Springer

International Journal of Geosynthetics and Ground Engineering (2022) 8:16

https://doi.org/10.1007/s40891-022-00361-7

ORIGINAL PAPER

Experimental Investigation of the Tensile Response of Stiff Fiberglass Geogrid Under Varying Temperatures

Mohamed Shokr, Mohamed A. Meguid & Sam Bhat

Received: 30 August 2021 / Accepted: 17 January 2022 ©

Abstract

Soil reinforcement placed at shallow depth below ground surface is usually exposed to seasonal variation in temperature that can affect the mechanical properties of the material, particularly in cold climates. It is, therefore, essential to understand the effect of temperature on the tensile response of geosynthetic material and consider these effects in the design of reinforced soil structures built in these extreme environments. High-strength fiberglass geogrids are relatively new reinforcement materials that have enhanced properties with a potential use in a wide range of applications. To measure the effect of temperature on the material's ultimate strength, strain at failure, and modulus of elasticity, 48 tensile tests were carried out at different temperatures that range from − 30 to 40 °C following ASTM D6637. The results indicated that the ultimate tensile strength and modulus of elasticity increased by about 24% as the ambient temperature decreased from room temperature to − 30 °C. However, the tested samples showed no significant in the measured strain at failure. It is also found that, for the range temperatures considered in this study, the strain at ultimate strength did not exceed 2%, which is significantly lower than that reported for comparable geogrid materials.