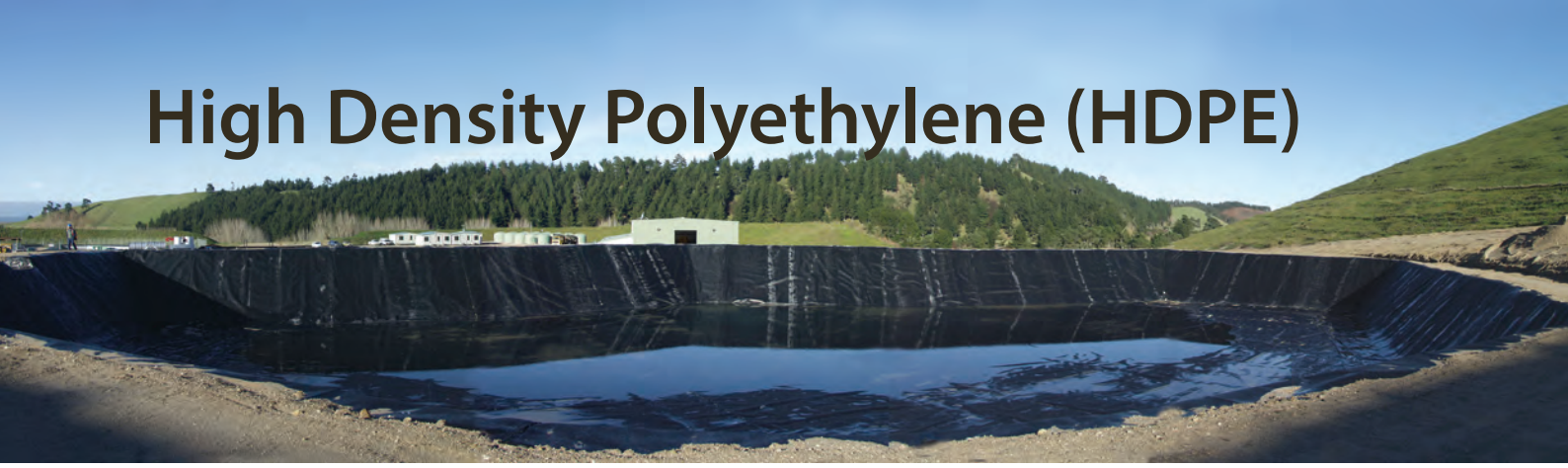
High Density Polyethylene (HDPE)



Permathene supplies and installs liners made from HDPE worldwide. The advantages of HDPE over other materials is its resistance to mechanical damage and chemical attack.

- Containment of Water
- Reservoirs
- Golf Course Ponds
- Industrial
- Containment of Chemicals
- Sewage Lagoons
- Aquaculture
- Agriculture

Mining
An HDPE geomembrane can prevent contamination of water and soil by providing a highly resistant barrier to chemicals produced during the extraction of precious metals.

Landfills
Highly resistant to hazardous chemicals HDPE has long been the lining of choice for this application. Used as either primary or secondary containment/ caps with or without GCL.

Irrigation Canals
To prevent water loss from seepage of water for man-made canals.

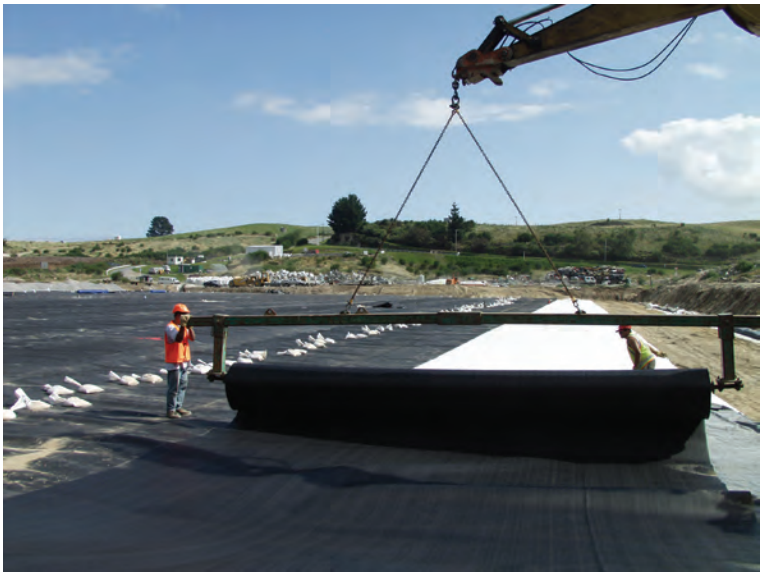
Dam Liners
Superior performance over prepared sub-base. HDPE has the highest resistance to mechanical damage and UV than any other material. Fast and economical installation.

Description

Our HDPE is produced on state-of-the-art 3 layer extruders to 7.0 m and 8.0 m wide rolls to ISO 9001.

The product is available in smooth ranging in thickness from 0.50 mm to 3.0 mm, and textured ranging in thickness from 0.75 mm to 2.5 mm.

The material is manufactured to strict specifications with all testing in accordance with ASTM and GSI standards.



Installation

Hot Wedge Welding: The primary method for sealing HDPE is on-site by fusion using a portable hot wedge welder.

