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AIR POLLUTION PREVENTION

Sampling of low-flashpoint fuels supplied to ships for use on board as fuel

Submitted by IBIA

SUMMARY

Executive summary:	This document provides information on a method developed for the sampling of low-flashpoint fuels supplied to ships for use on board as fuel.
Strategic direction, if applicable:	3
Output:	3.7
Action to be taken:	Paragraph 10
Related documents:	MEPC 80/17 and MEPC 80/WP.11

Introduction

1 MEPC 80 considered draft amendments to MARPOL Annex VI related to low-flashpoint fuels and other fuel oil related issues and, having noted the discussion of the Working Group on Air Pollution and Energy Efficiency, set out in paragraphs 20 to 28 of document MEPC 80/WP.11, approved draft amendments to regulations 2, 14, 18 and appendix I of MARPOL Annex VI (MEPC 80/17, paragraphs 5.36 and 5.37).

2 IBIA fully respects the decision of the Committee on the sampling of low-flashpoint fuels and, in particular, notes the concerns with respect to the risks associated with the safe sampling of such fuels.

3 Regulation 18 of MARPOL Annex VI, as amended, retains the requirement that fuel oil delivered to and used on board ships shall meet fuel oil quality provisions including that the fuel oil shall not include any substance or chemical waste that "jeopardizes the safety of ships or adversely affects the performance of the machinery".

4 Over the last 100 years, the marine cargo industry has developed measurement techniques, sampling norms and quality testing procedures. This has been driven largely by standardization bodies such as API, ASTM, IP and later ISO. The bunker industry has adopted such standards, as appropriate, and taking lessons from the liquid petroleum industry, also developed similar quantity measurement, sampling and quality testing procedures. This has benefited the bunker industry and minimized quantity and quality disputes, even though after many iterations of regulation there remain challenges to effective and uniform implementation.

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5 Given that the bunker industry is entering a phase where new fuels are emerging with a rising demand from ships for those fuels due to the imperative to reduce GHG emissions from international shipping, IBIA considers there is no reason to reinvent the wheel and so lessons can be taken, for example, from methanol as product cargo that is presently transported by ships for many years now, and could apply the same principles used for methanol cargo for measurement, sampling and product quality verification. Furthermore, strict safety requirements which are already in place in the methanol trade can be similarly applied.

6 IBIA considers that, irrespective of the regulatory requirements for fuel oil sampling, the buyer of fuel for ships will continue to seek assurance over the quality of those fuels not least to ensure compliance with the fuel oil quality provisions under regulation 18 of MARPOL Annex VI. Whilst methanol and other fuels have a low-flashpoint, product verification as bunker fuel at point of transfer to the ship is likely to continue to be required especially if it is needed to verify carbon intensity of the fuel.

7 Also, methanol as bunker fuel has a quality specification under development, that is ISO 6583,* which raises the question as to how the bunker industry is going to verify this if no sampling is to be allowed. Also, ISO 6583 allows for wider tolerances of methanol for delivery as fuel to ships to be used for combustion purposes on board, so it is suggested that evaluating product quality will become even more important.

8 Initial investigations have highlighted that there will be specific requirements for sampling containers and one of those is that the container should be able to withstand holding the low-flashpoint fuel for at least 12 months for ship retention. And there might also be additional requirements for onboard sample storage rooms due to the low-flashpoint. This is because owing to the lower energy density, and subject to the volume of the bunker fuel tanks storing the fuel, it can be expected that bunker frequency will increase resulting in more samples to be retained.

Proposed sampling solution for low-flashpoint fuel bunkering

9 A "Sampling Method for Low-Flashpoint Fuel" to address the critical need for safety and efficiency in handling low flashpoint fuels during bunkering operations has been developed by Green Marine Bunkering Pte. Ltd., Singapore. By employing modified sampling techniques, this method aims to enhance the accuracy of fuel quality assessments, mitigate safety risks, and optimize the overall bunkering process. The proposed sampling solution for low-flashpoint fuel bunkering is set out in the annex to this document. It should be noted that the proposed solution is a concept and further study on sampling equipment suitability remains to be done including, for example, on sample containers suitable for air freight.

