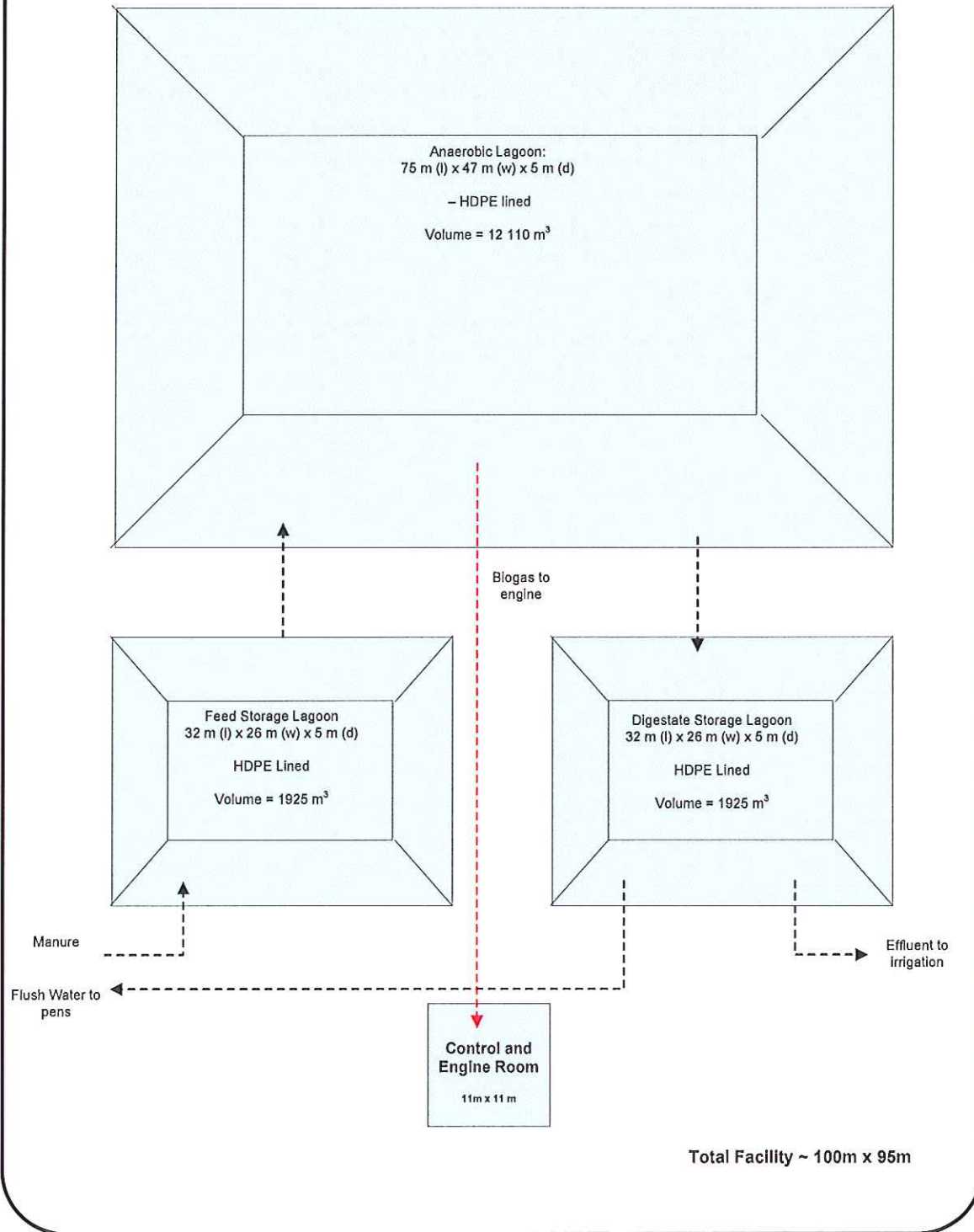
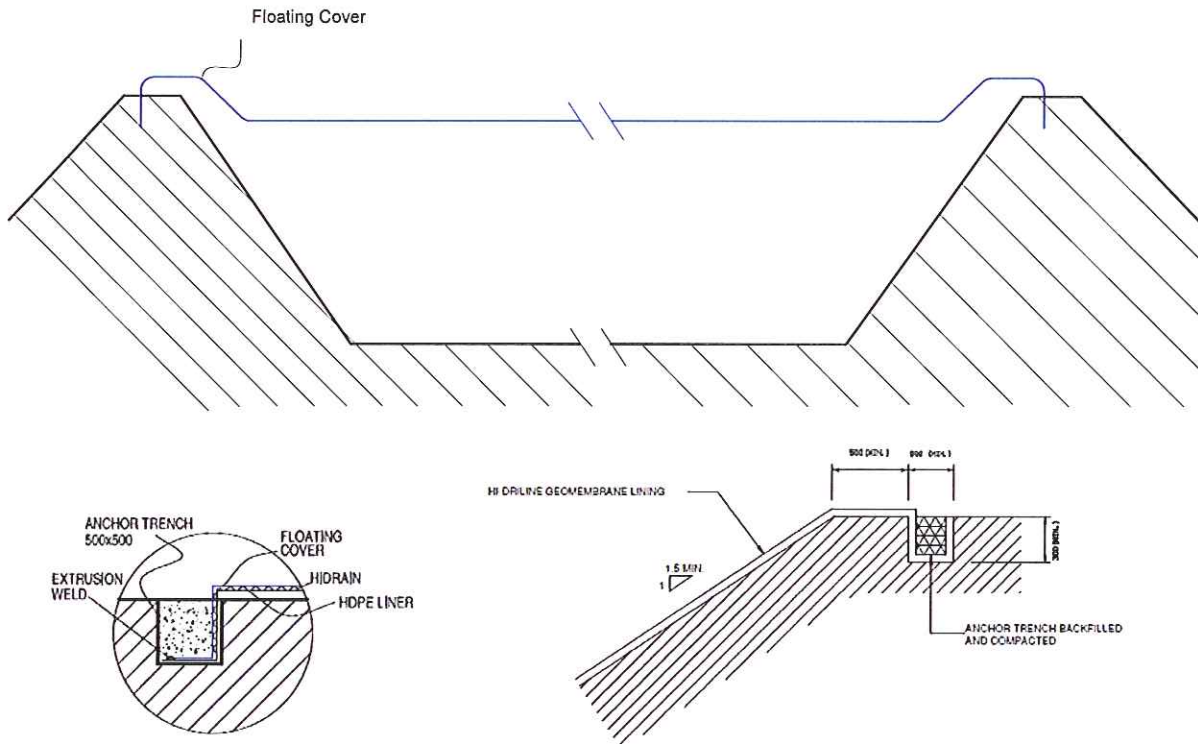


