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| From: | Secretary-General of the European Commission, signed by Ms Martine DEPREZ, Director |
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| To: | Ms Thérèse BLANCHET, Secretary-General of the Council of the European Union |
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| Subject: | COMMISSION STAFF WORKING DOCUMENT Union submission to the 10th session of the International Maritime Organization's Sub-Committee on Ship Systems and Equipment suggesting a proposed structure and overview of a new Regulation 20-2 in SOLAS Chapter II-2 on the requirements for vehicle, special category, open and closed ro-ro spaces and weather decks intended for the carriage of lithium-ion battery powered vehicles |

Delegations will find attached document SWD(2023) 358 final.

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EUROPEAN
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Brussels, 13.11.2023
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**COMMISSION STAFF WORKING DOCUMENT**

# Union submission to the 10th session of the International Maritime Organization's Sub-Committee on Ship Systems and Equipment suggesting a proposed structure and overview of a new Regulation 20-2 in SOLAS Chapter II-2 on the requirements for vehicle, special category, open and closed ro-ro spaces and weather decks intended for the carriage of lithium-ion battery powered vehicles

**Union submission to the 10th session of the International Maritime Organization's Sub-Committee on Ship Systems and Equipment suggesting a proposed structure and overview of a new Regulation 20-2 in SOLAS Chapter II-2 on the requirements for vehicle, special category, open and closed ro-ro spaces and weather decks intended for the carriage of lithium-ion battery powered vehicles.**

## PURPOSE

This Staff Working Document contains a draft Union submission to the International Maritime Organization's (IMO) 10th session of the Sub-Committee on Ship Systems and Equipment (SSE 10). The IMO has indicatively scheduled SSE 10 from 4 to 8 March 2024.

This document proposes an overview of amendments to SOLAS Chapter II-2 for ships carrying lithium-ion battery powered vehicles in vehicle spaces, special category spaces, ro-ro spaces and weather decks. This proposal is based on the European Maritime Safety Agency's (EMSA) Guidance addressing the safe carriage of alternative fuel vehicles (AFVs) in ro-ro spaces of cargo and passenger ships, developed to assist relevant authorities and stakeholders in ensuring the safe carriage of AFVs. The submission outlines the structure of the new proposed regulation and an outline of technical requirements.

## EU COMPETENCE

Article 6(2)(a)(i) of Directive 2009/45/EC[1] on safety rules and standards for passenger ships applies the Convention on the Safety of Life at Sea (SOLAS), as amended, to Class A passenger ships. The current SSE 10 work item includes the development of amendments to SOLAS and the Fire Safety Systems Code (FSS Code). The FSS Code is made mandatory for passenger ships through SOLAS.

In light of the above, the present draft Union submission falls under EU exclusive competence.[2] This Staff Working Document is presented to establish an EU position on the matter and to transmit the document to the IMO prior to the required deadline of 29 December 2023.

[1] OJ L 163, 25.6.2009, p. 1.

[2] An EU position under Article 218(9) TFEU is to be established in due time should the IMO Maritime Safety Committee eventually be called upon to adopt an act having legal effects as regards the subject matter of the said draft Union submission. The concept of '*acts having legal effects*' includes acts that have legal effects by virtue of the rules of international law governing the body in question. It also includes instruments that do not have a binding effect under international law, but that are '*capable of decisively influencing the content of the legislation adopted by the EU legislature*' (Case C-399/12 Germany v Council (OIV), ECLI:EU:C:2014:2258, paragraphs 61-64). The present submission, however, does not produce legal effects and thus the procedure for Article 218(9) TFEU is not applied.

SUB-COMMITTEE ON SHIP SYSTEMS AND EQUIPMENT
10th session
Agenda item 16

SSE 10/16/X
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# EVALUATION OF ADEQUACY OF FIRE PROTECTION, DETECTION AND EXTINCTION ARRANGEMENTS IN VEHICLE, SPECIAL CATEGORY AND RO-RO SPACES IN ORDER TO REDUCE THE FIRE RISK OF SHIPS CARRYING NEW ENERGY VEHICLES

## Proposed structure and overview of a new Regulation 20-2 in SOLAS Chapter II-2 on the requirements for vehicle, special category, open and closed ro-ro spaces and weather decks intended for the carriage of lithium-ion battery powered vehicles

**Submitted by Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the European Commission in the interest of the European Union**

