

SUB-COMMITTEE ON SHIP SYSTEMS AND  
EQUIPMENT  
10th session  
Agenda item 10

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**DEVELOPMENT OF AMENDMENTS TO SOLAS CHAPTER II-2 AND THE FSS CODE  
CONCERNING DETECTION AND CONTROL OF FIRES IN CARGO HOLDS  
AND ON THE CARGO DECK OF CONTAINERSHIPS**

**Assessment of appropriate RCOs provided in the CARGOSAFE FSA study**

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**SUMMARY**

<i>Executive summary:</i>	This document assesses several risk control options (RCOs) related to prevention, detection, fire fighting and containment of fires on board containerships as provided in the CARGOSAFE FSA study and recommends these to be further considered by the Sub-Committee.
<i>Strategic direction, if applicable:</i>	7
<i>Output:</i>	7.15
<i>Action to be taken:</i>	Paragraph 6
<i>Related documents:</i>	MSC 103/21; SSE 8/20, SSE 8/10/3; SSE 9/10; MSC 107/10 and SSE 10/10

**Background**

1 The Maritime Safety Committee agreed to include a new output on the "Development of amendments to SOLAS chapter II-2 and the FSS Code concerning detection and control of fires in cargo holds and on the cargo deck of containerships" at its 103rd session (MSC 103/21, paragraph 18.8).

2 In line with the new output, EMSA commissioned the CARGOSAFE FSA study with the objective to identify cost-effective risk control options for cargo fires on containerships, dealing with both dimensions of the problem, i.e. for existing ships and newbuilds, based on a safety risk study on containerized cargo fires. In October 2023, the FSA Experts Group reviewed the report of the CARGOSAFE study and concluded that it was adequately conducted in accordance with the Revised FSA Guidelines (MSC-MEPC.2/Circ.12/Rev.2) (SSE 10/10, paragraph 6.1.8).

3 The study report provides a list of RCOs and their cost-effectiveness assessed for three generic containership types (see table below). Several RCOs are confirmed to be viable for at least one of the three ship types due to their technology readiness level (TRL), overall risk reduction potential and cost-effectiveness. One RCO is considered to be cost-effective for all three ship types (F4 – Methods for unmanned firefighting).

Table 91: Summary of cost-effectiveness of all RCO's for the generic ships

RCO ID	Description	Twin Island	Single Island	Feeder
P1	Container screening tool	Maybe	No	No
P4	Improved control of lashing	Yes	No	No
D1	Optimizing current smoke detection system	No	No	No
D1R	Optimizing current smoke detection system (retrofitting)	No	No	No
D2	Heat detection looking at individual container temperature rise	Yes	Yes	No
D3	Fixed IR cameras. Coupled to a software solution to automate detection	No	No	No
D4	CCTV - AI - smoke detection	No	No	No
D5	Portable IR cameras for crew to enhance manual detection	Yes	Yes	No
F1	Increasing effectiveness of current CO2 system	No	No	No
F2	Improved manual firefighting tools for individual container breaching and firefighting	Yes	Yes	No
F3	Manual firefighting tools that increase reach	Yes	Yes	No
F4	Methods for unmanned fire fighting	Yes	Yes	Yes
F4R	Methods for unmanned firefighting (retrofitting)	No	No	No
F5	Watermist canon	No	No	No
C1	Active protection underneath hatch covers to protect from fire spread towards the deck	Yes	No	No
C2	Passive protection to protect from fire spread towards the deck	Yes	Yes	No
C3	Fixed external container stack cooling system to stop spread between stacks	No	No	No

4 All RCOs discussed in the CARGOSAFE Study should be reviewed carefully and none of them should be excluded for further deliberations. The co-sponsors have reviewed the RCOs and support the following ones for a more detailed consideration:

- .1 Prevention: P1 – Container screening tool;
- .2 Detection: D2 – Heat detection looking at individual container temperature rise;
- .3 Detection: D5 – Portable IR cameras for crew to enhance manual detection;
- .4 Fire fighting: F4 – Methods for unmanned fire fighting;
- .5 Containment: C1 – Active protection underneath hatch covers to protect from fire spread towards the deck; and
- .6 Containment: C3 – On-deck container stack cooling/containment system.

5 The rationale for the co-sponsors' support for these RCOs is outlined in the annex, which should be given consideration by the Fire Protection Working Group, if established.

**Action requested of the Sub-Committee**

6 The Sub-Committee is invited to:

- .1 consider the information provided in the annex regarding the CARGOSAFE RCOs which are deemed effective by the co-sponsors; and
- .2 instruct the Fire Protection Working Group, if established, to take these RCOs into consideration.

