

Development and Validation of Physiological Performance Models to Correlate the Effect of Ensemble THL - FY13 (921ZBFR)

Objective

To provide the standards organizations with a sound physiological basis for setting THL values in current and future PPE performance standards with a focus on CBRN standards

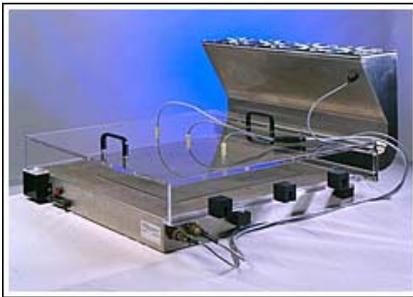


Fig. 1 Total Heat Loss Apparatus

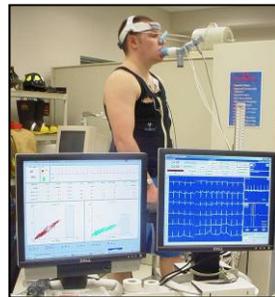


Fig. 2 NPPTL Physiology Lab

Applicable Standards

- NFPA Protective Clothing Standards –1994 (CBRN), 1951 (CBRN), 1971 (CBRN), 1999 (BRN), 1977, and 1992
- ASTM Standards - F 1868 Standard Test Method for Thermal and Evaporative Resistance of Clothing Materials Using a Sweating Hot Plate and Proposed Standard Practice for Determining the Physiological Responses of the Wearer to Protective Clothing Ensembles
- F2668-07 Standard Practice for Determining the Physiological Responses of Wearer to Protective Clothing Ensembles

Stakeholders

- Emergency Responders
- Manufacturers
- Test Laboratories

Key Partners



Project Scope

- 3-year project consisting of a series of experiments to be performed on a thermal manikin and human subjects wearing different type of emergency response protective ensembles (data on skin/core temp, CO₂/O₂, microclimate temp, etc.).
- Collected data will enable the development and validation of physiological performance models to correlate the effect of ensemble THL characteristics on emergency responder performance.

Milestones FY13

- Q1 Abstract on the physiological validation of the THL value to present at the International Conference on Environmental Ergonomics (ICEE).
- Q2 Presentations at the ICEE 2013 and FIERO 2013
Begin heat acclimatization data collection
- Q3 Begin phase 2 data collection and ACSM presentation
- Q4 Send paper on thermal manikin testing (collaboration with TNO) to OD

Outputs

- Conference presentations (3 presentations to date: ECPC, ICEE and FIERO, 1 accepted ACSM presentation)
- Manuscripts to peer-reviewed journals (one peer-reviewed proceeding paper to date, 3 in preparation)
- Presentation of the recommendations on establishment of THL criteria with a physiological basis for use to the NFPA Technical Committees(1994, 1971, 1977, 1951, 1992) and to the ASTM F23.

Outcomes

- Revisions or updates to all applicable NFPA Standards and ASTM Test Methods.
- Outputs cited by other researchers working on heat stress or firefighter PPE.

Updated: 13 March 2013