

SUB-COMMITTEE ON SHIP SYSTEMS AND  
EQUIPMENT  
6th session  
Agenda item 17

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**ANY OTHER BUSINESS**

**Review of systems that are required to remain operational in a casualty  
and methods of energy distribution for those systems**

**Submitted by CESA**

**SUMMARY**

*Executive summary:* CESA has conducted an initial review of relevant SOLAS regulations regarding systems that are required to remain operational in different emergencies. A holistic assessment of provisions for emergency power source (SOLAS regulation II-1/42) and safe return to port (SOLAS regulations II-2/21 and 22) revealed shortcomings that could hamper the efficient implementation of decentralized energy systems. CESA therefore recommends a more detailed review under a new output that could lead to amendments to SOLAS or specific guidance facilitating alternative design.

*Strategic direction,  
if applicable:* Not applicable

*Output:* Not applicable

*Action to be taken:* Paragraph 16

*Related documents:* MSC 99/10/1, MSC 99/22 and SDC 6/12/1

**Background**

1 The Maritime Safety Committee, at its ninety-ninth session (MSC 99), discussed and reconsidered the work of the SDC Sub-Committee aimed at improving availability of passenger ships' electrical power supply in case of a side raking damage, and agreed that no further action was required, in particular related to damage stability requirements and flooding scenarios. Member States and international organizations are invited to review the systems that were required by SOLAS regulation II-1/42 to be supplied by the emergency source of power, and the methods of energy distribution for those systems, and consider whether there were any additional systems that might need to remain operational in a damage scenario.

## Discussion

2 CESA welcomes the decision to terminate an unclear output that could have resulted in additional requirements not improving damage stability and could be incompatible or at least unclear in relation to the existing Safe Return to Port (SRtP) provisions. On the other hand, it should be noted that the increasing size and complexity of modern passenger ships, as well as the advances in ship technology, mandate a regular review of SOLAS requirements regarding systems' availability in important emergency situations.

3 In line with the request documented in paragraph 10.6 of document MSC 99/22, CESA conducted an initial review of SOLAS regulation II-1/42 on systems to be supplied by the emergency source of power, the methods of energy distribution for those systems, and whether there are any additional systems that might need to remain operational in a flood conditions after damage.

4 Throughout the course of the review, it was observed (see also CESA submission MSC 99/10/1) that for systems to remain operable it was more complex than foreseen as provided for in SOLAS regulation II-1/42, and this has implications on a number of other regulations, i.e. regulations II-1/8-1 and II-2/21 to II-2/23. In addition, a number of related circulars need to be considered.

5 In order to meet the shipping industries' challenging emission reduction goals, the shipbuilding industry is developing new concepts using hybrid systems, decentralized power storage and supply, or alternative energy sources. To facilitate new technologies and, at the same time, maintain the level of safety, a respective revision of the regulations mentioned above appears necessary.

## Findings

6 When inspecting the list of essential services and systems and their minimum operation times defined by regulation II-1/42, sub-paragraphs .2 to .4 individually, no obvious shortcomings have been identified. It should, however, be noted that the important issue of system availability in different emergency scenarios becomes less clear when considered jointly with the SRtP provisions of SOLAS regulations II-2/21 and 22, which define different lists of functions and systems that shall remain operational after specific fire casualties above or below a threshold.

7 For ships constructed after 1 July 2010 with a length of 120 m or more or having three or more main vertical fire zones, this set of regulations mandates three different sets of systems, which have to remain operational under specific emergency situations for varying time periods and be supplied by numerous energy sources in various locations. Several lists represent significantly diverse power demands and are defined with regard to different hazards and thresholds.

8 As a whole, this set of regulations is lacking clarity and consistency regarding the underlying safety concepts. Provisions for emergency and SRtP functions and systems stem from different decades and even the "new" SRtP requirements date back a decade. The lack of or minimalistic background information about goals and intentions make it difficult to interpret and implement the complete set of safety regulations consistently in an environment of rapid advancement in ship design and construction.

9 A significant potential to improve the availability of essential systems relates to the decentralization of energy sources and redundancy in the energy distribution systems. Modern passenger ships are mostly equipped with diesel-electric propulsion systems comprising

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several generators, which provide electrical energy for propulsion and all other consumers on board. This configuration provides significant redundancy and energy availability in all parts of the ship.

10 Centralized single systems, such as one emergency generator operating through one emergency switchboard, are no longer always the best answer to provide energy in case of damage. Nevertheless, all definitions and requirements of SOLAS regulation II-1/42 focus on a single centralized system.

11 The wording is therefore unclear as to whether and to what extent the SOLAS requirements are open to innovative solutions, which could provide an equivalent or higher availability of essential systems through a decentralized approach of systems providing emergency energy. A new approach should take into account the potential of alternative energy converters, cleaner fuels and storage of electrical energy.

### **Recommendations and proposals**

12 CESA recommends to the initiation of a holistic and detailed review of SOLAS chapters II-1 and II-2, in particular the provisions and definitions related to main and emergency energy, as well as SRtP, with a view to identifying ambiguities and limitations to improve ships' safety using new power supply concepts. The task is to identify and clarify provisions hampering the implementation of innovative energy conversion and distribution systems, which could improve the availability of essential systems in case of significant damage in an energy efficient and cost-effective manner. To this end, it might also be necessary to retrospectively define and formulate the intentions, goals and functional requirements connected to the relevant emergency energy provisions.

13 Based on the outcome of a detailed review, it might be deemed necessary to develop performance criteria for individual paragraphs or through specific guidelines in order to facilitate alternative design and arrangements in accordance with regulation II-1/55. Since main and emergency energy systems and their interaction are clearly areas of utmost importance for the safety of passenger ships, detailed guidance is necessary to ensure that the approval of alternative design and arrangements is performed and assessed in a globally harmonized manner.

14 When reconsidering the current regulations, it also becomes increasingly important to also consider energy efficiency aspects to reduce GHG emissions, in line with the urgent and ambitious initial IMO strategy. The essential safety principle to provide sufficient emergency energy in all damage scenarios should be implemented through intelligent system design that also fulfils the goal to limit GHG emissions.

15 CESA recommends the consideration of the need for a thorough and detailed review. The Sub-Committee should continue to discuss the way forward towards better availability of electrical systems in emergency through redundancy and decentralization at this session, in order to facilitate the drafting of a proposal for a new output by interested Member States in accordance with the Committees' method of work (MSC-MEPC.1/Circ.5/Rev.1). CESA is prepared to contribute technically to such a proposal.

### **Action requested of the Sub-Committee**

16 The Sub-Committee is invited to consider the assessment and proposals provided and take action, as appropriate.