The wedge melts the overlapped surfaces between pressure rollers. This produces a permanent homogenous seam with an air channel which allows for pressure testing. During testing a successful weld is stronger than the material (the sample material will break before the weld peels apart).

Extrusion Welding: This is used for all repairs and detail work such as pipe boots and protrusions. We use copper wire in our extrusion welds to reduce the possibility of defects for spark testing.

We also provide vacuum and lance testing where specified, though studies have indicated that these later methods are not as effective as once believed. Our preferred method is fusion welding only as the pressure produced by the machine rollers ensures a perfect weld. Extrusion welding is kept to a minimum because the tensile strength of the weld is always considerably less than the material.

Although studies have proven that geomembrane failure is caused primarily during the covering stage from earth moving equipment, trucks, etc. an unacceptably high number (almost 20%) of failure is caused by poor workmanship during the welding stage.

Permathene installation crews pay particular attention to detail and follow proven methods to ensure long-term success of the geomembrane liner. Foremost in any successful geomembrane installation is good design. Success of any lining system is dependent upon this.

QA/QC: We can provide geotechnical engineers to assist designers during any stage and to ensure all QA/QC is completed in accordance with specification as well as to monitor our own ISO 9001, 14001 Standards.

Manufactured and tested to conform with GRI GM13.

(member) International Association of Geomembrane Installers

HDPE (SMOOTH)

PROPERTY	METHOD	UNITS	P50	P75	P100	P150	P200	P250	P300
Minimum Values									
Thickness	ASTM D 5199	mm	0.50	0.75	1.00	1.50	2.00	2.50	3.0
Lowest Individual of 10 reading			0.45	0.67	0.90	1.35	1.80	2.30	2.7
Density	ASTM D 1505/ D 792	g/ cm3	.94	.94	.94	.94	.94	.94	0.94
Tensile Properties (each direction)	ASTM D 6693 Type IV specimen @ 50mm/ min								
Strength at Yield		kN/m	9	11	16	22	34	40	44
Strength at Break		kN/m	14	21	28	40	57	71	80
Elongation at Yield	G.L. 33 mm	%	13	13	13	12	13	13	13
Elongation at Break	G.L. 50 mm	%	700	700	700	700	700	700	700
Tear Resistance	ASTM D 1004	N	73	100	138	187	275	330	374
Puncture Resistance	ASTM D 4833	N	176	264	320	480	640	820	960
Carbon Black Content	ASTM D 1603	%	2	2	2	2	2	2	2
Carbon Black Dispersion	ASTM D 5596		Cat. 2	Cat. 2	Cat. 2	Cat. 2	Cat. 2	Cat. 2	Cat. 2
Oxidative Induction Time (OIT) (min.) (200 ° C, O2, 1 atm)	ASTM D 3895	minutes	100	100	100	100	100	100	100
Nominal Values									
Melt Flow Index (190 ° C, 2.16kg)	ASTM D 1238	g/10 min	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Stress Crack Resistance	ASTM D 5397	hrs	> 400	> 400	> 400	300	> 400	> 400	> 400
Dimensional Stability (100 ° C, 1 hr)	ASTM D 1204	%	± 1	± 1	± 1	± 1	± 1	± 1	± 1
Low Temperature Brittleness	ASTM D 746	° C	< - 77	< - 77	< - 77	< - 77	< - 77	< - 77	< -77

HDPE (TEXTURED)

PROPERTY	METHOD	UNITS		PX75	PX100	PX150	PX200	PX250	
Minimum Values									
Thickness	ASTM D 5199	mm		0.75	1.00	1.50	2.00	2.50	
Lowest Individual of 10 reading				0.64	0.85	1.28	1.70	2.30	
Asperity Height	GRI GM12	mm		0.25	0.25	0.25	0.25	0.25	
Density	ASTM D 1505/ D 792	g/ cm3		.94	.94	.94	.94	.94	
Tensile Properties (each direction)	ASTM D 6693 Type IV specimen @ 50mm/ min								
Strength at Yield		kN/m		11	15	23	30	38	
Strength at Break		kN/m		8	13	16	21	26	
Elongation at Yield	G.L. 33mm	%		13	13	13	13	13	
Elongation at Break	G.L. 50 mm	%		100	100	100	100	100	
Tear Resistance	ASTM D 1004	N		98	135	200	250	312	
Puncture Resistance	ASTM D 4833	N		240	270	410	534	800	
Carbon Black Content	ASTM D 1603	%		2	2	2	2	2	
Carbon Black Dispersion	ASTM D 5596			Cat. 2	Cat. 2	Cat. 2	Cat. 2	Cat. 2	
Oxidative Induction Time (OIT) (min.) (200 ° C, O2, 1 atm)	ASTM D 3895	minutes		100	100	100	100	100	
Nominal Values									
Melt Flow Index (190 ° C, 2.16kg)	ASTM D 1238	g/10 min		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Stress Crack Resistance	ASTM D 5397	hrs		> 400	> 400	> 400	> 400	> 400	
Dimensional Stability (100 ° C, 1 hr)	ASTM D 1204	%		± 1	± 1	± 1	± 1	± 1	
Low Temperature Brittleness	ASTM D 746	° C		< - 77	< - 77	< - 77	< - 77	< - 77	

Note: HDPE Smooth and Textured conforms to GRI GM13