250 Cross Direction	BOYUNA ≥ 300 Machine Direction BOYUNA ≥ 300 Machine Direction	%	EN 12311-2 (Metot B papyon)	(MD veya CMD) DIN 53455 %300
RESISTANCE TO IMPACT Darbe Dayanımı	≥ 750	≥ 750	≥ 800	<1x10 <sup>-7</sup>	EN 12691	ASTM D1709 No perforation
RESISTANCE TO TEAR (NAIL SHANK) Yırtılma Dayanımı (Çivi ile)	≥ 300	≥ 400	≥ 500	≤ 10	EN 12310-1	DIN 53363 ≥ 250
REACTION TO FIRE Yangına Tepki	CLASS E / E Sınıf	CLASS E / E Sınıf	CLASS E / E Sınıf	≤ 20	CLASSIFICATION AFTER EN 13501-1	DIN 4102/1 B1
JOINT STRENGTH Ek Yeri Kayma Mukavemeti	≥ 800	≥ 1000	≥ 1100	N/50mm	EN 12317-2	-
DETERMINATION OF WATER VAPOR TRANSMISSION Su Buharı Geçirgenliği Tayini	≥ 18.000 ± 30 %	≥ 18.000 ± 30 %	≥ 18.000 ± 30 %	μ	EN 1931	-
PEEL RESISTANCE OF JOINT Ek Yeri Soyulma Mukavemeti	≥ 200	≥ 200	≥ 250	N/50mm	EN 12316-2	-

PEEL RESISTANCE OF JOINT Ek Yeri Soyulma Mukavemeti	≥ 200	≥ 200	≥ 250	N/50mm	EN 12316-2	-
DIMENSIONAL STABILITY Boyutsal Kararlılık	≤ ±2	≤ ±2	≤ ±2	%	EN 1107-2	ASTM D1204 %2 DIN 16726 DIN 53377 %2
FOLDABILITY AT LOW TEMPERATURE Soğukta Elastisite	-20	-20	-20	°C	EN 495-5	DIN 16729 -20 °C
VISIBLE DEFECTS Görünür Kusur	Pass / Geçti	Pass / Geçti	Pass / Geçti	-	EN 1850-2	-
EFFECTS OF LIQUID CHEMICALS, INCLUDING WATER (28 DAYS / 23° C) Su Dahil Sıvı Kimyasallara Maruz Bırakma	Resistant / Dayanımlı	Resistant / Dayanımlı	Resistant / Dayanımlı	-	EN 1847, EN 1928, Metot B	(70o C ± 2o C for 70 days) (Heat ageing) %2
PRODUCT DESCRIPTION	PVC membrane obtained by the mixture of PVC resin, plastifiyan stabilizer and coloring substances.					
PRODUCT COMPOSITION	PVC, coloring substances,filler and chemicals					
USAGE	Used in general-purpose for waterproofing, waterproofing of basement tanking, and land remaining under structures (Type T), in the construction of tunnels and associated underground structures as a fluid barrier (GBR-P)					
APPLICATION METHOD	Applied with special welding machines.					
TOP SURFACE	Blue signal layer					
BOTTOM SURFACE	Black pvc membrane					
STORAGE	Keep from direct sunlight.					
ECOLOGICAL DATA	Can be used in natural atmosphere					

## HDPE GEOMEMBRAN

Hdpe geomembranes are manufactured from high density polietilen in order to ensure have high uv resistance ,chemical , antioxidant resistance .

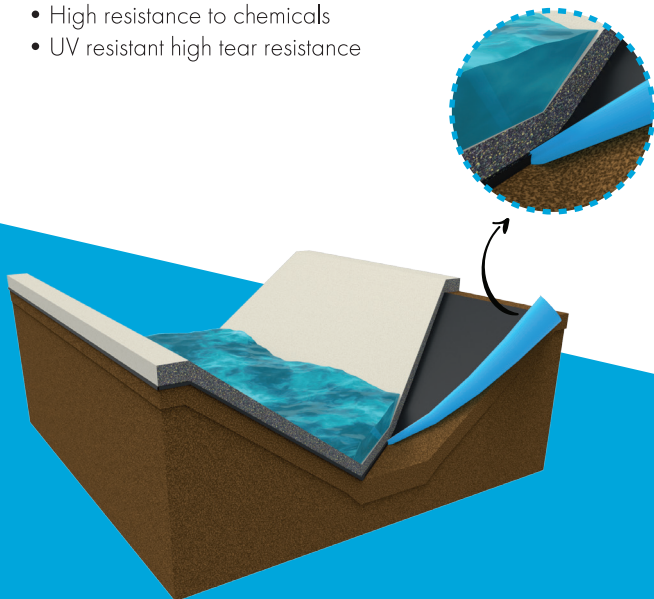
### Usage Areas

- Landfills,
- Waste landfill and mine landfill fields,
- Oil tanks
- Acid tanks
- Pool and water channels

