

## OBJECTIVE ASSESSMENT OF LIFEJACKET PERFORMANCE

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In the testing and approval of lifejackets, many authorities require that a series of human subjects should wear the lifejacket typically with a set of ordinary clothing and in relatively warm and calm water. The usual requirements are then to measure the height of the mouth (H-O-M) above the water and the flotation angle of the subjects trunk. Lifejacket performance becomes particularly important when the survivor is no longer able to perform vital survival actions, either as a result of unconsciousness from injury, or hypothermia (in calm water) or from exhaustion or incapacitation. HOM is typically measured by two rod-mounted rulers held in the subject's mouth and the average value then calculated. Flotation angle was usually estimated from the poolside by an observer.

Trials undertaken on behalf of the UK Department of Transport (1) compared the techniques of a graduated angle board beside the subject with using a trigonometrical calculation of depth of their iliac crest in relation to back length. The latter 'dip' technique was very simple and gave close agreement with the angle board. As the subjects relaxed in the water, it was observed that the average HOM decreased when immersed wearing the jackets under test, thus:

	LIFEJACKET				
	1	2	3	4	5
Time 0	154 ± 9	170 ± 6	123 ± 6	132 ± 9	105 ± 7
Time + 2 mins	143 ± 7	165 ± 6	121 ± 6	124 ± 7	104 ± 6

(Values are means ± 1SEM; n=6, expressed as millimetres)

The projection from this result is that the relaxed, unconscious victim with no voluntary control may decrease HOM still further. Whilst this may not present any hazards in calm water in a seaway, lifejacket performance may not be adequate.

Under seaway conditions the aspect of wave slap or splash has received considerable attention and whilst a splash guard has been retrofitted to all rotary wing aircraft lifejackets in the UK North Sea oil operations, there is no requirement for such a device to be fitted to marine lifejackets.

An additional objective measure of lifejacket performance has been developed incorporating a solid state liquid detector. The sensor is 8mm diameter and some 10mm in length, and may be simply secured to any position with adhesive tape. A lightweight 4-core cable is connected via an analogue-to-digital convertor to a Hewlett Packard computer. The software package then allows a histographic representation of the percentage time that the mouth is covered and clear of the water. The duration of the run time is user-selected. In addition to the simple histogram, a more detailed plot of every wave splash (each event) and the duration of each wave splash is also available. Thus enabling a detailed analysis of the pattern of wave insult to the airway to be compared and contrasted. When used in conjunction with the Robert Gordon Anthropometric Maritime Manikin (RAMM) the system provides a unique method of determination of lifejacket performance.

The system is currently being expanded to further identify lifejacket performance, and will include automated measurement of HOM and flotation angle of trunk and head, together with pitch and roll axes measurement of the latter body segments.

Reference (1): Robert Gordons Institute of Technology Report No. PJ4. 1985. Revision of Chapter III - Lifejackets