

An Investigation of the Effects of Gripping Systems in Geosynthetic Shear Testing

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Abstract : The use of geosynthetic materials in geotechnical engineering projects has rapidly increased over the past several years. These materials have resulted in improved performance and cost reduction of geotechnical structures as compared to the use of conventional materials. However, working with geosynthetics requires knowledge of interface parameters for design. These parameters are typically determined by the large direct shear device in accordance with ASTM-D5321 and ASTM-D6243 standards. Although these laboratory tests are standardized, the quality of the results can be largely affected by several factors that include; the shearing rate, applied normal stress, gripping mechanism, and type of the geosynthetic specimens tested. Amongst these factors, poor surface gripping of a specimen is the major source of the discrepancy. If the specimen is inadequately secured to the shearing blocks, it experiences progressive failure and shear strength that deviates from the true field performance of the tested material. This leads to inaccurate, unsafe, and cost ineffective designs of projects. Currently, the ASTM-D5321 and ASTM-D6243 standards do not provide a standardized gripping system for geosynthetic shear strength testing. Over the years, researchers have come up with different gripping systems that can be used such as; glue, metal textured surface, sandblasting, and sandpaper. However, these gripping systems are regularly not adequate to sufficiently secure the tested specimens to the shearing device. This has led to large variability in test results and difficulties in results interpretation. Therefore, this study was aimed at determining the effects of gripping systems in geosynthetic interface shear strength testing using a 300 x 300 mm direct shear box. The results of the research will contribute to easy data interpretation and increase result accuracy and reproducibility.

Keywords : geosynthetics, shear strength parameters, gripping systems, gripping

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