

## IMMERSION SUITS AND LIFE-JACKETS - SCIENTIFIC TESTING

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The "1983 Amendments to the international convention for the safety of life at sea, 1974" (IMO) provide the availability of immersion suits on board merchant ships to be used as personal life-saving appliances. According to the test series performed with different types of immersion suits and an immersible dummy / mannikin it was found that the physical conditions cause a more unfavourable position in the water than it was found during life-jacket tests. The material and shape of the immersion suits influence significantly the safety in the water. At a wave height of 1 m the flooding time of the face (respiratory openings) was found to be with one suit model 0.3 % against 100 % with another model. Appropriate shape and proper attachment of additional buoyant material in the head region of the suit as well as the use of non-absorbent lining would lead to better results as proved by the tests. In case water may penetrate into the suit the use of non-absorbent lining is required, which is not done by several manufacturers. The test results of immersion suits made from Neoprene and models made from other material which were provided with additional linings did not differ significantly when it was taken into account that the Neoprene material alone did not render sufficient buoyancy. Seven different models of immersion suits were tested according to the IMO regulations. All of them could be approved because they fulfilled the requirements of these regulations. Nevertheless, great differences were identifiable which may possibly have a negative effect on the survival at sea.

Due to the quoted new IMO amendments new models of life-jackets have been developed for the use on board merchant ships of the Federal Republic of Germany because the older ones did not reach the required freeboard of 12 cms. Our tests, however, showed that the required height of the freeboard is not the main criteria. It proved that some life-jackets with a freeboard of 3 cms showed the same or even better results than others with 12 cms. Evidently the shape and fit are more important for a proper function and it was found that the mode of fastening to the human body was very different with the individual models. The life-jackets equipped with spray caps / face screens showed the best results.

Also immersion suits equipped with additional buoyant material or life-jackets and with spray caps showed the best test results.

It can be stated that an optimal solution on designing adequate life-saving appliances cannot be achieved by theoretical deliberations. Tests have to be performed as done by us. So one can produce realizable results and thus more efficient and reliable life-saving appliances.