



Standard Guide for Selecting Test Methods for Geomembrane Seams¹

This standard is issued under the fixed designation D7700; 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 guide is intended for use as a summary of test methods necessary to evaluate geomembrane seams. It is intended to guide geomembrane users toward the appropriate evaluation techniques to assess geomembrane seam quality.

1.2 Geomembrane seams covered by this guide are: high-density polyethylene (HDPE), linear low-density polyethylene (LLDPE), very low-density polyethylene (VLDPE), flexible polypropylene (fPP), polyvinyl chloride (PVC), ethylene propylene diene terpolymer (EPDM), prefabricated bituminous geomembranes (PBGM), Ethylene Interpolymer Alloy (EIA) and reinforced geomembranes

1.3 Although a significant effort has been made to gather all types of geomembranes and related evaluation techniques which were on the market at the date of completion of this document, some available materials and technologies may have been omitted. The information presented in this document shall thus be considered to be non exhaustive.

1.4 *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

D751 Test Methods for Coated Fabrics

D4437 Practice for Non-destructive Testing (NDT) for Determining the Integrity of Seams Used in Joining Flexible Polymeric Sheet Geomembranes

D4439 Terminology for Geosynthetics

D5641 Practice for Geomembrane Seam Evaluation by Vacuum Chamber

D5820 Practice for Pressurized Air Channel Evaluation of Dual Seamed Geomembranes

D6214 Test Method for Determining the Integrity of Field Seams Used in Joining Geomembranes by Chemical Fusion Methods

D6365 Practice for the Nondestructive Testing of Geomembrane Seams using the Spark Test

D6392 Test Method for Determining the Integrity of Non-reinforced Geomembrane Seams Produced Using Thermo-Fusion Methods

D6747 Guide for Selection of Techniques for Electrical Detection of Potential Leak Paths in Geomembranes

D7002 Practice for Leak Location on Exposed Geomembranes Using the Water Puddle System

D7006 Practice for Ultrasonic Testing of Geomembranes

D7007 Practices for Electrical Methods for Locating Leaks in Geomembranes Covered with Water or Earth Materials

D7056 Test Method for Determining the Tensile Shear Strength of Pre-Fabricated Bituminous Geomembrane Seams

D7177 Specification for Air Channel Evaluation of Polyvinyl Chloride (PVC) Dual Track Seamed Geomembranes

D7272 Test Method for Determining the Integrity of Seams Used in Joining Geomembranes by Pre-manufactured Taped Methods

D7408 Specification for Non Reinforced PVC (Polyvinyl Chloride) Geomembrane Seams

3. Terminology

3.1

3.1.1 *destructive technique, n*—a method of seam testing requiring that a sample be removed from the fabricated or installed geomembrane for further evaluation.

3.1.2 *nondestructive technique, n*—a method of seam testing which does not compromise the geomembrane's ability to function as intended.

3.2 For definitions of other geosynthetic terms, refer to Terminology D4439.

3.3 Acronyms:

EPDM—Ethylene propylene diene terpolymer

fPP—Flexible polypropylene

HDPE—High-density polyethylene

LLDPE—Linear low-density polyethylene

¹ This test method is under the jurisdiction of ASTM Committee D35 on Geosynthetics and is the direct responsibility of Subcommittee D35.10 on Geomembranes.

Current edition approved Jan. 1, 2012. Published January 2012. DOI: 10.1520/D7700-12

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.

PVC—Polyvinyl chloride

VLDPE—Very low-density polyethylene

4. Significance and Use

4.1 There are a large number of geomembrane types and seaming techniques. This guide is intended to help practitioners select the appropriate seam test methods for their material.

4.2 Geomembranes are relatively impermeable planar materials sheets that are shipped either as rolls or folded panels. The panels may be seamed in a factory or in the field. This guide provides geomembrane users with the most appropriate seam evaluation techniques for the most common geomembrane materials available on the market.

4.3 Some type of geomembrane may not be listed and some seam evaluation techniques may offer a good performance with a given material although this may not be indicated on Table 1.

Users that are aware of this situation are invited to contact ASTM to propose an update of this guide.

