



PVC GEOMEMBRANE CERTIFIED PROPERTIES (PGI 1104)

Certified Properties ²	ASTM	PVC 10	PVC 20	PVC 30	PVC 40	PVC 50	PVC 60
Thickness	D-5199	10 ±0.5 mil 0.25 ±.013mm	20 ±1 mil 0.51 ± .03 mm	30 ±1.5 mil 0.76 ± .04 mm	40 ±2 mil 1.02 ± .05 mm	50 ±2.5 mil 1.27 ± .06 mm	60 ± 3 mil 1.52 ± .08 mm
Tensile Properties ³	D-882⁴						
Strength at Break	Min (MD & TD)	24 lbs/in 4.2 kN/m	48 lbs/in 8.4 kN/m	73 lbs/in 12.8 kN/m	97 lbs/in 17.0 kN/m	116 lbs/in 20.3 kN/m	137 lbs/in 24.0 kN/m
Elongation		250%	360%	380%	430%	430%	450%
Modulus at 100%		10 lbs/in 1.8 kN/m	21 lbs/in 3.7 kN/m	32 lbs/in 5.6 kN/m	40 lbs/in 7.0 kN/m	50 lbs/in 8.8 kN/m	60 lbs/in 10.5 kN/m
Tear Strength	D-1004⁴	2.5 lbs 11 N	6 lbs 27 N	8 lbs 35 N	10 lbs 44 N	13 lbs 58 N	15 lbs 67 N
Dimensional Stability	D-1204⁴	4%	4%	3%	3%	3%	3%
Low Temperature Impact	D-1790⁴	-10° F -23° C	-15° F -26° C	-20° F -29° C	-20° F -29° C	-20° F -29° C	-20° F -29° C
Index Properties^b	ASTM	PVC 10	PVC 20	PVC 30	PVC 40	PVC 50	PVC 60
Specific Gravity	D-792 Typical	1.2 g/cc	1.2 g/cc	1.2 g/cc	1.2 g/cc	1.2 g/cc	1.2 g/cc
Water Extraction Percent Loss (max)	D-1239⁴	0.15%	0.15%	0.15%	0.20%	0.20%	0.20%
Average Plasticizer Molecular Weight	D-2124^{4,5}	400	400	400	400	400	400
Volatile Loss Percent Loss (max)	D-1203⁴	1.5%	0.9%	0.7%	0.5%	0.5%	0.5%
Soil Burial Break Strength	G160⁴	5%	5%	5%	5%	5%	5%
Elongation	Max Chg	20%	20%	20%	20%	20%	20%
Modulus at 100%		20%	20%	20%	20%	20%	20%
Hydrostatic Resistance	D-751⁴	42 psi 290 kPa	68 psi 470 kPa	100 psi 690 kPa	120 psi 830 kPa	150 psi 1030 kPa	180 psi 1240 kPa
Seam Strengths	ASTM	PVC 10	PVC 20	PVC 30	PVC 40	PVC 50	PVC 60
Shear Strength ³	D-882⁴	20 lbs/in 3.47 kN/m	38.4 lbs/in 6.7 kN/m	58.4 lbs/in 10 kN/m	77.6 lbs/in 14 kN/m	96 lbs/in 17 kN/m	116 lbs/in 20kN/m
Peel Strength ³	D-882⁴	10 lbs/in 1.8 kN/m	12.5 lbs/in 2.2 kN/m	15 lbs/in 2.6 kN/m	15 lbs/in 2.6 kN/m	15 lbs/in 2.6 kN/m	15 lbs/in 2.6 kN/m

- Notes:**
1. PGI 1104 replaces PGI 1103 Specification effective 1/1/04.
 2. Certified properties are tested by lot as specified in PGI 1104 Appendix A.
 3. Metric values are converted from US values and are rounded to the available significant digits.
 4. Modifications or further details of test are described in PGI 1104 Appendix B.
 5. Index properties are tested once per formulation as specified in PGI 1104 Appendix A.

