The Swedish Club

Sampling Guide for Liquid Cargoes

Introduction

Sampling should be conducted to ensure the quality of the cargo. Taking samples is the best defence against cargo claims. There should be procedures for taking samples throughout the cargo operation. The Master should ensure that samples are taken as per industry standards. Any sample points on the vessel that are used must be cleaned according to industry practices. The crew should wear PPE as required in the MSDS sheet. This guide focuses on sampling for hazardous chemicals, edible oils, and petroleum cargoes.

We would like to thank CWA[1], RR&CO[2], and Stena Bulk for their invaluable advice and feedback.

[1] CWA has provided the advice for Cargo specifics.

[2] RR&CO has provided the advice for Labelling of Samples, Storage of Samples and Stowage and Disposal Log.

Loss Prevention Advice

- Perform a risk assessment before operations commence.
- The crew must record what samples are taken, including the date, time, personnel involved, and the method used.
- Adhere to regulatory standards, including MARPOL, SOLAS, Occupational Safety Standards, ISGOTT, IBC Code, and local guidelines.
- Follow ASTM (American Society for Testing and Materials), ISO, or API (American Petroleum Institute) standards for sampling and testing.
- The Chief Officer should be involved in all cargo sampling conducted by the crew or any surveyor.
- The surveyor should be accompanied by the Chief Officer or an officer delegated by the Chief Officer and the sampling crew. Discuss the sampling location and procedure with the surveyor.
- The crew should take identical samples to the surveyor, using the same method.
- It is advisable to draw first-foot and after-loading samples on an individual per-tank basis.
- Take appropriate precautions against static electricity hazards.
- Ensure final tank samples accurately represent the overall quality of the total volume in the tank.
- Witness all samples. Do not endorse non-witnessed samples.
- Issue a Letter of Protest when load port samples are not provided, joint sampling is not conducted, or the terminal does not allow manifold samples.
- At the discharge port, draw samples from each discharging tank. Draw a manifold sample for visual checks at the commencement of discharge operations.
- Ensure that the sample tape and sampling equipment are clean to avoid contamination. The equipment should be undamaged, and its electrical continuity tested as per the maker's instructions.
- The Master shall verify the details of the samples (size, description, seal numbers, etc.) against the sample report issued to the vessel by the load port surveyor.

Sampling

To protect the shipowner against cargo claims for contamination, the crew must take their own samples. This is vital, as such samples provide owners with representative samples taken by their own personnel. The crew should be competent[3] in checking and verifying the quality of the samples taken.

At the start of the cargo operation, the Shippers'/Charterers' Surveyors will normally carry out sampling. This usually does not include samples drawn at the vessel's manifold. Proper procedures[4] should exist for how samples are taken and stored onboard.

Shippers'/Charterers' Surveyors have no obligation to provide the crew with a sample. It is standard practice at the load port for Charterers to give the Master sealed samples of the delivering shore tank and after-load samples when loading is finished. These samples are not the property of the Master but are for the cargo receiver to confirm cargo quality pre- and post-loading operations. Occasionally, samples for the vessel may be provided, but this cannot be assumed and will rarely include any manifold samples.

Manifold Samples

The vessel's responsibility for the cargo starts and ends at the vessel's manifold.

- Samples must be taken by the crew when loading commences. The sample shall be visually checked for quality based on the cargo specifications in the voyage order.
- The manifold valve should preferably be in the closed position when the manifold sample is taken. Closing the manifold valve ensures the sample represents the liquid in the manifold or the immediate pipeline section.
- The crew should ensure that the manifold sampling point is flushed for at least 30 seconds before taking a sample to remove any residues.
- A new sample should be taken after any stoppage from shore, change of grade, change of shore tanks, and upon completion of the cargo operation.

[3] It is the Master's responsibility to check and verify the samples drawn onboard meet the specification of the cargo in the charterers' voyage orders.

