Influence of Multilayer Fabric Construction on Thermal Conductivity of Protective Fabrics

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Abstract:

The effect of layering on properties such as air and water vapor permeability, and thermal conductivity is crucial for materials meant to be worn as clothing. The majority of these multi-layered assemblies are three-layered, as each layer performing a specific function and working together to achieve of thermal physiological equilibrium. One of the main factors that contribute to thermal resistance is the still air trapped in the fabric. Thermal protective clothing is primarily designed to provide protection from thermal hazards such as exposure to high temperature sources and hot gases. Heat transfer from the thermal hazards can be by radiation, convection or conduction. This study identifies the relationship between the construction of multilayer fabrics used in the production of protective fabrics, and their thermal conductivity property by using 3 layers and 5 materials. The results show that there are opportunities to control protective fabric thermal conductivity. Further, thermal management attributes of Protective Fabrics materials can also be significantly improved to reduce thermal loss.

Keywords:

Technical Textiles, Protective Textiles, Thermal Protective Textiles, Multilayer Fabrics, Thermal Comfort

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