Action requested of the Committee

10 The Committee is invited to note the information provided.

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* ISO/DIS 6583 Specification of methanol as a fuel for marine applications.

ANNEX

PROPOSED SAMPLING SOLUTION FOR LOW FLASHPOINT FUEL BUNKERING (source: Green Marine Bunkering Pte. Ltd., Singapore)

Introduction

The rising demand for low-flashpoint fuels, driven by environmental and regulatory considerations, necessitates innovative approaches to ensure safe and reliable bunkering processes. This urgency underscores the importance of developing robust sampling methods tailored specifically for low flash fuels.

Green Marine Bunkering Pte. Ltd. (Singapore) is developing a proposed "Sampling Method for Low-Flashpoint Fuel". This approach addresses the critical need for safety and efficiency in handling low flashpoint fuels during bunkering operations. By employing modified sampling techniques, this method aims to enhance the accuracy of fuel quality assessments, mitigate safety risks, and optimize the overall bunkering process.

Purpose

The purpose of employing a "Sampling Method for Low -Flashpoint Fuel Bunkering" is to ensure the accurate and representative collection of fuel samples during the bunkering process. This method aims to mitigate the risk associated with low flashpoint fuels by providing a systematic approach for obtaining samples that reflect the quality and characteristics of the fuel being transferred. By adhering to a standardized sampling procedure, this method enhances safety measures, regulatory compliance, and overall operational efficiency in the bunkering of low flashpoint fuels.

Definitions

Representative sample is a product specimen having its physical and chemical characteristics identical to the average characteristics of the total volume being sampled.

Primary sample is the representative sample of the fuel delivered to the ship collected throughout the bunkering period obtained by the sampling equipment positioned at the bunker manifold of the receiving ship.

Retained sample is the representative sample in accordance with regulation 18.8.1 of MARPOL Annex VI[*], of the fuel delivered to the ship derived from the primary sample.

Closed sampling device refers to a system or apparatus designed for collecting samples of liquids or gases in a manner that minimizes exposure to the surrounding environment. The term "closed" indicates that the sampling process is contained or sealed, reducing the risk of contamination, and ensuring the integrity of the collected sample. Most used in oil and chemical tankers however not particularly designed for Container and Bulk Ships.

[*] MEPC 80 approved draft amendments to regulation 18 of MARPOL Annex VI that excludes low flashpoint fuels from the requirement to sample fuel oil delivered to the ship (MEPC 81/3/2).

Gastight valve / Vapour Lock (see figure 1) are airtight valves used to match the gauge of oil and water (oil gauge) and airtight sampling equipment in the cargo cellar. This valve is often used on tankers, chemical tankers, petroleum depots and on rigs. Container ships and bulk carriers are often designed and constructed without incorporating vapour locks that are compatible with closed sampling systems. This design variation presents a challenge in implementing closed sampling techniques on these vessels.

