

**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 sub
20,000 dwt oil tankers and on chemical tankers.**

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

SUMMARY

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

Introduction

1. The FP 53 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 CO₂ 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 in support of this work item and recall paragraph 14 of 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: *‘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 six hours 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/N₂ 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 25,000-30,000 dwt chemical tanker of in excess of 850 tonnes of fuel per annum. It should be recognised 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 (CO₂) 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 CO₂ 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 dwt becomes significantly acute. Such problems include difficulty in providing sufficient power on ships designed and optimised 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	N2 Capacity cbm/hr	Unit Cost \$ US	Fitting Cost \$ US
Small < 10000 dwt	1000	570 K	171K
Medium < 30000 dwt	2000	1.14 M	342 K
Large > 30000 dwt	3000	1.7 M	515 K

5) Practicalities regarding shore supply of N2

In specific shore locations where the safe supply of IG/N2 can be assured, this should be considered an acceptable alternative to the use of inert gas produced onboard the vessel, providing that tankers taking cargo from such locations can obtain an adequate on board provision of IG/N2 to replenish lost IG/N2 during the voyage and during any discharge/tank cleaning operations where an appropriate shore supply of IG/N2 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 N2 of over-pressurization of cargo tanks, that can lead to structural damage to ships' tanks.

6) Proposed alternative arrangements to current SOLAS requirements if N2 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 3000 M³). Such cargoes shall not be carried in a tank requiring inertion under the

*requirements of SOLAS chapter II *.* MSC/Circ.897/MEPC/Circ.348, state that ‘*Styrene Monomer may be transported in a chemical tanker with tanks over 3,000 m³ 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 note the information provided, to take it into account when determining inert gas requirements for new sub 20,000 dwt oil tankers and for new chemical tankers and to decide as appropriate.

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