Baffle Curtain Information

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Greetings,

I would like to take this opportunity to introduce you to our company.

Lange Containment Systems, Inc. (LCSI) is a premier fabricator of custom geosynthetic membrane products. We specialize in large panels, custom shapes and a full line of accessories. We utilize the highest quality materials including PVC, Hypalon, XR-5, Polypropylene, Urethanes and a variety of coated fabrics.

Our management team has over 50 years experience in all facets of the business and in all corners of the globe. We have had extensive experience with both floating & hanging baffle curtains, and at your direction we can provide all the components necessary for a complete baffle curtain project. We can also offer field installation services of a technician or complete crew to install the system.

LCSI is committed to providing the highest quality products, with the service and flexibility that sets the standard for our industry. This means that each bid, job, and person will get the quality individual attention of our team that is deserved. Our service will not be compromised.

With that said, please take your time reviewing our brochure and work. We welcome your calls and questions, and look forward to doing business with you in the future.

Sincerely,

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About LCSI

Centrally located in Denver Colorado, Lange Containment Systems Inc (LSCI) is a fabricator and installer of geomembranes and other geosysthetics. LSCI was founded in 1994 and has since fabricated and installed in excess of 100,000,000 Ft² of liner systems all over the world, including Antartica.

LCSI received an Industrial Fabrics Association International (IFAI) award of Excellance for the Salt Lake City International Airport deicing fluid storage and recycling ponds.

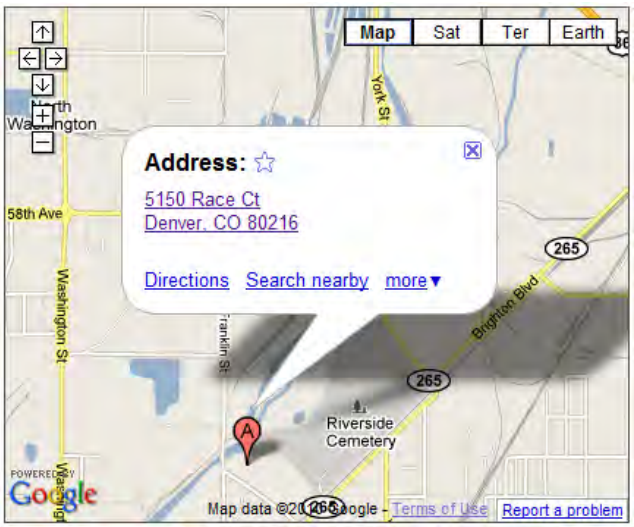
Health & Safety Policy:
At Lange Containment Safety is our number one priority for our staff, our clients and the people with whom we interact. Our approach is based on individual behavior and we apply this behaviour-based safety approach to all aspects of our work.

Environmental Policy:
Lange Containment is committed to improving the environment through our own internal initiatives. Our key environmental objectives include:

- Conduct our business in an environmentally responsible manner;
- Minimise environmental risks by employing safe operating procedures; and
- Limiting our impact on the environment by reducing office waste and waste generated by our operations.

Locate LCSI

We are conveniently located the heart of Denver's Industrial center. Click on Map for further details.



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Airline Water Reservoir— 2008 — Hanging Baffle Curtain
Project Photos

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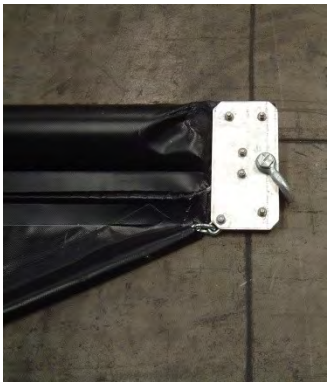
Zortman Mine — 2006 — Floating Baffle Curtain
Project Photos



