

32 Immersion suits - realistic and reproducible leak testing

A. Avery and I. Light, Offshore Survival Centre, Aberdeen, Scotland

The concept of the marine or helicopter passenger immersion suit is to provide a one-piece waterproof garment designed to cover the body surface with the exception of face and hands.

Over the last 2 years, the Offshore Survival Centre of the Robert Gordon's Institute of Technology, Aberdeen, Scotland, has carried out fifteen separate marine and helicopter immersion suit evaluations, and in so doing, has been actively involved in perfecting leak testing techniques which are realistic, and above all, reproducible. The content of this paper encapsulates the recent work of the Centre in this area and considers the implications not only to the potential survivor but also to industry and policy makers.

In order to evaluate the water excluding properties of an immersion suit, three separate but inter-related forms of leak testing are carried out, namely:

- a) Jump Test (marine suits only)
- b) Simulated Helicopter Underwater Escape
- c) 20 Minute Wave or Swim Test

The nominal pass/fail mark for these tests are 200mls and by establishing such a standard manufacturers have been encouraged to produce garments of improved design.

This is most noticeable by studying the results of a recent series of leak tests of four helicopter immersion suits for Shell UK Exploration and Production.

The Project consisted of 8 subjects wearing in turn four different suits whilst carrying out a 20 minute swim test and a simulated helicopter underwater escape, thus producing 64 separate leak test results

Water Ingress During 20 Minute Swim Test

	A	B	C	D
	14	60	96	28
	78	74	914	78
	102	92	1114	80
	186	106	1450	88
	188	110	1648	146
	192	154	1748	284
	206	212	1796	292
	740	352	2382	422
Mean	213	145	1398	177
SD	224	96.5	691	139

From the above results it can be seen that suit Type C (the in-service suit) had a totally unacceptable leak rate. Indeed such a leak rate represents a **loss** of initial insulation of between 40% - 50% (Allen, Higenbottam and Redman 1984). As the maintenance of adequate insulation is a significant factor in the survival equation, leaks of the magnitude of Suit C above will significantly decrease the survival expectations for survivors from the hypothermia viewpoint. Suits A, B and C have been designed to meet the specification requiring no greater leak than 200mls and in most cases these suits achieve this acceptable figure.