Marine Bunker Value Chain: Avoiding Disputes and Claims

The selection of marine fuel is influenced by both commercial and regulatory considerations, requiring vessels to carry multiple fuel grades, balancing costs with compliance. This document outlines best practices across the marine bunker value chain, aimed at preventing disputes and operational issues.

While Heavy Fuel Oil (HFO) and Marine Diesel Oil (MDO) have traditionally formed the marine fuel mix, additional fuel grades have been introduced owing to the emission regulations implemented in the past two decades. The advent of Emission Control Areas (ECAs) required 0.1% sulphur fuels, introducing Low Sulphur Marine Gas Oil (LSMGO) and Ultra Low Sulphur Fuel Oil (ULSFO), while the IMO 2020 Global Sulphur Cap limited the sulphur content to 0.5% introducing Very Low Sulphur Fuel Oil (VLSFO), except for vessels installed with scrubbers.

In May 2024, the latest version of the fuel quality standard ISO 8217:2024 expanded the categorisation of fuels, effectively creating distinct categories for residual fuels based on the sulphur limits, and including biofuel blends for both distillate and residual marine fuels.

The ISO 8217:2024 intends to address the shift in the marine fuel landscape, moving away from fuels sourced exclusively from traditional oil products derived from the processing of petroleum crude, towards fuels derived from synthetic and renewable feedstocks, as well as recycled and alternative sources.

The ISO 8217:2024 categorises fuel grades into four tables:

- Table 1 – Distillate and bio-distillate marine fuels (DM / DF grades)
- Table 2 – Residual marine fuels ≤ 0.50% sulphur (VLSFO / ULSFO)
- Table 3 – Bio-residual marine fuels (RF grades)
- Table 4 – Residual marine fuels > 0.50% sulphur (HSFO)

By streamlined categorisation of fuel grades and inclusion of clauses 5 to 10 in the tables, ISO 8217:2024 has strengthened the quality assurance of marine fuels, and it is therefore strongly advised to include the latest standard in Bunker Purchase Agreements and Charter Party Clauses.

The activities from the moment the need to supply bunkers arises until the fuel is consumed make up the Marine Bunker Value Chain, comprising of four key stages – Bunker Procurement, Bunkering, Fuel Analysis and Fuel Management. The marine bunker value chain involves multiple stakeholders with competing interests, where lapses in diligence can quickly lead to operational disruption and contractual disputes. Ensuring diligence and adhering to industry best practices at each of these stages is crucial in avoiding disputes between the stakeholders.

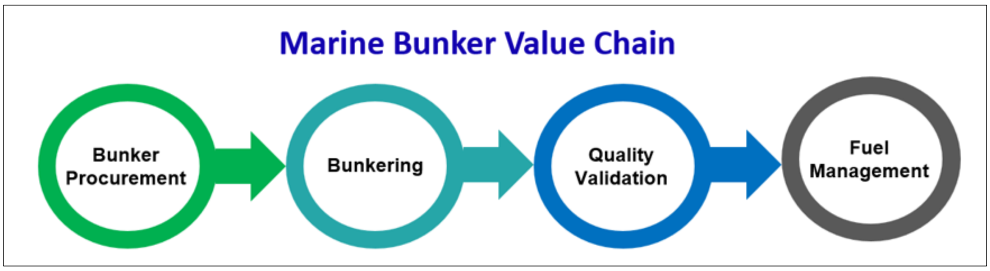

Figure 1: Marine Bunker Value Chain

1. Bunker Procurement

Bunkers are procured either as a one-off spot purchase agreement through a Bunker Confirmation Note or through a long-term supply contract concluded as a Bunker Supply Agreement.

In a time charter, the Charterer is expected to procure fuel to the specification agreed within the Charter Party, in a quantity mutually agreed with the vessel and considering all relevant factors pertaining to the intended voyage.

The factors taken into consideration in determining the fuel specification and quantity for a voyage could typically include:

- Fuel required to safely perform the voyage
- Regulatory requirements
- Maximising cargo uplift
- Fuel availability and cost

Ensuring that the fuel is supplied in the correct quantity and quality requires diligence during procurement. While fuel availability and cost have been the main determining factors for procuring fuel, expanding the scope to include metrics evaluating historic data of ports and fuel suppliers can enable informed procurement decisions. Such diligence can help reduce the likelihood of potential issues arising, such as discrepancies in fuel quantity or quality, and ensures that the fuel delivered meets the operational requirements and contractual obligations.