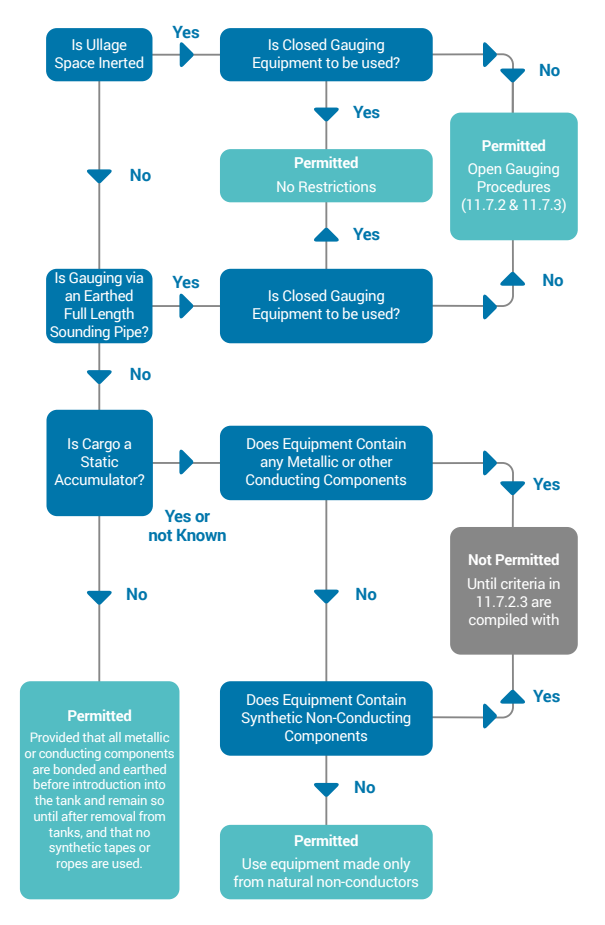
[4] Comply with latest version of ISGOTT. Ensure sampling procedures are included in the SMS.

First-Foot Samples

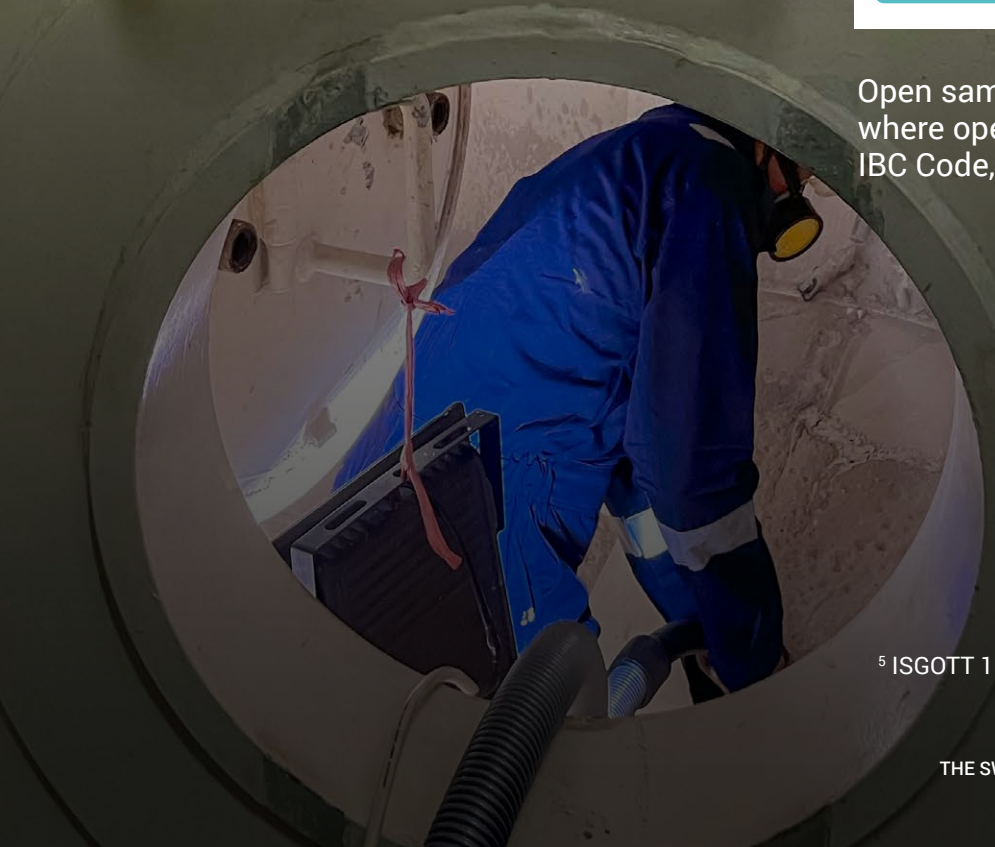
After tank cleaning, the upper part of the tank is usually cleaner than the lower part, as contaminated particles tend to settle at the bottom. Loading 2% of the cargo exposes it to more than 30% of the tank surface, including the tank top and heating coils. If the cargo is sensitive, the surveyor might take first-foot samples and send them to a laboratory for analysis.