**SUMMARY**

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| *Executive summary:* | This document presents an overview of proposed amendments to SOLAS Chapter II-2 for ships carrying lithium-ion battery powered vehicles in vehicle, special category, ro-ro spaces and weather decks. This proposal is based on the European Maritime Safety Agency's (EMSA) Guidance addressing the safe carriage of alternative fuel vehicles (AFVs) in ro-ro spaces of cargo and passenger ships, developed to assist relevant authorities and stakeholders in ensuring the safe carriage of AFVs. |
| *Strategic direction, if applicable:* | 7.33 |
| *Output:* | OW 36 |
| *Action to be taken:* | Paragraph 28 |
| *Related documents:* | MSC 104/15/19, MSC 107/20/Add.1, MSC 107/INF.5, SSE 7/6/6, SSE 7/6/7, SSE 9/20, SSE 9/INF.6, SSE 10/INF.XX(DK, ELBAS Project) |

## Introduction

1 This document is based on a Guidance on the safe carriage of alternative fuel vehicles (AFVs) in ro-ro spaces of cargo and passenger ships[3], to assist administrations and maritime stakeholders. The Guidance has been developed by the European Maritime Safety Agency (EMSA) that engaged with the European Commission and around 20 organizations

[3] Ship Safety Standards - Transportation of Alternative Fuelled Vehicles (AFV) - EMSA - European Maritime Safety Agency (europa.eu)

(European Member States, operators, research institutes, car makers and classification societies) gathering the necessary technical and operational expertise.

2 The Guidance considers the need of developing a risk assessment on each ship for which the carriage of AFVs may affect the safety of the persons on board, the ship and the environment. Specific hazards have been identified in relation to transported vehicles using liquid fuels, compressed gas and batteries.

3 Drawing-up on partial elements of the Guidance this submission contains considerations in relation to ships carrying lithium-ion battery powered vehicles in vehicle, special category, ro-ro spaces and weather decks.

**Need to address the risks associated to lithium-ion battery powered vehicles**

4 The Association of European Vehicle Logistics reported that, in the EU, 21.5%[4] of the new car sales in 2022 were electrically charged vehicles. For Norway, that share was of 87.8% in 2022. These vehicles together with the hybrid electric vehicles account for the large majority of the new alternative fuel vehicles added to the fleets in 2022. This fact shows the need to address the specific risks associated with their transport onboard. The same issue has been identified by China in SSE 7/6/7.

5 Electric vehicles can be divided into two types according to their power usage:

.1 pure electric vehicles with batteries as the single power source, and

.2 hybrid vehicles driven by batteries combined with other power sources.

6 The proposals in this submission, based on the specific risks of the battery technology, address the carriage of all types of lithium-ion battery powered vehicles irrespective of battery size, use or ship's cargo plan, as it is the most common technology used in these vehicles.

**Current regulatory regime for the carriage of electrical vehicles**

7 Whereas requirements for vehicle carriers carrying motor vehicles with compressed hydrogen or natural gas in their tanks for their own propulsion are included in SOLAS Chapter II-2 Regulation 20-1, electric vehicles are not currently addressed in SOLAS.

8 The co-sponsors highlight the need to coordinate this agenda item with the ongoing work under CCC sub-committee for which a specific agenda item on the carriage of battery powered vehicles under the IMDG Code is open.

**Specific Hazards for lithium-ion battery powered vehicles**

9 To address the fire safety of lithium-ion batteries, it is necessary to identify the specific hazards of such technology when installed on battery powered vehicles carried on board of ships. The main risk factor for lithium-ion batteries is thermal runaway of battery cells, which is the condition of accelerated increase of temperature by self-heating, where the rate of heat generation within a battery component, typically larger than 1 °C/s, exceeds its heat dissipation capacity. A cell temperature above 80°C could also be an indication of thermal runaway. The thermal runaway can be produced by electrical and mechanical abuse, which can be caused by various factors (such as dendritic accretion or cell damage due to

[4] European Car-Transport Group of Interest (ECG). (2023). Prepping for the EV Invasion. In https://www.ecgassociation.eu/.

impact). In this situation, the fire can grow through specific mechanisms and the electrolyte released depending on the cells' design and assembly technology.

10 Specific hazards that need to be considered during a lithium-ion battery fire include cells emitting toxic gases (such as hydrogen fluoride), and/or flammable gases, small jet flames from the progressive ignition of cells, accumulation of explosive gases, re-ignition of the fire once the extinguishing mean is removed and, in general, the longer fire duration compared to traditional liquid fuels.

11 In addition to the above, it is considered more challenging to detect and confirm a battery fire at an early stage of development when compared to a fire in vehicles powered by diesel or petrol due to the design of the vehicle and battery and to the specific detection technology to be used.

12 Furthermore, the risks of charging vehicles onboard due to the potential malfunction of the charging equipment, incompatibility with the ship's electrical arrangements and possible incorrect operation, e.g., excessive charging time, should be assessed.

