Designation: D7408 – 12

Standard Specification for Non Reinforced PVC (Polyvinyl Chloride) Geomembrane Seams [1]

This standard is issued under the fixed designation D7408; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers the minimum values for seams fabricated into unreinforced PVC geomembranes in factory and field applications.

1.2 This specification covers PVC Geomembranes in thickness of .25 through 1.52 mm (0.010 through 0.060 in.)

1.3 In addition to structural characteristics, the specifier shall evaluate other characteristics beyond the scope of this specification that affect the final choice of construction. These include, but are not limited to, functional, legal, insurance and economic considerations.

1.4 This specification is not intended to exclude products or systems not covered by the referenced documents.

1.5 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D638 Test Method for Tensile Properties of Plastics

D882 Test Method for Tensile Properties of Thin Plastic Sheeting

D4439 Terminology for Geosynthetics

D7176 Specification for Non-Reinforced Polyvinyl Chloride (PVC) Geomembranes Used in Buried Applications

3. Terminology

3.1 *Definitions:*

3.1.1 *chemical fusion seams, n*—use of a chemical agent to dissolve the surface of the geomembrane for bonding.

3.1.2 *adhesive or bodied solvent, n*—these seams are typically produced by applying an adhesive to both sides of the sheet to be bonded and then pressure is applied to the top sheet with the bottom sheet supported by flat a firm surface

3.1.3 *thermal fusion, n*— also known as hot air or hot wedge, this technique introduces high-temperature air or gas or a hot wedge between two geomembrane surfaces to facilitate melting. Pressure is applied to the top and/or bottom sheets of the geomembrane, forcing together the two surfaces to form a continuous bond.

3.1.3.1 *Discussion*—Some seams of this kind are made with dual bond tracks separated by a non-bonded gap. These seams are referred to as dual track seams or double-track seams

3.1.4 *hot air or knife, n*— this technique melts the two geomembrane surfaces to be seamed by running a hot metal wedge or hot air between them. Pressure is applied to the top or bottom geomembrane, or both, to form a continuous bond. These seams are usually produced with a combination of a hand held heat gun or hand held hot wedge along with a hand roller.

3.2 For definitions of other terms, see Terminology D4439.

4. Classification

4.1 Types of seams covered in this specification:

4.1.1 Chemical Fusion,

4.1.2 Adhesive or Bodied Solvent,

4.1.3 Dielectric, and

4.1.4 Thermal Fusion.

5. Significance and Use

5.1 *Significance*— the increased use of geomembranes as barrier materials to restrict fluid migration from one location to another in various applications, and the various types of seaming methods used in joining geomembrane sheets, has created a need to standardize minimum seam strength requirements.

[1] This specification is under the jurisdiction of ASTM Committee D35 on Geosynthetics and is the direct responsibility of Subcommittee D35.10 on Geomembranes.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

5.2 *Use*—Standard seam specification provides information as to the status of the seam. Data obtained by this standard can be used in CQC/CQA documents. This test method is useful for specification testing and for comparative purposes but does not necessarily measure the ultimate strength that the seam may acquire.

6. Apparatus

6.1 Tensile instrumentation shall meet the requirements outlined in Test Method D638.

6.2 Grip Faces—Grip faces shall be a minimum 25 mm (1 in.) wide and a minimum of 25 mm (1 in.) in length. Smooth rubber, fine serrated or coarse serrated grip faces have all been found to be suitable for testing geomembrane seams.

7. Sample Preparation

7.1 Cut a sample large enough to accommodate the removal of five (5) peel specimens and five (5) shear specimens (use Fig. 1)

NOTE 1—Larger samples sizes may be required on site specific or project specific or requirements for the purpose of archiving or third party testing.

7.2 Once the sample is received at the testing facility, the sample shall be acclimated at a standard laboratory environment, Humidity between 50 and 70 % and a temperature of 21.6 ±2 °C (70.6 ±4 °F) for a minimum of 40 hours for all types of seams, except thermo and dielectric type seams, for these types of seams a minimum of 4 hours at the standard laboratory environment is required.

NOTE 2— If samples are sent to the lab and testing is preformed prior to the required lab acclimating period then this must be noted on the sample results. However the sample should be at least a minimum of 40 hours from the time of fabrication and lab acclimation period should be at least one (1) hour minimum.

8. Specimen Preparation

8.1 Cut five specimens in peel and five in sheer as shown in Fig. 1.

NOTE 3—Cut out the 5 peel and 5 shear specimens from the sample typically across the seam. In some conditions with seams without a cross flap, seams may have to be partially peeled open to initiate a peel test tab.