The PGI 1104 Specification was developed with the cooperation of PGI member companies in order to meet the stringent requirements of today's geosynthetic applications. To assure this level of quality, be sure to specify that your PVC geomembrane is produced and fabricated by a PGI member.

1500 W. Shure Drive Arlington Heights, IL 60004 USA 800.527.9948 Fax 847.577.5571

For the most up-to-date information please visit our website, www.cetco.com

A wholly owned subsidiary of AMCOL International

PGI 1104 APPENDIX A TESTING FREQUENCIES

MANUFACTURING TESTING FREQUENCIES

Certified Properties - Certified properties are tested based on a quantity of material produced. Certified properties are tested once per lot, or once every 40,000 lbs of material (18,000 kg), whichever is more frequent. The certification properties include thickness, tensile break strength, elongation at break, modulus at 100% strain, tear resistance, dimensional stability, and low temperature impact. Thickness is to be tested once per roll unless automatic thickness measuring equipment is installed on the production equipment. Certified test reports (Mill Certificates) for the tested properties are to be provided with every order on request.

Index Properties - Index tests are performed when preparing and approving a geomembrane formulation. The tests are performed on the final production formulation of a geomembrane. The index properties include specific gravity, water extraction, volatile loss, hydrostatic resistance, and soil burial resistance. A certified statement of the test results for the formulation is to be made available to the customer on request.

PGI 1104 APPENDIX B TESTING CLARIFICATIONS AND DETAILS

When both US and metric values are shown the value for acceptance is the US value. Metric values are conversions and may contain rounding errors.

Test Method Clarification and Details

ASTM D751

Test Methods for Coated Fabrics

- For Hydrostatic Burst use Section 33, Procedure A, "Pressure Application by Mullen Type Hydrostatic Tester"
- Units of pressure in pounds per square inch (psi) or kilopascals (kPa)

ASTM D882

Tensile Properties of Thin Plastic Sheeting

- Use Method A
- D882 method may be used for PVC film up to 60 mil (1.5mm) thick
- Units are in pounds of force per inch of width (lbs/in)
- Metric units are in kilonewtons per meter of width (kN/m), or Newtons per millimeter of width (N/mm) which are equivalent units
- Factory Seam Shear Testing
 - Use ASTM D882 Method A
 - ASTM D882 may be used for thicknesses greater than 1.0 mm (40 mil) for seam testing
 - Use 25.4 mm wide (1") specimens
 - Use grip separation of 51 mm (2 in) plus the seam width
 - Crosshead speed of 510 mm/min (20 in/min)
- Factory Seam Peel Testing
 - Use ASTM D882 Method A
 - Use 25.4 mm wide (1") specimens
 - Position grips 13 mm (1/2") on either side of seam
 - Crosshead speed of 51 mm/min (2 in/min)

ASTM D1004

Initial Tear Resistance of Plastic Film and Sheeting

- Units are in pounds of force to initiate tear in the specially die-cut specimen (lbs) or in Newtons of force (N)

ASTM D1203

Volatile Loss from Plastics Using Activated Carbon Methods

- Use method A

ASTM D1204

Linear Dimensional Changes of Thermoplastic Film at Elevated Temp.

- Test specimens at 100C for 15 minutes
- Measure percent change in lineal dimensions

ASTM D1239

Resistance of Plastic Films to Extraction by Chemicals

- ASTM D1239 may be used for thicknesses greater than 1.0 mm (40 mil)
- Test specimens in 50° C (122° F) water for twenty-four hours
- Measure percent change in weight

ASTM D1790

Brittleness Temperature of Plastic Sheeting by Impact

- 50% of specimens must pass at specified temperature

ASTM D 2124

For plasticizer extraction, followed by GC or GC/MS for identification and molecular weight determination.

ASTM D5199

Measuring the Nominal Thickness of Geosynthetics

- US units of thousandths of an inch (0.001 inches = 1 mil)
- Metric unit of millimeters of thickness (mm)

ASTM G160

Evaluating Microbial Susceptibility of Nonmetallic Materials by Soil Burial

- Bury sample in prepared soil for 30 days
- Perform test on actual liner sheet samples
- Measure maximum change in properties as shown in specification