**Proposals**

13 Based on the above, the co-sponsors see the need to address these specific hazards in SOLAS Chapter II-2 also evaluating the applicability of the new measures proposed to existing ships (such as for charging, fire-fighters outfits and training). Accordingly, the co-sponsors propose, taking into account submission SSE 7/6/6 by China, that a new regulation is introduced, entitled, 'SOLAS Chapter II-2/Regulation 20-2 Requirements for vehicle, special category, open and closed ro-ro spaces and weather decks intended for the carriage of lithium-ion battery powered vehicles', with a similar structure to Regulation SOLAS II-2/20-1 (adapted as appropriate). Annex outlines the proposed structure of the regulation and a descriptive narrative of each topic.

14 In addition, it is foreseen that consequential amendments to MSC.1/Circ.1615, the International Code for Application of Fire Test Procedures (FTP Code) and the International Code for Fire Safety Systems (FSS Code) should be considered. Such amendments should consider the need for automatic activation of the fixed fire extinguishment system and specific provisions for equipment referred to in Annex.

15 Furthermore, the definitions in SOLAS Chapter II-2/3 of vehicle space and ro-ro space should be amended to include the carriage of 'electric vehicles' or possibly 'vehicles' in general, regardless the type of their propulsion system.

16 The co-sponsors acknowledge that this submission addresses a specific domain of the broad theme of new energy vehicles (see para 4 to 6), and that other technical solutions such as compressed hydrogen and gas, or electric vehicles carried in vehicles carriers would need further considerations by the sub-committee.

17 On the basis of the above, the co-sponsors propose the establishment of an intersessional Correspondence Group to address the broad scope of work under this agenda item.

**Action requested by the sub-Committee**

18 The sub-Committee is invited to consider the information provided and to take action, as appropriate, on the proposals included in paragraphs 13 to 17 and Annex.

## ANNEX

Proposal for the structure of a new Regulation under Chapter II-2 of SOLAS and outline of requirements to be addressed by each topic:

**Chapter II-2 / Regulation 20-2 Requirements for special category, open and closed ro-ro spaces and weather decks intended for the carriage of lithium-ion battery powered vehicles.**

**1 Purpose**

*<The purpose of such dedicated regulation should be to provide additional safety measures in order to address the fire safety objectives of this chapter (SOLAS II-2) for ships fitted with vehicle, special category, ro-ro spaces and weather decks and transporting lithium-ion battery powered vehicles on them.>*

**2 Application**

*<The new proposed regulation should apply to new [and existing ships].>*

**3 Requirements for spaces intended for carriage of lithium-ion battery powered vehicles.**

**3.1 Electrical equipment and wiring**

*<On ro-ro passenger ships such spaces should provide for electrical connections included in the prevention/ignition section, paragraphs 1.1 to 1.6 of the Annex of MSC.1/Circ.1615>*

**3.2 Ventilation arrangement**

*<In closed ro-ro spaces and vehicle spaces ventilation systems should be designed for the type of atmospheres that may appear during a battery powered vehicle fire. Tactical use of the ventilation system should be possible in case of emergency and used in combination with the activation and operation of fixed fire-fighting system.><Smoke management strategy should include the active use of ventilation as part of decision support tools based on fire simulations> (SSE 10/INF.XX – ELBAS)*

**3.3 Charging**

***3.3.1. For ro-ro cargo ships***

*<Concerning charging on board, on ro-ro cargo ships charging onboard should not be allowed unless for the purpose of the vehicles fulfilling the stowage plan, subject to risk assessment as further specified below.>*

***3.3.2. For ro-ro passenger ships***

*<Charging onboard should not be carried out unless there are measures to ensure that the charging facilities and vehicle charging are safe and implemented based on risk assessment carried out in accordance with guidelines developed by the Organization. The risk assessment should include, but not be limited to, the topics identified in Section 2.2.7 of the EMSA Guidance (See footnote 1).*

*<Only ship owned cables and connectors should be used in charging operations> <No charging during cargo loading/unloading>*[5]

[5] Ref. *Best Practices for the Transport of Electric Vehicles On-Board Vessels* by ABS in June 2022 https://ww2.eagle.org/content/dam/eagle/advisories-and-debriefs/best-practices-transport-electric-

***3.3.3.*** *Charging stations should trigger an audible alarm, distinct from other alarms in the space, in case something with the charging changes such as, but not limited to: abrupt stop of charging, abnormal heating of the battery, malfunction of any kind.*

## 4 Fire detection

### *4.1. Video monitoring*

*<For detection, fire-extinguishment and suppression methods for battery powered vehicle fires including manual operation and protection of the crew should be addressed by provisions such as for continuous video monitoring of the space [Ref. MSC.1/Circ.1615], by using infrared cameras>.<The system should be provided with immediate playback capability to allow for quick identification of fire location and drencher zones. Cameras should be installed to cover the whole space, without requirement for continuous monitoring of the video by the crew>* [6] *(see MSC 107/20/Add.1 Annex 33).*