8.2 Use 25.4 mm wide (1 in.) specimens

8.3 Five specimens should be tested in 90 degree peel mode and five in shear

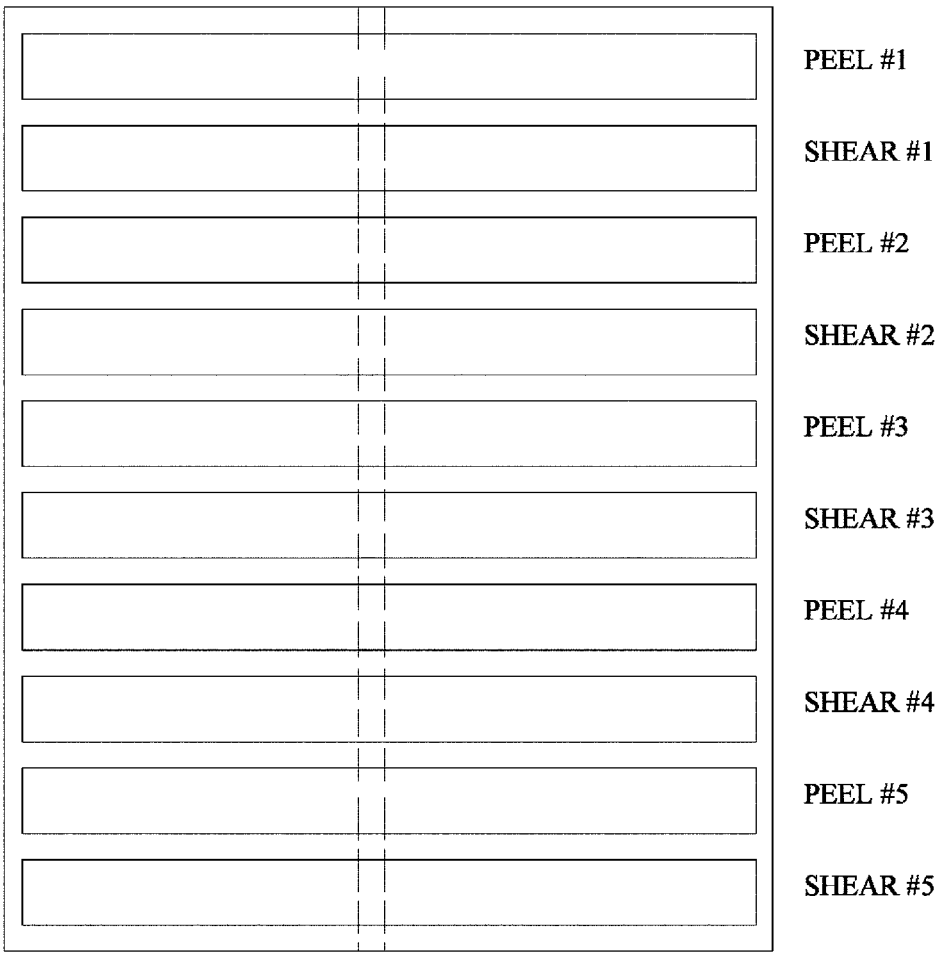


FIG. 1 Seam Sample

TABLE 1 Mechanical Properties Minimum Properties

	Seam Strengths	ASTM	PVC 10	PVC 20	PVC 30	PVC 40	PVC 50	PVC 60
Section 1	Bond Seam Strength 20 in./min	Test Method D882 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. 20 kN/m
Section 2	Peel Strength 2 in./min	Test Method D882 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
Section 3	Peel Strength 20 in./min	Test Method D882 Min	10 lbs/in 1.8 kN/m	15 lbs/in 2.2 kN/m	18 lbs/in 2.6 kN/m	18 lbs/in 3.1 kN/m	18 lbs/in 3.1 kN/m	18 lbs/in 3.1 kN/m

8.4 The gage length for shear strength shall be 50.8 mm + the width of the seam (2 in. + the width of the seam)

8.5 For peel test, position grips 13 mm (1/2 in.) on either side of seam

9. Procedure

9.1 Test peel specimens until break and record the peak value for each specimen and the type of break per Fig. 2 for chemical, adhesive and dielectric, Fig. 2 for all dual track seams.

NOTE 4—For Dual track seams test both weld tracks for peel.

9.2 Test shear specimens until break and record the peak value for each specimen and the type of break per Fig. 2 for chemical, adhesive and dielectric, Fig. 2for all dual track seams at 508 mm/min (20 in./min).

9.3 Test Peel and Bond Seam Strength specimens at:
9.3.1 Option 1 – 508 mm/min (20 in./min).
9.3.2 Option 2 – 0.8 mm/min (2 in./min).

NOTE 5—Peel test are typically run at 50.8 mm/min and 508 mm/min (2in. /min and 20 in./min) and should be reported on the report as to the speed of the test was run. Test specimens until break and record the peak value for each specimen.

9.4 Average the peak results of the 5 specimens to obtain the recordable result of the sample.

9.5 Record one test result for the peel sample and one for the shear sample.

9.6 All results should be rounded off to two decimals

10. Mechanical Properties Minimum Properties

10.1 See Table 1.

NOTE 6—See Specification D7176 for thickness reference of PVC10, PVC20, etc.

