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EQUIPMENT
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ANY OTHER BUSINESS

Issues with the implementation of SOLAS regulation II-2/4.5.10 concerning the arrangement of detectors of the fixed hydrocarbon gas detection system and the bilge high-level alarm in the cargo pump-rooms of oil tankers

Submitted by IACS

SUMMARY

Executive summary: This document discusses lessons learned from accidents which may have been avoided by having more clarity on the arrangement of detectors of the fixed hydrocarbon gas detection system and the bilge high-level alarm in the cargo pump-rooms of oil tankers.

Strategic direction, if applicable: Not applicable

Output: Not applicable

Action to be taken: Paragraph 15

Related documents: None

Introduction

1 SOLAS regulation II-2/4.5.10 states the following in respect of the protection of cargo pump-rooms:

"5.10 Protection of cargo pump-rooms

5.10.1 In tankers:

- .1 cargo pumps, ballast pumps and stripping pumps, installed in cargo pump-rooms and driven by shafts passing through pump-room bulkheads shall be fitted with temperature sensing devices for bulkhead shaft glands, bearings and pumps casings. A continuous audible and visual alarm signal shall be automatically effected in the cargo control room or the pump control station;
- .2 lighting in cargo pump-rooms, except emergency lighting, shall be interlocked with ventilation such that the ventilation shall be in

operation when switching on the lighting. Failure of the ventilation system shall not cause the lighting to go out;

- .3 a system for continuous monitoring of the concentration of hydrocarbon gases shall be fitted. Sampling points or detector heads shall be located in suitable positions in order that potentially dangerous leakages are readily detected. When the hydrocarbon gas concentration reaches a pre-set level which shall not be higher than 10% of the lower flammable limit, a continuous audible and visual alarm signal shall be automatically effected in the pump-room, engine control room, cargo control room and navigation bridge to alert personnel to the potential hazard; and
- .4 all pump-rooms shall be provided with bilge level monitoring devices together with appropriately located alarms."

2 For the reasons discussed below, IACS considers that the *Guidelines for measures to prevent fires in engine-rooms and cargo pump-rooms* (MSC.1/Circ.1321), as relevant to SOLAS regulations II-2/4.5.10.1.3 and II-2/4.5.10.1.4, need further clarification to assist in avoiding accidents similar to the ones discussed below.

Discussion

3 SOLAS regulation II-2/4.5.10 addresses the protection of cargo pump-rooms. In particular SOLAS regulations II-2/4.5.10.1.3 and II-2/4.5.10.1.4 require, inter alia, respectively:

- .1 "sampling points or detector heads shall be located in suitable positions in order that potentially dangerous leakages are readily detected"; and
- .2 "all pump-rooms shall be provided with bilge level monitoring devices together with appropriately located alarms".

4 The vague expressions "suitable positions" and "appropriately located" appearing in the above regulations continue to cause confusion and disagreement in application, even considering the existence of MSC.1/Circ.1321.

5 With different cargoes on board, cargo vapours of different densities, lighter or heavier than air, may accumulate in different (upper or lower) positions in the cargo pump-room. Also, the long-time existence of bilge in the cargo pump-room may contribute with high probability to the development of an explosive atmosphere.

6 In 2015, there was an explosion in the cargo pump-room of FPSO **Cidade de São Mateus**. The National Agency for Petroleum, Natural Gas and Bilfuels (ANP), Rio de Janeiro, Brazil, described the accident as follows:

"The first team was sent to the pump-room to investigate the source of gas detection, eighteen minutes after the alarm was sounded. Indeed, they identified the leakage, removing any doubt over the validity of the alarm. Afterwards, the team leader went to the control room to describe what they had seen on-site to the emergency command. The scene was reported as a black liquid leak from a flange four floors below the main deck, which by that time had low flow (in the form of thread) and was forming a small pool on-site despite the large volume that had leaked to the floors below the pump-room."

7 From this above description, IACS considers that an early and proper high bilge alarm could have helped to eliminate the development of an explosive atmosphere at an early stage

when the leakage happened. Although the requirements in SOLAS regulation II-2/4.5.10 are not applicable to this FPSO (however the design and installation voluntarily followed the same regulation as the onboard arrangement is similar to oil tankers), the incident provides an example of a dangerous situation originating from the accumulated leakage which may have been avoided by early and effective bilge high level alarm.

