INTERNATIONAL MARITIME ORGANIZATION

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REVISION OF THE INTERIM RECOMMENDATIONS FOR CARRIAGE OF LIQUEFIED HYDROGEN IN BULK

Comments on document CCC 10/14

Submitted by IACS

SUMMARY

Executive summary:	This document comments on document CCC 10/14 and proposes that further considerations are required before the *Revised Interim recommendations for carriage of liquefied hydrogen in bulk*, as adopted by resolution MSC.565(108), can be amended.
Strategic direction, if applicable:	2
Output:	2.25
Action to be taken:	Paragraph 11
Related document:	CCC 10/14

Introduction

1 This document is submitted in accordance with the provisions of paragraph 6.12.5 of the *Organization and method of work of the Maritime Safety Committee and the Marine Environment Protection Committee and their subsidiary bodies* (MSC-MEPC.1/Circ.5/Rev.5) and provides comments on the proposal in document CCC 10/14 (the Republic of Korea).

Background

2 Document CCC 10/14 describes the concept and safety requirements of a recently developed membrane-type cargo containment system for the carriage of liquefied hydrogen in bulk and proposes adding these details to the *Revised Interim Recommendations for carriage of liquefied hydrogen in bulk*, as a new part D.

Discussion

3 IACS is of the view that the inclusion of membrane tanks as potential LH_2 tanks needs more technical discussion, and that the associated risks should be thoroughly evaluated. Some key risks, which should be considered, are identified in this document.

Explosion risks

4 The risks of ignition of flammable hydrogen and air mix inside the interbarrier spaces or inside the vacuum pumping systems are not addressed in document CCC 10/14. For hydrogen, this is not something that can be disregarded, even without electrical components for ignition. The flammability hazard may be more severe for a membrane system in case of a hydrogen leakage from the tank and the loss of the vacuum.

Integrity of interbarrier spaces

5 Document CCC 10/14 mentions the risks following the loss of integrity of the interbarrier spaces so that air is sucked into the spaces. However, relevant solutions are not addressed, apart from duplicating the vacuum pumps. If air condensation is happening in the interbarrier spaces, IACS questions whether the vacuum pumps will be available, since frozen air may have already blocked the piping. Also, if there is a breach of the barrier, allowing the air to come in, one would question if a local flammable mix can be avoided.

6 In such cases, vacuum pumps are not likely to be effective, as gas will flow to the tank boundary and freeze. From the discussion with designers, IACS understands that such inleak of air of inert gas will be difficult to detect with vacuum monitoring, unless it is massive enough to cause pressure increase and loss of insulation performance, in which case vacuum pumps will be inadequate.

Inert gas in secondary insulation space

7 IACS questions the use of inert gas in the secondary insulation space, since the concept seems to be to use vacuum pumping after LH_2 has been leaking into the primary insulation space. IACS is concerned that the temperature in the secondary insulation space will not be high enough to avoid the freezing of the inert gas for a period long enough to allow the creation of the vacuum.

8 The potential for undetected migration of inert gas through the secondary barrier into the interbarrier space and undetected breaches of the secondary insulation space should also be considered, as this could cause inleak of air into the space in case of low pressure.

Hydrogen in the insulation layer

9 IACS notes that document CCC 10/14 does not address the risk of hydrogen going into the insulation layer.

Proposal

10 IACS proposes further discussions to address key risks in paragraphs 4 to 9 above.

Action requested of the Sub-Committee

11 The Sub-Committee is invited to consider the foregoing, the proposal in paragraph 10 and take action, as appropriate.