

Mechanical Behavior of Geosynthetics vs the Combining Effect of Aging, Temperature and Internal Structure

Authors : Jaime Carpio-García, Elena Blanco-Fernández, Jorge Rodríguez-Hernández, Daniel Castro-Fresno

Abstract : Geosynthetic mechanical behavior vs temperature or vs aging has been widely studied independently during the last years, both in laboratory and in outdoor conditions. This paper studies this behavior deeper, considering that geosynthetics have to perform adequately at different outdoor temperatures once they have been subjected to a certain degree of aging, and also considering the different geosynthetic structures made of the same material. This combining effect has been not considered so far, and it is important to ensure the performance of geosynthetics, especially where high temperatures are expected. In order to fill this gap, six commercial geosynthetics with different internal structures made of polypropylene (PP), high density polyethylene (HDPE), bitumen and polyvinyl chloride (PVC), or even a combination of some of them have been mechanically tested at mild temperature (20°C or 23°C) and at warm temperature (45°C) before and after specific exposition to air at standardized high temperature in order to simulate 25 years of aging due to oxidation. Besides, for 45°C tests, an innovative heating system during test for high deformable specimens is proposed. The influence of the combining effect of aging, structure and temperature in the product behavior have been analyzed and discussed, concluding that internal structure is more influential than aging in the mechanical behavior of a geosynthetic versus temperature.

Keywords : geosynthetics, mechanical behavior, temperature, aging, internal structure

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