Maritime and Coastguard Agency

MARINE INFORMATION NOTE

MIN 315 (M)

RESEARCH PROJECT 555: Development of Lifeboat Design

Notice to all Shipbuilders, Shipowners, Marine Equipment Suppliers, Operators, Masters and Surveyors.

This notice replaces MIN 254 (M)

This MIN expires 31December 2009

PLEASE NOTE:-
Where this document provides guidance on the law it should not be regarded as definitive. The way the law applies to any particular case can vary according to circumstances - for example, from vessel to vessel and you should consider seeking independent legal advice if you are unsure of your own legal position.

Summary

The research project was a study into the safety of davit-mounted, side launched ships' lifeboats and their launching systems. The primary objective of the study was to make proposals for measures to improve the hardware performance of lifeboats and contribute to the prevention of accidents.

The project found that:

- All on-load release hooks should be designed and constructed to be stable, ie self-closing, when supporting the weight of the lifeboat;
- A safety case regime should be introduced specifically (and only) for lifeboat on-load release hooks, so as to achieve this aim; and
- The International Convention for the Safety of Life at Sea should be amended to include both this safety case requirement and additional safe design requirements for lifeboat launching equipment.
- An interim measure of by-passing on-load release hooks during drills should be considered.

1. Introduction/ Background

1.1 Lifeboat accidents make headline news. This is for two reasons. Firstly, the function of lifeboats is to save life, and the boats therefore need to be free of danger themselves. Secondly, most lifeboat accidents occur during tests or drills, and it therefore appears ironic that regulations intended to improve safety by requiring these drills should actually lead to injuries and fatalities.

1.2 By international agreement at the International Maritime Organization (IMO), it became a requirement in 1986 for lifeboats to be fitted with on-load release hooks. The intention was to enable a lifeboat to be released from its lowering tackle, even if some tension still remained in the falls (as may occur, for example, when launching into waves).

1.3 Through premature or unexpected opening of one or both hooks during a routine test or drill, the lifeboat either becomes suspended vertically or drops completely into the water, typically resulting in injury or fatality to the crew.

1.4 Accidents also arise from problems with other elements of the equipment used to launch lifeboats, such as winches, falls, gripes, tricing and bowsing gear, etc, but generally these types of accident have less severe consequences.

1.5 Previous studies, by shipping industry organisations and by the Marine Accident Investigation Branch, have examined this range of different accidents and produced recommendations aimed at addressing the various causative factors. These recommendations, often widely disseminated, sought improvements in maintenance and training, and urged design improvements by manufacturers.

1.6 Nevertheless accidents have continued to occur, prompting action by the IMO to reduce the level of risk. Thus, IMO Circulars have been issued in recent years regarding equipment servicing and maintenance, crew training and safety management during lifeboat drills.

1.7 A risk-based approach to design improvements had been proposed for the project. A generic fault tree model of a ship's lifeboat launching system was to have been constructed to examine risk contributions and to facilitate identification of design improvements. This model was to have been validated, refined and developed by a workshop of domain experts from various stakeholder groups. Unfortunately a lack of detailed design information coming from lifeboat manufacturers undermined the technical basis for constructing a realistic model. However an informative and productive workshop was held at which the issues surrounding lifeboat safety and how difficulties might be overcome were discussed.

1.8 Anthropometric data confirm that the human species is increasing in stature and mass across the globe. In some populations the mean mass may exceed the figure required by regulation to be used in lifeboat system design. A similar problem exists with breadth of hip for seating area requirements.

2. Conclusions

2.1 Notwithstanding the contributory factors noted in the IMO Circulars, this study has found that many existing on-load release hooks, whilst satisfying the current regulations, may be inherently unsafe and therefore not fit for purpose.

2.2 This situation arises because some designs of on-load hook can be described as unstable, in that they have a tendency to open under the effect of the lifeboat's own weight and need to be held closed by the operating mechanism. As a result, there is no defence against defects or faults in the operating mechanism, or errors by the crew, or incorrect resetting of the hook after being released.

2.3 The research project concluded that this was the principal reason for almost all of the more serious accidents that have occurred. Furthermore, it considered that the solution lies not in training or maintenance, but in radical re-design of the hook types involved. Improved maintenance, whilst desirable, is unlikely to be a sufficiently effective risk reduction measure because of the harsh operating environment and dwindling levels of skilled resource on board a ship.

2.4 Improved training is similarly unlikely to be a sufficiently effective measure. This is because human error is inevitable, particularly under the difficult working conditions (time pressures,

language barriers, fatigue, cold, dark, wet, etc) which typically prevail on board. Given the reality of this context, it is entirely inappropriate for a safety critical system (ie an unstable design of on-load hook) to be catastrophically susceptible to single human error.

2.5 However, the research has clearly indicated that a stable hook design is achievable. Some designs of on-load hook currently in service, fulfil this objective, and convincing evidence was presented of a new hook design developed explicitly to have stable characteristics.

2.6 Development of lifeboat design regulations has to address whether and how to ensure adequate protection for the larger populations. Should anthropometric values be applied universally or on a geographical basis? There are practical and commercial justifications for both. The study presents a method for calculating mixed population statistics.

2.7 Populations used to determine design anthropometric data represent a small element within the seafaring population. The populations causing concern in respect of current lifeboat designs are a small element of international seafarers.

2.8 If new regulations are to increase the values of human mass and hip width, the question of retrospective legislation has to be addressed. If new requirements are not to be applied retrospectively, seafarers may be put at risk. If they are to be applied retrospectively, the cost-benefit has to be justified.

2.9 The specific design issues controlled by regulations have been examined against anthropometric growth. Generally “overloaded” lifeboats will continue to operate within their safety factors. The principal exception is the on-load release equipment where significantly larger populations may lead to an exceedance of the proof load.

3. Final Recommendations

3.1 Unstable designs of on-load release hook are to be identified with the intention that they be withdrawn from service on all ships and replaced with stable designs. The necessary development of new hooks should be undertaken urgently and the transition made at the earliest possible time.

3.2 A safety performance specification for lifeboat launching systems should be developed and imposed by IMO regulation on the equipment manufacturers, while the responsibility for developing safe and fit for purpose on-load hooks rests with the manufacturers.

3.3 All lifeboat on-load release hooks must prove to be safe and fit for purpose by means of a safety case regime. This regime should comprise a design safety case for each type or make of hook, supplemented by an operational safety case incorporating the design safety case but extended to interface with ship-specific safety management arrangements.

3.4 The design safety case should be submitted for independent review and approval as part of current type-approval activities for equipment. The operational safety case should be similarly submitted for independent review and approval as part of current vessel safety management system approval activities.

3.5 In view of the serious nature of the hazard, only as interim risk reduction measures, to avoid further unnecessary fatalities during mandatory lifeboat tests and trials a system should be introduced whereby maintenance shackles are rigged to by-pass the on-load release hook during lowering and recovery, but are disconnected at all other times.

3.6 Noting the difficulties with on-load release for twin fall launching systems, consideration should be given to adoption of single fall capsules for ships carrying small numbers of persons.

3.7 No specific recommendations concerning anthropometrics arise from the project.

More Information

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