

Porosity and Ultraviolet Protection Ability of Woven Fabrics

Authors : Polona Dobnik Dubrovski, Abhijit Majumdar

Abstract : The increasing awareness of negative effects of ultraviolet radiation and regular, effective protection are actual themes in many countries. Woven fabrics as clothing items can provide convenient personal protection however not all fabrics offer sufficient UV protection. Porous structure of the material has a great effect on UPF. The paper is focused on an overview of porosity in woven fabrics, including the determination of porosity parameters on the basis of an ideal geometrical model of porous structure. Our experiment was focused on 100% cotton woven fabrics in a grey state with the same yarn fineness (14 tex) and different thread densities (to achieve relative fabric density between 59 % and 87 %) and different type of weaves (plain, 4-end twill, 5-end satin). The results of the research dealing with the modelling of UPF and the influence of volume and open porosity of tested samples on UPF are exposed. The results show that open porosity should be lower than 12 % to achieve good UV protection according to AS/NZ standard of tested samples. The results also indicate that there is no direct correlation between volume porosity and UPF, moreover, volume porosity namely depends on the type of weave and affects UPF as well. Plain fabrics did not offer any UV protection, while twill and satin fabrics offered good UV protection when volume porosity was less than 64 % and 66 %, respectively.

Keywords : fabric engineering, UV radiation, porous materials, woven fabric construction, modelling

Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development

Conference Location : Chicago, United States

Conference Dates : December 12-13, 2020