- First-foot samples confirm that the vessel's manifolds, sampling points, pipes, and lines are clean. They also ensure that the tank is fit to carry the intended cargo.
- The Chief Officer should ask the surveyor which test methods will be used for the first-foot sample.
- The crew should log the time between when the first-foot sample was taken and when loading commenced.

Precautions Required When Using Portable Measuring and Sampling Equipment[5]



Open sampling is permitted for cargoes where open gauging is allowed under the IBC Code, subject to port regulations.



[5] ISGOTT 11.8.2.2 figure 11.4

Labelling of Samples

Owners should provide their crews with large pre-printed self-adhesive sample labels for use on the standard 500 ml sampling bottles. These labels should be filled in, sealed/chopped by the surveyor and/or crew, and pasted onto a glass sample bottle. A photograph of the completed label and seal (including the seal number) against a white background should be taken for records.

Vital details to record on each sample label:

1. Place where the sample was drawn (terminal, feeder vessel, port, berth, anchorage).
2. Date and time of sampling.
3. Ship's name and operational status (before loading, after loading, before discharge).
4. Name and signature of the party who drew the sample.
5. Identity of sampler (Chief Officer, pumpman, crew member, or surveyor).
6. Description of the cargo sampled.
7. Type of sample (upper, middle, lower, dead bottom, running, or composite).
8. Sampling device used.
9. Product sample source (tank number, manifold, or deepwell pump-stack sampling point).
10. Seal number.
11. Appropriate hazard labelling.
12. Space for signatures and chops of any witnessing parties (surveyor/crew).

Storage of Samples

Commonly carried chemical cargoes produce a large number of samples to be retained onboard.

It is preferable for samples to be drawn in amber glass bottles or metal cans, with plastic/metal inserts for retention. This prevents exposure of the product to UV light, which can cause deterioration of the sample. Samples should be stored preferably for 15 months in a cool and dry location.

Cargoes that have inhibitors added to prevent polymerization must be stored in a cool, dark place, and samples must be checked by the Chief Officer every week until the samples are disposed of.

Samples tend to remain representative for longer than the period the inhibitor certificate states, on the basis that the conditions the samples are exposed to are different from those the cargo experiences during the laden voyage.

As per the International Bulk Chemical (IBC) Code, Section 16.5 highlights the requirements for the safe stowage of chemical samples. These include:

a. The vessel needs to have a sample locker situated in the main cargo area (IBC 16.5.1).

b. The sample locker must have cells to keep the bottles secure and prevent shifting when rolling (IBC 16.5.2.1).

c. The sample locker must be made of chemical-resistant material. If any part of the sample locker is made of materials like wood, this needs to be changed to a chemical-resistant material. Cells made of stainless steel are the most suited for this purpose. However, if the vessel is only carrying certain products, such as palm oil, these cells can be made of reinforced plastic.

d. The sample locker must have a ventilation arrangement. The ventilation need not be "forced," but if natural ventilation is used, there must be a flame screen on the natural vent.

e. The sample locker must have fire extinguishing arrangements, such as a sprinkler system.

f. Incompatible samples should not be stowed close to each other (e.g., acids and caustic samples should have a vertical separation in the sample locker).

