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UNIFIED INTERPRETATION OF PROVISIONS OF IMO SAFETY, SECURITY, ENVIRONMENT, FACILITATION, LIABILITY AND COMPENSATION-RELATED CONVENTIONS

Proposed revised interpretation of the IGC Code, related to the secondary barrier testing and effectiveness assessment

Submitted by IACS

SUMMARY

Executive summary:	This document proposes a draft revised interpretation of the IGC Code, related to the secondary barrier testing and effectiveness assessment, taking into account the discussion at CCC 9.
Strategic direction, if applicable:	7
Output:	7.1
Action to be taken:	Paragraph 12
Related document:	CCC 9/10/1

Introduction

1 At CCC 9, IACS proposed a unified interpretation of paragraphs 4.4.1, 4.5, 4.6.2.1 and 4.6.2.4 of the IGC Code and paragraphs 4.7.1, 4.7.3, 4.7.4.1 and 4.7.7 of the 1983 IGC Code in relation to the secondary barrier testing and effectiveness assessment (CCC 9/10/1).

2 Within the Working Group on Amendments to the IGF Code and Review of the IGC Code established at that session, the following views were expressed (CCC 9/WP.4, paragraph 8.4):

".1 the wording 'functional goal' in item 5 of the UI was not defined and therefore the word 'goal' should be removed;

.2 the content of the UI was related to a niche issue specific to a membrane containment system using gluing technology and that an amendment to the IGC Code would be appropriate if all different versions of membrane containment systems were identified and addressed within the Code;

.3 notwithstanding the view in paragraph 8.4.2 and plenary's instruction to draft relevant amendments (see paragraph 8.2), there was no mechanism to amend the 1983 IGC Code, as it was replaced by the 2014 Code and, therefore, the matter could only be addressed by a UI; and

.4 the issue required urgent attention and, therefore, the submitter should consider submitting a revised proposal to CCC 10, taking into account the comments received".

3 In view of the above, the Working Group invited IACS, interested Member States and international organizations to submit a revised proposal to CCC 10, taking into account the views expressed therein (CCC 9/WP.4, paragraph 8.5).

Discussion

4 IACS agrees to the comment mentioned in paragraph 8.4.1 of document CCC 9/WP.4 on the term "functional goal" and proposes to use the word "function" instead.

5 IACS shares the view mentioned in paragraph 8.4.2 of document CCC 9/WP.4 that the content of the unified interpretation is a niche issue specific to a membrane containment system using gluing technology. Therefore, IACS does not see a need for an amendment to the IGC Code as, in its view, other types of membrane containment systems are out of scope of this issue, i.e. the matter should only be addressed by a unified interpretation as mentioned in paragraph 8.4.3 of document CCC 9/WP.4.

6 After CCC 9 and during the process for the revision of the draft interpretation, a number of additional calculations, modelling and laboratory testing have been carried out by a containment system designer to assess possible causes of primary membrane integrity failures and to quantify the consequences of primary barrier leakage rates in terms of liquid filling of the inter-barrier space. The results may be used to assess the criticality of the indications detected during the secondary barrier testing. The documentation from those activities and their supporting documents have been reviewed by IACS members.

7 Additionally, several risk assessments have been carried out by independent third parties with the attendance of the relevant subject matter experts and have provided additional confirmation relating to the causes and criticality of different types of leaks of the primary barrier and then the subsequent impact of any secondary barrier defects, as well as documenting (in detail) the various prevention and mitigation safeguards relevant to the primary barrier leaks and the secondary barrier defects.

8 Based on the experience gained during recent years of tightness testing of glued secondary barriers, and inspection and repair of defect indications found by the tests and the mentioned developments made from 2019 until 2024, IACS decided to further elaborate the scope of the draft interpretation to include when indications identified as defects can be considered not requiring to be repaired, on a case-by-case basis.

9 Based on the above discussions, the interpretation is considered to reaffirm the aims of paragraph 1.4.3.1 of the IGC Code, ensuring that the secondary barrier remains fit for the ship to proceed to sea after survey without danger to the ship or persons on board or without presenting unreasonable threat of harm to the marine environment.

