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CONTACT SIMULATION DEVICES FOR HANDWEAR EVALUATION

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In cold weather, protection for the extremities is important for comfort, work performance and safety. Loss of dexterity, pain and cold-injury to tissue are uncomfortable consequences of improper or inadequate handwear. In an emergency, loss of hand function due to inadequate hand protection can be detrimental to survival. Selection of handwear is important to both military and industrial safety personnel.

At USARIEM, after determining relative dry insulation on a static hand model, the normal testing proceeds to environmental chamber testing with human subjects. Chamber tests are conducted at several temperatures, and two work levels: a) static or sedentary (MET 1) and b) active or dynamic (MET 3). The dynamic activity is walking on a treadmill. The hands are not active.

One important aspect of handwear performance, the protection provided when the hand is in direct contact with objects, such as tools or metallic surfaces, is not tested until the item is actually placed in the field. Thus, functional problems with handwear may not be discovered until a combination of extreme conditions and specific tasks coincide; perhaps after adoption and general issue. It is desirable to determine such deficiencies in the laboratory prior to general field use.

This study describes two devices for testing handwear protection during work. One device is a work simulator for a specific task, 6 min of fuel pumping. The second, an outgrowth of that work, is a universal contact device consisting of an envelope of coolant with a pressure switch. A potential advantage of contact testing is that it may replace a static or sedentary test phase and obtain two sets of information from one test. One hand presses against the envelope, providing a measurement of conductive heat flux or contact, and the other hand remains in a static state.

Cold weather fuel handlers gloves were tested using actual fuel handles on an adjustable mount fitted to a timing device. The subjects were fitted with skin thermocouples on the right and left hands. The pumping effort disrupts blood circulation to the fingers of the pumping hand, but this effect is counteracted by heat generated from static muscular activity. The pump simulator is suitable for testing gloves designed specifically for limited tasks. However, to use a fuel pump or any other task specific simulator to test handwear for general issue to Combat Vehicle Crewmen (CVC) is inappropriate. The presently designed envelops provides a more universal contact test device. Another advantage of the onvelope is that it obviates errors duo to subjects adopting special hand positions that minimize hand to surface contact.