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AMENDMENTS TO THE IGF CODE AND DEVELOPMENT OF GUIDELINES FOR LOW-FLASHPOINT FUELS

Proposed amendments to parts A-1 and C-1 of the IGF Code

Submitted by IACS

SUMMARY

Executive summary:	This document proposes amendments to part A-1 (paragraphs 5.12.1, 6.9.1.1, 9.8.1, 9.8.2, 9.8.4 and table 1 of chapter 15) and paragraph 18.4.1.1.1 of part C-1 of the IGF Code
Strategic direction, if applicable:	2
Output:	2.3
Action to be taken:	Paragraph 26
Related documents:	None

Introduction

1 The *International Code of Safety for Ships using Gases or other Low-flashpoint Fuels* (IGF Code), which was adopted by resolution MSC.391 (95), as amended by resolution MSC.422 (98), provides an international standard for ships using low-flashpoint fuel, other than ships covered by the *International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk* (IGC Code).

2 Based on the experience gained to date in the application of the IGF Code, this document proposes amendments to paragraphs 5.12.1, 6.9.1.1, 9.8.1, 9.8.2, 9.8.4 and table 1 of chapter 15 of part A-1, and paragraph 18.4.1.1.1 of part C-1 of the IGF Code.

Discussion

Paragraph 5.12.1 of part A-1 of the IGF Code

3 Paragraph 5.12.1 of the IGF Code states:

> *"An airlock is a space enclosed by gastight bulkheads with two substantially gastight doors spaced at least 1.5 m and not more than 2.5 m apart. Unless subject to the requirements of the International Convention on Load Lines, the door sill shall not be less than 300 mm in height. The doors shall be self-closing without any holding back arrangements."*

4 The text in paragraph 5.12.1 of the IGF Code originates from section 3.6 of the revised IGC Code, where texts from paragraphs 3.6.1 and 3.6.7 have been merged and amended in the IGF Code text. The IGC Code paragraphs 3.6.1 and 3.6.7 state:

> *"3.6.1 Access between hazardous area on the open weather deck and non-hazardous spaces shall be by means of an airlock. This shall consist of two self-closing, substantially gastight, steel doors without any holding back arrangements, capable of maintaining the overpressure, at least 1.5 m but no more than 2.5 m apart. The airlock space shall be artificially ventilated from a non-hazardous area and maintained at an overpressure to the hazardous area on the weather deck.*
>
> *3.6.7 Subject to the requirements of the International Convention on Load Lines in force, the door sill shall not be less than 300 mm in height."*

5 Numerous gas-fuelled ships include semi-enclosed bunker stations with access to internal spaces via an airlock. Air locks may also be found between other hazardous areas on deck and internal fuel gas equipment spaces. However, it is not clear as to whether the requirement for "*door sill"* applies to the outer door (i.e. the door leading to the hazardous area) only.

6 To address the above, IACS proposes the following changes* to paragraph 5.12.1:

> "An air lock is a space enclosed by gastight bulkheads with two substantially gastight doors spaced at least 1.5 m and not more than 2.5 m apart. Unless subject to the requirements of the International Convention on Load Line, the ~~door~~ sill height of the door leading to the hazardous area shall not be less than 300 mm ~~in height~~. The doors shall be self-closing without any holding back arrangements."

Paragraph 6.9.1.1 of part A-1 of the IGF Code

7 Paragraph 6.9.1.1 of the IGF Code states:

> *"6.9.1.1 With the exception of liquefied gas fuel tanks designed to withstand the full gauge vapour pressure of the fuel under conditions of the upper ambient design temperature, liquefied gas fuel tanks' pressure and temperature shall be maintained at all times within their design range by means acceptable to the Administration, e.g. by one of the following methods:*
>
> *.1 reliquefaction of vapours;*

* Here and throughout the document, tracked changes are indicated using "strikeout" for deleted text and "grey shading" to highlight new insertions.

.2 thermal oxidation of vapours;

.3 pressure accumulation; or

.4 liquefied gas fuel cooling.

The method chosen shall be capable of maintaining tank pressure below the set pressure of the tank pressure relief valves for a period of 15 days assuming full tank at normal service pressure and the ship in idle condition, i.e. only power for domestic load is generated."

