No. 131 (July 2013) Uniform application of SOLAS Ch.II-2 Reg. 4.5.7.3.2.1 for accepting a constant operative inerting systems (COIS) as an alternative to fixed hydrocarbon gas detection equipment in double hull and double-bottom spaces on oil tankers

Background:

1. SOLAS Regulation II-2/4.5.7.3.2 gives an alternative to fixed hydrocarbon gas detection systems in double hull spaces.

2. IACS has agreed the following interpretation:

A "constant operative inerting system" is a permanently fitted inert gas system connected to those spaces detailed in SOLAS Regulation II-2/4.5.7.3.1 in lieu of a fixed hydrocarbon gas detection system. The system complies with the requirements for inert gas systems for cargo tanks and is capable of constantly maintaining such spaces under an inert atmosphere at all times except when all adjacent spaces have been confirmed gas free for the purpose of entry.

3. Anticipating that designers would probably prefer to utilize the ship's existing inert gas system for the purpose of fulfilling the requirement for a COIS, there is a need to assess additional features that may be applied to such systems. For the purpose of ensuring harmonized practices regarding the approval of such systems the following additional requirements should be considered:

Applicability:

4. The requirement in SOLAS Regulation II-2/4.5.7.3.2 applies to all spaces detailed in SOLAS Regulation II-2/4.5.7.3.1 and includes *"all ballast tanks and void spaces in the double-hull and double-bottom spaces adjacent to the cargo tanks, including the forepeak tank and any other tanks and spaces under the bulkhead deck adjacent to cargo tanks"*. Due to the safety hazards related to inerting of spaces that are arranged for normal entry during operation, the use of COIS should not be permitted for such spaces.

Inert gas distribution piping:

5. SOLAS Regulation II-2/4.5.5.1.3 requires the following:

Tankers required to be fitted with inert gas systems shall comply with the following provisions:

.1 double hull spaces shall be fitted with suitable connections for the supply of inert gas;

.2 where hull spaces are connected to a permanently fitted inert gas distribution system, means shall be provided to prevent hydrocarbon gases from the cargo tanks entering the double hull spaces through the system; and

.3 where such spaces are not permanently connected to an inert gas distribution system, appropriate means shall be provided to allow connection to the inert gas main.

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6. The above does not consider the hazards related to hydrocarbon gas backflow from spaces detailed in SOLAS Regulation II-2/4.5.7.3.1 to non-hazardous spaces. These spaces are typically defined as hazardous zones 1 on tankers. Hence, means for prevention of gas backflow from ballast tanks to the inert gas unit and the non-hazardous area in which it is located are required. The following is therefore proposed:

Prevention of hydrocarbon gas backflow from spaces detailed in SOLAS Regulation II-2/4.5.7.3.1:

7. In addition to SOLAS Regulation II-2/4.5.5.1.3, the COIS should be provided with means for prevention of backflow of hydrocarbon gas from spaces detailed in SOLAS Regulation II-2/4.5.7.3.1 to the inert gas unit and the non-hazardous space in which it is located. Acceptable means are;

- Double block and bleed arrangements as per IACS UR F20 or,

- At least two non-return devices as per FSS Code Ch.15 Reg.2.3.1.4.1.

8. Transfer of inert gas between spaces detailed in SOLAS Regulation II-2/4.5.7.3.1 and cargo tanks should not be permitted.

Prevention of gas backflow from cargo tanks to spaces detailed in SOLAS Regulation II-2/4.5.7.3.1:

9. Considering that the COIS has to be continuously operated (even during inerting and topping up of cargo tanks), the above means are also required for connections allowing gas backflow from cargo tanks into spaces detailed in SOLAS Regulation II-2/4.5.7.3.1.

10. Transfer of inert gas between cargo tanks and spaces detailed in SOLAS Regulation II-2/4.5.7.3.1 should not be permitted.

Prevention of water ingress into cargo tanks and void spaces/cofferdams:

11. To prevent water ingress (due to overfilling of ballast tanks) into the inert gas generator unit and the space in which it is located, a non-return valve with a positive means of closure should be provided in the main COIS distribution line.

12. Unless alternative means of prevention of water ingress are provided, where a common distribution system is arranged for ballast tanks and void spaces/cofferdams, a high level alarm should be provided in the ballast tank and a water ingress detector should be provided in the void space.

13. If the COIS is interconnected with the inert gas system serving cargo tanks, a non-return valve with a positive means of closure should be so located that water ingress into cargo tanks is also prevented.