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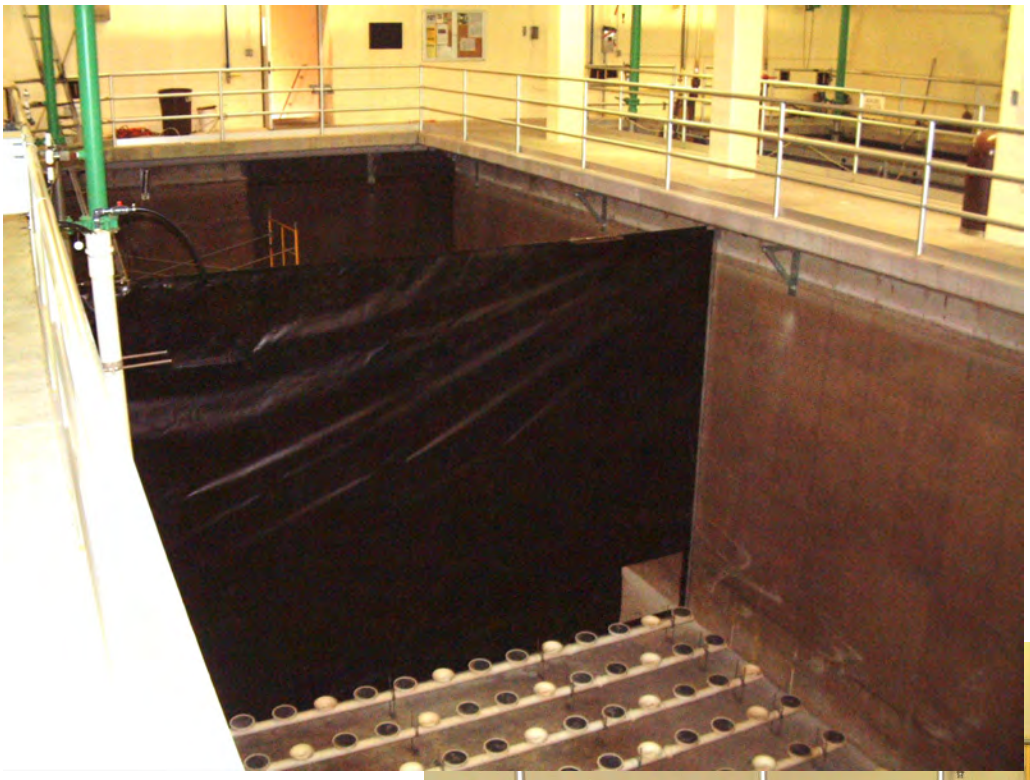
Genesee WWTP— 2004 — Hanging Baffle Curtain
Project Photos



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Hypalon Geomembrane – Mechanical Properties

Property	Test Method	Minimum Specification*	Typical Avg. Values
Thickness			
1 Total overall (mils)	ASTM D751	34	36 nominal
2. Min. over scrim (mils)	Optical Method	11	Pass
Tensile Properties (each direction)	ASTM D751 Grab Method		
1. Breaking Strength (lbs) Fabric Membrane Rupture		200 150	275 225
2. Elongation at Break Fabric Membrane Rupture		15% 30%	20% 110%
Tear Propagation (lbs)	ASTM D751 Tongue Tear (8" x 8")	80	100
Hydrostatic Resistance (psi)	ASTM D751 Method A Procedure 1	250	405
Puncture Resistance (lbs)	FTMS 101B method 2031	-	240
Bonded Seam Strength (lbs)	ASTM D751, Modified (12in./min)	160	175
Ply Adhesion (lbs./in. width)	ASTM D413 Machine Method, Type A (12in./min)	7 (or film tearing bond)	8
Ozone Resistance	ASTM D1149 1/8" bent loop, 100 pphm 104°F, 7 days	No cracks at 7 x magnification	Pass
Low Temperature[1]	ASTM D2136, 1/8" mandrel, 4 hrs. @ -40°F	Pass	Pass at -45°F

Notes:

