

Title: Case Histories Illustrating How ASTM Test Methods are Used to Demonstrate Performance and Compliance with GRI-GM13 Specification for HDPE Geomembranes

Abstract:

HDPE Geomembranes provide a low permeability barrier between contained materials and the outside environment. The barrier function is related to the design life of the facility. Over the past five decades, polyethylene geomembranes have been used successfully in numerous waste containment applications. Performance is derived largely from the quality of the material, good installation, and proper design. The purpose of this presentation is to clarify critical issues with regard to polyethylene HDPE geomembrane manufacturing that are the focus of ongoing discussions within the waste containment industry and contained in GRI-GM13. This generic specification, currently provides designers guidance as to specific values and testing for mechanical, physical, and endurance properties required for performance, as published by GSI on its website, www.geosynthetic-institute.org.

Although the geomembrane containment industry is mature, there still exists (and most probably always will) several quality issues related to the long-term performance of geomembranes. The fact that HDPE polyethylene geomembranes have become somewhat standard for environmental containment projects, the issues presented in this paper consider only polyethylene geomembranes.

In addition to a review of the properties within GRI-GM13, this presentation will illustrate two case histories of exhumed geomembranes beneath MSW subtitle D landfills. The geomembranes taken from these landfills have been in service for the over 20 years insitu. Both of the liners were exhumed due to a lateral expansion at the site. The owner plans to tie the new cell's construction into the existing liner system. Hence the opportunity arose to exhume a section of smooth and textured 1.5 mm (60 mil) HDPE geomembranes from the two sites. These geomembranes that were in service since their installation and were experiencing actual field conditions of compression, actual site temperatures and leachate exposure.



Fig 1- Overview Photograph of Site #1



Fig 2- GM sample being taken from Site #1



Fig 3- Overview Photograph of Site #2



Fig 4- GM sample being taken from Site #2

Most durability research (covered under ASTM D35.02) has been laboratory work making use of accelerated aging tests. Rarely are we presented the opportunity to access actual geomembranes that have undergone field exposed conditions. Fortunately, quality assurance testing of the geomembrane during installation was very rigorous and used ASTM Standards that are still currently used. Thus, with this new data, a direct comparison will be made between the as-manufactured test results versus current test results after exposure to MSW long-term field conditions at the site. These results show how important it is to have consensus test methods contained within generic specifications.

References

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Vita:

George R. Koerner is Director of the Geosynthetic Institute. He is in charge of laboratory accreditation, field certification and continuing education at the Institute. He also manages several research projects and has published over 350 technical papers in his 35 year association with polymers used in blow ground construction. Dr. Koerner’s Ph.D. is from Drexel University in Geotechnical Engineering. He is a registered professional engineer and a certified quality auditor. George has received many awards over the years. The most notable being IFAI’s Environmental Technologies Award of Excellence 1995, ASCE’s DVGI Geotechnical Engineer of the year in 2004, the title of ASTM Fellow in 2013 and GMA’s first Koerner lecturer in 2017.

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