Means for isolation for the purpose of safe entry:

14. Means should be provided for isolating each space detailed in SOLAS Regulation II-2/4.5.7.3.1 from a common COIS distribution system. Where stop valves are fitted, they should be provided with locking arrangements which should be under the control of the responsible ship's officer. There should be a clear visual indication of the operational status of the valves or other acceptable means.

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Piping design:

15. The COIS distribution system should be so designed as to prevent accumulation of water in the system under all normal conditions.

Consequences of system failure:

16. The COIS is an alternative to fixed HC gas detection and thus requires continuous operation. The system must therefore be arranged with redundancy in accordance with the requirements for inert gas systems in The FSS Code Ch.15. In case of failure of the COIS, emergency manual gas detection is required as a temporary means. Compliance with SOLAS Regulation II-2/4.5.7.2 is therefore required also for ships with COIS.

Automation:

17. The COIS is required to be constantly operating. This implies that the system should be arranged as follows:

- The COIS provides a continuous overpressure supply of inert gas (padding).

- The inert gas system serving the COIS is arranged for automatic start in case of low pressure.

Monitoring:

18. The COIS may be arranged to supply inert gas to spaces detailed in SOLAS Regulation II-2/4.5.7.3.1 independently or simultaneously with the supply of inert gas to cargo tanks for topping up purposes. Accordingly, the following independent instrumentation is required for a COIS distribution system serving the spaces detailed in SOLAS Regulation II-2/4.5.7.3.1:

- Low water level in deck water seals as per FSS Code Ch.15.2.4.3.1.7 (if provided for the COIS).

- Double-block and bleed activation and alarms as per IACS UR F20 (if provided for the COIS).

- Low pressure in the COIS distribution piping as per FSS Code Ch.15.2.4.3.1.8.

- High pressure in the COIS main distribution piping as per FSS Code Ch.15.2.4.3.1.9.

Air pipe/ventilation arrangements:

19. Spaces detailed in SOLAS Regulation II-2/4.5.7.3.1 are required to be maintained in an inert condition. Accordingly, unless arrangements are made for continuously purging such spaces with inert gas, means should be required to ensure that inert gas does not escape via individual air pipes fitted to such spaces when inert gas is not supplied with due care taken to provide protection from overpressure and underpressure from additional thermal variation in the event the tank becomes isolated in the process of ensuring the gas does not escape[1].

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1 In determining the type of inerting system to be provided the following should be considered:

a. If the spaces are required to be fully inerted and pressurised then a closed pressurised system with P/V valves should be fitted with low pressure alarms, high pressure alarms and automatic make up.

b. An open venting system constantly leaking inert gas onto the deck is possible. In this case a constant supply of inert gas is required. A low pressure alarm would not be effective and a constant low flow of inert gas to all spaces irrespective of pressure should be provided. Arrangements should prevent the build-up of pockets of inert gas on deck and the introduction of inert gas into ventilation inlets.

c. A simple 'partly inerted' ballast tank philosophy with an open venting system is possible. As inert gas is slightly heavier than air, the tank will be mainly inerted but could have a layer of air on top of the gas. In time there would be dilution of the inert gas and mixing of air and inert gas. Occasional make up with inert gas is required.

d. In all cases the venting system should be arranged to effectively disperse the inert gas when the ballast tanks are being filled. The aggregate area of the venting system opening should be not less than 125% of the effective area of the ballast tank filling line.

20. Arrangements for isolation of ballast tanks from the tank venting system should be such that inadvertent isolation does not lead to structural failure due to ballast operations.

21. The capacity of the means must not result in overpressure (static and dynamic) exceeding structural design limits, even in the event of overfilling of ballast tanks. Additionally, the capacity of the means must not result in under-pressure exceeding structural design.

22. For common venting systems, considerations should be made with respect to damage stability and progressive flooding.

System capacities:

23. Where an inert gas production plant provides inert gas for both the cargo inerting and COIS system then the following should be applied[2]:

- At least 125% of the combined maximum discharge rate of the cargo and ballast tanks where systems and operational procedures available onboard permit simultaneous cargo and ballast discharge; or

- At least 125% of the combined maximum discharge rate of the cargo or ballast tanks, whichever is greater, where the system has an interlocking arrangement for the gas regulating valves that do not permit simultaneous inerting of cargo and ballast tanks and operational procedures available onboard are limited to this type of inerting.

If ballast tanks are arranged for gravity drainage, the maximum discharge rate of ballast tanks should be taken as the maximum discharge rate using ballast pumps or the maximum obtainable gravity discharge rate, whichever is greater.

24. Where a separate inert gas production plant is provided for the COIS system then the plant should have a capacity of at least 125% of the maximum discharge rate of the ballast tanks.

2 This assumes that there will be one I.G. system serving both the cargo tanks and COIS. This is not necessarily the case.

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