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Relation between garment size and thermal protective performance of process operations clothing

Abstract:

The purpose of this study was to examine the effect of air gap thickness between body and clothing on the thermal protective performance of clothing. Twelve firefighters participated in this study and were exposed to three different radiation intensities (1.5, 2.0, and 2.5 kW/m²). The participants wore one-layer process operators protective clothing and made stepping movements during the heat exposure. The air gap was estimated using the difference between body and clothing circumferences and skin temperatures were measured at five body locations during the tests. At low radiation intensities (1.5 and 2.0 kW/m²) the air gap thickness was positively related to exposure time and negatively to skin temperature change over time. These observations were most prominent for the abdomen and upper arm. This study shows the effect of the clothing fit on the thermal protective performance and indicates the importance of stable air gaps entrapped between body and clothing. This study provides evidence for consideration of the clothing fit in the design of process operators heat protective clothing. Further research needs to be done for the effects of the fit at and above 2.5 kW/m², and the effects of realistic body movements.

Keywords

Protective clothing; air gap; thermal protective performance; heat; skin temperature.