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DEVELOPMENT OF A GOAL-BASED INSTRUMENT FOR MARITIME AUTONOMOUS SURFACE SHIPS (MASS)

Comments on document MSC 109/5

Submitted by Republic of Korea and ICS

SUMMARY

Executive summary:	This document comments on the report of the Intersessional Working Group on Maritime Autonomous Surface Ships (MASS) (MSC 109/5) and proposes a way forward for the further development of the "Emergency response" chapter in the MASS Code.
Strategic direction, if applicable:	2
Output:	2.23
Action to be taken:	Paragraph 21
Related documents:	MSC 108/4; MSC/ISWG/MASS 3/3 and MSC 109/5

Introduction

1 This document is submitted in accordance with section 6.12.5 of the document on *the operational procedures and methods of the Maritime Safety Committee, the Marine Environment Protection Committee, and their subsidiary bodies* (MSC-MEPC.1/Circ.5/Rev.5), and includes comments on document MSC 109/5.

2 At the third Intersessional Working Group on MASS (MSC-ISWG-MASS 3), discussions and reviews focused on part 3 of the draft MASS Code, particularly revising the functional requirements and expected performances for chapters 17, 20, 23 and 28 (MSC 109/5, paragraphs 8 to 28).

3 In particular, MSC-ISWG-MASS 3 considered chapter 28 (Emergency response), taking into account document MSC/ISWG/MASS 3/3, and proposed to delete the entire chapter, given that the operational elements of the chapter were sufficiently covered by existing instruments and other chapters of the draft MASS Code. Taking into account document MSC/ISWG/MASS 3/3 and the discussion at this session, the Group agreed to discuss further at MSC 109.

4 The co-sponsors have conducted additional development and review of chapter 28 (emergency response) based on the discussion in MSC-ISWG-MASS 3 and related documents. This document provides comments on emergency response in the draft Code, with a view to further discussion during MSC 109.

Emergency response management for MASS

5 Regarding the emergency response of ships, detailed procedures are stipulated in SOLAS, the ISM Code, and other IMO conventions and related instruments. However, in the case of MASS, it may be required that emergency response management measures, procedures and methods are differentiated from conventional ships depending on various mode of operation and technology level.

6 The scope of emergency response management should include all emergency situations and factors that may occur in the MASS functions, within the operational context of part 2 of the draft MASS Code. The emergency response management should be designed to address the entire spectrum from a degraded state to an accident state for effective response.

7 Especially in the case of MASS, considering the characteristics of the systems involved in identifying and assessing risk factors that could lead to emergency situations, it is necessary to consistently manage the emergency conditions and factors that may arise within the operational context to ensure the safe operation of MASS.

8 Emergency response management, taking into account the characteristics of MASS, should be included in the MASS Code. It should prioritize the safe operation of MASS, the safety of life, environmental protection, and the elimination or mitigation of accident factors in emergency situations.

Concept of emergency response management

9 Emergency response management refers to the processes and measures for effectively and quickly managing and responding to various emergency states that may arise in MASS from the initial stage (degraded state). It aims to prevent the deterioration into emergency states by managing various accident factors from the early stages and to ensure that the consistent standards and procedures are applied when humans or systems make judgements and decisions regarding emergencies.

10 Emergency response management is divided into three states of response measures within the operational context of MASS; degraded state, fallback state and accident state. Each state is executed according to the established procedures as follows:

.1 degraded state (blue): The MASS is in a "low-down state" of condition and is moving away from a normal condition (safe condition), with the potential to become a fallback state. The priority is to assess incidents and primarily respond to return to the Operational Design Domain (ODD) to maintain a safe condition;

.2 fallback state (yellow): The operational condition of MASS has moved outside the Operational Envelope (OE). Recovery actions should be taken to return to the OE and preparations for response are required if the state further deteriorates; and

.3 accident state (red): Despite executing fallback responses, the MASS cannot return to the OE, or an emergency accident occurs that could severely impact seaworthiness of ship. Emergency procedures should be executed in advance according to the established contingency plan.

11 Emergency response management should be systematically implemented for accident detection, assessment (judgement), recovery and response actions in all unsafe conditions of the MASS (outside the ODD), including the abnormal conditions:

.1 the potential emergency situations that may occur in MASS should be classified into external and internal factors, or technical and environmental factors, and appropriate measures and procedures should be prepared to account for the characteristics of each emergency situation; and

.2 to achieve this, the system should continuously monitor the operational status of a ship and be able to utilize relevant information at any time.