1. *These specification tables represent current opinion of the data points to characterize the membrane product as produced and are not necessarily appropriate for product performance or installation or engineering design criteria 'per se'. (For example, the low temperature resistance numbers represent qualities for few minutes at a given temperature and must not be interpreted or extrapolated into installation temperature qualities or comparisons.*

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XR-5 Geomembrane – Mechanical Properties

XR-5® 8130 Reinforced	Test Method	Specification
Base Fabric Type	ASTM D3776	Polyester
Base Fabric Weight (nominal)	ASTM D3776	6.5 oz/yd^2
Thickness	ASTM D751	30.0 mils (min.)
Weight	ASTM D751	30.0 ± 2 oz/yd^2
Tear Strength	ASTM D4533, Trapezoid Tear	35/35 lb_f (min.)
Breaking Strength	ASTM D751, Grab Tensile	550/550 lb_f (min.)
Low Temperature	ASTM D2136, 4hr – 1/8" mandrel	Pass @ -30 ^oF
Dimensional Stability	ASTM D1204, 212^{o}F / 100^{o}C – 1 hr	1.5% max. each direction
Adhesion – Heat Sealed Seam	ASTM D751, Dielectric Weld	35 lb_f/2 in (min.)
Dead Load – Seam Shear Strength	ASTM D751	2 in seam, 4 hr, 1 in strip 210 lb_f @ 70^{o}F 105 lb_f @ 160^{o}F
Bursting Strength	ASTM D751 Ball Tip	650 lb_f (min.) 800 lb_f (typical)
Hydrostatic Resistance	ASTM D751, Method A	800 psi (min.)
Blocking Resistance	ASTM D751 (180^{o}F / 82^{o}C)	#2 Rating (max.)
Adhesion – Ply	ASTM D413	15 lb_f/in (min.) or Film Tearing Bond
Bonded Seam Strength	ASTM D751 as modified by NSF 54	550 lbf (min.)
Abrasion Resistance	ASTM D3389 (H-18 Wheel, 1000 g load)	2,000 cycles (min.) before fabric exposure 50 mg/ 100 cycles max weight loss
Weathering Resistance	ASTM G23 (Carbon-Arc)	8,000 hrs (min.) – No appreciable changes or stiffening or cracking of coating
Water Absorption	ASTM D471, Section 12, 7 days	0.025 kg/m^2 (max.) @ 70^{o}F / 21^{o}C 0.14 kg/m^2 (max.) @ 212^{o}F / 100^{o}C
Wicking	Shelter-Rite® Procedure	1/8 in (max.)
Puncture Resistance	ASTM D4833	250 lb_f (min.)
Coefficient of Thermal Expansion / Contraction	ASTM D696	8 x 10^{-6} in/in/^{o}F (max.)

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Polypropylene Geomembrane – Mechanical Properties