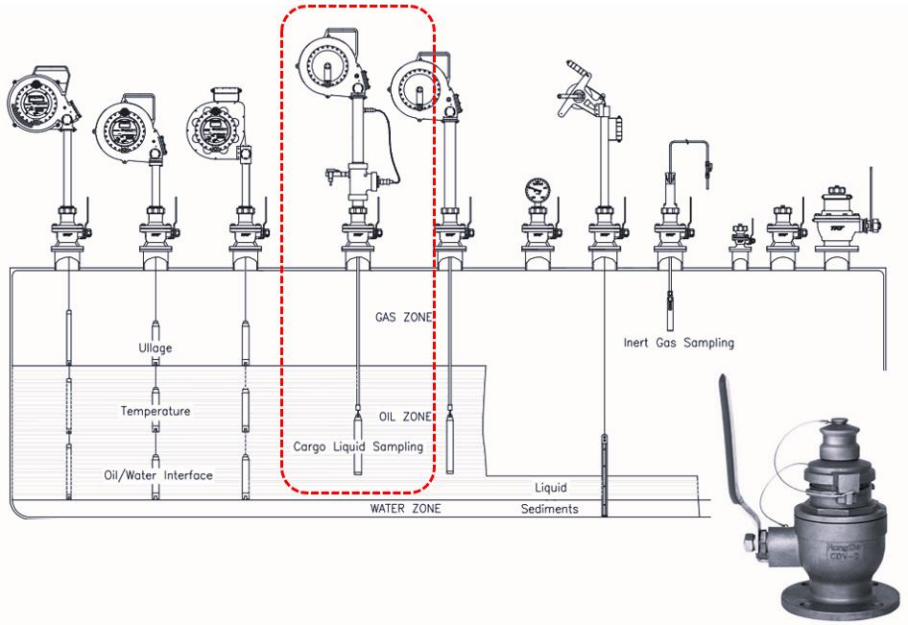


Figure 1: Gastight Valve / Vapour Lock arrangement

Drip Sampler (see figure 2) is a specialized equipment component designed for the sampling of fuel or other fluids during bunkering operations. Bunkering involves the transfer of fuel from one vessel or storage facility to another, and it is crucial to monitor and sample the fuel to ensure its quality, compliance with regulations, and safety.

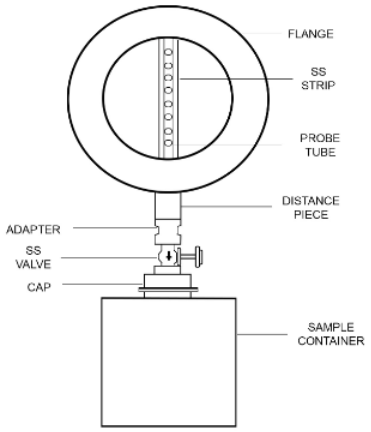


Figure 2: Drip sampler

Sampling methods

Direct Tank Sampling is the process of fuel sampling in closed conditions would involve obtaining samples from a ship's fuel tanks through vapour locks, using the ship's own sampling devices. Closed sampling systems requires the use of a specific sampler. Often, surveyors

rely on the vessel's equipment when they lack suitable samplers. However, crews on ships other than oil or chemical tankers, like container vessels and bulk carriers, are generally not familiar with using closed samplers. In addition, these samplers are designed in a way that allows for the release of some vapours during the transfer of sample from the sampler to the sample bottle.

Achieving ***Representative samples*** in fuel sampling presents a challenge, significantly affected by the choice of both the sampling point location and the equipment used. When sampling from directly from storage tanks, certain samplers are tailored to collect fuel only at a specific height they are inserted, whereas others are designed to start collecting samples once they reach the tank bottom. Furthermore, owing to logistical constraints related to storage and the necessity for numerous sample containers, collecting top, middle, and bottom samples from each fuel tank post-bunkering is often impractical.

Manifold Sampling In light of these limitations, the collection of running samples at the manifold during the bunkering process using ***Drip Sampler*** presents itself as a more practical approach for achieving representative samples. This method is especially valuable in ascertaining whether contamination has occurred during the transfer process, whether it be on board the vessel or at the shore facility. The development of fixed sampling points on methanol dual fuelled ships has been constrained owing to the lack of guidelines. Addressing this issue involves several potential improvements.

The primary objective is to secure representative sample without relying on fixed outfitting points, such as drain points that also serve as sampling lines. A key challenge here is the lack of standardization in the sizes and types of endpoints of these lines, which can vary significantly and affect the ease of sampling process.

Option 1

- The sampling mechanism should be **simple and familiar** to vessel crew. As an example, a drip sampler, known for its ease of use, emerges as a suitable option. In terms of design, the drip sampler can be improved by using sample container approved for methanol resistance, safeguarded within a protective cage or enclosure to prevent impact or mechanical damage.

- The positioning of the drip sampler requires careful consideration, particularly given that the receiving vessel's presentation manifold typically features a dry-disconnect system, often utilizing a Quick Connect/Disconnect Coupling (QCDC). The conventional placement of the drip sampler between the manifold flange and the bunkering hose is not feasible in this setup. An effective alternative would be to position the drip sampler between the vessel's male QCDC flange and the receiving vessel's manifold flange as shown in figure 3.

