



The Liner Company

PVC: Polyvinyl Chloride Flexible Membrane Liners

PVC liners fabricated by EPI are a single-ply construction with Polyvinyl Chloride as the principle polymer. Only first quality virgin resins are used and all materials meet or exceed the PGI 1104 Specification for flexible membrane liners.

PVC Liners are fabricated by EPI in panel sizes up to 40,000 square feet, accordion-folded in both directions, and packaged for shipment to your site for quick, easy installation to save you time and money.

EPI utilizes statistical process control (SPC) to ensure the integrity of each panel produced. Samples from actual factory seams are removed during the welding process for a rigorous, proven testing procedure that assures you of the highest quality factory-fabricated PVC geomembranes available.

TYPICAL INSTALLATIONS:

Sewage Lagoons	Canals	Landfills	Decorative Ponds
Reservoirs	Golf Course Ponds	Industrial Waste Ponds	Recreation Ponds
Cooling Ponds	Farm Ponds	Tailings Ponds	Secondary Containment

Applications suggested are not intended to be all inclusive. EPI does not warrant or guarantee the suitability, merchantability, fitness for a particular purpose, or longevity of this material for the uses listed. You may wish to consult your project engineer or installer/contractor to determine what physical properties are required for a synthetic liner. In some cases a chemical compatibility test may be required.

MINIMUM PHYSICAL PROPERTIES:

PROPERTY	TEST METHOD	REQUIREMENTS					
		10 mil	20 mil	30 mil	40 mil	50 mil	60 mil
Thickness	ASTM-D1593	±5%	±5%	±5%	±5%	±5%	±5%
Specific Gravity (min.)	ASTM-D792	1.20	1.20	1.20	1.20	1.20	1.20
100% Modulus (psi, min.)	ASTM-D882	1000	1000	1000	1000	1000	1000
lb. force/in. width, min.)		10	21	32	40	50	60
Tensile (psi, min.)	ASTM-D882	2400	2400	2400	2400	2400	2400
(lb. force/in. width, min.)		25	48	73	97	121	145
Elongation at Break (% min.)	ASTM-D882	250	360	380	430	430	450
Graves Tear (lb./in., min.)	ASTM-D1004	2.5	6	8	10	13	15
Resistance to Soil Burial (% change max.)	ASTM-D3083 (NSF Modified)						
1. Breaking Factor		5	5	5	5	5	5
2. Elongation At Break		20	20	20	20	20	20
3. Modulus at 100% Elongation		20	20	20	20	20	20
Impact Cold Crack (°C)	ASTM D-1790	-23	-26	-29	-29	-29	-29
Dimensional Stability (% change/max.)	ASTM D-1204 (212°F/15 min.)	4	4	3	3	3	3
Water Extraction (% max.)	ASTM D-3083	0.15	0.15	0.15	0.2	0.2	0.2
Volative Loss (% max.)	ASTM D-1203(A)	1.5	0.90	0.70	0.50	0.50	0.50
Hydrostatic Resistance (psi, min.)	ASTM D-751(A)	42	68	100	120	150	180

Minimum Specifications for EPI Factory Fabricated Seams:

Peel Strength, lbs/in.	ASTM D882	10	12.5	15	15	15	15
Shear Strength, lbs/in.	ASTM D882	20	38.4	58.4	77.6	96	116

These data are based on tests believed to be reliable. However, these are laboratory tests that may not simulate actual use conditions. They are provided for your informational purposes only. No warranty, express or implied, including any other further warranty of fitness for a particular purpose or merchantability, is made by this promotional literature.



The Liner Company

UltraTech® FLEXIBLE MEMBRANE LINERS

The UltraTech flexible membrane liner is a single-ply membrane compounded for hydraulic containment and possessing proven physical characteristics. By virtue of its unique composition, UltraTech offers excellent weatherability, resistance to chemicals, oils, and grease. It is noted for its high tensile strength and elongation properties, as well as its flexibility over a broad temperature range.

