



Designation: D6747 – 21

Standard Guide for Selection of Techniques for Electrical Leak Location of Leaks in Geomembranes¹

This standard is issued under the fixed designation D6747; 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 to assist individuals or groups in assessing different options available for locating leaks in installed geomembranes using electrical methods. For clarity, this guide uses the term “leak” to mean holes, punctures, tears, knife cuts, seam defects, cracks, and similar breaches in an installed geomembrane (as defined in 3.2.6).

1.2 This guide does not cover systems that are restricted to seam testing only, nor does it cover systems that may detect leaks non-electrically. It does not cover systems that only detect the presence, but not the location, of leaks.

1.3 (**Warning**—The electrical methods used for geomembrane leak location could use high voltages, resulting in the potential for electrical shock or electrocution. This hazard might be increased because operations might be conducted in or near water. In particular, a high voltage could exist between the water or earth material and earth ground, or any grounded conductor. These procedures are potentially very dangerous, and can result in personal injury or death. The electrical methods used for geomembrane leak location should be attempted only by qualified and experienced personnel. Appropriate safety measures must be taken to protect the leak location operators as well as other people at the site.)

1.4 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.5 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recom-*

mendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 ASTM Standards:²

- D4439 Terminology for Geosynthetics
- D7002 Practice for Electrical Leak Location on Exposed Geomembranes Using the Water Puddle Method
- D7007 Practices for Electrical Methods for Locating Leaks in Geomembranes Covered with Water or Earthen Materials
- D7240 Practice for Electrical Leak Location Using Geomembranes with an Insulating Layer in Intimate Contact with a Conductive Layer via Electrical Capacitance Technique (Conductive-Backed Geomembrane Spark Test)
- D7703 Practice for Electrical Leak Location on Exposed Geomembranes Using the Water Lance Method
- D7852 Practice for Use of an Electrically Conductive Geotextile for Leak Location Surveys
- D7953 Practice for Electrical Leak Location on Exposed Geomembranes Using the Arc Testing Method
- D8265 Practices for Electrical Methods for Mapping Leaks in Installed Geomembranes

3. Terminology

3.1 For general definitions used in this guide, refer to Terminology D4439.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *conductive-backed geomembrane, n*—a specialty geomembrane manufactured using the co-extrusion process with an insulating layer in intimate contact with a conductive layer.

3.2.2 *conductive drainage geocomposite, n*—a specialty drainage geocomposite manufactured with one or several conductive geotextiles.

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

Current edition approved Aug. 1, 2021. Published August 2021. Originally approved in 2002. Last previous edition approved in 2015 as D6747 – 15. DOI: 10.1520/D6747-21.

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.

3.2.3 *conductive geotextile, n*—a specialty geotextile manufactured with an electrically conductive element or fiber or external treatment to make it electrically conductive.

3.2.4 *electrical leak location, n*—a method which uses electrical current or electrical potential to locate leaks in a geomembrane.

3.2.5 *electrically isolated conductive-backed geomembrane installation, n*—an installation of conductive-backed geomembrane that achieves a continuously conductive surface on the bottom layer while electrically isolating the bottom conductive layer from the top insulating layer of the entire geomembrane installation.

3.2.6 *leak, n*—for the purposes of this guide, a leak is any unintended opening, perforation, breach, slit, tear, puncture, crack, or seam breach. Significant amounts of liquids or solids may or may not flow through a leak. Scratches, gouges, dents, or other aberrations that do not completely penetrate the geomembrane are not considered to be leaks. Types of leaks detected during surveys include, but are not limited to: burns, circular holes, linear cuts, seam defects, tears, punctures, and material defects.

3.2.7 *poor contact condition, n*—for the purposes of this guide, a poor contact condition means that a leak is not in intimate contact with the sufficiently conductive layer above or underneath the geomembrane to be tested. This occurs on a wrinkle or wave, under the overlap flap of a fusion weld, in an area of liner bridging, and in an area where there is a subgrade depression or rut.

