




Special sessions on Geosynthetics, ICID Conference in Marrakech, November 25, 2021 

ENSURING LEAK-PROOF RESERVOIRS WITH GEOELECTRICAL LEAK DETECTION SURVEYS ON EXPOSED OR COVERED GEOMEMBRANES


Carl Charpentier, Groupe Alphard, Canada



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* Mr. Charpentier has been working in Electrical Leak Location Surveys since 2001. With his background in electronics, he first started by making new equipment and has been improving methods and electronics since. He is part of the ASTM committee and has been publishing plenty of documentation pertaining to ELL.

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WHAT IS ELL?

- * Basically, an electrical leak location is comprised of several methods to verify 100% of the integrity of an installed geomembrane. It is also the only way to detect damage after the installation of the drainage/protection layer.



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WHAT ARE ELL OBJECTIVES?

- * Detect and locate damage in an installed geomembrane (exposed or covered)
- * Locate damage in order to facilitate repair, as opposed to a conventional Head Pressure Test
- * Validate the performance of the installer and contractor, and isolate responsibility of the installer and general contractor
- * Ensure site design was adequate, including the types of geosynthetics, construction methods, and natural materials specified in the design
- * Lower leakage risks (contamination, loss of valuable product)



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**WHAT ABOUT QC (QUALITY-CONTROL)
OR CQA (CONSTRUCTION QUALITY ASSURANCE)**

- * Quality Control (QC): Internal quality verification by the liner installer
- * Construction Quality Assurance (CQA): Third-party verification that specifications have been followed, double-checking the following specific elements:
 - * Efforts focused on seams in both cases
 - * Only applicable on exposed geomembranes
 - * ELL can be part of CQA as an additional way of reducing leakage risks

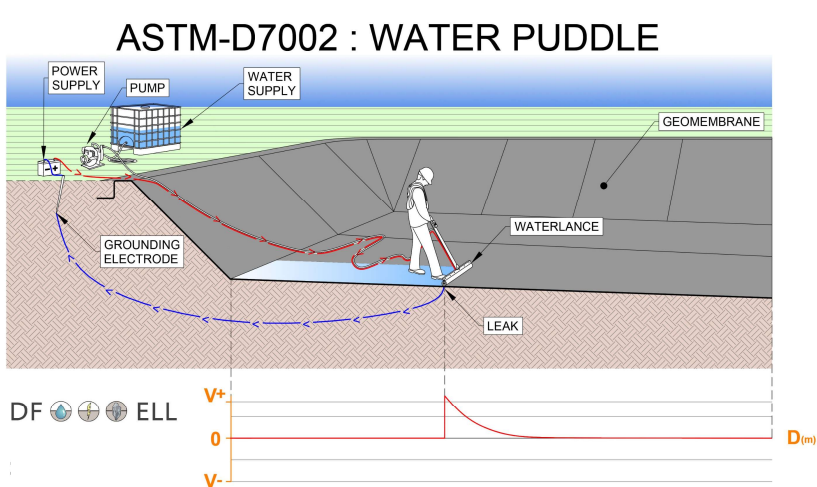



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ASTM-D7002 : WATER PUDDLE

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WATER PUDDLE: TYPICAL LEAKS

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ASTM-D7007 : DIPOLE

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WATER PUDDLE: STATISTICS

- * 1,030 leaks detected over 10 years of surveys, ranging from 1 mm² to 400 cm²
- * Average of 5.38 leaks/hectare on HDPE, PVC, and bituminous geomembranes
- * 11 out of 76 projects had more than 20 leaks/hectare
- * Out of 40 projects that had constant third-party CQA on-site, 37 had leaks



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DIPOLE: STATISTICS

- * 931 leaks detected over 10 years of surveys, ranging from 1 mm² to 240 m²
- * Average of 4.46 leaks/hectare on HDPE, PVC, and bituminous geomembranes
- * 13 out of 90 projects had more than 20 leaks/hectare
- * Out of 47 projects that had constant third-party CQA on-site, 22 had leaks
- * More than a third of the projects showing defects had at least one large leak (>50 cm²)



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CONCLUSION

- * Only two (2) of the several ELL methods were presented in this paper. It is possible to refer to ASTM D6747 for a guide of all standardized methods
- * The use of exposed and covered ELL can locate pretty much any damage done during transportation, storage and construction
- * For the long term efficiency, CQA is a major factor (durability of seams)
- * If there are problems with a lined work once it is in service, it is often possible to do a dipole survey if the material layer above the geomembrane is not too thick (technically < 1m)


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THANK YOU

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leak-location-alphard.com



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