

Geomembrane Products: LLDPE (LINEAR LOW DENSITY POLYETHYLENE) GEOMEMBRANES



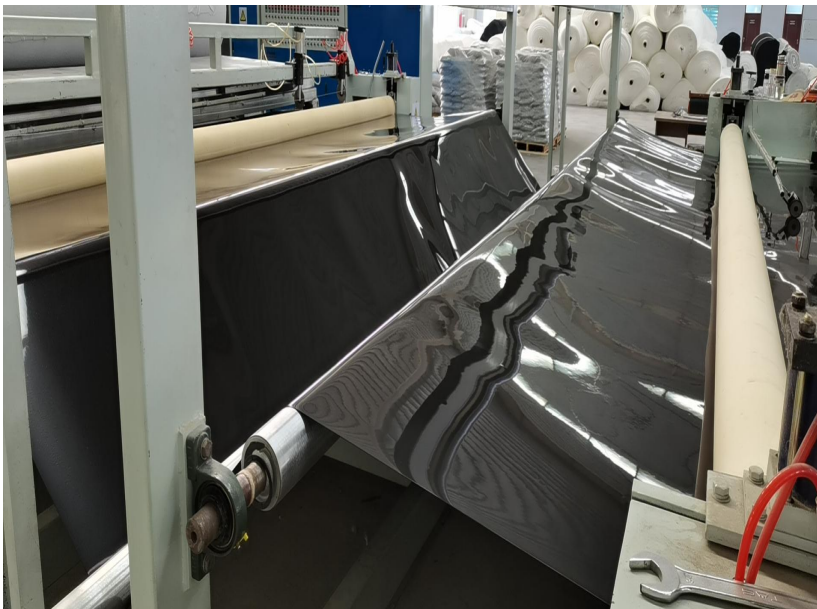
## LLDPE(Linear Low Density Polyethylene) Geomembrane

LLDPE geomembrane has great flexibility and excellent low-temperature ultraviolet tolerance. It is high in quality, affordable, long service life, high strength and durability, and is widely used in the anti-seepage of the embankment, dam, and reservoir of water conservancy projects. At the same time House buildings, underground buildings, garbage dumps, environmental engineering and other aspects are used as anti-seepage, anti-corrosion, leak-proof, and moisture-proof materials.

LLDPE geomembrane is made from the highest quality resin specially formulated for flexible geomembranes. It is designed for situations that require higher elongation. It is similar to HDPE geomembrane, but has a lower density, making it more flexible. Linear low density polyethylene geomembrane, as a new type of material, has excellent anti-seepage, anti-corrosion performance, good chemical stability, and can be processed according to actual engineering needs. It is widely used in water conservancy, landscaping, agriculture, animal husbandry and other engineering projects.



[LLDPE (Linear Low Density Polyethylene) Geomembranes]



[LLDPE (Linear Low Density Polyethylene) Geomembranes]

Linear low-density polyethylene (LLDPE) is a odorless and odorless milky white particle with a density of 0.918-0.935 g/cm<sup>3</sup>. It has good flexibility, higher tensile strength, puncture resistance, and tear resistance than ordinary low-density polyethylene, and also has good resistance to environmental stress cracking. It is currently the most widely used geosynthetic membrane raw material. The tensile strength of geomembranes made of linear low-density polyethylene can also reach 27Mpa, which is generally used to make pure raw materials (also known as "new materials") geomembranes.

### LLDPE Geomembrane Features:

- LLDPE geomembrane has good fracture elongation;
- LLDPE geomembrane has puncture resistance;
- LLDPE geomembrane has the ability to withstand multiple strains;
- LLDPE geomembrane has excellent UV resistance;
- LLDPE geomembrane has stable low-temperature embrittlement performance;
- LLDPE geomembrane has high flexibility and strong toughness;
- LLDPE geomembrane has impermeability;
- LLDPE geomembrane has chemical corrosion resistance;
- LLDPE geomembrane has outstanding environmental stress cracking resistance;
- LLDPE geomembrane has high transparency, wide temperature range adaptability, and convenient laying and construction.

Geomembrane Products: LLDPE (LINEAR LOW DENSITY POLYETHYLENE) GEOMEMBRANES

## APPLICATION

- LLDPE geomembrane is suitable for hydraulic engineering.