In general, UltraTech liners do not require earthen or other cover materials. They are ideally suited for a variety of applications, particularly where resistance to biodegradation and to a wide range of chemicals is advantageous.

UltraTech can be welded directly to a PVC liner, allowing the use of PVC on the pond bottom and UltraTech on the slopes, with no loss of integrity at the connection of the two liners.

MINIMUM PHYSICAL PROPERTIES: PROPERTY

PROPERTY	TEST METHOD	REQUIREMENTS		
		20MIL	30MIL	40MIL
Thickness	ASTM D-2083	±5%	±5%	±5%
Specific Gravity (min.)	ASTM D-792	1.20	1.20	1.20
100% Modulus (psi, min.)	ASTM D-882	900	900	900
Tensile (psi, min.)	ASTM D-882	2300	2300	2300
Elongation at Break (% min.)	ASTM D-882	290	290	290
Graves Tear (lbs./in., min.)	ASTM D-1004	280	280	280
Resistance to Soil Burial (%change,max.)	ASTM D-3083			
1. Breaking Factor	(NSF modified)	5	5	5
2. Elongation at Break		20	20	20
Impact Cold Crack (°F)	ASTM D-1790	-25	-25	-25
Dimensional Stability (%change/max.)	ASTM D-1204 (212°F/15min.)	5	5	5
Water Extraction (%loss,max.)	ASTM D-1239	0.35	0.35	0.35
Volatile Loss (%loss, max.)	ASTM D-1203	1.0	0.8	0.8
Hydrostatic Resistance (psi, min.)	ASTM D-751	55	75	110

These data are based on tests believed to be reliable. However, these are laboratory tests that may not simulate actual use conditions. They are provided for your informational purposes only. No warranty, express or implied, including any other further warranty of fitness for a particular purpose or merchantability is made by this promotional literature.

CHEMICAL RESISTANCE:

Oil – Excellent	Acids - Fair/very good
Brine - Excellent	Hydrocarbons-Good/Excellent
Solvents - Poor/Fair	Bases - Excellent

TYPICAL INSTALLATIONS:

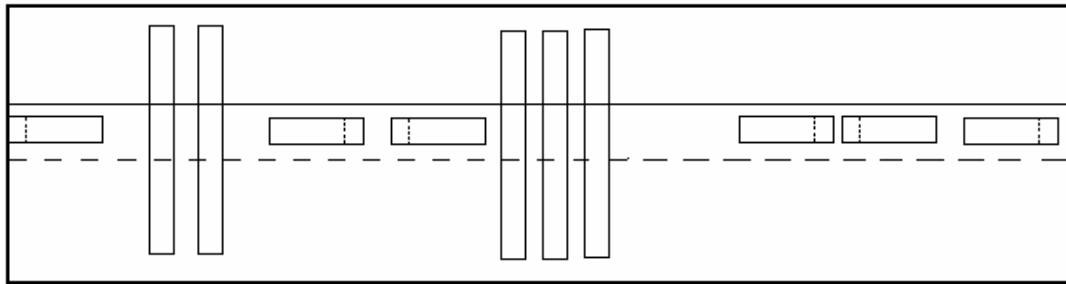
Canals	Secondary Containments
Brine Pits	Landfill Linings/Covers
Oil Holding Pits	Wastewater Lagoons
Tailing Ponds	Heap Leach Pads
Solar Ponds	Industrial Waste Impoundments

Applications suggested are not intended to be all inclusive. EPI does not warrant or guarantee the suitability, merchantability, fitness for a particular purpose, or longevity of this material for the uses listed. You may wish to consult your project engineer or installer/contractor to determine what physical properties are required for a synthetic liner. In some cases a chemical compatibility test may be required.

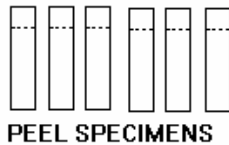
UltraTech®

is a registered trademark of Environmental Protection, Inc.