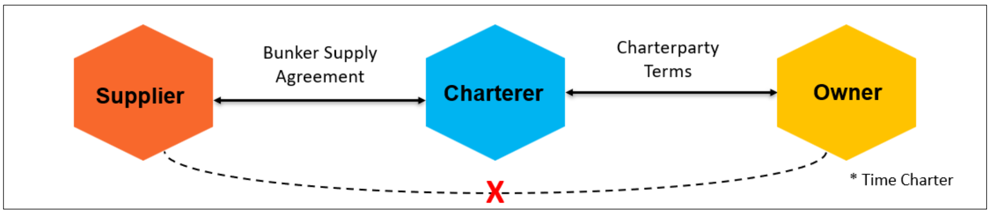

Figure 2: Contractual interactions between stakeholders in a Marine Bunker Value Chain

In instances where a claim arises due to the quality of fuel supplied, the resolution of such disputes is usually governed by the fuel standard stipulated within the relevant contractual agreements. The fuel standard specified in the Charter Party typically forms the core of Owners' claim against Charterers, while the fuel standard specified in the Bunker Supply Agreement would similarly be central in Charterers' claim against the fuel suppliers. Owing to these contractual boundaries, in order to ensure that fuel claims can be managed efficiently throughout the supply chain it is essential that the bunker specifications agreed in the Bunker Supply Agreement are consistent with the bunker terms outlined in the Charter Party. This alignment facilitates seamless progression of claims throughout the supply chain and ensures that contractual obligations are upheld across all parties involved.

Recommendations:

- *Implement a robust fuel procurement protocol incorporating risk metrics in supplier selection.*
- *Ensure that the fuel specification and quality analysis agreed in the fuel procurement contract align with the terms in the Charter Party.*

2. Bunkering

Bunkering is performed through Ship-to-Ship, Truck-to-Ship, or Shore-to-Ship transfers. It is often the case that 3rd party physical suppliers are entrusted with the task of the 'last mile' delivery of the nominated fuel to the vessel, which introduces additional layers of competing interests within the bunker supply chain. These competing interests can manifest in various forms, notably in disputes related to timely fuel delivery, as well as over the quantity and quality of the supplied fuel. These issues have the potential to escalate into costly claims, underscoring the importance of clear procedures and robust documentation around the bunkering operation.

a. Procedures

The Safety Management System (SMS) should have procedures covering the following key aspects to ensure the safe receipt of the nominated bunker stem.

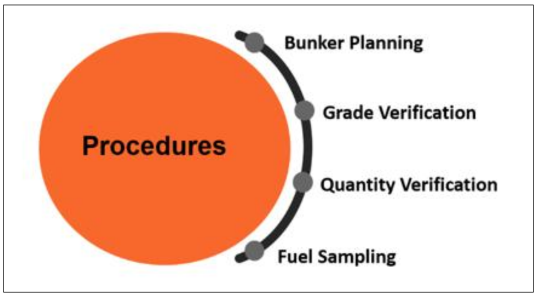

Figure 3: Key procedural bunkering aspects

i. Bunker Planning

Bunker requirement is often calculated by balancing the vessel's fuel needs for the intended voyage with the commercial demands to maximise cargo uplift. Once the bunker nomination is confirmed, proper planning of the transfer is required to ensure its safe execution.

Recommendations:

- *Create a Bunker Plan identifying the tanks to be stemmed, their estimated initial quantity, quantity to be added and final quantity.*
- *Conduct a toolbox meeting to ensure awareness of individual crew members' duties and actions to be taken in the event of an emergency.*
- *Conduct a Simultaneous operations (SIMOPS) assessment for the prospective bunker port.*

ii. Grade Verification

It is expected that the fuel quantity and quality of the bunker stem would match the bunker order confirmation received by the purchaser. However, although rare, owing to the increased number of fuel grades being handled by the physical supplier in recent years, there is a risk of inadvertently receiving a fuel grade which differs from the one specified. Exercising diligence in verifying the fuel grade and quantity ahead of commencement of bunkering can avoid situations which can prove costly to mitigate.

