

SUB-COMMITTEE ON CARRIAGE OF
CARGOES AND CONTAINERS
9th session
Agenda item 10

CCC 9/10/1
12 June 2023
Original: ENGLISH
Pre-session public release:

**UNIFIED INTERPRETATION OF PROVISIONS OF IMO SAFETY, SECURITY, AND
ENVIRONMENT-RELATED CONVENTIONS**

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

Submitted by IACS

SUMMARY

Executive summary: This document proposes a draft interpretation of the IGC Code related to secondary barrier testing and effectiveness assessment.

Strategic direction, if applicable: 7

Output: 7.1

Action to be taken: Paragraph 10

Related documents: None

Introduction

1 The *International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk*, as amended by resolution MSC.370(93) (the IGC Code), provides revised international standards for the design and construction of ships carrying liquefied gases in bulk, constructed on or after 1 July 2016.

2 The previous version of the IGC Code as per resolution MSC.5(48) as amended by resolutions MSC.17(58), MSC.30(61), MSC.32(63), MSC.59(67), MSC.103(73), MSC.177(79) and MSC.220(82) is hereinafter referred to as the "1983 IGC Code".

3 IACS members, in applying the IGC Code and the 1983 IGC Code in their capacity as recognized organizations, have identified requirements which may need further clarification in order to facilitate their global and uniform implementation.

Background

4 The IGC Code has the following requirements:

- .1 paragraph 4.4.1 states:

"The containment systems shall be provided with a **full secondary liquid-tight barrier** capable of safely containing all potential leakages through the primary barrier and, in conjunction with the thermal insulation system, of preventing lowering of the temperature of the ship structure to an unsafe level.";
 - .2 table on paragraph 4.5 requires "**Complete secondary barrier**" for membrane tanks;
 - .3 paragraph 4.6.2.1 states:

"it is capable of containing **any envisaged leakage** of liquid cargo for a period of 15 days, unless different criteria apply for particular voyages, taking into account the load spectrum referred to in 4.18.2.6"; and
 - .4 paragraph 4.6.2.4 states:

"it is **capable of being periodically checked** for its **effectiveness** by means acceptable to the Administration or recognized organization acting on its behalf. This may be by means of a visual inspection or a pressure/vacuum test or **other suitable means** carried out according to a documented procedure agreed with the Administration or the recognized organization acting on its behalf;"
- 5 The 1983 IGC Code has the following requirements:
- .1 paragraph 4.7.1 states:

"... to act as a temporary containment for **any envisaged leakage** of liquid cargo through the primary barrier.";
 - .2 table on paragraph 4.7.3 requires "**Complete secondary barrier**" for membrane tanks;
 - .3 paragraph 4.7.4.1 states:

"it is capable of containing **any envisaged leakage** of liquid cargo for a period of 15 days"; and
 - .4 paragraph 4.7.7 states:

"The secondary barrier should be **capable of being periodically checked** for its effectiveness, by means of a pressure/vacuum test, a visual inspection or another suitable method acceptable to the Administration. The method should be submitted to the Administration for approval."
- 6 Paragraph (GI) 2.1.2.11 of annex 5 of resolution A.1156(32) states:
- "for containment systems with glued secondary barriers, confirming that a tightness test has been carried out in accordance with the approved procedures of the system manufacturer before and after the initial cool down; where the designer's threshold values are exceeded, confirming that an investigation and additional testing, such as, thermographic or acoustic emission testing, has been carried out (IGC Code 83/90/00/14 ch.4)".

7 Taking into account paragraph (GI) 2.1.2.11 of annex 5 to resolution A.1156(32), IACS has implemented paragraph 4.6.2.4 of the IGC Code and paragraph 4.7.7 of the 1983 IGC Code in the following manner:

- .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 and acceptance criteria before and after initial cool down. Low differential pressures tests are not considered an acceptable test;
 - .2 if the designer's threshold values are exceeded, an investigation is to be carried out and additional testing such as thermographic or acoustic emissions testing should be carried out; 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 is not required.

8 However, on the basis of the experience of the industry with vacuum decay tightness tests and application of additional testing techniques which were not used at the time when the above-mentioned IACS approach was established, IACS acknowledges that a conduct of a comprehensive review of the above-mentioned requirements of the IGC Code and the 1983 IGC Code is needed to provide the following:

- .1 clarity regarding the testing methods for the secondary barrier, based on the approved cargo containment system designer's testing and inspection survey plan required by the IGC Code and the 1983 IGC Code;
- .2 guidance on how to deal with indications detected on the secondary barrier when these are located above the approved maximum cargo filling level;
- .3 requirements to provide a risk assessment based on the recommendations issued by the designer of the cargo containment system when such detected indications are not intended to be investigated and repaired, as necessary, at the time of the finding;
- .4 requirements to implement a monitoring plan for the secondary barrier during the time that the ship is in operation between the consecutive renewal surveys. The monitoring plan is to be agreed with the designer of the cargo containment system and the recognized organization;
- .5 clarity regarding the acceptability of testing methods which shall be carried out at the consecutive renewal survey, when such detected indications have not been repaired;
- .6 transparency among the recognized organization and the flag Administration of the ship when such detected indications have not been repaired; and
- .7 transparency between recognized organizations in relation to the condition of the secondary barrier when the ship is subject to the change of the registration from one recognized organization to another recognized organization.

Proposal

9 In order to facilitate efficient and unified implementation of these mandatory requirements, IACS has prepared draft unified interpretations as shown in the annex to this document, for the consideration of the Sub-Committee.

Action requested of the Sub-Committee

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

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 and in paragraph 4.2.2 of the 1983 IGC Code, except as otherwise explicitly indicated.

Interpretations

The following interpretations should apply in relation to the content of the above listed paragraphs of the IGC Code and the 1983 IGC Code:

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 in normal operation, resulting in filling of the inter-barrier space until a static equilibrium state is reached between the tank space and the inter-barrier space;

2 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 during operation 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 time prior to the 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.

3 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 and 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 other 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;
 - .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;
- 4 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 above paragraph 1;
- 5 the expression "effectiveness" (paragraph 4.6.2.4 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 barrier to prevent passage of 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 global 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 and additional testing, such as thermographic or acoustic emissions testing, should be carried out to locate any secondary barrier defect;
 - .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.

All detected indications should be evaluated to confirm whether or not they preclude the functional goal of the secondary barrier supported by documentation submitted by the cargo containment system designer and approved by the Administration or the recognized organization acting on its behalf. The documentation should take into consideration the requirements of paragraph 4.6.2.5 of the IGC Code.

All defects identified as compromising the functional goal of the secondary barrier should be repaired.

Special considerations with concurrence of the Administration may be given if test results show limited indications (indications that are singular or not clustered or grouped within the area evaluated) above the static liquid line and mitigating measures can be implemented to ensure that the effectiveness of the secondary barrier is not compromised.

In such cases, arrangements should be made to monitor the secondary barrier in service and to be able to confirm, during the intervals of the periodical testing as required by paragraph 1.4.2 of the IGC Code or by paragraph 1.5.2 of the 1983 IGC that the accepted base line has not been changed.

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.

Verification of the continued effectiveness of the monitoring arrangements and procedures should be carried out annually as an additional requirement to the annual survey.

Those indications that are accepted without further investigations should be documented and made available to the next survey attending surveyor.

A global vacuum test should not be considered an acceptable test to determine the effectiveness of the secondary barrier to tanks with a history of known and unrepaired secondary barrier defects already accepted by the Administration;

6 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.