



## Linear Low Density Polyethylene (LLDPE) Geomembrane Liners



Contain Enviro Services Ltd. is the leader in the supply and installation of geomembranes for a wide variety of challenging containment applications. Contain Enviro Services Ltd. feels that there is no single geomembrane which is suitable for every containment application, therefore we have insured that we have access to the complete spectrum of geomembrane materials and can suggest the most appropriate and cost effective material for your containment project.

Linear Low Density Polyethylene (LLDPE) geomembranes are manufactured by a wide variety of geomembrane producers; some are branded with trade names, while others simply call it "Linear Low". This material is commonly produced in 20, 30 or 40 mil thickness on a blown film extrusion line and may consist of one or multiple layers of material. LLDPE is a popular choice for containment as its unique chemical nature makes it ideal for containing either water or hydrocarbons.

LLDPE is also a very flexible giving this material the ability to be shop fabricated, meaning it can be welded indoors under controlled conditions, accordion folded and rolled up, then sent to the field and installed. If the project is quite large several large panels can be sent, then welded together in the field in a large patch-work quilt arrangement. Each panel is typically kept around 4000lbs, so depending on the thickness of LLDPE very large panels of 25,000ft<sup>2</sup> or greater, can be prefabricated into one panel, resulting in far fewer hours required to install the geomembrane in the field as compared to more rigid geomembranes which cannot be shop fabricated.

LLDPE in its raw form is a milky clear material similar to what you would find a milk jug made of. Carbon Black is added to the raw material to not only color the geomembrane but to provide a degree of UV protection. If that milk jug were to be left exposed it would become very brittle in only a few months and will easily crumble under a load. The carbon black protects the material enabling it, if required, to be left exposed for several years. Refer to Contain Enviro "UV Resistance Tech Note" for more information. Contain Enviro Services Ltd. however, recommends that LLDPE, and all other geomembranes be back-filled to extend the service life and to protect the liner from damage.



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LLDPE's flexibility and elongation characteristics make it an excellent choice when differential settlement may be a concern, and its tear and puncture resistance gives it an added degree of protection when ground conditions are less than ideal. A protective layer or non-woven geotextile above and below the liner is also recommended to reduce the risk of installation damage and maximize the service life of the containment system.

Standard	LLDPE Minimum Properties			
	ASTM	20 mil LLDPE	30 mil LLDPE	40 mil LLDPE
Thickness (Minimum Average)	D5199	20 mil 0.5 mm	30 mil 0.75 mm	40 mil 1.0 mm
Thickness (Lowest Individual of 10 values)	D5199	-10%	-10%	-10%
Density (Max)	D792	0.939	0.939	0.939
Tensile Strength at Break	D638 Type IV	76 ppi 13.3 N/mm	114 ppi 20.0 N/mm	152 ppi 26.6 N/mm
Elongation	D638	800%	800%	800%
Tear Resistance	D1004	11 lbs 49 N	16 lbs 71 N	22 lbs 98 N
Puncture Resistance	D4833	32 lbs 142 N	42 lbs 186 N	61 lbs 271 N
Carbon Black Content	D1603	2.0-3.0%	2.0-3.0%	2.0-3.0%
Low Temperature Impact Resistance	D746	-69°F -56°C	-69°F -56°C	-69°F -56°C
Minimum Shop Seam Strengths				
	ASTM	20 mil LLDPE	30 mil LLDPE	40 mil LLDPE
Heat Bonded Seam Strength	D6392 25.4 mm (1") Strip	35 ppi 6.1 N/mm	48 ppi 8.4 N/mm	68 ppi 11.9 N/mm
Heat Bonded Peel Adhesion Strength	D6392 25.4 mm (1") Strip	FTB 28 ppi 4.9 N/mm	FTB 43 ppi 7.4 N/mm	FTB 58 ppi 10

The geomembrane selection process can often be challenging. Besides the geomembrane material performance, several other factors should be considered; wind, moisture, temperature fluctuations, installation location and construction schedule are only a few things that need to be factored into your geomembrane selection. Contain Enviro Services has over 15 years of geomembrane installation experience and can help guide you through the process. With access to the complete range of Geomembrane materials, Contain Enviro Services Ltd. will suggest the most cost-effective liner material while still meeting the timing, environmental and safety requirements of your project.

**For More Information, Please Visit Our Website [www.contain.ca](http://www.contain.ca)**