Recommendations:

- *Verify the fuel grades and quantities being delivered.*
- *Retain documented evidence of the verification carried out.*

iii. Quantity Verification

In bunkering, disputes with the fuel quantity often arise between the supplier and the vessel, either due to an intentional or inadvertent short supply by the supplier, or an incorrect accounting of the fuel received on the vessel.

The implementation of Mass Flow Meters (MFM) in certain jurisdictions has led to a significant reduction in bunker quantity disputes, but alleged malpractices still occur. The employment of a 3rd party independent bunker surveyor as an independent verifier during bunkering cannot be overstated, especially in bunker ports with trends of reported bunker delivery issues.

Recommendations:

- *Retain procedures for mandatory physical gauging of the vessel's bunker tanks within the company's SMS.*
- *Employ the services of 3rd party independent bunker surveyor, especially at locations with trends of reported bunker delivery issues.*

iv. Fuel Sampling

In commercial shipping, with barge deliveries, fuel samples are collected both at the vessel manifold and barge manifold, although certain jurisdictions mandate the collection of samples at the vessel's manifold, thereby streamlining the process. In this context, it is pertinent to note that MARPOL Annex VI resolution MEPC.182(59) recommends collecting the samples at the receiving vessel's inlet bunker manifold, while ISO 13739 keeps the option open for samples to be collected at either end of the bunkering hose. Understanding that the fuel samples hold pivotal evidential weight in bunker quality disputes and regulatory compliance, to protect the interests of both Owners and Charterers, it is crucial that the vessel collects fuel samples at the vessel's manifold.

Recommendations:

- *Invite the barge representative and surveyor (if employed) to witness the fuel sampling.*
- *Adhere to industry best practices, fuel analysis lab procedures and bunkering procedures in the SMS in collection and sealing of the fuel samples.*
- *Retain documented evidence of all actions taken to ensure the integrity of the fuel sample collection.*

b. Documentation

The bunkering procedures outlined within the Safety Management System (SMS) specify the essential forms and checklists that must be completed and retained as part of the vessel's documented records. This systematic approach ensures that all relevant information regarding bunkering activities is accurately captured and preserved.

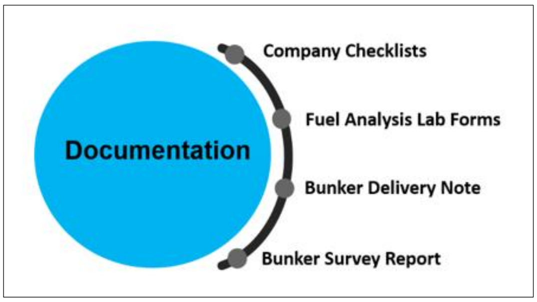

Figure 4: Key bunkering documentation

i. Company Checklists

The bunkering procedures outlined within the vessel's Safety Management System (SMS) specify the checklists that must be completed and retained as part of the vessel's documented records. These checklists are typically formulated with a risk-averse approach, focusing on safety and compliance aspects. It is imperative that the crew diligently adhere to these procedures, ensuring that all required checklists are fully completed and retained as documented information.

In the event of an undesired incident, such as pollution, the checklists form an integral part of the vessel's SMS and serve as documented evidence enabling investigators to verify the vessel's compliance with the International Safety Management (ISM) Code.

ii. Fuel Analysis Lab Forms

The retained fuel analysis lab will provide its own forms, which are specifically designed to capture essential information of the bunker stem and record the chain of custody for fuel samples.

These typically include information such as the vessel, date and location of bunkering, supplier details, fuel grade, delivery quantities, sampling method and seal numbers.
Proper completion and diligent retention of these forms is vital for maintaining the integrity of the fuel sample collection, thereby supporting reliable outcomes in subsequent laboratory analysis.

iii. Bunker Delivery Note (BDN)

The BDN is the key document issued by the bunker supplier, evidencing the custody transfer of the bunker stem, holding both statutory and commercial importance.

The Chief Engineer should sign the BDN only on completion of the intended transfer, ensuring the following:

- The BDN contains the information required under MARPOL Annex VI Regulation 18.
- The fuel quantity inserted in the BDN reflects the quantity received by the vessel.
- The fuel sample seal numbers are entered in the BDN.