Stowage and Disposal Log

The Chief Officer must keep detailed records of the sampling procedures, retain all evidence, and document how the samples are being stored onboard. A log must be kept recording all samples entering and departing the sample cabinet/ room to provide evidence of the proper and safe custody of cargo samples and to assist with providing a timeline of the location and transfers of a sample. This is particularly important in cases where only one sample remains, and all parties must be bound by the analysis results of that sample. It must be possible to prove that it came from a specific tank on a specific date and document what happened to it since that date.

These samples and associated records will be the best defense against any cargo claim.

Such a log must record for each sample:

1. The date and time the sample was drawn.
2. A description of the cargo sampled.
3. The type of sample, i.e., upper, middle, lower, dead bottom, running, or composite.
4. The sampling location, i.e., terminal, port, berth, or anchorage.
5. The ship's name and operational status, i.e., before loading, after loading, before discharge.
6. Seal number.
7. Appropriate hazard labelling.
8. Disposal method, either delivered to a shore reception facility providing a certificate of receipt or disposed of with tank cleaning waters of a similar grade having the same pollution category and chemical compatibility (MARPOL Annex 2 cargo) or as slops (MARPOL Annex 1).

Bill of Lading

As mentioned previously, the main reason to draw samples is to protect the owner against cargo claims. The document that dictates the quality and quantity of the cargo is the Bill of Lading.

A Bill of Lading has three functions:

a. It is a receipt for the goods received by the carrier.

b. It is evidence of the contract of carriage.

c. It can be a document of title.

As the Bill of Lading acts as a receipt for the goods, it must accurately record the number/quantity and condition of the goods as shipped. It is, therefore, important that a Master never signs a blank Bill of Lading or a Bill of Lading that he knows, or reasonably suspects, to contain inaccurate or false information.

An Early Departure Procedure (EDP) allows the departure of a vessel from the berth and the load port before Bills of Lading have been issued. EDP occurs predominantly in the tanker trade due to the time required to produce shore loading figures.

EDP generally involves a Master:

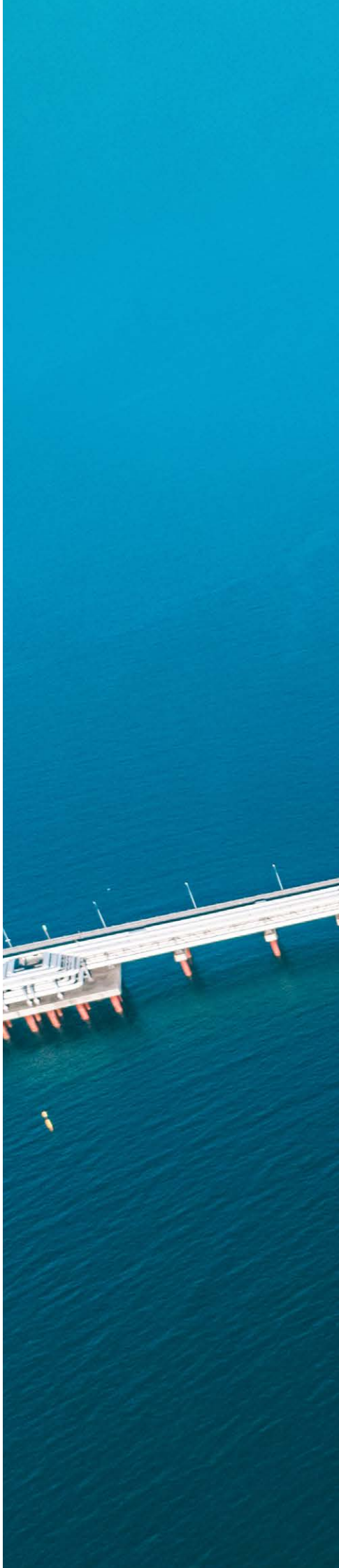
a. Completing unsigned Bills of Lading except for the cargo quantity figures.

b. Authorizing an agent to insert the cargo quantity and sign/release the Bills of Lading on his behalf, once the Master has confirmed the cargo quantity.

