INTERNATIONAL

Designation: ~~D7002 – 15~~ D7002 – 16

Standard Practice for Electrical Leak Location on Exposed Geomembranes Using the Water Puddle Method[1]

This standard is issued under the fixed designation D7002; 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 practice is a performance-based standard for an electrical method for locating leaks in exposed geomembranes. For clarity, this practice uses the term "leak" to mean holes, punctures, tears, knife cuts, seam defects, cracks, and similar breaches in an installed geomembrane (as defined in 3.2.5).

1.2 This practice can be used for geomembranes installed in basins, ponds, tanks, ore and waste pads, landfill cells, landfill caps, canals, and other containment facilities. It is applicable for geomembranes made of materials such as polyethylene, polypropylene, polyvinyl chloride, chlorosulfonated polyethylene, bituminous geomembrane, and any other electrically insulating materials. This practice is best applicable for locating geomembrane leaks where the proper preparations have been made during the construction of the facility.

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

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]

D4439 Terminology for Geosynthetics

D6747 Guide for Selection of Techniques for Electrical Leak Location of Leaks in Geomembranes

D7703 Practice for Electrical Leak Location on Exposed Geomembranes Using the Water Lance Method

[1] This practice 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, 2015~~Jan. 1, 2016. Published ~~January 2015~~January 2016. Originally approved in 2003. Last previous edition approved in ~~2010~~2015 as D7002~~D7002–10.~~-15. DOI: ~~10.1520/D7002-15.~~10.1520/D7002-16.

[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.

D7953 Practice for Electrical Leak Location on Exposed Geomembranes Using the Arc Testing Method

3. Terminology

3.1 *Definitions:*

3.1.1 For general definitions used in this practice, refer to Terminology D4439.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *artificial leak, n*—an electrical simulation of a leak in a geomembrane.

3.2.2 *conductive-backed geomembrane, n*—a specialty geomembrane manufactured using coextrusion technology featuring an insulating layer in intimate contact with a conductive layer.

3.2.3 *current, n*—the flow of electricity or the flow of electric charge.

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

3.2.5 *leak, n*—for the purposes of this document, 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.

3.2.6 *leak detection sensitivity, n*—the smallest leak that the leak location equipment and survey methodology are capable of detecting under a given set of conditions. The leak detection sensitivity specification is usually stated as a diameter of the smallest leak that can likely be detected.

3.2.7 *poor contact condition, n*—for the purposes of this practice, a poor contact condition means that a leak is not in intimate contact with the 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 *probe, n*—for the purposes of this practice, any conductive structure that is attached to a power source.

3.2.9 *squeegee, n*—for the purposes of this document, a squeegee is a device used to contain and push water on top of an exposed geomembrane. It may consist of a handle and a transverse piece at one end set with a strip of leather or rubber, or a roller apparatus.

3.2.10 *water puddle, n*—a small pool of water placed on the geomembrane to create a conduit for current to flow through any leaks.

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 Electrical leak location methods are an effective and proven quality assurance measure to detect and locate leaks.

5. Summary of Exposed Geomembrane Electrical Leak Location Methods

5.1 *Principles of the Electrical Leak Location Methods for Exposed Geomembranes:*

5.1.1 The principle of the electrical leak location methods is to place a voltage across a geomembrane and then locate areas where electrical current flows through leaks in the geomembrane.

5.1.2 Currently available methods include the water lance method (Practice D7703), the arc testing method (Practice D7953), and the water puddle method.

5.1.3 All of the methods listed in 5.1.2 are effective at locating leaks in exposed geomembranes. Each method has specific site and labor requirements, survey speeds, advantages and limitations. A professional specializing in the electrical leak location methods can provide advice on the advantages and disadvantages of each method for a specific project.

5.1.4 Alternative ASTM Standard Practices for electrical leak location survey methods should be allowed when mutually agreeable and warranted by adverse site conditions, clearly technical superiority, logistics, or schedule.

6. Water Puddle Method

6.1 A summary of the method capabilities and limitations is presented in Table 1.

NOTE 1—If used, conductive-backed geomembrane must be installed per the manufacturer's recommendations in order to allow it to be tested using