8 Paragraph 2.1.7 of chapter 3 of MSC.1/Circ.1321 provides the following recommended arrangement for hydrocarbon gas detectors:

"2 Gas detection systems

2.1 Design requirements

...

.7 a hydrocarbon gas detector is recommended to be installed in the following places:

.7.1 (perpendicular) upper part of the main cargo pump or between two cargo pumps;

.7.2 one detector within 30 cm above the lowest part of the cargo pump-room bottom floor; and

.7.3 one detector every 10 m length or width of the cargo pump-room;"

9 Further, even following the requirements in SOLAS regulation II-2/4.5.10 and recommendations in MSC.1/Circ.1321, the fixed gas detection system was not effectively activated on board the ship **Valtamed** in February 2020. The report of the investigation into the incident states:

"6. The pump-room's fixed gas detection system alarms did not activate at any point in time surrounding the accident.

7. It is likely that effectiveness of the system was compromised by the distance (4.5 m) between the starboard bilge alarm sensor and the nearest sampling suction point."

10 Further, the same report states the following measures taken by the Company:

"4. The pump-room's fixed gas detection system was upgraded, and a new sampling suction point was inserted in the vicinity of the starboard bilge space access.

5. All valves on the stripping pump suction line and the suction valves of the pump-room bilges were overhauled and pressure tested.

6. The arrangement for stripping the AUS drain tank was modified to eliminate the risk of accidental contamination of the bilge spaces by cargo residue and vapours."

11 In addition, the words "main cargo pump" and "cargo pumps" in section 2.1.7.1 of MSC.1/Circ.1321 also cause confusion. For example, in trying to understand if they relate to the same pump, whether they refer to all the cargo pumps or just bigger pumps.

12 At the same time, considering different cargo vapours having different density, as mentioned in paragraph 5, it is believed that detectors are necessary to be fitted at a higher position in the cargo pump-room. With reference to paragraph 2.2.1.3 of chapter 16 of the FSS Code, which in respect of the installation of sampling points in the ballast tank, states that "...the upper gas sampling point shall not be located lower than 1 m from the tank top", it is suggested to add additional detectors in the cargo pump-room not more than 1 m from the cargo pump-room ceiling/head deck.

13 To improve the safe condition for the personnel accessing or working in the cargo pump-rooms, IACS considers that the provisions of MSC.1/Circ.1321 should be improved in respect of places or positions which can be regarded as "suitable positions" and "appropriately located".

Proposal

14 Considering the moratorium placed by MSC 107 on new output proposals (MSC 107/20, paragraph 17.69), IACS seeks the advice of the Sub-Committee on the best course of action to introduce improvements into MSC.1/Circ.1321, as contained in the annex.

Action requested of the Sub-Committee

15 The Sub-Committee is invited to consider the information and the proposal in paragraph 14, and take action, as appropriate.

ANNEX

DRAFT AMENDMENTS TO GUIDELINES FOR MEASURES TO PREVENT FIRES IN ENGINE-ROOMS AND CARGO PUMP-ROOMS (MSC.1/CIRC.1321)

The following changes are proposed:*

PART IV CARGO PUMP-ROOMS

CHAPTER 3 – CONTROL OF VENTILATION

2 Gas detection systems

2.1 Design requirements

...

.7 a hydrocarbon gas detector is recommended to be installed in the following places:

.7.1 (perpendicular) upper part of the ~~main~~ each cargo pump or between two cargo pumps;

.7.2 one detector within 30 cm above the lowest part of the cargo pump-room bottom floor; ~~and~~

~~.7.3 one detector every 10 m length or width of the cargo pump-room;~~

~~.7.3 one detector not more than 1 m below the cargo pump-room ceiling/head deck; and~~

~~.7.4 one detector every 10 m length or width of the cargo pump-room;~~

...

2.4 Bilge high level alarms

.1 A high level of liquid in the pump-room should activate a continuous audible and visual alarm signal in the cargo control room, engine control room and on the navigation bridge.

* Tracked changes are indicated using "strikeout" for deleted text and "grey shading" to highlight all modifications and new insertions, including deleted text.