Under no circumstances should a Master sign (or authorize an agent to sign on his behalf) blank or incomplete Bills of Lading. It is important that a Master does not sail until the ship cargo figures have been calculated so that he is able to verify the shore figures once these are provided to him by the agent.

If the cargo is not as per specification, the Master should clause the Bill of Lading. Clausing a Bill of Lading is the process of inserting written remarks on the Bill of Lading regarding the quality or condition of the cargo at the time of loading. A Bill of Lading that does not contain any remarks (and is, therefore, not claused) is called a "clean" Bill of Lading.

The Master must insist on clausing any Bill of Lading where damage or contamination has been observed during the loading of the cargo. Clean Bills of Lading are not to be issued, even if the shipper so requires.



If, nonetheless, it becomes a commercial necessity to issue clean Bills of Lading, this should only be done after due consideration of the risks involved—and, preferably, accompanied by a Letter of Indemnity (LOI).

If Bills of Lading are not claused—when they should have been claused—this may prejudice P&I cover. This means that there may not be any insurance cover for any cargo claim.

If the Master is not permitted (e.g., by the Charterer) to clause the Bill of Lading, he should refuse to sign and contact the P&I Club immediately.

If the Master believes that he should not sign a Bill of Lading, he should always contact the Owners and/or the P&I Club. The consequences of wrongly refusing to sign a Bill of Lading may be serious. Before agreeing to accept a Letter of Indemnity (LOI), the Master should always contact the Owners and/or the P&I Club.

For more information, see The Swedish Club's Practical Guides: Clausing Bills of Lading, Letters of Indemnity, Early Departure Procedure, and Three Functions of Bills of Lading.

Cargo Specifics

Petroleum Cargoes

Manifold, first foot, and after-loading samples should be drawn during and after the completion of loading the cargo. Some terminals do not allow manifold samples to be drawn; therefore, the rules and regulations of each terminal should be followed, possibly followed by a protest if appropriate. Samples taken during the stages of loading allow for potential contamination issues to be caught early and thoroughly investigated, possibly preventing or reducing contamination of the bulk cargo.

At the discharge port, before-discharge samples should be drawn as individual tank samples, either as running or upper, middle, and lower level samples.

