



# FGI PVC Geomembrane Specification<sup>1</sup>

Effective January 1, 2017



Certified Properties <sup>2</sup>	ASTM	PVC 10	PVC 20	PVC 30	PVC 40	PVC 50	PVC 60
Thickness	<a href="#">D-5199</a>	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 <sup>3</sup>	<a href="#">D-882<sup>4</sup></a> Min (MD & TD)						
Strength at Break		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	20 lbs/in 3.6 kN/m	30 lbs/in 5.4 kN/m	40 lbs/in 7.2 kN/m	50 lbs/in 9.0 kN/m	60 lbs/in 10.8 kN/m
Tear Strength	<a href="#">D-1004<sup>4</sup></a> Min	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	<a href="#">D-1204<sup>4</sup></a> Max Chg (MD & TD)	4%	4%	3%	3%	3%	3%
Low Temperature Impact	<a href="#">D-1790<sup>4,6</sup></a> Pass	-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 <sup>5</sup>	ASTM	PVC 10	PVC 20	PVC 30	PVC 40	PVC 50	PVC 60
Specific Gravity	<a href="#">D-792</a> 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)	<a href="#">D-1239<sup>4</sup></a> Max Loss	0.15%	0.15%	0.15%	0.20%	0.20%	0.20%
Average Plasticizer Molecular Weight	<a href="#">D-2124<sup>4,5,7</sup></a>	400	400	400	400	400	400
Volatile Loss Percent Loss (max)	<a href="#">D-1203<sup>4</sup></a> Max Loss	1.5%	0.9%	0.7%	0.5%	0.5%	0.5%
Soil Burial (max change allowed in)	<a href="#">G160<sup>4</sup></a> Max Chg						
Break Strength		5%	5%	5%	5%	5%	5%
Break Elongation		20%	20%	20%	20%	20%	20%
Modulus at 100% strain		20%	20%	20%	20%	20%	20%
Hydrostatic Resistance	<a href="#">D-751<sup>4</sup></a> Min	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 <sup>3, 8</sup>	<a href="#">D-7408<sup>4</sup></a> Min	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	92.8 lbs/in 16 kN/m	109.6 lbs/in 20kN/m
Peel Strength <sup>3,8</sup>	<a href="#">D-7408<sup>4</sup></a> Min	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. FGI PVC Specification revision effective 1/1/17.
2. Certified properties are tested by lot as specified in [FGI PVC 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 [FGI PVC Appendix B](#).
5. Index properties are tested once per formulation as specified in [FGI PVC Appendix A](#).

6. For arid climates (sheet temperature of 50°C or 120°F) passing temperatures are -17°C for PVC 20 and -20° C for all other thicknesses.
7. For arid climates use average plasticizer molecular weight of 410.
8. If adhesive or solvent seams are created, a 24-hour cure time is required before seam testing.

## FGI PVC APPENDIX A MANUFACTURING TESTING FREQUENCIES

### Certified Properties

Certified test 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.

## FGI PVC APPENDIX B TESTING CLARIFICATIONS AND DETAILS

**General:** 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.

### ASTM 0751: Test Methods for Coated Fabrics

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

### ASTM 0882: Tensile Properties of Thin Plastic Sheeting

- o Use Method A
- o ASTM 0882 method may be used for PVC film up to 60 mil (1.5mm) thick o Units are in pounds of force per inch of width (lbs/in)
- o Metric units are in kiloNewtons per meter of width (kN/m), or Newtons per millimeter of width (N/mm) which are equivalent units

### ASTM 0882 Factory Seam Shear Testing

- o ASTM 0882 may be used for thicknesses greater than 1.0 mm (40 mil) for seam testing Use 25.4 mm wide (1") specimens.
- o Use grip separation of 51 mm (2 in) plus the seam width Crosshead speed of 510 mm/min (20 in/min)

### ASTM 0882 Factory Seam Peel Testing

- o Use ASTM 0882 Method A
- o Use 25.4 mm wide (1") specimens
- o Position grips 13 mm (1/2") on either side of seam Crosshead speed of 51 mm/min (2 in/min)

### **ASTM D6392 STANDARD TEST METHOD FOR DETERMINING THE INTEGRITY OF NONREINFORCED GEOMEMBRANE SEAMS PRODUCED USING THERMO-FUSION METHODS**

### ASTM 01004 : Initial Tear Resistance of Plastic Film and Sheeting

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

### ASTM 01203: Volatile Loss from Plastics Using Activated Carbon Methods o Use method A

### ASTM 01204: Linear Dimensional Changes of Thermoplastic Film at Elevated Temp.

- o Test specimens at 100C for 15 minutes
- o Measure percent change in two lineal dimensions (length & width)

### ASTM 01239 : Resistance of Plastic Films to Extraction by Chemicals

- o Test specimens in 50 °C (122 °F) water for twenty-four hours
- o Measure percent change in weight

ASTM 01790: Brittleness Temperature of Plastic Sheeting by Impact o 50% of specimens must pass at specified temperature

ASTM 05199: Measuring the Nominal Thickness of Geosynthetics

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

ASTM G160: Evaluating Microbial Susceptibility of Nonmetallic Materials by Soil Burial o Bury sample in prepared soil for 30 days

- o Perform test on actual liner sheet samples
- o Measure maximum change in properties as shown in specification

This FGI PVC Geomembrane Specification was developed with the cooperation of FGI 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 FGI member.

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