Common water conservancy projects such as anti-seepage measures for river embankments, lake dams, storage areas, water channels, and slope protection. This type of engineering generally uses LLDPE geomembrane with a thickness of about 1.0mm, or two fabrics and one membrane in composite membranes, which can provide effective protection while preventing seepage.

- LLDPE geomembrane is suitable for landscape engineering.

Geomembranes are used in landscape engineering, such as artificial lakes, rivers, reservoirs, ponds, slope protection, and green grass for anti-seepage. For example, in artificial lakes, geotextile membranes above 0.75mm or composite membranes around 800g can be used, combined with waterproof blankets, to achieve better anti-seepage effects.

- LLDPE geomembrane is suitable for agriculture and animal husbandry.

Such as reservoir, drinking storage pool, irrigation system, rural biogas pool, animal husbandry farming, etc., generally use the membrane with a thickness of 1.0mm-1.5mm for construction.

## SPECIFICATIONS OF LLDPE GEOMEMBRANE

LLDPE GEOMEMBRANE GB/T 17643-2011 GL-2 TYPE

No	Item	Indicators							
		0.50	0.75	1.00	1.25	1.50	2.00	2.50	3.00
1	Density g/cm <sup>3</sup>	≤0.939							
2	Tensile fracture strength (longitudinal and transverse) N/mm	≥13	≥20	≥27	≥33	≥40	≥53	≥66	≥80
3	Elongation at break (longitudinal and transverse) %	≥800							
4	2% Secant Modulus N/mm	≤210	≤370	≤420	≤520	≤630	≤840	≤1 050	<1 260
5	Right angle tear load (longitudinal and transverse) N	≥50	≥70	≥100	≥120	≥150	≥200	≥250	≥300
6	Puncture resistance strength N	≥120	≥190	≥250	≥310	≥370	≥500	≥620	≥750
7	Carbon black content %	2.0~3.0							
8	Carbon black dispersibility	Out of 10 data points, there should be no more than 1 level 3, and levels 4 and 5 are not allowed							
9*	oxidation induction time (OIT) min	Atmospheric pressure oxidation induction time ≥ 100							
		High pressure oxidation induction time ≥ 400							
10	85 °C thermal aging (retention rate of atmospheric pressure OIT after 90 days) %	≥35							
11*	UV resistance (OIT retention rate after 1600 hours of UV irradiation) %	≥35							

Note: The technical performance indicators for thickness specifications not listed in the table are required to be executed using interpolation method.

Geomembrane Products: LLDPE (LINEAR LOW DENSITY POLYETHYLENE) GEOMEMBRANES

## SPECIFICATIONS OF LLDPE GEOMEMBRANE

### LLDPE GEOMEMBRANE GM17

GM17 LLDPE (Linear Low Density Polyethylene) Geomembrane										
Properties	Test Method (ASTM)	Test Value								
		0.20mm	0.50mm	0.75 mm	1.00 mm	1.25 mm	1.50 mm	2.00 mm	2.50mm	3.00mm
Density	D 792	0.939 g/cm <sup>3</sup>	0.939 g/cm <sup>3</sup>	0.939 g/cm <sup>3</sup>	0.939 g/cm <sup>3</sup>	0.939 g/cm <sup>3</sup>	0.939 g/cm <sup>3</sup>	0.939 g/cm <sup>3</sup>	0.939 g/cm <sup>3</sup>	0.939 g/cm <sup>3</sup>
tensile Properties (min.ave.) break strength break elongation	D 6693 Type IV	5N/mm	13N/mm	20N/mm	27N/mm	33N/mm	40N/mm	53N/mm	66N/mm	80N/mm
		800%	800%	800%	800%	800%	800%	800%	800%	800%
Tear Resistance (min.ave.)	D 1004	25N	50N	70N	100 N	120N	150 N	200 N	250N	300N
Puncture Resistance (min.ave.)	D 4833	65N	120N	190N	250N	310N	370N	500N	620N	750N
Axi-Symmetric Break Resistance Strain %(min)	D 5617	30%								
Carbon Black Content (range)-%	D 4218 (3)	2.0-3.0								
Oxidative Induction Time (OIT) Standard OIT High Pressure OIT	D 3895 D 5885	100 min.	100 min.	100 min.	100 min.	100 min.	100 min.	100 min.	100 min.	100 min.
		400 min.	400 min.	400 min.	400 min.	400 min.	400 min.	400 min.	400 min.	400 min.
Oven Aging at 85°C Standard OIT retained after 90 days High Pressure OIT retained after 90 days	D 5721 D 3895 D 5885	35%	35%	35%	35%	35%	35%	35%	35%	35%
		60%	60%	60%	60%	60%	60%	60%	60%	60%
UV Resistance Standard OIT High Pressure OIT	D 7238 D 3895 D 5885	N.R.(7)	N.R.(7)	N.R.(7)	N.R.(7)	N.R.(7)	N.R.(7)	N.R.(7)	N.R.(7)	N.R.(7)
		35%	35%	35%	35%	35%	35%	35%	35%	35%

