



Standard Guide for Selection of Techniques for Electrical Detection of Potential Leak Paths in Geomembranes¹

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^{ε1} NOTE—Editorial corrections were made in November 2002.

1. Scope

1.1 This standard guide is intended to assist individuals or groups in assessing different options available for locating potential leak paths in installed geomembranes through the use of electrical methods. For clarity, this document uses the term potential leak path to mean holes, punctures, tears, knife cuts, seam defects, cracks and similar breaches over the partial or entire area of an installed geomembrane.

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 *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 requirements prior to use.*

2. Referenced Documents

- 2.1 *ASTM Standards:*
D 4439 Terminology for Geosynthetics²

3. Terminology

3.1 Definitions:

3.1.1 *electrical leak location, n*—any method which uses electrical current or electrical potential to detect and locate potential leak paths.

3.1.2 *geomembrane, n*—an essentially impermeable membrane used with foundation, soil, rock, earth or any other geotechnical engineering related material as an integral part of a manmade project, structure, or system.

3.1.3 *geosynthetic, n*—a planar product manufactured from polymeric material used with soil, rock, earth, or other geotechnical engineering related material as an integral part of a manmade project, structure, or system.

3.1.4 *potential leak paths, n*—for the purposes of this document, a potential leak path is any unintended opening, perforation, breach, slit, tear, puncture, crack, or seam breach. Scratches, gouges, dents, or other aberrations that do not completely penetrate the geomembrane are not considered. Leak paths detected during surveys have been grouped into five categories: (1) Holes—round shaped voids with downward or upward protruding rims, (2) Tears—linear or areal voids with irregular edge borders, (3) Linear cuts—linear voids with neat close edges, (4) Seam defects—area of partial or total separation between sheets, and (5) Burned through zones—areas where the polymer has been melted during the welding process.

4. Significance and Use

4.1 Types of potential leak paths have been related to the quality of the sub-grade material, quality of the cover material, care in the cover material installation and quality of geomembrane installation.

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

4.3 The damage to a geomembrane can be detected using electrical leak location systems. Such systems have been used successfully to locate leak paths 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.

4.4 The principle behind these techniques is to place a voltage across a synthetic geomembrane liner and then locate areas where electrical current flows through discontinuities in the liner (as shown schematically in Fig. 1). Insulation must be secured prior to a survey to prevent pipe penetrations, flange bolts, steel drains, and batten strips on concrete to conduct electricity through the liner and mask potential leak paths. The liner must act as an insulator across which an electrical potential is applied. This electric detection method of locating potential leak paths in a geomembrane can be performed on

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² *Annual Book of ASTM Standards*, Vol 04.09.