- To put in context, even the 'closed' sampling devices (see example in figure 4) employed on tankers that regularly handle methanol as cargo necessitate the removal of the sampling bottle after the sample has been transferred from the sampler. This process inevitably leads to the release of a small amount of methanol vapours. A similar situation occurs in laboratories where personnel manually transfer methanol into other containers for testing. The question here is the extent to which these minor emissions of vapours from sample bottles pose a concern, particularly considering that the individuals performing the transfers are equipped with Personal Protective Equipment (PPE) and personal gas detectors. This consideration is essential in evaluating the overall safety and risk associated with the sampling and transfer processes.

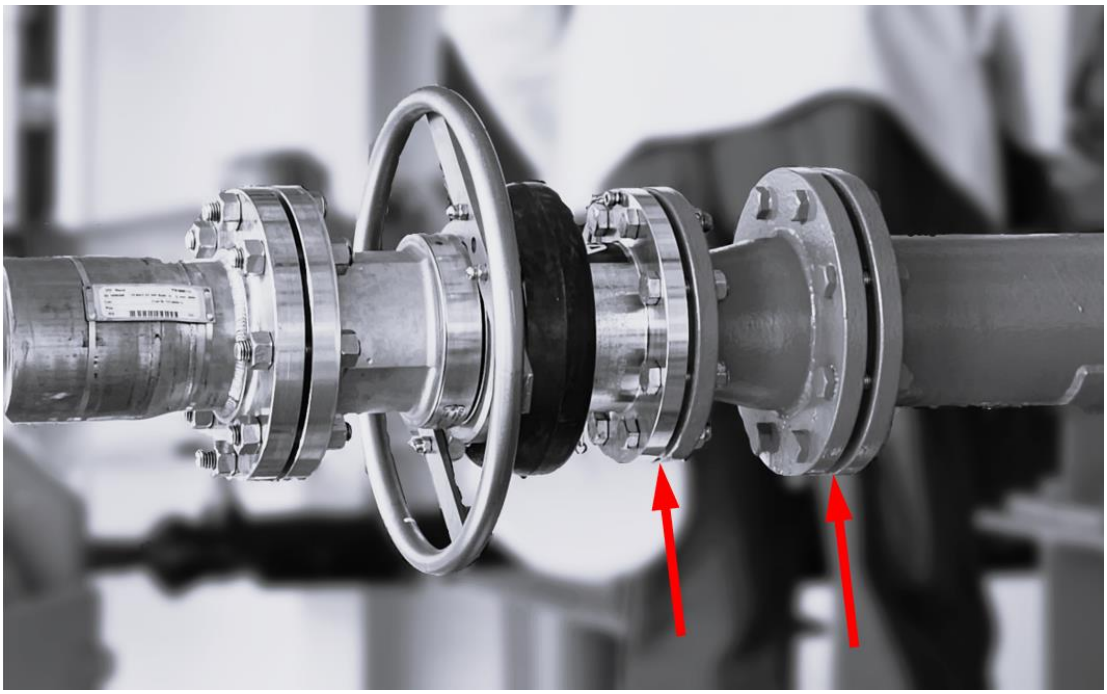


Figure 3: Proposed position of the drip sampler between the vessel's male QCDC flange and the receiving vessel's manifold flange



Figure 4: Example of a 'Closed' sampling devices employed on tankers that regularly handle methanol as cargo

If it is established that minor emissions of vapours from sample collecting containers to small sample bottles pose a concern even with the use of appropriate PPE & Personal Gas Detectors, then we can go for option 2.

Option 2

- A redesigned drip sampler can be developed to create a completely enclosed system (see illustration in figure 5). As one of several potential improvements, this design would incorporate a specialized adapter for the sample container. The primary function of this adapter would be to enable the container's removal from the manifold sampling point in a way that prevents any vapour from escaping. Such an enhancement would contribute to reducing the risk of vapour exposure.

