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## **Life-Saving Appliances - Marine Evacuation Systems, Survival Craft and Launching Appliances - Risk Mitigation for Single Point of Failure**

**Notice to all Owners, Masters, Builders, Recognised Organisations and Crew of UK Passenger Ships, and Service Stations and Manufacturers of Survival Craft**

*This notice should be read with SOLAS Chapter III, S.I.1999/2721 as amended, S.I.1999/2723 as amended, Directive 2009/45/EC as amended, and S.I.2000/2687 as amended and MSN1823.*

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### **Summary**

This MGN explains the process to be applied by ship operators to demonstrate the assessment and mitigation of the risk of a single point of failure leading to reduced abandonment capacity.

### **1. Introduction / Background**

- 1.1 Certain passenger ships depend on MES or a launching appliances to deploy survival craft as the sole means of abandonment and there may only be a single system on each side of the ship. It is possible that the incident that has led to the decision to abandon has, at the same time, caused damage to one of the MES or davit launching systems. In such circumstances, the capacity to abandon to a survival craft may be severely reduced.
- 1.2 Where the failure of a single MES or launching appliance could severely reduce the capacity to abandon to survival craft, a risk assessment should be conducted by the ship operator through the safety management system. Identified risks should be mitigated and the safety management system updated accordingly. Plans should ensure that redundant capacity, which allows for the embarkation of all persons on-board, may still be achieved within the remaining survival craft or system. This might be achieved by the transfer of rafts, once deployed, from one side of the vessel to the other, or indeed fitting additional survival craft.
- 1.3 The risk assessment should cater for all anticipated scenarios and conditions. During routine surveys, the MCA will expect to see that appropriate plans are in place if the potential for single point of failure has been identified through the risk assessment described above.



## 2. Mitigation of Single Point of Failure – Actions for Ship Operators

- 2.1 Operators of UK Ships certificated (or due to be certificated) by the MCA should complete a risk assessment of their operation with regard to the ability to successfully disembark passengers in the event of a single point of failure. This should be undertaken through Safety Management System measures.
- 2.2 The risk assessment completed by the ship operator should consider whether the risks are sufficiently mitigated for the ship or whether remaining survival craft in the event of a single point of failure (damage to or failure of one abandonment system or component) may be transferred – ideally through over-deck transfer of liferafts. If appropriate, moving liferafts through the water to the other (safe) side of the ship in order to provide for the liferafts remaining on the safe side of the ship to be capable of evacuating at least 75% of the total number of persons the ship is certificated to carry may be an option for ships where solely MES or Davit-launched liferafts are fitted. Failing these two options, the operator might consider whether additional liferafts are to be provided in order to ensure a redundancy of 75% remaining capacity on any one side of the ship in the event that one abandonment system is rendered unserviceable.
- 2.3 A single mechanical fault or accidental damage may be foreseeable and the risks of such a failure should be mitigated primarily through appropriate design but also through good on-board operational procedures. In developing a risk assessment the ship operator is advised to consider mitigation of the following (which are not to be considered an exhaustive list):-
- a) Operating profile of the ship (time of year, proximity to rescue).
  - b) Anticipated worst sea state, sea temperature and weather conditions.
  - c) Ease with which survival craft may be transferred (due to weight or ability to tow).
  - d) Suitability of rescue boat and bousing arrangements for transfer in-water.
  - e) The nature of single point failure likely to occur with the system installed.
  - f) Number of persons on board, ratio of crew to passengers and crew responsibilities.
  - g) The history of operation of the ship, and other vessels in the same operating area.
  - h) Integral redundancy of survival craft arrangements (fall-back modes, enhanced maintenance regimes, or layers of redundancy).
  - i) Time delay to evacuation that may be incurred by the transfer of survival craft, and the availability of suitability trained personnel.
  - j) Design and construction of the ship, including residual stability.
- 2.4 The suitability of MES liferafts for transfer from one side to the other in the water as part of a risk mitigation strategy will significantly depend on how that liferaft is connected to, and therefore bowsed-in to the MES. Towing such a liferaft to the other side of the ship is just the beginning of the activity and so any risk mitigation strategy relying on transfer through the water should also account for the practicalities of doing so in order to demonstrate that the end point of a fully bowsed-in liferaft ready for boarding via the MES is achievable given anticipated limitations such as weather, sea state and number of crew. The easiest method of achieving such evidence is through a practical trial but the risks of relying on in-water transfer should be adequately considered in the risk assessment.
- 2.5 Provided the ship operator can demonstrate during survey or inspection evidence of having considered risks relevant to the proposed abandonment arrangements, ideally accounting for at least the points highlighted in this MGN, then no additional actions are required of ship operators besides compliance with the minimum requirements of the applicable regulations. Once completed, the risk assessment remains the responsibility of the ship operator; it may be reviewed by the MCA at any time. MCA surveyors may assess whether additional safety management measures could be required to provide an acceptable level of safety in the course of applying the applicable regulations.



### 3. Mitigation of Single Point of Failure – Potential Failure Scenarios

- 3.1 Mitigation against the single failure approach underpins UK policy. This policy requires that sufficient survival craft correctly served by launching appliances, where necessary – are available to ensure dry-shod evacuation in the event of any single failure including loss of any single survival craft, loss of a launching appliance or of any component of an MES system.
- 3.2 Provision of mitigation against a single point of failure is necessary given the possible reasons for requiring an abandonment and that a single mechanical failure or accidental damage is quite foreseeable, and has been experienced during drills. A single point of failure could result in one or more of the following scenarios:-
- a) Failure of control mechanisms leading to the loss of an entire system.
  - b) Failure of MES chutes to deploy (or damaged/twisted on deployment), again leading to loss of the entire system, unless each chute of a twin-chute system can be deployed and used completely independently.
  - c) Failure of a single launching appliance prior to or after deployment.
  - d) Failure of an individual survival craft after deployment.
  - e) Inaccessibility of MES chute/slide, survival craft or a launching appliance due to compromised ship structural integrity or fire.
- 3.3 The outcome of a single failure could therefore be much more significant than the simple loss of one survival craft and needs to be fully addressed in the on board safety management procedures as well as on board LSA complement.

#### More Information

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