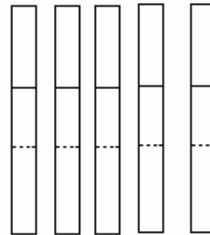
TYPICAL FACTORY SEAM SAMPLE DIAGRAM



SPECIMEN CUTOUT DIAGRAM



PEEL SPECIMENS



BONDED SEAM STRENGTH SPECIMENS

FIGURE 1

Figure 1 is a picture of a typical sample cut from an EPI factory fabricated PVC or UltraTech seam. The sample is 9" X 30" with the seam running lengthwise. On the bottom left are six specimens for testing peel adhesion. One specimen is cut from each end, while four are cut from the center. One inch of peel is initiated on each specimen at the time of fabrication. Each specimen is peeled a minimum of two inches. On the bottom right are five specimens cut for bonded seam strength testing. EPI's samples are cut from actual factory seams at a minimum sampling rate of one per 3,000 lineal feet of seam produced. This is equivalent to approximately each 20,000 square feet of material produced. These samples are tested in EPI's lab and the results are used in EPI's Statistical Process Control Program.



The Liner Company

FACTORY SEAM Q. C. INSPECTION RECORDS AND SUMMARY IN-PROCESS INSPECTION AND WOLSCHON TEST

REV 08/01/2005
FORM # Q-112-B

TEST DATE: ___/___/___ SERIAL NO.: _____ JOB NAME : _____ MATERIAL : _____ SOL APP : _____ TEMP : _____ TIME : __:__:__ SHIFT : _____ LOT NO.: _____ LOCATION OF SAMPLE: _____ SIZE OF PANEL : _____ X _____ = _____ SQ.FT. 2 ND SOL APP : _____ ROLLER : _____	FAB DATE: ___/___/___ DESC: _____ MANF : _____ ROLLER : _____ HUMIDITY : _____ % TABLE : _____ ROLL NO.: _____ FT. ON PANEL _____	WOLSCHON PEEL TEST <table style="width: 100%;"> <tr> <td style="width: 50%; text-align: center;">RESULT</td> <td style="width: 50%; text-align: center;">TYPE SEP.</td> </tr> <tr> <td style="text-align: center;">_____</td> <td style="text-align: center;">_____</td> </tr> <tr> <td style="text-align: center;">_____</td> <td style="text-align: center;">_____</td> </tr> </table> SECONDS BETWEEN SOLVENT APPLICATOR & ROLLER: _____	RESULT	TYPE SEP.	_____	_____	_____	_____
RESULT	TYPE SEP.							
_____	_____							
_____	_____							

BSS TEST
ASTM D-882 / PGI 1104

DATE TESTED : ___/___/___

RESULT	TEST SPEED	TYPE SEP.
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

PEEL TEST
ASTM D-413 / PGI 1104

DATE TESTED : ___/___/___

RESULT	TEST SPEED	TYPE SEP.
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Type Separation : AD = PEEL AD-BRK = PEEL THEN TEAR BRK = TEAR OR BREAK IN SHEET SE = BREAK AT SEAM EDGE CL = BREAK IN CLAMP



