

# A MODEL TO ASSESS THE POTENTIAL OF PPE ENSEMBLES TO GENERATE OR EXACERBATE HEAT STRAIN

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Many PPE ensembles involve persons wearing effectively water vapour impermeable clothing in conjunction with gloves and RPE. It is therefore essential that planners be able to correctly identify the maximum safe wear duration in each likely use situation to ensure that life and/or performance threatening heat strain does not occur. Current Heat Strain/Heat Stress models in both Europe and the USA default to ISO 7933:2004, e.g. BS7963:2000 and the current ACGIH Threshold Limit Value for Thermal Stress. However, ISO 7933 and its related standards are based on a number of assumptions that are contrary to accepted thermodynamic principles, e.g. the concept of a thick layer of stationary air on the outermost surface of the garment with such air layer being opaque to low frequency radiation. In addition, 7933 cannot accommodate situations where the radiant temperature is higher than the ambient dry bulb temperature and where there can be significant convective loss from the surface of the clothing. The last situation is important as it is commonly experienced by firefighters. The presentation will examine the scientific validity of ISO 7933 and describe a physically rigorous heat transfer model which allows the potential for heat strain to be identified, and therefore avoided.