### Comparison between LLDPE geomembrane and LDPE geomembrane

Compared with LDPE, LLDPE has a closer crystallinity and relative density, but there are significant differences in structure. LLDPE has higher strength, toughness, tear resistance, and puncture resistance; LLDPE is easier to process and films have better optical properties. LLDPE has excellent impact resistance, especially at low temperatures where its impact resistance is much higher than LDPE; LLDPE has high rigidity and can manufacture thin-walled products, reducing raw materials. In addition, LLDPE also has excellent tensile and bending strength, with a tensile strength 50% to 70% higher than LDPE, and even higher. LLDPE has excellent environmental cracking resistance, far higher than LDPE.

When laying geotextile membranes, the weld seam should be the smallest, and the joint span between membranes should not be less than 10cm, generally 10-20cm. The welding direction should be parallel to the maximum slope and along the slope direction. When laying geomembranes, although walking and moving equipment on the surface of the membrane should be reduced, any object that can cause a crisis in the impermeable membrane should not be placed or walked on the membrane. To avoid unmeasurable membrane contusions.

LLDPE geomembrane liners, also known as LLD, are distinguished by their remarkable flexibility, a characteristic that simplifies installation by reducing the need for cutting and minimizing the risk of punctures during the process. Typically employed in ponding, containment, or wastewater applications, LLD is a Linear Low-Density Polyethylene Geomembrane that surpasses the requirements set by the GRI-GM17 Specification standard for LLD Geomembrane Liners. These liners are available in thicknesses ranging from 20 to 120 mils and offer both textured and conductive options. Additionally, they can be procured in various colors to suit specific project needs.





## PROJECTS CASE OF LLDPE (Linear Low Density Polyethylene) Geomembrane



[Riverside in Bolivia]



[ Agricultural Irrigation Reservoirs in Colombia]

### GEOMEMBRANE CONSTRUCTION

Construction method of geomembrane:

- It should be extended from the bottom to the high level. Do not pull too tightly. There should be 1.50% of the remaining sinking stretch. Considering the actual situation of this project, the slope adopts the order of laying from top to bottom;
- The two adjacent vertical joints should not be on a horizontal line, and it should be staggered by more than 1m;
- The vertical connector should be from the dam of the dam. At the bending foot of 1.50m, it should be located on the plane;
- First slope and backcourt;
- When the slope is laid, the direction of the exhibition membrane should basically parallel on the maximum slope line.

Climate requirements for geomembrane construction:

- The temperature should geomembrane be above five degrees Celsius. At low temperature, the geomembrane should be tense, and the geomembrane should be relaxed at high temperature.
- The wind is below level four.
- When the temperature is too low, the wind and rainy weather above level 4 should not be constructed.
- David weather and wind force affect the construction of the geomembrane, the HDPE geomembrane to be welded and the sandbags are applied.

### APPLICATION SCENARIOS

- LLDPE geomembrane can be used for anti-seepage and water storage in reservoirs.
- LLDPE geomembrane can be used in landfill sites.
- LLDPE geomembrane can be used for lining agricultural irrigation reservoirs.
- LLDPE geomembrane can be used for slope protection.
- LLDPE geomembrane can be used for aquaculture.



The main mechanism of geomembrane is to use the impermeability of plastic film to isolate the leakage channel of the earth dam, and to withstand water pressure and adapt to dam deformation with its large tensile strength and elongation.