Emergency response management in the MASS Code

12 The goals of chapter 28 (Emergency response management) should be to provide adequate and effective measures for emergency response management. The regulations are related to the other safety operation regulations for MASS, as stipulated below.

13 Emergency response management should be established in accordance with each state, including all emergency situations and accident factors that may arise in MASS, within the scope of management in chapter 8 (Operational context).

14 Chapter 11 (management of safe operation) requires the establishment of a Safety Management System (SMS) for all physical ranges and mode of operation (MoO) of MASS. The emergency response management, including step-by-step response methods and procedures in the event of an emergency, will be detailed in chapter 28.

15 Chapter 14 (Alert management) addresses all aspects of alert management that may occur in MASS and is designed to cover incident assessment and detection, recovery, and response plans in emergency state.

16 Functional requirements and performance standards for each emergency state will be detailed in part 3, including chapters 17 to 20, 22 and 23.

17 Emergency response management is an essential requirement for MASS to operate safely. It is necessary to consider the restructuring of this chapter into part 2 as a basic principle applicable to all MASS, such as other chapters under this part of the draft MASS Code.

Proposals

18 Based on the above, amendments to the draft MASS Code are proposed, as set out in the annex, to facilitate further discussions on chapter 28, as follows:

.1 change the title of this chapter to "Emergency response management" (paragraphs 9 to 11); and

.2 amend the FR and EP of chapter 28 (annex) (modifications in grey).

19 Based on the emergency response management proposed in this chapter, it is recommended to clarify term definitions in chapter 4 (Termology and definitions) and to propose amendments to terminology in chapter 8 (Operational context).

20 In addition, considering the structure of the Code, it is proposed that this chapter on emergency response management be restructured into part 2 as a fundamental principle applicable to all MASS (see paragraphs 12 to 17).

Action requested of the Committee

21 The Committee is invited to consider the proposals in paragraphs 18 to 20 and to take action, as appropriate.

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ANNEX

PROPOSED AMENDMENTS TO CHAPTER 28 (EMERGENCY RESPONSE)

CHAPTER 28 EMERGENCY RESPONSE MANGEMENT

28.1 Goal

The goal of this chapter is to provide adequate and effective measures for the emergency response management of MASS.

28.2 Functional requirements

To achieve the above-mentioned goal, the ship should comply with the requirements for emergency response management of ships in SOLAS, ISM Code and other IMO instruments as modified and/or supplemented by the functional requirements of this chapter.

28.2.1 Emergency response management for accident detection, assessment, recovery, and response measures should be implemented for unsafe conditions, including abnormal conditions.

EP 1 Procedures and methods should be established as appropriate for the degraded state, fallback state, and accident state.

28.2.2 The operational status of the MASS should be continuously monitored, and the information should be available at all times for emergency management.

Degraded state

28.2.3 In the degraded state, actions should be taken to minimize or eliminate risks in unsafe conditions.

EP 1 These actions should prioritize return to the ODD to maintain a safe condition.

EP 2 Protocols should be established for incident detection and assessment.

28.2.4 It should be assessed whether a transition to a fallback state is required, and if needed, prepared with the fallback response.

Fallback state

28.2.5 In the fallback state, recovery actions should be taken to return to the OE.

EP 1 Recovery actions, consisting of mitigation layers, should minimize risks and prepare the onboard crew and ROC operators for a standby condition.

EP 2 Appropriate procedures for assessment and response in the fallback state should be established.

28.2.6 Assessment of the need to enter an accident state, and preparation for accident response, if necessary.

Accident state

28.2.7 The accident stage is the inability of the MASS to return to the OE, and action should be taken as soon as it is recognized as such. Accident procedures should be implemented in accordance with the pre-established contingency plan if returning to the OE is not possible despite fallback responses, or if an accident may seriously affect the ship's seaworthiness.

EP 1 An appropriate MoO should be adopted to resolve the emergency situation, and, if necessary, the suspension of operations should be considered.

EP 2 Emergency response and relevant information should be accessible in real time from the ROC.

EP 3 A minimum level of connectivity between the ship and the ROC should be ensured to receive information on the state of emergency.

28.2.8 The actions should be determined in accordance with the MoO.

EP 1 If required in an accident state, an on-scene commander may be designated on behalf of the master.

EP 2 Depending on the situation, the override should be considered if necessary.

EP 3 All resources of the ship and the ROC should be made available for accident response at any time.