INTERNATIONAL MARITIME ORGANIZATION

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SUB-COMMITTEE ON FIRE PROTECTION
54th session
Agenda item 6

FP 54/6
6 January 2010
Original: ENGLISH

MEASURES TO PREVENT EXPLOSIONS ON OIL AND CHEMICAL TANKERS TRANSPORTING LOW-FLASH POINT CARGOES

Information regarding the practicality of fitting and operating Inert Gas Systems on oil tankers of less than 20,000 tonnes deadweight and chemical tankers

Submitted by the International Chamber of Shipping (ICS) and International Parcel Tankers Association (IPTA)

SUMMARY

Executive summary:	As requested by FP 53, ICS and IPTA provide information regarding the consequences of fitting inert gas (IG) to oil tankers of less than 20,000 tonnes deadweight and chemical tankers
Strategic direction:	5.2
High-level action:	5.2.3
Planned output:	5.2.3.4
Action to be taken:	Paragraph 6
Related documents:	FP 53/5, FP 53/5/5, FP 53/5/6, FP 53/5/7, FP 53/INF.3, FP 53/23; MSC 81/8/1 and MSC 81/INF.8

Introduction

1 The Sub-Committee agreed that the fitting of appropriate inert gas systems (IGS) to new oil tankers of less than 20,000 tonnes deadweight and new chemical tankers carrying low-flash point cargoes would minimize the risk of fires and explosions. It was, however, also agreed that the benefits of such fitting should outweigh any negative effects of the introduction of IGS, such as increased fuel consumption, increased CO_2 emissions, increased building costs, increased complexity of procedures, and possible increase of the risk associated with tank entries.

2 The Sub-Committee also noted the importance of agreeing a lower size limit for new oil tankers to which the IGS requirement would apply, and also felt that it may be appropriate to apply the same size limit to chemical tankers. Despite FSA studies having been submitted by Norway and Japan, no agreement was reached regarding the lower size limit for either tanker type.

3 FP 53 decided that because a number of important issues remained outstanding regarding the installation and operation of IGS, Member Governments and international organizations should be invited to submit information regarding the matter to FP 54.

General

4 ICS and IPTA continue to support the work undertaken on matters related to this work item and recall paragraph 14 of document MSC 81/8/8 (ICS, IAPH, IACS, CEFIC, OCIMF, INTERTANKO and IPTA) that reported on the industry investigation into a series of tanker fires and explosions which recommended the following:

> "Although the prime cause of the incidents was a failure to follow procedures and a number of the incidents occurred during periods when the vessel was incorrectly assumed to be gas-free, the IIWG nevertheless recommends that as an additional safety measure the Committee give consideration to amending SOLAS to provide for the application of inert gas to new oil tankers of less than 20,000 dwt and to new chemical tankers. If the Committee wishes to consider the application of inert gas to existing ships, the IIWG would suggest that this should be based on the principles of resolution A.900(21) on Objectives of the Organization in the 2000s including a Formal Safety Assessment (FSA) study, and a cost/benefit analysis. The industry confirms its commitment to participate fully in any such studies."

5 In response to the FP Sub-Committee's request for information on a number of important environmental and safety issues relating to the fitting and operation of IGS on new ships, ICS and IPTA sought additional relevant information from their members. The data received related primarily to the operation of chemical tankers and we are able to provide the Sub-Committee with the following information.

1 Impact on turnaround time in ports and port congestion

It is estimated that for low-flash cargoes at least 6 h of additional time per tank would be required. This would add an additional 25% to 30 % to in-port time and some operators advise that for them this equates to in excess of an additional 1,500 in-port days, per annum.

This will obviously add to the individual work load of ship's personnel.

2 Increased fuel consumption and related environmental emissions/costs associated with running IG/N_2 plant

While it is difficult to estimate a global figure for this element, the data received indicates that the use of IG would mean an increase in fuel consumption in the case of a 25,000 tonnes deadweight to 30,000 tonnes deadweight chemical tanker of in excess of 850 tonnes of fuel per annum. It should be recognized that this increased use of fuel and the associated emissions would occur primarily in port areas.

The co-sponsors consider it important to give very careful consideration to the additional nitrogen oxide (NO_x) and carbon dioxide (CO_2) that would be produced during the operation of IGS and its consequences on control measures in MARPOL Annex VI and to the developing IMO agreements and regulations for the control of CO_2 emissions.

3 Lower ship size limit

While the results of further FSA studies are anticipated at FP 54, regarding the lower size limit for IGS application a consensus amongst operators of small chemical tankers indicates that difficulties associated with fitting, and operating IGS on ships below 5,000 tonnes deadweight becomes significantly acute. Such problems include difficulty in providing sufficient power on ships designed and optimized for existing operational and environmental considerations, as well as stability and space limitations. This could result in ships having less cargo capacity but higher costs and increased environmental impact.

