



STP1544

# Translation between Heat Loss Measured Using Guarded Sweating Hot Plate, Sweating Manikin, and Physiologically Assessed Heat Stress of Firefighter Turnout Ensembles

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### Abstract

Sweating skin models and instrumented thermal manikins are commonly used to assess the heat stress potential of materials used in protective clothing. This research describes the relationship observed between heat loss through firefighter turnout ensembles measured using a sweating thermal manikin and that measured with a guarded sweating hot plate. Materials and garment level instrument measures are compared on the basis of their ability to predict human physiological responses related to heat stress in firefighter turnout systems. Sweating hot plate and manikin test results for selected firefighter turnout ensembles are compared to human wear studies in which firefighter turnout ensembles were worn in different environmental conditions. Sweating manikin tests are used to explain differences in the human physiological response and how these measures are related to turn-out heat transfer properties measured using a sweating hot plate. This study confirms the utility of sweating manikins in characterizing the effects of clothing design, fit, and layers on heat and moisture transfer. Thermal manikins are shown to be valuable tools for evaluating the distribution of heat loss through

different areas of protective gear.

**Keywords:**

sweating manikin, heat stress, sweating hot plate, thermal manikin, total heat loss, thermal resistance, evaporative resistance, THL, physiological response

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Read and translate the text. Fire prevention measures. Fire prevention measures of ships are provided by its constructive, organizational and technical aspects and also by adequate actions of the crew in their fight against fire. It is noted that considerable per cent of fire accidents are connected with the explosion and ignition of light type fuel. Explosions of hydraulic systems, short circuits, defects in electrical equipment have also high frequency. Usually fire in the engine room is the result of lubricants ignition in the bearings of the main and auxiliary mechanisms. The other type of Translation between Heat Loss Measured Using Guarded Sweating Hot Plate, Sweating Manikin, and Physiologically Assessed Heat Stress of Firefighter Turnout Ensembles. K. Ross, Roger L. Barker, A. Shawn Deaton. Materials Science. 2012. A comprehensive data base for estimatng clothing insulation. Elizabeth A. Mccullough, Byron W. Jones, Jerry Huck. Engineering. Assessment of both heat stress and heat strain can be used for evaluating the risk to worker safety and health. A deci-sion making process is suggested in Figure 1. The exposure guidance provid-ed in Figures 1and 2 and in the associated Documentation of the TLV® repre-sents conditions under which it is believed that nearly all heat acclimatized, adequately hydrated, unmedicated, healthy workers may be repeatedly exposed without adverse health effects. The Action Limit (AL) is similarly pro-TECTIVE of unacclimatized workers and represents conditions for which a heat stress management program s... The expo-sure guidance is not afine line between safe and dangerous levels. Heat Strain is the overall physiological response resulting from heat stress. Translation between Heat Loss Measured Using Guarded Sweating Hot Plate, Sweating Manikin, and Physiologically Assessed Heat Stress of Firefighter Turnout Ensembles. Article. Oct 2012. Sweating hot plate and manikin test results for selected firefighter turnout ensembles are compared to human wear studies in which firefighter turnout ensembles were worn in different environmental conditions. Sweating manikin tests are used to explain differences in the human physiological response and how these measures are related to turnout heat transfer properties measured using a sweating hot plate. This study confirms the utility of sweating manikins in characterizing the effects of clothing design, fit, and layers on heat and moisture transfer.

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