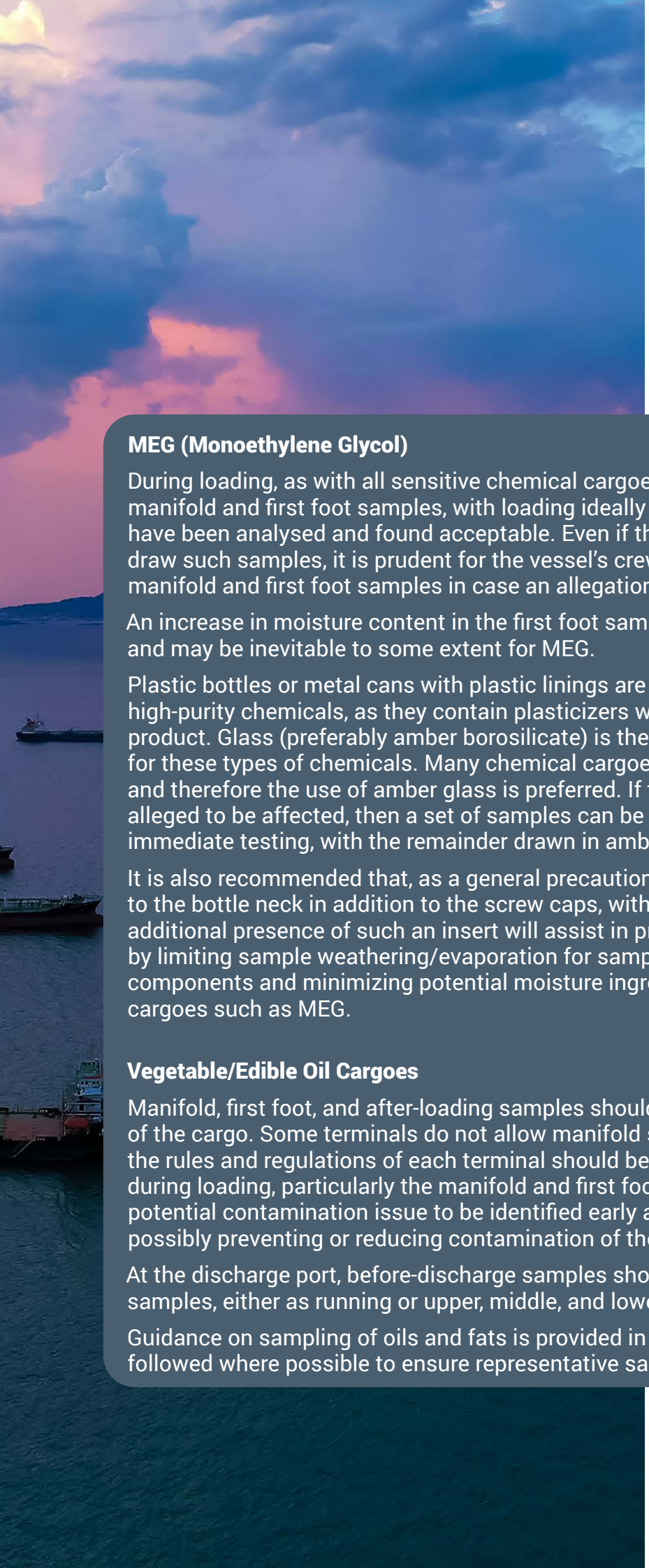
Hazardous Chemical Cargoes

In addition to the pre-loading surveys often carried out by shippers' surveyors, first foot sampling methods can give a good indication of the cleanliness of cargo tanks and lines. This is because any contaminants present in the shore or vessel lines or the cargo tanks will be concentrated in the first foot samples.

However, tanks coated with epoxy-type coating systems can absorb light solvent species, such as aromatics, which may not immediately be detected during pre-loading inspections. As with residues of previous cargoes, water is undesirable in high-purity chemical cargoes. Moisture can enter a cargo via insufficient tank/line ventilation and draining of wash water, although this will typically be detected in the pre-loading survey and first foot samples.

Samples should be carefully stored in cool, dark places out of direct sunlight to avoid deterioration of colour. Sampling in amber glass bottles assists in preventing deterioration but has the drawback of making rapid colour observations difficult. Samples containing inhibitors should be kept away from direct sunlight and in a cool location to avoid accelerated consumption of the inhibitor.

Sampling of monomeric inhibited cargoes will be the same as for any other high-purity chemical cargo, i.e., it should be performed via the vapor lock using the appropriate closed system sampling equipment. The Chief Officer should inspect the samples weekly, and any sign of an increase in viscosity or warming of the samples should prompt disposal of the sample.



MEG (Monoethylene Glycol)

During loading, as with all sensitive chemical cargoes, it is recommended to draw manifold and first foot samples, with loading ideally suspended until the samples have been analysed and found acceptable. Even if the shippers' surveyors do not draw such samples, it is prudent for the vessel's crew to draw and retain a set of manifold and first foot samples in case an allegation of contamination arises.

An increase in moisture content in the first foot sample during loading is expected and may be inevitable to some extent for MEG.

Plastic bottles or metal cans with plastic linings are generally unsuitable for storing high-purity chemicals, as they contain plasticizers which could leach into the product. Glass (preferably amber borosilicate) is the preferred sample container for these types of chemicals. Many chemical cargoes are sensitive to sunlight, and therefore the use of amber glass is preferred. If the appearance parameter is alleged to be affected, then a set of samples can be drawn in clear glass bottles for immediate testing, with the remainder drawn in amber glass bottles.

It is also recommended that, as a general precaution, a hermetic insert is fitted to the bottle neck in addition to the screw caps, with both securely fastened. The additional presence of such an insert will assist in preserving sample condition by limiting sample weathering/evaporation for samples containing volatile components and minimizing potential moisture ingress for samples of hygroscopic cargoes such as MEG.