The Liner Company

GENERAL Q. C. INSPECTION RECORDS AND SUMMARY

REV 08/01/2005
FORM # Q-114

<p>TEST DATE: ___/___/___ FAB DATE: ___/___/___</p> <p>JOB NAME : _____</p> <p>MATERIAL : _____ MANF : _____</p> <p>DESCRIPTION: _____</p> <p>_____</p> <p>_____</p> <p>_____</p>		<p>RAW MATERIAL DATA (MACHINE DIRECTION)</p> <p>THICKNESS</p> <p>_____</p> <p>TENSILE</p> <p>_____</p> <p>MODULUS</p> <p>_____</p> <p>ELONGATION</p> <p>_____</p>																								
<p>BSS TEST ASTM D-882 / PGI 1104</p> <p>DATE TESTED : ___/___/___</p> <table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:50%;">RESULT</th> <th style="width:50%;">TYPE SEP.</th> </tr> </thead> <tbody> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> </tbody> </table>	RESULT	TYPE SEP.	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	<p>PEEL TEST ASTM D-413 / PGI 1104</p> <p>DATE TESTED : ___/___/___</p> <table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:50%;">RESULT</th> <th style="width:50%;">TYPE SEP.</th> </tr> </thead> <tbody> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> </tbody> </table>	RESULT	TYPE SEP.	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	<p>RAW MATERIAL DATA (MACHINE DIRECTION)</p> <p>THICKNESS</p> <p>_____</p> <p>TENSILE</p> <p>_____</p> <p>MODULUS</p> <p>_____</p> <p>ELONGATION</p> <p>_____</p>
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SUBGRADE SURFACE ACCEPTANCE CERTIFICATE

PROJECT NAME: _____

LINER LOCATION: _____

INSPECTION DATE: _____

	Approved	Not Acceptable	Comment
Soil Type	<input type="checkbox"/>	<input type="checkbox"/>	_____
Soil Moisture	<input type="checkbox"/>	<input type="checkbox"/>	_____
Uniformity	<input type="checkbox"/>	<input type="checkbox"/>	_____
Grading	<input type="checkbox"/>	<input type="checkbox"/>	_____
Rocks	<input type="checkbox"/>	<input type="checkbox"/>	_____
Roots	<input type="checkbox"/>	<input type="checkbox"/>	_____
Vegetation	<input type="checkbox"/>	<input type="checkbox"/>	_____
Rubble	<input type="checkbox"/>	<input type="checkbox"/>	_____
Protrusions	<input type="checkbox"/>	<input type="checkbox"/>	_____
Compaction	<input type="checkbox"/>	<input type="checkbox"/>	_____
Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	_____

I, the undersigned a duly authorized representative of the OWNER of above mentioned project have completed all required testing on the subgrade and do hereby accept the subgrade surface as being acceptable for placement of the geomembrane liner by Environmental Protection Inc.

NAME TITLE DATE

CUSTOMER SIGNATURE

RECEIVED BY EPI REPRESENTATIVE:

NAME TITLE DATE

EPI SIGNATURE



The Liner Company

FIELD SEAM C.Q.C INSPECTION RECORD

REVISED 08/01/2005

FORM#Q-113-A

FIELD USE

Sample Data

Job Name: _____

Sample location: _____

Installation Date: ____/____/____

Air Temp: _____ Sheet Temp: _____ Humidity: High Med Low

Material: _____ Sol./Welder Opp: _____ Roller/Helper: _____

Weather/ Site/Subgrade Conditions: _____

Field Testing

Weld Type: Chemical Adhesive Thermal

Air Lance: Pressure Used: _____ Area tested: _____

Results: _____

Test Strip: Shear _____
Peel _____

Air Channel Pressure Test

Seam ID: _____ Area/Length tested: _____

Start Pressure: _____ End Pressure: _____ Pressure Drop: _____

Time Start: _____:_____ Time End: _____:_____ Total Time: _____

Results / Corrective action: _____

LAB TESTS

Bonded Seam Test
ASTM D-882 and PGI 1104

Thickness: _____

Test Date: _____

Result	Break Type
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Peel Test
ASTM D-882 and PGI 1104

Thickness: _____

Test Date: _____

Result	Break Type
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____



EPI FIELD SEAM INSPECTION FORM

Project Name: _____

Seam Designation (s): _____

Between Panels: _____

Date Installed: _____

Approved by: _____

(Please Print)

Signature: _____

Company : _____

Date Approved: _____

EPI Technician: _____



Environmental Protection, Inc.
9939 US 131 South N.E.
Mancelona, Mich. 49659
Ph 800-655-4637 Fax 1-231-587-8020

Change Order

Date: ____/____/____

Project: _____

Customer: _____

PO/Contract # _____

Environmental Protection, Inc., is hereby directed to:

Revise panels and/or specifications as follows: _____

Stand by at site from _____ to _____ because of:

Demobilize crew at site effective _____ and remobilize for new schedule start on _____.

