TEXTILE AIR DISTRIBUTION SYSTEM

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Abstract

This article presents the concept, design, and preliminary testing of a textile air distribution system using seamless knit technology. The developed ventilation duct is intended for use in temporary accommodation facilities, protective structures, military tents, and mobile halls. The solution aims to evenly distribute air, minimize local drafts, improve thermal comfort, and enable the integration of additional functions. The duct's design is lightweight, flexible, easy to transport and install, while minimizing the number of potential leaks and mechanical weaknesses. The textile duct can function not only as a duct but also as an air diffuser, allowing air to flow through the porous structure of the material or through zones of controlled permeability.The textile duct was made of polypropylene. Measurements were conducted in laboratory conditions to ensure repeatability and reproducibility of the results. Air velocity was measured at five points along the duct's cross-section, along different lengths. The location of these points allowed for the assessment of uniform airflow and the presence of local zones of air velocity variation. The research section discusses the measurement setup, velocity and temperature measurement procedure, and the method for analyzing the results using isometric maps generated using Kriging interpolation. The results confirm that the fabric structure, its grammage, and the channel stabilization method influence the flow velocity distribution, and that textile channels can be a practical alternative to conventional rigid channels in mobile applications.

Keywords: Microclimate, mechanical ventilation, textile air duct, seamless knitwear.

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