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## ANNEX

### ASSESSMENT OF APPROPRIATE RCOs PROVIDED IN THE CARGOSAFE FSA STUDY

#### **P1 – Container scanning tool**

1 Container scanning tools are crucial elements to prevent containership fires from occurring. A high percentage of cargo fires is connected to mis-declared or non-declared dangerous goods (DG). It is, therefore, essential to identify mis-declared and non-declared DG before they are loaded. This risk can be reduced by using scanning technology. While certain limitations still exist related to the effectiveness of such technologies, e.g. size, amount and placement of the goods inside the container and how cargoes are packed, the TLR is considered high by the CARGOSAFE Study. Effectiveness is likely to improve over time as the technology is applied more widely, thereby increasing its risk reduction potential.

2 It is understood that container scanning does not normally fall under the remit of the Organization. On the other hand, the regulations on the verified gross mass (VGM) of containers which would also be considered outside of the IMO's scope, have been successfully adopted by the Organization and implemented by the industry. The wider use of container scanning tools should be encouraged in the appropriate forums by Member States and the CCC Sub-Committee should be requested for more input on this RCO.

#### **D2 – Heat detection looking at individual container temperature rise**

3 The current smoke detection systems on board containerships have significant shortcomings due to the smoke travel time through the pipelines and their limited means to detect smoke inside containers. RCO D2 "Heat detection looking at individual container temperature rise" provides the basis for significant reduction of the time to detect a fire. Temperature rises within containers can permeate to the walls of the container resulting in the appearance of hotspots. If such hotspots are identified as soon as they appear on the container walls, this will potentially reduce the detection time by a significant margin. In certain scenarios it may alert the crew before combustion has begun, and smoke and flames occur outside the container.

4 Type approval standards for such container temperature monitoring systems should be developed. These should include performance standards for temperature measuring, vibration, corrosion, and environmental impacts on the systems, such as humidity and temperature variations. Requirements for the mechanical protection of the systems should be developed to avoid damage from vibration and impact during loading/unloading operations.

#### **D5 – Portable IR cameras for manual detection**

5 The use of portable IR cameras enhances the possibility of detecting and locating a fire. These tools are indispensable for an effective and safe manual fire fighting and are common standard for onshore firefighters. They should however be considered under the RCO category related to "fire fighting" instead of "detection" because portable IR cameras are a tool for confirming a fire rather than a primary means of detection. Such portable equipment is not able to replace a systematic and continuous detection system, since portable IR cameras only show temporary images. Additional patrol rounds with IR cameras are not desirable and would not compensate for a systemic heat detection system. Systematic detection as proposed under RCO "D2 – Heat detection looking at individual container temperature rise" is essential to significantly improve the fire detection capabilities onboard containerships.

#### **F4 – Methods for unmanned firefighting**

6 Mobile water monitors are already required under SOLAS regulation II-2/10.7.3.2. Certain modifications on the water monitors and fire hoses enable them to be temporarily installed in a fixed position to fight a fire. This approach can be effective in certain scenarios but has operational and practical limitations: Mobile water monitors are heavy equipment, which must be manually carried to the location of the fire by crew members wearing fire-fighting outfits, smoke masks and breathing apparatuses. Under time pressure, this task is further exacerbated.

7 An operational limitation of mobile monitors is the height of container stacks, which can lead to a steep angle between the possible position of the monitor and the top tiers. In such a scenario it is difficult to target the extinguishing agent directly to the front of a burning container or between burning containers.

#### **C3 – On-deck container stack cooling/containment system**

8 Owing to the limitations of mobile water monitors referred to in RCO F4, RCO C3 "On-deck container stack cooling/containment system" presents measures to provide adequate fire-fighting and containment capabilities. Currently, the on-deck fire-fighting equipment requirements for container ships are modest or non-existent. The approach described in RCO C3 combines a fixed water sprinkler system able to project a wall of water between the container stack of origin and the lashing bridge with the use of fixed and mobile water monitors. This method would address the gap in the current SOLAS regulations.

9 In view of the dimensions of the on-deck cargo on board containerhips, appropriate methods for unmanned fire fighting are necessary. The separation into cargo zones using the approach outlined in RCO C3 prevents the spread of a fire to other compartments. Fixed water monitors as an alternative means for a mobile water monitor improve the fire-fighting capability for the cargo deck area of containerhips significantly. Document SSE 9/10 (Qatar et al.) makes proposals to this effect which should be considered in more detail.

#### **C1 – Active protection underneath hatch covers to protect from fire spread towards the deck**

10 As outlined in the CARGOSAFE study, a fire in the hold, if unhindered by fire-fighting or containment measures, will propagate on the deck. Propagation can be effectively prevented by a water spray system. These are already required for the carriage of Class 1 DG in table 19.3 of SOLAS regulation II-2/19.4 and can be applied on board containerhips.

11 A spray water system can be used without time limitations and has a secondary cooling effect. To provide maximum effectiveness of this RCO, it is essential that the active protection system is applied across the entire deck. The system must be set up in a way that the SOLAS requirements for water flow capacity, both for the spraying and the draining of the water, are satisfied.