Vegetable/Edible Oil Cargoes

Manifold, first foot, and after-loading samples should be drawn during the loading of the cargo. Some terminals do not allow manifold samples to be drawn; therefore, the rules and regulations of each terminal should be followed. Samples drawn during loading, particularly the manifold and first foot samples, can allow for a potential contamination issue to be identified early and thoroughly investigated, possibly preventing or reducing contamination of the bulk cargo.

At the discharge port, before-discharge samples should be drawn as individual tank samples, either as running or upper, middle, and lower level samples.

Guidance on sampling of oils and fats is provided in ISO 5555 and should be followed where possible to ensure representative samples are being drawn.

Conclusion

Sampling is essential for quality assurance and defence against cargo claims. Proper storage, recordkeeping, and adherence to regulatory guidelines are emphasized to maintain sample integrity and provide evidence in case of disputes.

Key Takeaways:

- Sampling Protocols: Draw manifold, first foot, and after-loading samples to detect contamination early. Use joint sampling with surveyors and comply with terminal regulations.
- Sample Storage: Store samples in amber glass or metal containers, keep them in a cool, dry, ventilated location, and ensure weekly checks for inhibitors.
- Documentation: Maintain a detailed log recording sample origin, type, seal numbers, and storage/disposal history to support claim defence.
- Bills of Lading: Clause bills of lading for observed defects, avoid signing incomplete documents, and secure Letters of Indemnity (LOIs) when necessary.
- Cargo-Specific Practices: Follow tailored sampling and storage guidelines for sensitive cargoes like MEG, hazardous chemicals, and vegetable oils.

Checklist

Best Practices for Sampling

1. General Sampling Protocols

- [ ] Use proper sampling tools and methods specific to the cargo type (e.g., closed system equipment for hazardous chemicals).
- [ ] Ensure all sampling personnel are properly trained in handling and storing cargo samples.
- [ ] Conduct joint sampling with terminal staff or surveyors whenever possible to establish transparency.
- [ ] Maintain accurate records of all sampling activities, including seal numbers, sample descriptions, and conditions.

2. Storage of Samples

- [ ] Use amber glass bottles or metal cans with appropriate seals to preserve sample integrity.
- [ ] Store samples in a designated, secure, cool, and dry location to prevent degradation.
- [ ] Regularly inspect stored samples, particularly those containing inhibitors, to ensure their condition remains stable.
- [ ] Avoid mixing incompatible samples in the same storage area; use vertical separation for substances like acids and caustics.

3. Sampling During Cargo Operations

- [ ] Take manifold, first foot, and after-loading samples to detect contamination early in the loading process.
- [ ] Suspend loading operations if first foot samples reveal contaminants, pending further analysis.
- [ ] At discharge ports, take running or level-specific tank samples to assess cargo condition.

4. Documentation and Recordkeeping

- [ ] Maintain a comprehensive sample log, including details such as date, time, type of sample, seal numbers, and location.
- [ ] Cross-check and verify sample details with reports provided by load port surveyors.
- [ ] Record disposal methods, ensuring compliance with MARPOL Annex 2 or Annex 1, and retain certificates of receipt from shore facilities.

5. Handling Bills of Lading

- [ ] Always clause Bills of Lading for observed defects or contamination during loading.
- [ ] Refuse to sign blank or incomplete Bills of Lading.
- [ ] If clean Bills of Lading are commercially necessary despite defects, secure a Letter of Indemnity (LOI) and consult P&I Club representatives.

6. Communication and Coordination

- [ ] Establish clear communication with shippers, surveyors, and agents regarding sampling expectations and protocols.
- [ ] Immediately report and document any irregularities or disputes to owners and P&I Club representatives.
- [ ] Issue Letters of Protest promptly in cases of non-compliance, contamination, or restricted sampling access.

7. Crew Training and Preparedness

- [ ] Regularly train crew on cargo sampling and handling procedures, including MARPOL compliance.
- [ ] Familiarize crew with the requirements of the IBC Code, especially for hazardous chemicals.
- [ ] Equip the vessel with adequate sampling tools, storage materials, and protective equipment.


The
Swedish
Club