Safeguards

10 In accordance with paragraph 4.44 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.6), the following safeguards were assessed as follows:

.1 UIs should not amend mandatory requirements in Conventions and associated instruments: The proposed interpretation does not amend the IGC Code. It provides technical explanation for the application of expressions given in the Code, such as "envisaged leakage of liquid cargo", the expression of "effectiveness" within the scope of "full secondary liquid-tight barrier" and "Complete secondary barrier" for cargo tanks fitted with membrane containment system on board liquefied gas ships, when they are in service and their secondary barrier has to be periodically checked as required at each renewal survey of the Certificate of Fitness;

.2 UIs should not go beyond the interpretation of mandatory requirements: The proposal does not go beyond an interpretation, as it merely states what shall be considered when evaluating the findings on the reports of the secondary barrier tightness tests carried out as required at each renewal survey of the Certificate of Fitness, under the conditions of the approved "Inspection/Survey Plan" and associated approved testing procedures. For evaluating those findings, the interpretation ensures that any of the findings which could compromise the integrity and function of the secondary barrier to maintain the liquid cargo tightness is fully evaluated and dealt with as necessary to meet the Code requirements; and

.3 UIs should not contradict the mandatory requirements: The proposed interpretation does not contradict the mandatory requirements of the IGC Code. It provides the necessary support to ensure that the evaluation of the findings from the reports of the secondary barrier tightness tests is done in a standardized way across flag States and their recognized organizations (ROs), so that similar findings reported during the secondary barrier tightness test are dealt with in the same way for all cargo tanks fitted with the same membrane containment system; transparency between flag States and their ROs in relation to those findings will be provided.

Proposal

11 The Sub-Committee is invited to consider the draft revised interpretation contained in the annex of this document.

Action requested of the Sub-Committee

12 The Sub-Committee is invited to consider the foregoing, the draft unified interpretation provided in the annex, and take action, as appropriate.

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ANNEX

DRAFT INTERPRETATION OF PARAGRAPHS 4.4.1, 4.5, 4.6.2.1 AND 4.6.2.4 OF THE IGC CODE AND PARAGRAPHS 4.7.1, 4.7.3, 4.7.4.1 AND 4.7.7 OF THE 1983 IGC CODE

Application

This unified interpretation applies to all gas carriers provided with membrane containment systems as defined in paragraph 4.1.5 of the IGC Code and in paragraph 4.2.2 of the 1983 IGC Code, except as otherwise explicitly indicated.

Interpretations

The following five (5) interpretations should apply in relation to the content of the above listed paragraphs of the IGC Code and the 1983 IGC Code.

1 *"Any envisaged leakage of liquid cargo"*

1.1 The expression "any envisaged leakage of liquid cargo" (paragraph 4.6.2.1 of the IGC Code and paragraphs 4.7.1 and 4.7.4.1 of the 1983 IGC Code) should be interpreted as a leakage, which may have resulted from a failure of the primary barrier resulting in filling of the inter-barrier space with liquid until a static equilibrium state is reached between the tank space and the inter-barrier space.

1.2 For ships in service equipped with containment systems where potential failure modes to the primary barrier tightness have been identified and documented through in-service experience, envisaged leakage scenarios may be determined by suitable engineering and risk analyses carried out by the cargo containment system designer. The envisaged leakage scenarios calculations should demonstrate the probability of tightness failures of the primary barrier, cargo flow and thermal analysis within the inter-barrier space and thermal effects to the inner hull structure. The flow and thermal analyses should determine the cargo liquid filling level of the inter-barrier space at the end of a 15-day period. The studies leading up to the conclusion should be to the satisfaction of the Administration or the recognized organization acting on its behalf.

2 *"Capable of being periodically checked"*

2.1 The expression "capable of being periodically checked" (paragraph 4.6.2.4 of the IGC Code and paragraph 4.7.7 of the 1983 IGC Code) means that the design arrangement of the containment system and the secondary barrier should be such that the effectiveness of the secondary barrier may be reliably confirmed by a suitable test and/or inspection programme specified in the approved "inspection and survey plan" required by paragraph 4.3.6 of the IGC Code. The effectiveness of the secondary barrier should be checked at the initial survey during the time of construction, as required by paragraph 1.4.2.1 of the IGC Code, and no less than at each renewal survey when the Certificate of Fitness is due to be renewed, as required by paragraph 1.4.2.2 of the IGC Code or paragraph 1.5.2 of the 1983 IGC Code. Additionally:

.1 for containment systems with glued secondary barriers:

.1 at the time of construction, a tightness test should be carried out in accordance with approved system designers' procedures to demonstrate compliance with the acceptance criteria before and after initial cool down, to verify the effectiveness of the secondary barrier;

.2 the initial cargo tank cool down could be achieved during gas trial or could be carried out prior to proceeding with gas trial with limited amount of cargo or another refrigerating medium inside the tank. In case there is a refrigerating medium inside the tank, details of the minimum average temperature and cooling time to be achieved at the secondary barrier during tank cool down should be agreed between the cargo containment designer and the Administration or the recognized organization acting on its behalf; and

.3 the values recorded should be used as reference for future assessment of secondary barrier tightness; and

.2 for containment systems with welded metallic secondary barriers, a tightness test after initial cool down, at the time of construction, should not be required.