8 IACS notes that paragraph 6.9.1.1 mentions that only one method of pressure control is allowed, which may not have been the intention at the time of drafting the IGF Code. In many cases it is necessary to utilize more than one method in order to control the tank pressure and temperature. Consequently, the following amendment to paragraph 6.9.1.1 is proposed:

"6.9.1.1 With the exception of liquefied gas fuel tanks designed to withstand the full gauge vapour pressure of the fuel under conditions of the upper ambient design temperature, liquefied gas fuel tanks' pressure and temperature shall be maintained at all times within their design range by means acceptable to the Administration, e.g. by one or more of the following methods:..."

Paragraphs 9.8.1, 9.8.2 and 9.8.4 of part A-1 of the IGF Code

9 Paragraph 9.8.1 of the IGF Code states:

"The design pressure of the outer pipe or duct of fuel systems shall not be less than the maximum working pressure of the inner pipe. Alternatively for fuel piping systems with a working pressure greater than 1.0 MPa, the design pressure of the outer pipe or duct shall not be less than the maximum built-up pressure arising in the annular space considering the local instantaneous peak pressure in way of any rupture and the ventilation arrangements."

10 Paragraph 9.8.2 of the IGF Code states:

"For high-pressure fuel piping the design pressure of the ducting shall be taken as the higher of the following:

.1 the maximum built-up pressure: static pressure in way of the rupture resulting from the gas flowing in the annular space;

.2 local instantaneous peak pressure in way of the rupture: this pressure shall be taken as the critical pressure given by the following expression:

(...)

The tangential membrane stress of a straight pipe shall not exceed the tensile strength divided by 1.5 (R_m/1.5) when subjected to the above pressures. The pressure ratings of all other piping components shall reflect the same level of strength as straight pipes.

As an alternative to using the peak pressure from the above formula, the peak pressure found from representative tests can be used. Test reports shall then be submitted."

11 Paragraph 9.8.4 of the IGF Code states:

> *"For low pressure fuel piping the duct shall be dimensioned for a design pressure not less than the maximum working pressure of the fuel pipes. The duct shall be pressure tested to show that it can withstand the expected maximum pressure at fuel pipe rupture."*

12 IACS notes that as per paragraphs 9.8.1 and 9.8.2 of the IGF Code, the dimensioning of the duct may be determined by calculations related to the maximum built-up pressure for systems with design pressures above 1.0 MPa, however this alternative is not allowed for lower pressure systems.

13 IACS also notes that paragraph 9.8.1 of the IGF Code provides the alternative design pressure criteria for piping systems greater than 1.0 MPa, which, by definition in paragraph 2.2.22 of the IGF Code, means high pressure systems, but is only in part agreement with the criteria given in paragraph 9.8.2 of the IGF Code.

14 IACS further notes that low pressure piping systems, which incorporate GVU (Gas Valve Unit) enclosures as part of the double wall piping system, may apply pressure vessel standards for the verification of their designs. In such instances, application of the requirement in paragraph 9.8.4 of the IGF Code may be overly conservative for dimensioning of the GVU enclosure.

15 Based on the above, IACS is of the opinion that the actual pressure experienced for the outer pipe or duct shall also be allowed to be calculated by the alternative criteria for systems with design pressure below 1.0 MPa. Consequently, the following amended text is proposed for paragraphs 9.8.1, 9.8.2 and 9.8.4:

> "9.8.1 The design pressure of the outer pipe or duct of fuel systems shall not be less than the maximum working pressure of the inner pipe. Alternatively ~~for fuel piping systems with a working pressure greater than 1.0 MPa~~, the design pressure of the outer pipe or duct may be calculated in accordance with 9.8.2~~shall not be less than the maximum built-up pressure arising in the annular space considering the local instantaneous peak pressure in way of any rupture and the ventilation arrangements.~~"
>
> "9.8.2 ~~For high-pressure fuel piping t~~The design pressure of the ducting shall be taken as the higher of the following: (…)"
>
> "9.8.4 ~~For low pressure fuel piping the duct shall be dimensioned for a design pressure not less than the maximum working pressure of the fuel pipes.~~ The duct shall be pressure tested to show that it can withstand the expected maximum pressure at fuel pipe rupture."