Change project schedule as follows: _____

Authorized Customer Representative



The Liner Company

EPI PVC GEOMEMBRANE LIMITED WARRANTY

Subject to the terms and conditions set forth below, Environmental Protection, Inc. (EPI), warrants that the factory seams of the liner material shown on the reverse of this invoice, if installed in accordance with the manufacturer's specifications and recommendations, shall be free from defects for a period of one (1) year:

The material is warranted by the manufacturer. The manufacturer's warranty shall be the only warranty applying to the material. The warranty of EPI of the seams shall be limited to confinement of an aqueous effluent rated as "excellent" or "A" as set forth in the chemical compatibility list published by the liner material manufacturer.

The warranty is subject to the following:

1. During the period of the one (1) year of which this warranty applies, an earthen cover shall be maintained on top of the liner at all times. The maximum effluent temperature shall not exceed 100° F and the Ph of the effluent shall be maintained between 5 and 9.
2. This warranty shall not cover damage caused by mechanical, physical or other external forces caused by persons or entities other than EPI or damages caused by solutions of greater concentrations than the chemicals as defined below, excessive pressure or stress from any sources or acts of God, casualty or catastrophe, such as, but not limited to, floating debris, insects and animals.
3. This warranty is conditioned upon
 - a) normal use and service of the liner for the purpose and in the manner for which it is designed and manufactured;
 - b) installation of the liner on preconsolidated soil free of sharp protrusions,
 - c) proper field seaming, and installation of the liner material, and
 - d) payment in full for all materials and services.

Deviation from any of these conditions shall void this warranty.

EPI guarantees to replace or repair, at its option; defective factory seams caused by poor workmanship for up to one (1) year after the date of the invoice. This warranty is limited to the repair or replacement of the affected membrane area and does not include the cost of earthwork or other activities not originally performed by EPI. **IN NO EVENT SHALL EPI'S LIABILITY EXCEED THE ORIGINAL SELLING PRICE OF THE DEFECTIVE AREA OF THE LINER.**

To enable EPI's technical staff to properly determine the cause of any alleged defect and to take appropriate steps to effect timely corrective measures if such defect is within the warranty, any claim for alleged breach of warranty must be made and presented to EPI within thirty (30) days after the alleged defect was first noticed or all warranties will be deemed to have been waived by the buyer.

During the warranty period, EPI reserves the right to have one or more of its representatives visit (with or without giving prior notice) the site at which its material(s) are being utilized to observe the site preparation, liner installation, emplacement of cover material(s) and/or factory and field seams.

THERE ARE NO WARRANTIES GIVEN BY EPI WITH RESPECT TO THE MATERIAL OR INSTALLATION COVERED HEREBY, OTHER THAN THOSE SPECIFICALLY DESCRIBED HEREIN. THOSE WARRANTIES ARE IN THE PLACE AND STEAD OF THE IMPLIED WARRANTIES OF MERCHANT ABILITY AND FITNESS FOR USE. IN NO EVENT SHALL EPI BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR, RESULTING FROM, OR IN CONNECTION WITH, ANY BREACH OF WARRANTY OR ANY LOSS RESULTING FROM USE OF THE LINER BY BUYER. EPI DOES NOT ASSUME NOR AUTHORIZE ANY PERSON TO ASSUME FOR IT ANY OTHER OR ADDITIONAL LIABILITY OF ANY KIND IN CONNECTION WITH THE SALE OF THE LINER TO THE BUYER OR BUYER'S USE OF THE LINER.

Environmental Protection, Inc.