### *4.2. Infrared Camera*

*<At least two portable infrared (IR) cameras suitable for thermal imaging, detection of hot areas and overheating electrical equipment should be provided at a location suitable for use during fire patrol routines.>*

### *4.3. Fire patrol routines*

*<Crew members on fire patrol duties should be familiarised in the basic characteristics and safety aspects of lithium-ion battery powered vehicles. Fire patrol routes should be arranged in such way that spaces designated to charging lithium-ion battery powered vehicles are duly covered at all times. Fire patrol crew should carry at all times and regularly use the IR cameras. Fire patrols should be especially trained on the potential indications that may reveal the instability of lithium-ion battery powered vehicles related such as smoke/heat emitted from places of the vehicle where a battery is normally located, popping sounds from battery cells caused by a thermal runaway, suspected unauthorized connection to ship electric system for charging of batteries.*

*On suspicion of unstable behaviour of a lithium-ion battery powered vehicle, in terms of fire safety, the fire patrol (always wearing and carrying the appropriate PPE) should take additional precautions such as maintaining a safe distance and avoiding potentially hazardous gases.>*

*< Suitable signage and markings should be adapted to typical patterns of fire patrol and not only crew movement. A training manual should explain procedures for fire confirmation and localization in vehicle and ro-ro spaces.> See footnote 4 on project LASH FIRE.*

### *4.4. Fire-fighter's communication*

*<Fire-fighter's communication should also be addressed with provisions addressing equipment such as flashlight or a two-way portable radio telephone that should be arranged in such way to leave both hands of the firefighter free and smoke diver that should have access to a personal communication device.><Not less than 85%*

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vehicles-board-vessels.pdf

[6] LASH FIRE Project Deliverable D04.8 https://lashfire.eu/media/2023/10/LASH-FIRE_D04.8_ImpactOnRegulationsByNewSolutionsAndConsolidationOfNewProposalsForRegulations_V04.pdf

*of the vehicle and ro-ro space areas should have radio coverage when fully loaded. In special category spaces, manually operated call points shall be spaced so that no part of the space is at a distance of more than 20 m and one call point should be placed close to each exit from those spaces.> See footnote 4 on project LASH FIRE.*

**5 Fire suppression and extinguishment**

*<The use of any other fixed fire-extinguishing system in a vehicle space or ro-ro space, that is as least as effective in controlling fires likely to occur in such a space than the one required by SOLAS Chapter II-2/20.6, should only not be permitted unless demonstrated by a full-scale test in conditions simulating a lithium-ion battery fire with confirmed thermal runaway, in accordance with SOLAS Chapter II-2/20.6.1.3 as amended, to the satisfaction of the Administration. The amount of extinguishing medium and system control devices should ensure that it can be released multiple times in case of re-ignition of the fire (SSE 7/6/6). A cooling strategy to contain the fire should be implemented. Specific provisions for weather decks may be developed. Finally, relevant crew members should be trained on fire-fighting strategies and risks (such as entering in a space with toxic gases) associated with lithium-ion battery powered vehicles. [MSC.1/Circ.1615].Provisions for PPEs should be developed. Personal protective equipment suitable for battery fires should be provided, i.e., resistant to off-gas exposure - in particular to the possible presence of higher concentrations of hydrogen fluorite - and suitable for low visibility.>*

*<Ships should carry relevant equipment according to the ship's needs but at least one water mist lance and one fire blanket for cars and one boundary cooling device. Requirements for this equipment should be included as well as a maintenance plan> See footnote 4. <Water lancing equipment is recommended to be provided for all vessels carrying EVs> See footnote 3.<Managing of this equipment during a fire onboard considered very challenging> (SSE 10/INF.XX-ELBAS).*

***5.1. Fire-fighters outfits***

*<The necessary number of outfits should be assessed> <The suit should be suitable certified for heat protection, water penetration and water vapor resistance. Firefighters should wear a hood (balaclava), to protect exposed areas of the head and neck and be suitably certified. Firefighter should wear acid-resistant respiratory protection with self-contained breathing apparatus. Full-coverage clothing with sealed gaps should be worn under the suit. The fire station should be equipped with undergarments for any firefighter arriving without wearing full coverage.> <Pre-bent knees and elbows to improve mobility and knee pads to allow crawling on hot or hard surfaces should be provided> See footnote 4 LASH FIRE.*

**6 Drills**

*<In addition to the requirements in SOLAS II/15, a fire drill using a scenario involving a fire in a lithium-ion battery powered vehicle should be considered to be carried out at least every two months, in compliance with the requirements of SOLAS III/19.3.>*

*<The drill shall also include the actions for emergency disconnection of charging of lithium-ion battery powered vehicles, if provided.>*