Physical Property	Test Method	Property Of Unaged Sheet	Property After Aging 672 hrs (28 days) @ 240°F (116°C)
Tolerance on nominal thickness, %	ASTM 0 5199 ASTMD 751	0.036", 0.045" &: 0.060" ·± 10	
Thickness over scrim, in. (mm) 35-mil 45-mil 60-mil	ASTM D4637 Optical Method	 0.010 (0.254) min. 0.013 (0.330) min. 0.030 (0.762) min.	
Mass per unit area, lb/ft^2 (g/ft^2) (kg/m^2) 36-mil 45-mil 60-mil	ASTM D 5261	 0.17 (77) (0.83) typical 0.21 (95) (1.03) typical 0.25 (117) (1.22) typical	
Breaking strength, lbf (kN) (grab tensile at strain rate of 12 in./min.) 36-mil 45 & 60-mil	ASTM D 751 Grab Method A	 200 (0.9) min. 260 typ. 250 (1.1) min. 300 typ.	 200 (0.9) min. 260 typ. 250 (1.1) min. 300 typ.
Elongation at break of fabric, %	ASTM D 751	25 typical	25 typical
Tearing strength, lbf (N) (2 in./min. strain rate) 36-mil 45 & 60-mil	ASTM D5884 (max. load)	 80 (356) min. 130 (578) typ. 100 (445) min. 160 (712) typ.	
Low temperature flexibility, °F (°C)	ASTM D 2135 1/8 in. mandrel 4 hour @ temp.	 -40 (-40) max. -50 (-46) typical	
Linear Dimensional Change (Shrinkage), %	ASTM D 1204		+/- 1.0 max -0.5 typical
Ozone resistance, 100 pphm, 168 hours	ASTM D 1149	No cracks	No cracks
Resistance to water (distilled absorption after 30 days immersion 122 °F (50°C) Change in mass, %	ASTM D 471 (coating com-pound only)	 1.0 max 0.5 typical	
Hydrostatic resistance, lbfr/in. 2 or psi (MPA) (Mullen burst) 36-mil 45-mil 60-mil	ASTN D 751 Procedure A	 350 (2.4) min. 400 (2.8) typical 450 (3.1) typical 500 (3.4) typical	 350 (2.4) min. 400 (2.8) typical 450 (3.1) typical 500 (3.4) typical
Field Seam strength, lbf/in. (kN/m) Seam tested in peel after weld Factory Seams, bonded seam strength, lbf (kN), if applicable	ASTM D 4437 1 in. wide ASTM D 751 Grab Method A	30 (5.3) min. 60 (10.5) typical peak value 200 (0.9) min	
Water Vapor permeance, Perms	ASTM E 96	0.10 max. 0.05 typical	
Puncture resistance, lbf (N) 36-mil & 45-mil 60-mil	ASTM D4833 (index punc-ture)	85 (378) min 110 (489) typical 118 (525) typical	
Resistance to xenon-arc weathering[1] Xenon-arc, 15,120 kJ/m^2 total radiant exposure, visual condition at 10X	ASTM G 155 0.70 W/m^2 80 °C B.P.T.	No cracks No loss of breaking or tearing strength	

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Geomembrane Chemical Resistance Comparison

	Hypalon	XR-5®	Polypropylene
Kerosene	C	A	C
Diesel Fuel	C	A	C
Acids (General)	B	A	A
Naphtha	B	A	C
Jet Fuels	B	A	C
Saltwater 160°F	B	A	A
Crude Oil	B	A	C
Gasoline	C	B	C