By: Sample

Authorized Officer

SAMPLE

CANADIAN GENERAL-TOWER LIMITED CONTAINMENT LINER MATERIAL LIMITED WARRANTY

PROJECT: _____

APPROXIMATE SIZE: _____

INSTALLATION DATE: _____

Canadian General-Tower Limited (CGT) warrants that the liner material to be used in the above referenced project will perform satisfactorily when incorporated into a liner to be used for the containment of the aqueous solution which is defined as follows according to the conditions set forth in any additional pages of the agreement:

CGT further warrants that the material, if properly fabricated and installed, will have a useful service life for a period of 20 years. In addition, the maximum solution temperature is not to exceed ___F° and the pH of the solution is to be maintained between 5 and 9.

This warranty does not cover damage caused by mechanical, physical or other external forces or damage caused by solutions of greater concentrations than the one defined above.

This warranty is subject to the following:

1. This warranty is conditional upon (a) normal use and service of the liner for the purpose and in the manner for which it is designed and manufactured, (b) installation of the liner on preconsolidated soil, free of sharp protrusions, (c) proper sealing, fabricating and installation of the liner. Deviation from any of these conditions will void this warranty.
2. CGT shall not be responsible for damage to the liner due to external agents, including but not limited to, damage resulting from exposure of the liner to harmful chemicals; abuse by machinery, equipment or people; excessive pressure or stress from any sources; or acts of God, casualty or catastrophe, such as, but not limited to, unusual storms or other weather conditions, flooding, earthquakes, floating debris, insects or animals.
3. Upon breach of warranty, CGT's sole liability shall be, at its option, either to (a) repair the defective material or (b) supply the owner with repair or replacement material, charging the owner only for a portion of that material (at the then-current price) in proportion to the portion of the ___ year warranty period that has elapsed since the installation date. In no event, however, shall CGT's liability under this warranty exceed an amount equal to the sales price of the defective portion of the liner multiplied by a fraction, the numerator of which shall be the number of years remaining in the ___ year warranty period and the denominator of which shall be ___.
4. To enable CGT technical staff to properly determine the cause of any alleged defect and to take appropriate steps to effect timely corrective measures, if such defect is within the warranty, any claim for alleged breach of warranty must be made and presented to CGT within 30 days after the alleged defect is first noticed, or all warranties will be deemed to have been waived by the owner.

5. This warranty shall come into effect only upon payment in full to CGT of the purchase price of the original liner material.

6. **THERE ARE NO WARRANTIES GIVEN BY US TO YOU WITH RESPECT TO THE MERCHANDISE COVERED HERewith OTHER THAN THOSE SPECIFICALLY DESCRIBED HEREIN. THOSE WARRANTIES ARE IN THE PLACE AND INSTEAD OF THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR USE. IN NO EVENT SHALL CGT BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR, RESULTING FROM, OR IN CONNECTION WITH, ANY BREACH OF WARRANTY OR ANY LOSS RESULTING FROM USE OF THE LINER BY THE OWNER.**

CGT does not assume nor authorize any person to assume for it, any other or additional liability of any kind in connection with the sale of the liner to the owner or the owner's use of the liner.

CANADIAN GENERAL-TOWER LIMITED
TECHNICAL APPROVAL

CANADIAN GENERAL-TOWER LIMITED

BY: _____

BY: _____

TITLE: _____

TITLE: _____

DATE: _____

DATE: _____

ACKNOWLEDGED AND ACCEPTED

(NAME OF OWNER)

BY: _____

TITLE: _____

DATE: _____



Environmental Protection, Inc.
9939 US 131 South N.E.
Mancelona, Mich. 49659
Ph 800-655-4637 Fax 1-231-587-8020

DATE: ____/____/____

PROJECT: _____

CUSTOMER: _____

CONTRACT: -- P.O. NUMBER: _____

All the site installation requirements of Environmental Protection, Inc., for the subject project, have been satisfactorily completed

AUTHORIZED CUSTOMER REPRESENTATIVE