4.4 The relevance of a seaming technique within a particular engineering context is beyond the scope of this guide.

5. Geomembrane Seam Evaluation Techniques

5.1 Geomembrane seam evaluation techniques can be either destructive or non destructive. The destructive techniques provide an indication of the strength and/or elongation characteristics of a small sample of a seam. The non-destructive techniques are used to test for leaks or defects along the entire length of a seam. The types of seam tests that are potentially applicable to various types of geomembrane materials are listed in **Table 1**. Their applicability may depend on the particular seaming technique used, and their feasibility given specific issues on the project.

TABLE 1 Seam Evaluation Techniques and Their Applicability to Different Geomembrane Materials

Type of seam evaluation technique	ASTM Test Method / Type of Geomembrane	Non-reinforced Polyolefin geomembranes		Non Reinforced PolyvinylChloride (PVC) and Ethylene Interpolymer Alloy (EIA)	Ethylene Propylene Diene Terpolymer (reinforced and nonreinforced) (EPDM)	Bituminous Geomembranes (PBGM)	Other reinforced Geomembranes
		HDPE	All other types of nonreinforced geomembranes (for example (fPP, LLDPE, VLDPE)				
Destructive	D751 , section 16: Coated Fabrics – Cut Strip Test	—		—	—	—	X (see Note 1)
	D6214 Field seams, chemical fusion methods	—	—	X (see Note 2)	—	—	X (see Note 2)
	D6392 Nonreinf GM-Seams Thermo-Fusion Meth	X	X	X	—	—	(see Note 3)
	D7408 PVC Seam	—	—	X	—	—	—
	D7056 BGM Seams	—	—	—	—	X	—
	D7272 Taped seams evaluation	—	—	—	X	—	—
Non-destructive	D5641 Vacuum Chamber (Note 4) (Note 5)	X	X	X	—	X	X
	D4437 Air lance (Note 4)	X (see Note 6)	X (see Note 7)	X	X	X	X
	D4437 Mechanical point stressing	X (see Note 8)	X	X	—	X	X
	D5820 Pressurized Air Channel (Note 4)	X (see Note 9)	X (see Note 9)	X (see Note 9)	—	—	X (see Note 9)
	D6365 Spark Test (Note 4)	X	X	X	—	X	—
	D7177 Air Channel Evaluation of PVC	—	—	X	—	—	—
	D7006 Ultrasonic Testing of Geomembranes (Note 4)	X (see Note 10)	X (see Note 10)	X (see Note 11)	—	X	—
Electrical Leak location	D7002 Leak location / water puddle/lance	X (see Note 12)	X (see Note 12)	X (see Note 12)	—	X (see Note 12)	X (see Note 12)
	D7007 Leak location / covered geomembranes	X (see Note 12)	X (see Note 12)	X (see Note 12)	—	X (see Note 12)	X (see Note 12)

X = Applicable
 — = Not Applicable

NOTE 1—A new standard test method is being worked on in D35.10 for seam evaluation for reinforced geomembranes

NOTE 2—This type of test not commonly performed on this type of material, but it can be performed if desired.

NOTE 3—While Test Method **D6392** was originally developed for non-reinforced geomembranes, it is standard practice for some manufacturers, fabricators, designers, and installers to use this method for reinforced products. However, a new standard test method is being worked on in D35.10 for seam evaluation of reinforced geomembranes, which shall be preferred to Test Method **D6392** as soon as it is available

NOTE 4—Only provides evaluation of seam continuity, but not seam strength

NOTE 5—May not be applicable to very flexible geomembranes, especially thinner ones, that will highly deform into the vacuum box.

NOTE 6—There are some experiences with air lance on HDPE geomembrane seams for hole detection, although this is not common practice

NOTE 7—Typically applicable to materials that are 1.0 mm and thinner

NOTE 8—When applicable

NOTE 9—Applicable to dual track seam only

NOTE 10—Not applicable to extrusion fillet

NOTE 11—Applicable to factory seams only

NOTE 12—Refer to Guide **D6747**

ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.

This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org). Permission rights to photocopy the standard may also be secured from the ASTM website (www.astm.org/COPYRIGHT/).