

## THE DEVELOPMENT AND TESTING OF AN AUTOMATICALLY-INFLATING LIFEJACKET

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Personnel working on the upper decks of Ships and in other **exposed** areas often require protection from the eventuality of falling overboard, in the form of a lifejacket. This lifejacket must not be too bulky or it will **impede the work** which they have to perform. However, it is not uncommon for the victim to be knocked unconscious or otherwise disabled before entering the water in such circumstances, so that an automatically-inflating lifejacket has become the item of choice in the Royal Navy. A series of trials proved **separate** components of the jacket in a range of **extreme** conditions, so as to provide reliable inflation even in **extreme** cold, protection from wavesplash, and minimise the risk of accidental firing, but the **gas charge** required remained untested.

A mixture of prototype, unmodified, and modified production lifejackets manufactured by Lifeguard Equipment were subjected to **preliminary exposure** to temperatures between +5 and -30 degrees C and then immersed in sea-water at -1.9 degrees C. The **same** lifejackets were **also** tested for buoyancy by underwater weighing according to the British **standard**, and used in training procedures in still open water. The **time** taken to start and complete inflation, and the **angle** of flotation and **degree** of head support were assessed during each trial, together with the amount of **gas** discharged from each cylinder.

Initially, it appeared that the portion of the lifejacket stole around the sides and back of the neck was inflating inadequately with a 36 g carbon dioxide **charge**. This resulted in lack of support for the head and neck which could have led to the immersion of a victim's face and subsequent **drowning**.

Calculations using the physical **gas** laws showed that it was not possible to achieve acceptable inflation of the lifejacket under all environmental conditions with a **fixed gas** charge and stole volume. A 35 g **charge** would avoid excessive inflation under tropical temperatures, but provide too little **gas** below 5 degrees C, whereas a 39 g charge, which would be satisfactory at -20 degrees C, would cause overinflation in the heat.

Consequently, it was decided to opt for a **gas** charge of 40 g, which **proved** adequate down to -30 degrees C, coupled with modifications to the cover to assist opening. Although at high temperatures, as experienced in use in the tropics, the jacket inflates to uncomfortably high pressures, this leads to no serious consequences, and the **excess** pressure can be reduced easily by a **conscious** victim.