A = Excellent
B = Moderate
C = Poor
NF = Not Found in Published Chart

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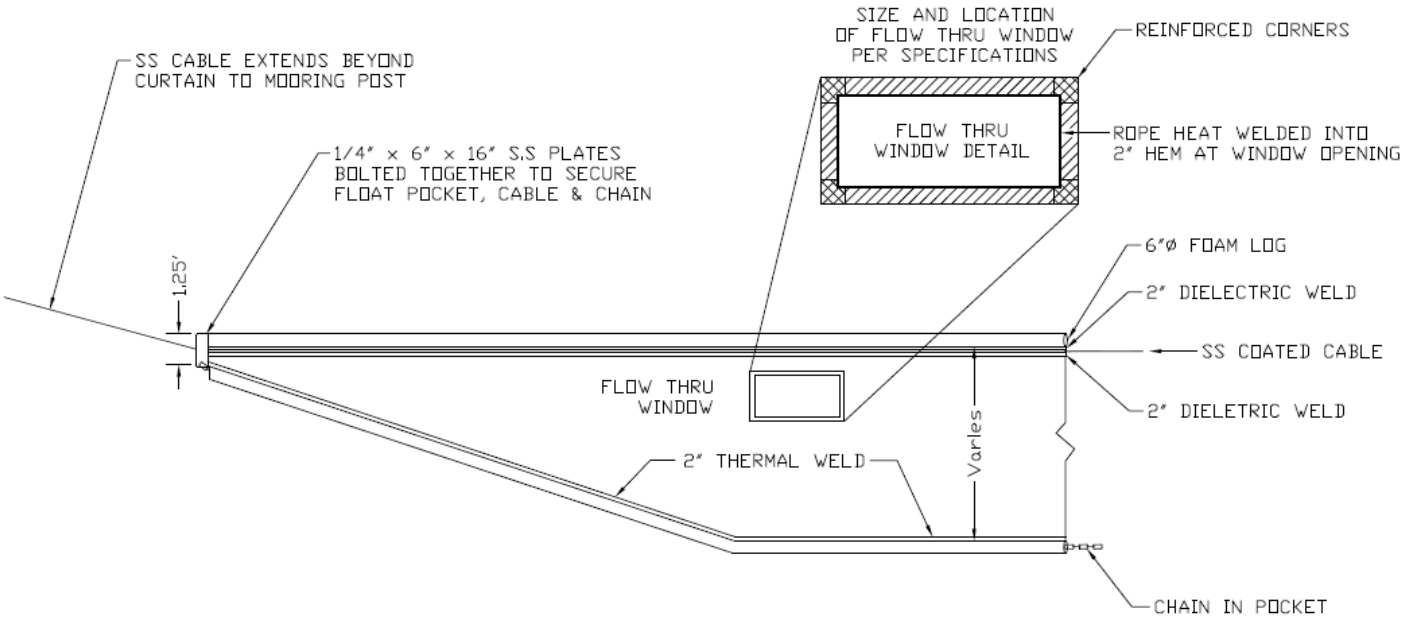
Typical Floating Baffle Curtain Layout



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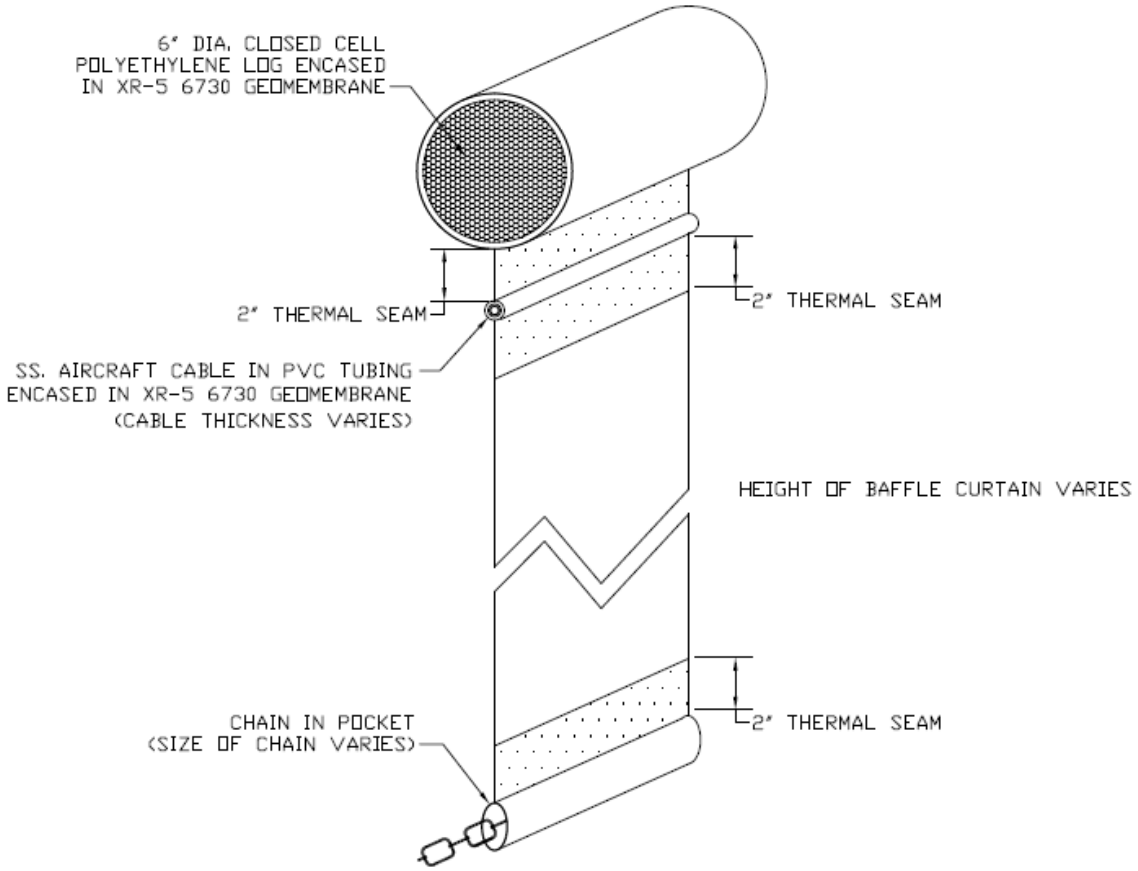
Typical Floating Baffle Cross-Section