3.2.8 *substrate, n*—for the purposes of this guide, the sufficiently conductive layer directly underneath the geomembrane being testing for leaks.

3.2.9 *survey area, n*—for the purposes of this guide, the survey area refers to the geomembrane area subject to electrical leak location testing.

4. Significance and Use

4.1 Geomembranes are used as barriers to prevent liquids from leaking from landfills, ponds, and other containments. For this purpose, it is desirable that the geomembrane have as little leakage as practical.

4.2 The liquids may contain contaminants that, if released, can cause damage to the environment. Leaking liquids can erode the subgrade, causing further damage. Leakage can result in product loss or otherwise prevent the installation from performing its intended containment purpose.

4.3 Geomembranes are often assembled in the field, either by unrolling and welding panels of the geomembrane material together in the field, unfolding flexible geomembranes in the field, or a combination of both.

4.4 Geomembrane leaks can be caused by poor quality of the subgrade, poor quality of the material placed on the geomembrane, accidents, poor workmanship, manufacturing defects, and carelessness.

4.5 Experience demonstrates that geomembranes can have leaks caused during their installation and placement of material(s) on the geomembrane.

4.6 Electrical leak location methods are an effective and proven quality assurance measure to locate leaks. Such methods have been used successfully to locate leaks in electrically insulating geomembranes such as polyethylene, polypropylene, polyvinyl chloride, chlorosulfonated polyethylene, and bituminous geomembranes installed in basins, ponds, tanks, ore and waste pads, and landfill cells.

4.7 The principle behind these techniques is to place a voltage across a sufficiently electrically insulating geomembrane and then locate areas where electrical current flows through leaks in the geomembrane (as shown schematically in Fig. 1). Other electrical leak paths such as pipe penetrations, flange bolts, steel drains, and batten strips on concrete and other extraneous electrical paths should be electrically isolated

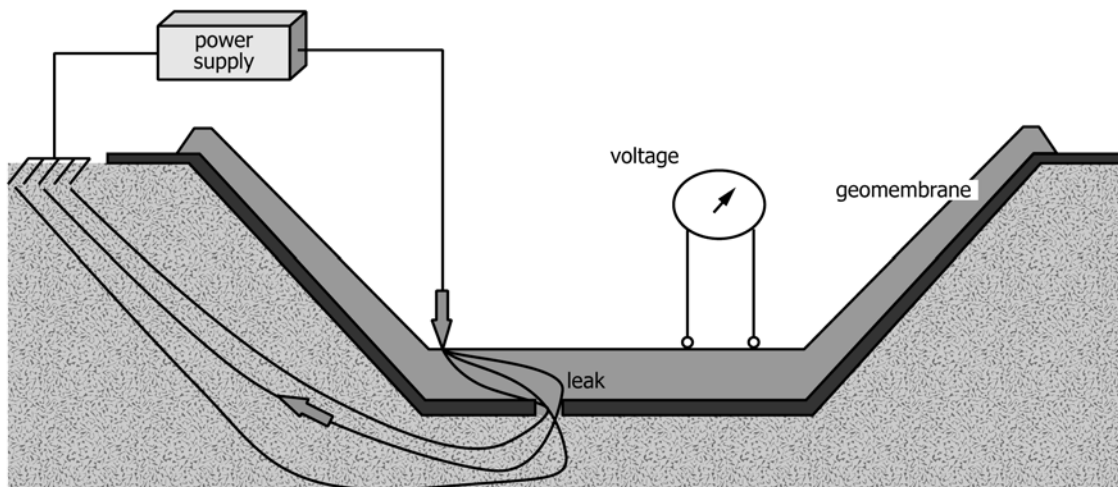


FIG. 1 Schematic of the Electrical Leak Location Method (Earthen Material-Covered Geomembrane System is Shown)