- Regarding the design, the container should be robust enough or adequately protected to withstand any mechanical damage. This consideration is vital to ensure durability and safety in various operational conditions.

- The main challenge involves devising a system that allows the transfer of contents from the collecting container to individual sampling bottles without releasing any methanol vapour. To accomplish this, the system could be equipped with specialized adapters and cover caps. These components would be designed to enable the flow of liquid into the sample bottle while concurrently displacing the air or vapour from the bottle back into either the bunker line or the collecting container. Such a configuration is crucial for maintaining a completely closed and secure system during the transfer process.

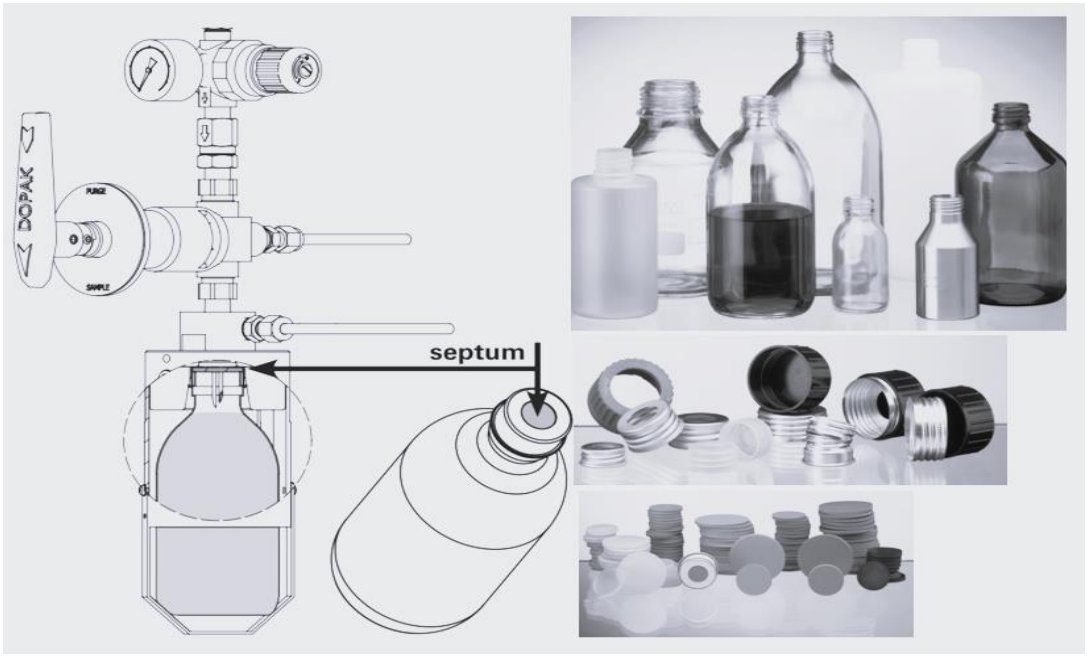


Figure 5: Possible redesigned drip sampler to create a completely enclosed system

Conclusion

The Drip Sampling Method stands out as a recommended approach for low flashpoint fuel bunkering, offering valuable insights into fuel quality and safety during transfer operations. This method's controlled and representative sampling process allows for accurate analysis without disrupting the bunkering process. However, it is imperative to acknowledge and address the limitations associated with the Drip Sampling Method.

While the controlled capture of small amounts of fuel minimizes the risk of contamination and ensures the integrity of the sample, it is crucial to implement appropriate measures to mitigate potential drawbacks. To ensure the reliability of the Drip Sampling Method, it is essential to use methanol-resistant materials and enhance the protection of the sample container against mechanical damage.

By diligently addressing these limitations, bunkering operators can capitalize on the benefits of the Drip Sampling Method, enhancing safety measures, regulatory compliance, and overall operational efficiency. The method's ability to provide real-time insights into fuel characteristics positions it as a valuable tool for maintaining the quality and safety standards of low flashpoint fuels during bunkering activities. Therefore, with due consideration and mitigation of its limitations, the Drip Sampling Method emerges as a recommended and effective practice in the bunkering of low flash fuels.