Paragraph 14.3.3 of part A-1 of the IGF Code

16 Paragraph 14.3.3 of the Code states:

> *"Where electrical equipment is installed in hazardous areas as provided in 14.3.2 it shall be selected, installed and maintained in accordance with standards at least equivalent to those acceptable to the Organization.*[29]

_____

29 Refer to the recommendation published by the International Electrotechnical Commission, in particular to publication IEC 60092-502:1999.

Equipment for hazardous areas shall be evaluated and certified or listed by an accredited testing authority or notified body recognized by the Administration."

17 IACS understands that the term "notified body" is not applicable for an IMO document. For marine purposes, this term is related to the EU Marine Equipment Directive. Furthermore, the term "or listed" is not clear and is proposed to be deleted.

18 IACS proposes the following amendments to paragraph 14.3.3:

"Where electrical equipment is installed in hazardous areas as provided in 14.3.2 it shall be selected, installed and maintained in accordance with standards at least equivalent to those acceptable to the Organization.[29]

29 Refer to the recommendation published by the International Electrotechnical Commission, in particular to publication IEC 60092-502:1999.

Equipment for hazardous areas shall be evaluated and certified ~~or listed~~ by an accredited testing authority ~~or notified body~~ recognized by the Administration."

Table 1 of chapter 15 of part A-1 of the IGF Code

19 Paragraph 15.8.2 of the IGF Code states:

"In each ESD-protected machinery space, redundant gas detection systems shall be provided."

20 Column "Parameter" of table 1 of chapter 15 of the IGF Code states:

"Gas detection on two detectors[1)] in ESD protected machinery space containing gas fuelled engines at 40% LEL",

with the footnote:

"1) Two independent gas detectors located close to each other are required for redundancy reasons. If the gas detector is of self-monitoring type the installation of a single gas detector can be permitted."

21 IACS understands that since the requirement in paragraph 15.8.2 of the IGF Code specifies a higher safety concept standard for redundancy of gas detection systems in an ESD-protected engine-room, this must also be consistently reflected in the requirements for gas detectors of table 1 of chapter 15.

22 IACS therefore proposes to amend table 1 of chapter 15 of the IGF Code for consistency with paragraph 15.8.2, to remove the reference to the footnote 1 as follows:

"Gas detection on two detectors ~~1)~~ in ESD protected machinery space containing gas fuelled engines at 40% LEL"

Paragraph 18.4.1.1.1 of part C-1 of the IGF Code

23 Paragraph 18.4.1.1.1 of the IGF Code states:

"Before any bunkering operation commences, the master of the receiving ship or his representative and the representative of the bunkering source (Persons In Charge, PIC) shall:

.1 agree in writing the transfer procedure, including cooling down and if necessary, gassing up; the maximum transfer rate at all stages and volume to be transferred;

.2 agree in writing action to be taken in an emergency; and

.3 complete and sign the bunker safety check-list."

24 IACS noted incidents occurring during bunkering from installations with delivery pressure above 1.0 MPa. There have been recurring situations where pumping against a closed valve in the bunkering line has resulted in the opening of the PRVs installed for venting trapped cryogenic liquid. This has resulted in massive amounts of LNG being pumped into the gas mast and dispersed onto the ship and harbour, resulting in dangerous situations for crew and shore personnel.

25 To address the above, IACS proposes the following changes to paragraph 18.4.1.1.1:

"Before any bunkering operation commences, the master of the receiving ship or his representative and the representative of the bunkering source (Persons In Charge, PIC) shall:

.1 agree in writing the transfer procedure, including cooling down and if necessary, gassing up; the maximum transfer rate at all stages, compatibility of maximum possible delivery pressure and vessel's bunkering line design pressure, and volume to be transferred;…"

Action requested of the Sub-Committee

26 The Sub-Committee is invited to consider the foregoing, in particular the proposals made in paragraphs 6, 8, 15, 18, 22 and 25, and take action, as appropriate.