3 *"Full secondary liquid-tight barrier"*

The expressions "full secondary liquid-tight barrier" (paragraph 4.4.1 of the IGC Code) and "Complete secondary barrier" (table 4.5 of the IGC Code and paragraph 4.7.3 of the 1983 IGC Code) should be interpreted as a secondary barrier forming a liquid-tight secondary containment capable of containing any envisaged leakage from the tank through its primary barrier, as interpreted in paragraph 1.1 above.

4 *"Effectiveness"*

4.1 The expression "effectiveness" (paragraph 4.6.2.4, 4.6.2.5.1 and 4.6.2.5.4 of the IGC Code and paragraph 4.7.7 of the 1983 IGC Code), in the context of the secondary barrier being "capable of containing any envisaged leakage of liquid cargo" (paragraph 4.6.2.1 of the IGC Code and paragraphs 4.7.1 and 4.7.4.1 of the 1983 IGC Code), should mean the ability of the secondary barrier to prevent passage of liquid cargo in ways and quantities likely to cause unsafe cold spots to the ship structure. The effectiveness of the secondary barrier should be verified by an approved method described in the "inspection/survey plan" required by paragraph 4.3.6 of the IGC Code, such as but not limited to:

.1 a tightness test, in accordance with approved system designer's procedure and acceptance criteria. If the approved threshold values are exceeded, an investigation should be carried out along with additional testing, such as thermographic or acoustic emissions testing, to locate any secondary barrier indications exceeding threshold values as per approved method;

.2 a thermographic examination of the cargo tank boundaries in accordance with approved system designer's procedure and approved designer's acceptance criteria, in combination with acoustic emission testing in areas, such as the domes, where thermographic examination cannot be performed effectively; or

.3 other equivalent methods suitable for the specific cargo containment system design.

4.2 At each renewal survey, all detected indications should be evaluated to confirm whether or not they preclude the function of the secondary barrier. When evaluating whether the detected indications compromise the secondary barrier "liquid-tight effectiveness" as defined on 4.6.2.5.1, the primary barrier leakage scenario described in interpretation 1.1 above should be taken into account to confirm that the result of such leakages will not result in filling the inter-barrier space with cargo liquid above the position of the detected indication. The interpretation given in 1.2 above may be applied in the evaluation if this is demonstrated to represent an equivalent level of safety considering the probability and extent of tightness failures of the primary barrier. The evaluation should take into consideration the requirements of paragraphs 4.6.2.5.1 and 4.6.2.5.2 of the IGC Code. All indications identified as compromising the function of the secondary barrier should be repaired.

4.3 Special considerations, in concurrence with the Administration, may be given when the detected indication(s) are confirmed to be located above the anticipated highest liquid level accumulated inside the inter-barrier space. In such cases, the owners, in collaboration with Cargo Containment System designer, should submit to the Administration or the recognized organization acting on its behalf, suitable documentation to demonstrate the equivalent level of safety and describe the necessary mitigating measures to be implemented to ensure that the function of the cargo containment system is not compromised. In addition:

.1 arrangements should be made for owners to submit an annual health monitoring report to confirm that the cargo containment system remains satisfactory for the service for which the ship is intended, as required by paragraph 1.4.2 of the IGC Code, or by paragraph 1.5.2 of the 1983 IGC Code;

.2 the monitoring arrangements and procedures should be documented, endorsed by the cargo containment system designer and submitted to the Administration or the recognized organization acting on its behalf;

.3 verification of the continued effectiveness of the monitoring arrangements and procedures should be carried out at each annual survey;

.4 those indications under special considerations should be documented and information should be made available to the next survey attending surveyor; and

.5 at renewal surveys, tightness test, as indicated in 4.1.1 above is not considered to be an acceptable test method to determine the effectiveness of the secondary barrier. Approved testing procedures capable to localize the indications should be used.

5 *"Other suitable means" and "another suitable method"*

The expressions "other suitable means" (paragraph 4.6.2.4 of the IGC Code) and "another suitable method" (paragraph 4.7.7 of the 1983 IGC Code) should be interpreted to mean that any other suitable means or another suitable method should be described within the "inspection and survey plan" required by paragraph 4.3.6 of the IGC Code.