

Liquid Cooling/Warming Garment

This lightweight garment can be used by firefighters, soldiers, and personnel working with hazardous materials.

The NASA liquid cooling/ventilating garment (LCVG) currently in use was developed over 40 years ago. With the commencement of a greater number of extra-vehicular activity (EVA) procedures with the construction of the International Space Station, problems of astronaut comfort, as well as the reduction of the consumption of energy, became more salient.

A shortened liquid cooling/warming garment (SLCWG) has been developed based on physiological principles comparing the efficacy of heat transfer of different body zones; the capability of blood to deliver heat; individual muscle and fat body composition as a basis for individual thermal profiles to customize the zonal sections of the garment; and the development of shunts to minimize or redirect the cooling/warming loop for different environmental conditions,

physical activity levels, and emergency situations.

The SLCWG has been designed and completed, based on extensive testing in rest, exercise, and antiorthostatic conditions. It is more energy efficient than the LCVG currently used by NASA. The total length of tubing in the SLCWG is approximately 35 percent less and the weight decreased by 20 percent compared to the LCVG.

The novel features of the innovation are:

1. The efficiency of the SLCWG to maintain thermal status under extreme changes in body surface temperatures while using significantly less tubing than the LCVG.
2. The construction of the garment based on physiological principles of heat transfer.
3. The identification of the body areas

that are most efficient in heat transfer.

4. The inclusion of a hood as part of the garment.
5. The lesser consumption of energy.

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In accordance with Public Law 96-517, the contractor has elected to retain title to this invention. Inquiries concerning rights for its commercial use should be addressed to:

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