11. Results

11.1 The average of the five specimens shall meet or exceed the minimum requirements for peel and shear.

11.2 Four of the five specimens from each sample shall meet or exceed for the peel test Shear test.

12. Report

12.1 The report for each sample shall contain but not limited to;

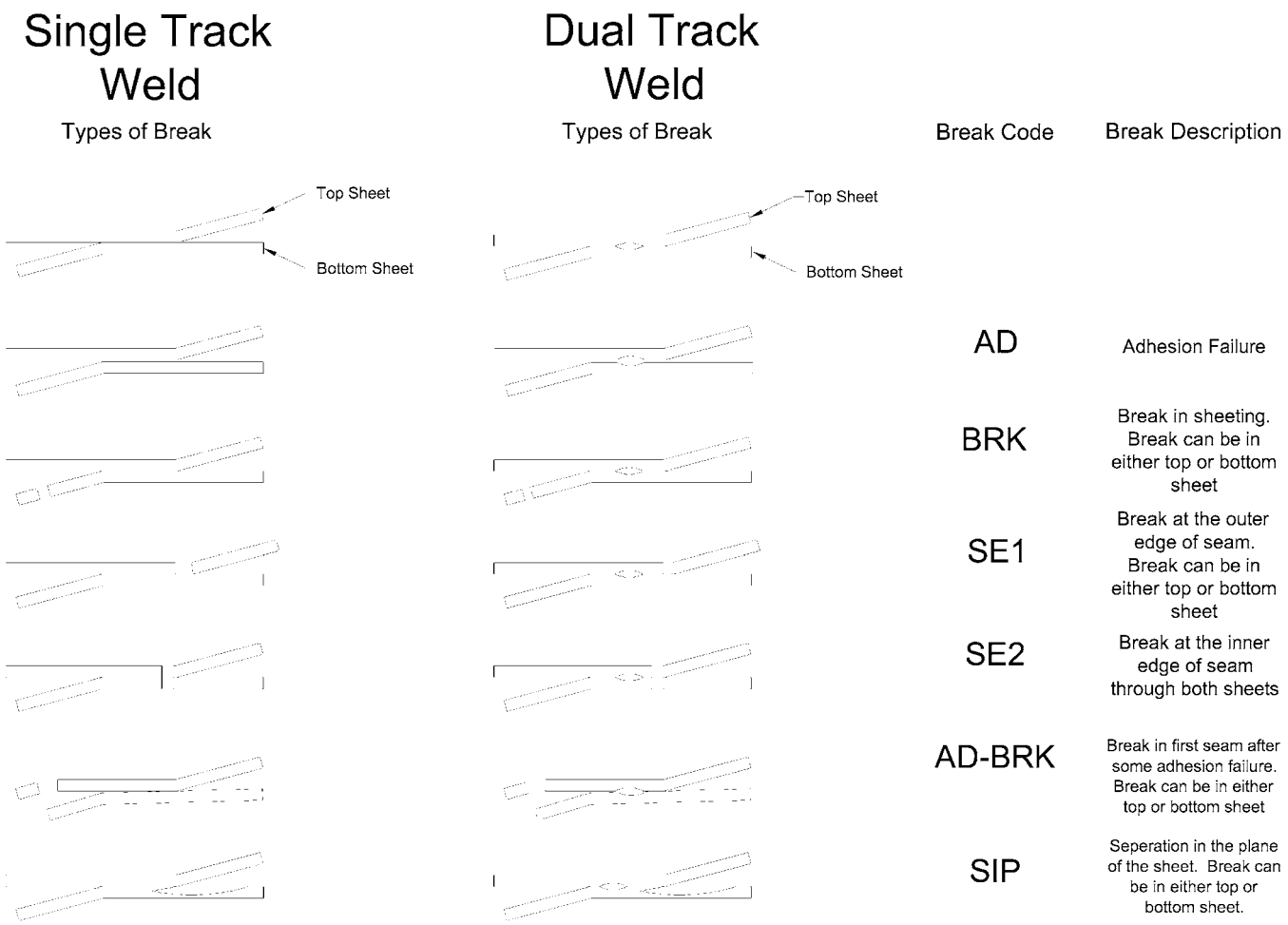
12.2 All individual data to be consistent with 11.2
12.2.1 The Identification of the panel.
12.2.2 The location of the sample.
12.2.3 The reportable result of the peel test.
12.2.4 Report the break type for the peel (Fig. 2).
12.2.5 The reportable result of the shear test.
12.2.6 Report the break type for the Bond Seam test (Fig. 2).
12.2.7 Job Name.
12.2.8 Sample ID or Number.
12.2.9 Lot Number and/or Roll Numbers.
12.2.10 Machine and/or Operators Number.
12.2.11 Other items on the test report may contain; Temperatures ambient and sheet, weather conditions for field applications.

13. Precision and Bias

13.1 No statement is made as to the precision or bias at the time of publishing

14. Keywords

14.1 flexible sheeting ; ; geomembrane; geosynthetic; landfill; pond liner; poly(vinyl chloride); polyvinyl chloride resin; PVC; reservoir; seams; water containment membrane; water leakage resistance



Locus-of-Break Codes in Seamin Unreinforced Geomembranes Tested for Seam Strength in Shear and Peel Modes for Adhesive, Chemical and Thermal.

FIG. 2 Break Type Diagram