
SPECIFICATIONS GUIDE

WATER PUDDLE SLOPE METHOD

The Water Puddle Slope Method for Bare-Liner Surveys is:

- Applicable to double geomembrane liner systems for geosynthetic applications (double-lined systems).
- Performed when the top-most, relative geomembrane liner is exposed and bare, is conductive-backed, contains a conductive geotextile, contains an underlying geosynthetic clay liner, or has a layer of drainage/filtration soil directly underneath.
- Conducted on smooth geomembrane side slopes with a moderate to severe inclined plane angle of 14° or greater (slope gradient of 4H:1L or steeper).
- Conducted on textured geomembrane side slopes with a moderate to severe inclined plane angle of 22° or greater (slope gradient of 2.5H:1L or steeper).

Please note that this guide:

- May be used in the electrical leak detection quality assurance section of the specifications document.
- Should be reviewed carefully, modified and/or combined accordingly to fit the specifications format per ASTM Standard.
- May be changed, revised, or updated accordingly from time-to-time.
- Is only a reference guide and may not apply to all geomembrane-lined geosynthetic systems or applications.

Please contact **Beyond Leak Detection** for any comments, concerns, or questions regarding the leak detection service or this guide.

SECTION 1 - REFERENCES

The required electrical leak detection survey will be conducted in accordance to the guidelines mentioned in the ASTM Standards, specifically, the following listed below.

- **ASTM D6747 - 15**
Selection of Techniques for Electrical Leak Location of Leaks in Geomembranes
- **ASTM D7002 - 16**
Electrical Leak Location on Exposed Geomembranes Using the Water Puddle Method

SECTION 2 - SUBMITTALS

The Electrical Leak Detection Testing Firm shall submit an Electrical Leak Detection Survey Work Plan to Engineer for approval prior to commencement of the leak detection survey. The Work Plan shall include the following listed below.

- Descriptions of the proposed leak detection survey methods on the relative geomembrane
- Procedures on the leak detection survey method
- Procedures on how a leak is located and pinpointed
- All equipment used to conduct the survey such as power supply, leak detection device and survey probe
- Amount of round-trip mobilizations required to complete the leak detection survey
- Duration of leak detection survey in work days or hours
- Resumes of on-site field managers and/or technicians to perform the leak detection survey
- List of required site preparations, responsibilities, materials, and equipment in order to maximize the leak detection sensitivity level and survey efficiency when conducting the survey
- Procedures on daily field calibrations for the proposed survey method
- Sample of field documentation forms for quality reassurance
- List of qualified projects demonstrating the qualifications and experience mentioned in SECTION 3 - QUALIFICATIONS
- Sample of a final report in accordance to the ASTM Standards of the proposed leak detection survey method

SECTION 3 - QUALIFICATIONS

The Electrical Leak Detection Testing Firm shall be a third party firm that is solely independent, and unrelated by ownership or relation, to the General Contractor, CQA Consultant, Engineer, or Geomembrane Installation Contractor. The testing firm shall have qualifications and experience in conducting the proposed leak detection survey method with having tested a minimum of 2,500,000 ft² of geomembrane material within the previous three years. In addition, the leak detection surveys must be managed or supervised by an experienced professional or technician with a minimum electrical leak detection testing experience of three years and having tested a minimum of 1,000,000 ft² of geomembrane material for the proposed leak detection survey method. The testing firm qualified to provide electrical leak detection is Beyond Leak Detection located in Leon Valley, Texas with a contact number of (210) 684 - 8886.

SECTION 4 - PROJECT DETAILS

The project details and specifications must be provided to the Electrical Leak Detection Testing Firm prior to any leak detection surveys. The General Contractor shall provide the following listed below.

- Project specifications documents
- Name of application
- Name of the facility of where the application is located
- Location of the facility (physical address with city, state, and zip code)
- Size of application in square feet (or quantity of geomembrane required for testing)
- Map of the application
- Complete top-down geosynthetic lining system with details showing all layer names of the liner system
- Details of all geomembrane penetrations including, but not limited to, welds, adjacent lining systems, structures and obstructions, mounting flanges, batten strips, concrete pads, pipes, cables, drains, pumps, etc.
- Electrical schematics or wiring of the application

SECTION 5 - PREPARATIONS AND REQUIREMENTS

The General Contractor shall be responsible for preparing the application for the Electrical Leak Detection Bare-Liner Survey using, specifically, the Water Puddle Slope Method. These preparations and requirements are to:

- Provide any safety training, site specific training, drug tests, vehicle driving tests or inspections to obtain any clearances.
- Provide supervised laborers to assist in the leak detection service during the preparation, survey, or investigation process.
- Provide a light source (if the survey were to be conducted during the night).
- Disconnect and remove conductive materials and isolate ground sources that are electrically connected with the operations layer inside the application.
- Zone segments of the survey area to prevent technicians from surveying into a restricted, non-required or unintended area.
- Schedule or provide a water truck, source of water, and driver during the leak detection process.
- Verify the top-most, relative geomembrane in the application is not frozen, or contain a surface layer of ice.
- Remove and dispose of any residual water on the top-most, relative geomembrane.
- Confirm the layering directly underneath the top-most, relative geomembrane to be tested contain a properly-prepared subgrade or medium with sufficient conductivity.
- Minimize or remove trapped air pockets (aka “hippos” or “ballooning”) and wrinkles.
- Location and reference marks on the geomembrane must not be erased or covered until the documentation, pinpointing, and repair process is complete.
- Purchase or provide industrial type garden hoses.
- Verify the side slopes are within the proper parameters.
- Provide access to place temporary electrodes through slits for electrical contact with the conductive medium (if copper wire electrodes were not installed).
- Install an 8-AWG solid, bare copper wire electrode prior to installation of the top-most, relative geomembrane (typical or conductive-backed), conductive geotextile, geosynthetic clay liner, or drainage/filtration soil.

SECTION 6 - EXECUTION

The Electrical Leak Detection Testing Firm will provide core responsibilities when onsite. The testing firm will:

- Assess and inspect the site preparedness and conditions to determine if all site preparations and conditions have been fulfilled or are appropriate for the leak detection survey.
- Confirm the proposed leak detection survey method can be performed on the geomembrane along the side slopes.
- Notify the General Contractor or CQA Consultant if site preparations or conditions are not appropriate or complete and execute corrective measures for site readiness to ensure all site preparations are complete and valid.
- Prepare the application, perform the calibration, and conduct the proposed leak detection survey method in accordance to guidelines mentioned in ASTM D7007-16.
- Inform the General Contractor and/or CQA Consultant the locations of all leaks and document all locations and descriptions of leaks.

SECTION 7 - REPORTS

Field daily reports are provided to General Contractor at the end of each work day, or on the last field work day (if requested). In general, the report entails the name of each technician, the daily weather climate, the work accomplished, fieldwork hours, standby hours, survey hours (if applicable) and preparations or requirements for the next work day. After completion of the project, a final report will be generated within 14 work days. The final report will explain how and what survey methods were used to complete the project, the calibration procedure or sensitivity test, leak signals or anomalies found (if any), map showing the approximate locations and descriptions of leaks, length of survey period, and the name of each experienced professional or technician who performed the leak detection survey. The reports, whether preliminary or final, will be provided to General Contractor and/or CQA Consultant.