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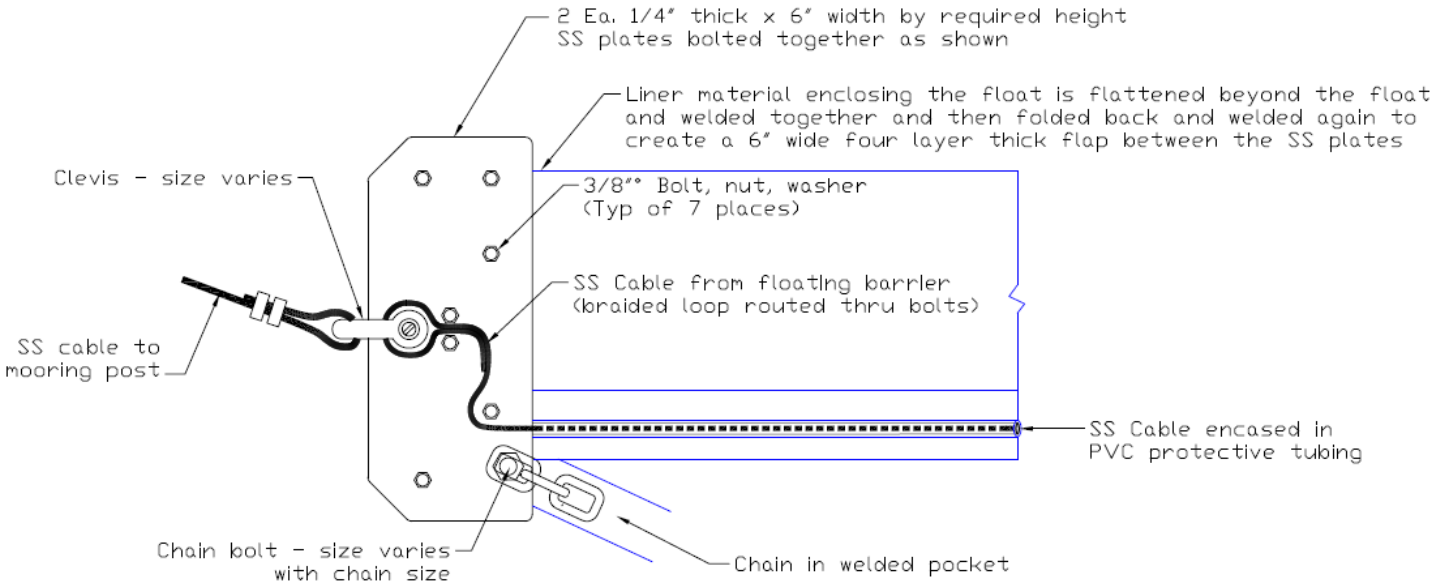
Typical Floating Baffle End Detail



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