subsystem). Fanger's concepts of PPD and PMV (predicted percentage of dissatisfied and predicted mean vote) were included into the model to make it comparable with an approach of ISO 7730 standard. This standard deals with an assessment of moderate thermal environments. The model was implemented on a simple 8-bit microcomputer. The program was organized in such a way to be usable even for non-experts in the field of thermal physiology. Some simulation experiment results were presented. They generally show a very good performance of a model in predicting thermal comfort conditions. Similarities and differences between the ISO standard approach and the model presented were discussed briefly.

53 **Implementation of SOLAS 74/83 immersion suit standards**

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In 1983, the International Maritime Organization (IMO) adopted the second set of amendments to the International Convention for Safety of Life at Sea 1974 (SOLAS 74). These amendments included specifications and carriage requirements for immersion suits. The specifications for the suits were further interpreted in IMO Resolution A-521, Recommendation on Testing of Lifesaving Appliances. The amendments, now referred to as SOLAS 74/83, enter into force on July 1, 1986. This paper will outline the pitfalls encountered and lessons learned by the author, a staff engineer in the Survival Systems Branch, Merchant Vessel Inspection Division of the U.S. Coast Guard Office of Merchant Marine Safety, in the process of amending our domestic regulations to incorporate the provisions of SOLAS 74/83 with regard to immersion suits. Similar experience has been or is being faced by other staff engineers in connection with other items of approved equipment. The opinions expressed in this paper are, however, those of the author and do not necessarily reflect the position of the U.S. Coast Guard.

Immersion suits, as provided for by SOLAS 74/83, can include a number of devices already in existence in various countries. The IMO delegates obviously reached a compromise intended to allow existing devices to remain in use and production with little or no redesign. SOLAS 74/83 thus recognizes immersion suits which are insulated or uninsulated, and buoyant or non-buoyant. The U.S. Coast Guard has already been approving "exposure suits" for a number of years; these suits are required to be insulated and buoyant. One of the first issues to be dealt with in implementing the SOLAS 74/83 requirements was whether or not to approve uninsulated and/or non-buoyant immersion suits. The uninsulated immersion suit performs "as advertised" only when worn over a standard outfit of clothing which includes two woolen sweaters. The non-buoyant suit must be worn in conjunction with a life preserver. Since the extra time required to don these layers of protection might well cost a seaman his life, the U.S. Coast Guard has thus far rejected the concept of the uninsulated and non-buoyant suits.

IMO Resolution A-521 was prepared almost simultaneously with Chapter III of SOLAS 74/83, and there are places where the resolution seems to conflict with the document it is intended to interpret or apply. For example, the resolution calls for a more stringent hand dexterity test than the Convention itself. Where possible, U.S. Coast Guard regulations have resolved such conflicts in favor of the Convention, using the test called for in the resolution as an alternative where this would be more economical for the applicant. Other conflicts have had to be resolved where the language of IMO is not directly enforceable as a U.S. domestic regulation. We have attempted, in such cases, to preserve enough of the SOLAS 74/83 language to make it clear to other Administrations that our regulations are equivalent to the convention requirements, in order to ensure international marketability of U.S. Coast Guard Approved equipment.

SOLAS 74/83 permits an immersion suit to be carried in place of a lifejacket if the immersion suit meets all the performance standards of a lifejacket. The greatest single obstacle to this is the fact that a buoyant immersion suit, as presently designed, will not turn an unconscious wearer face up in the water. I encourage manufacturers to study this problem further, since a suit which could carry dual approval as an immersion suit and a lifejacket could save shipowners considerable sums of money.