Bonnievale Biogas Plant: Preliminary Layout





HI-DRILINE® SMOOTH (HDPE) Product Data Sheet

HI-DRILINE® Smooth (HDPE) is a black, high quality, high density polyethylene geomembrane produced from specially formulated, virgin polyethylene resin. The polyethylene resin is designed specifically for flexible and durable geomembrane applications. HI-DRILINE® Smooth (HDPE) contains approximately 97.5% polyethylene, 2.5% carbon black and trace amounts of antioxidants and heat stabilizers. HI-DRILINE® Smooth (HDPE) has outstanding chemical resistance, mechanical properties, environmental stress crack resistance, dimensional stability and thermal aging characteristics. HI-DRILINE® Smooth (HDPE) has excellent resistance to UV radiation and is suitable for exposed applications. These product specifications (≥ 0.75 mm) meet or exceed GRI-GM 13

Tested Property	Unit	Test Method	Values(*)				
Thickness (a)	mm	ASTM D 5199	0.5	0.75	1.0	1.5	2.0
Density	g/cm ³	ASTM D 792	≥ 0.94	≥ 0.94	≥ 0.94	≥ 0.94	≥ 0.94
Tensile Properties (each Direction)		ASTM D 6387/D 6683, type IV					
Strength at Yield	N/mm	50 mm/min	8 ^(b)	13 ^(b)	16 ^(b)	24 ^(b)	32 ^(b)
Elongation at Yield	%	10 = 33 mm	16 ^(b)	16 ^(b)	16 ^(b)	16 ^(b)	16 ^(b)
Strength at Break	N/mm	200 mm/min	17 ^(b)	28 ^(b)	33 ^(b)	43 ^(b)	68 ^(b)
Elongation at Break	%	10=50mm	800 ^(b)	800 ^(b)	800 ^(b)	800 ^(b)	800 ^(b)
Tear Resistance	N	ASTM D 1004	70 ^(b)	100 ^(b)	140 ^(b)	205 ^(b)	275 ^(b)
Puncture Resistance	N	ASTM D 4833	240 (160)	340 (240)	420 (320)	550 (450)	650 ^(b)
Carbon Black Content	%	ASTM D 1603	2.0 – 3.0	2.0 – 3.0	2.0 – 3.0	2.0 – 3.0	2.0 – 3.0
Carbon Black Dispersion	Category	ASTM D 5595	1/2 ^(b)	1/2 ^(b)	1/2 ^(b)	1/2 ^(b)	1/2 ^(b)
Dimensional Stability (each Direction)	%	ASTM D1204 (120 °C/1h)	± 2	± 2	± 2	± 2	± 2
Melt Flow Index ^(c)	g/10 min	ASTM D 1238 (190 °C, 2.0 kg)	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3.0
Stress Crack Resistance (NCTL)	h	ASTM D 5397, Appendix C	≥ 400	≥ 400	≥ 400	≥ 400	≥ 400
Reference Property	Unit	Test Method	Values(*)				
Low Temperature Brittleness	°C	ASTM D 746	-77	-77	-77	-77	-77
Oxidative Induction Time (OIT)	min	ASTM D 3895 (200°C; Pure O ₂ ; 1 atm)	≥ 100	≥ 100	≥ 100	≥ 100	≥ 100
UV Resistance ^(d)		GRI-GM11					
HP-OIT retained after 1,600 hours ^(e)	%	ASTM D 5685	≥ 50	≥ 50	≥ 50	≥ 50	≥ 50
Roll Width (approx.)	m	-	6.95		7.5 / 6.95		
Surface	-	-	Double-sided smooth				

(*) All values - unless otherwise noted - are nominal values. Values in brackets are minimum values within the 95% confidence interval.
 (a) Tolerance 1.0%; 0.3 mm; Tolerance 1.15% - Special thickness available upon request.
 (b) Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be category 1 or 2. No more than 1 view from category 3.
 (c) Standard test conditions: 190°C 15.0 kg.
 (d) Test Conditions: 20 hours UV cycle at 75°C followed by 4 hours condensation at 60°C; total: 1,600 hours.
 (e) UV Resistance is based on percent retained value regardless of the original High Pressure - OIT value.