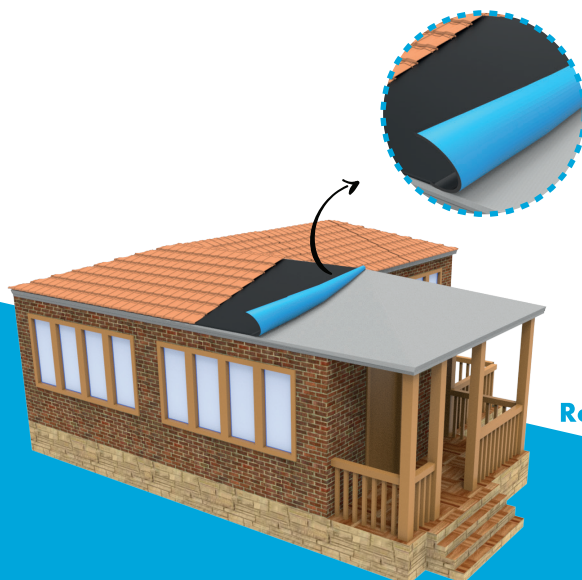
### Advantages

- High resistance to chemicals
- UV resistant high tear resistance

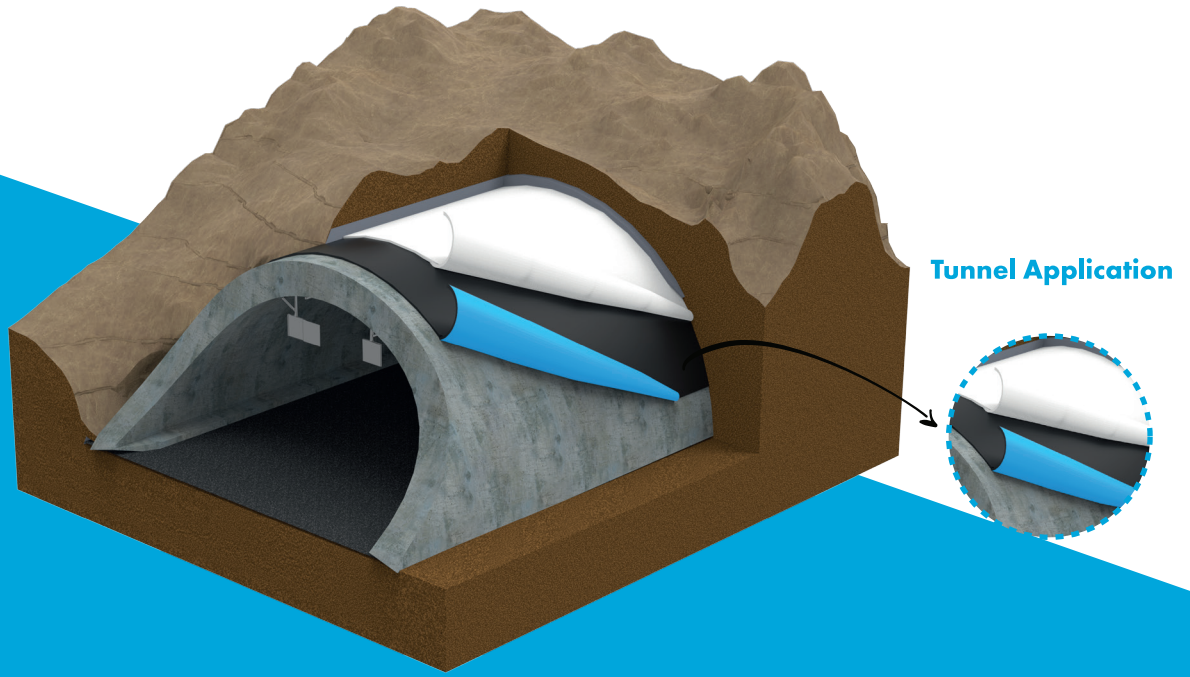
- Highly resistant to organic and inorganic solvents
- Profoundly resistant to the fractures
- Resistant against natural conditions
- Resistant to punctures and cracks
- Low permeability high resistance to mechanical effects
- High flexibility and dimensional stability
- Easy to weld by hot welding machine



Water Channel 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	D 5199	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
Puneture 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