4 Increase in ship building costs

Estimates of increased building cost when including IGS vary, although a figure of a 4% increase is considered reasonably representative. Significant variations are associated with differences in ship size and the consequential required output capacity of IGS:

Chemical Tanker Size	N_2 Capacity cbm/hr	Unit Cost $US	Fitting Cost $US
Small < 10,000 dwt	1,000	570 K	171 K
Medium < 30,000 dwt	2,000	1.14 M	342 K
Large > 30,000 dwt	3,000	1.7 M	515 K

5 Practicalities regarding shore supply of N_2

In specific shore locations where the safe supply of IG/N_2 can be assured, this should be considered an acceptable alternative to the use of inert gas produced on board the ship, providing that tankers taking cargo from such locations can obtain an adequate on board provision of IG/N_2 to replenish lost IG/N_2 during the voyage and during any discharge/tank cleaning operations where an appropriate shore supply of IG/N_2 is not available.

Concerns have been expressed, however, in relation to availability and supply rates, and there is an identified risk associated with an insufficiently controlled shore supply of N_2 of over-pressurization of cargo tanks, that can lead to structural damage to ships' tanks.

6 Proposed alternative arrangements to current SOLAS requirements if N_2 is mandated for chemical tankers

Given the differences in operations between chemical and oil tankers, the profile associated with IGS operations on an oil tanker may not be appropriate for chemical tankers. It should be noted that most cargo related, fire and explosion incidents on chemical tankers investigated by the IIWG occurred during cargo discharge or during tank washing and gas freeing operations.

A chemical tanker that berths with "clean" tanks prior to loading cargo will have its cargo tanks inspected by a surveyor prior to loading cargo. If such a ship is required to have inerted tanks prior to arrival it will be necessary to gas free the tank(s) prior to inspection. Such inspection frequently includes a "wall wash" to determine tank suitability and cleanliness prior to loading. If the tank fails the "wall wash" test it may require full re-cleaning. Similarly once loading has commenced, where samples are taken, if these fail testing, discharge and re-cleaning of the tank may be required. If tanks are required

to be inerted during all such operations, other than for tank entry, significant additional in-port time and cost will occur.

If a chemical tanker was allowed to arrive in port with "clean" non-inerted tanks the necessary inspection process and any identified additional tank preparation could be conducted without undue delay or addition to current in-port time. Loading and samples could be taken, as is current practice, and on completion of cargo IG could be introduced to create an inert blanket over the cargo. During discharge and tank washing inert gas procedures would be applied as are currently practiced on tankers complying with SOLAS IG requirements.

The following table provides an illustration of the anticipated additional time required in port and associated emissions release associated with two potential chemical tanker IGS operational profiles. Shaded areas of the table indicate the cargo related activities that were reported as being conducted and associated with the significant majority of fire and explosion incidents on chemical tankers investigated by the IIWG.

IGS profile	**Chemical tanker (profile 1)**	**Additional in-port time**	**Chemical tanker (profile 2)**	**Additional in-port time**
Arrival in Port	Inerted	N/A	Gas Free	N/A
Tank Inspection/additional preparation	Inerted	Significant + emissions increase	Gas Free	N/A
Initial Loading	Inerted	N/A emissions increase	Gas free/Cargo Vapour	N/A
Sampling/possible sample discharge – further cleaning	Inerted	Significant + emissions increase	Gas free/Cargo Vapour	N/A
Bulk Loading	Inerted	N/A	Gas free/Cargo Vapour	N/A
Completion of Loading	Inerted	N/A	Inerted	Minimal
Transit	Inerted	N/A	Inerted	N/A
Discharge	Inerted	N/A	Inerted	N/A (depending on IGS capacity)
Tank Cleaning	Inerted	Significant + emissions increase	Inerted	Significant + emissions increase
Purging	Inerted towards gas free	Slight + emissions increase	Inerted towards gas free	Slight + emissions increase

ICS and IPTA would suggest that in the event of inert gas being mandated for chemical tankers, the Sub-Committee give consideration to the development of separate operational requirements for the application of inert gas to chemical tankers.

7 Training considerations

The mandatory introduction of IGS requirements on ships that have not previously been fitted with this equipment would have implication for the training requirements within the STCW Code (section A-V/1). Specific amendments to competency tables will require training to address the operation and maintenance of inert gas systems.

8 The effect of inert gas on polymerisation of certain cargoes

Regulation 15.13.5 of the IBC Code states that:

> "A product containing an oxygen-dependent additive shall be carried without inertion (in tanks of a size not greater than 3,000 m^3). Such cargoes shall not be carried in a tank requiring inertion under the requirements of SOLAS chapter II-2"*.

MSC/Circ.879 and MEPC/Circ.348 state that:

> "Styrene Monomer may be transported in a chemical tanker with tanks over 3,000 m^3 fitted with an IGS (inert gas system), provided that the oxygen content inside those tanks is maintained between 2% and 8% ...".

Any operational inert gas requirements should fully take into account that certain cargoes' carriage requirements may include specified tank atmosphere oxygen contents higher than that associated with an IGS providing fire protection.

Action requested of the Sub-Committee

6 The Sub-Committee is invited to consider the information provided, take it into account when determining inert gas requirements for new oil tankers of less than 20,000 tonnes deadweight and for new chemical tankers, and to decide as appropriate.

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* For equivalency arrangements for the carriage of styrene monomer, see MSC/Circ.879 and Corr.1.