If there is any discrepancy in the fuel quality and/or quantity, the protocols set out in the vessel's SMS should be followed, which may include issuing a Letter of Protest (LOP).

iv. Bunker Survey Report

The bunker surveyor acts as an independent entity witnessing the bunkering operation and issues a Bunker Survey Report upon completion. Having the presence of a 3rd party independent surveyor to witness and record the initial quantities, fuel sampling and final quantities in a Bunker Survey Report forms a vital element of documented information, should a dispute arise related to the quantity, quality or chain of custody of the fuel samples.

3. Quality Validation

Bunkers are contractually procured and supplied with ISO 8217 as the acceptance criteria for fuel quality. This ensures that the fuel delivered meets internationally recognised specifications and regulatory requirements, providing a benchmark for quality assurance in marine fuel procurement.
However, in recent years, chemical contaminants have been found in marine fuels, prompting the need for enhanced testing through pre-burn screening of fuels.

It is pertinent to note that the supplied fuel must comply with all the clauses of ISO 8217, not merely the relevant table parameters. Clause 5 of ISO 8217 requires the supplied fuel to be homogeneous and conform to limits set out in the relevant tables, and for it to be free of any materials, including added substances and chemical species, which could be harmful to personnel or adversely affect the safety and/or performance of the vessel.

If the fuel meets the ISO 8217 parameter limits, the presence of chemical contaminants by themselves cannot establish that the fuel is not compliant vis-à-vis Clause 5. While Clause 5 provides a wide safety net, invoking it requires machinery damage to have occurred, and establishing that the fuel was causative to the damage.

Quality testing of marine fuels falls under two categories:

a. Fuel Quality Testing (FQT)

The primary objective of the standard fuel analysis is to determine if the received fuel meets the parameter limits set out in the relevant table of ISO 8217. The FQT report provides the determined values for the listed parameters, indicating whether the fuel is 'on-spec' or 'off-spec'. If the fuel is 'off-spec' or if certain determined parameter values are a cause of concern, the lab report usually provides recommendations on measures to be taken to avoid operational or compliance issues. These recommendations, along with industry best practices and fuel management procedures within the SMS, should be diligently applied in managing the fuel.

In addition, these reports now typically indicate on a qualitative basis, whether the presence of chemical contaminants has been observed, and would be a trigger for requesting the lab to perform an enhanced screening of the fuel.

b. Enhanced Fuel Screening

The objective of enhanced fuel screening is to test the fuel beyond the scope of the standard FQT to determine its potential to cause operational issues either during their storage, transfers, conditioning or consumption.

If harmful chemical compounds are present in the fuel, they can manifest themselves when the fuel is consumed, at which point the bunker supplier's time bar could have passed. Therefore, when there is an indication of chemical contamination, it is recommended to carry out enhanced fuel screening analysis to quantify these chemical compounds. This would ensure timely pursuit of any potential non-compliance of the fuel with ISO 8217 to the bunker supplier.

Fuel analysis labs offer several screening tests, including:

- Gas Chromatography/Mass Spectrometry (GCMS) Analysis
- Fourier Transform Infrared (FTIR) Spectrometry Analysis
- Fuel Stability Reserve Analysis
- Wax Appearance Temperature (WAT) & Wax Disappearance Temperature (WDT) Analysis

4. Fuel Management

A proactive approach, adhering to industry best practices in managing fuel storage, transfers, conditioning and consumption, is crucial not only for operational reliability, but also for meeting regulatory compliance.

With the rapidly evolving regulatory landscape, new fuel grades introduced in the recent past and their behaviour in the operational environment are being analysed by industry bodies such as the International Council on Combustion Engines (CIMAC), providing guidelines in building operational knowledge for managing these fuels.

A fuel could be 'on-spec' to the ISO 8217 table parameters, but if the fuel is not diligently managed on board, operational issues with machinery can arise, causing vessel delays, stoppages and in certain cases, even regulatory non-compliance.

In a time charter, when an Owner claims for machinery damage attributed to the fuel, the defence would seek to ascertain whether everything that a prudent Owner would do was reasonably done to manage the fuel on board, and that any action or lack thereof was not causative of the claimed damage. Consequently, it is essential that the vessel's staff ensure utmost diligence during storage, transfers, conditioning and consumption of the fuel.

Effective fuel management involves exercising diligence in the following four aspects:

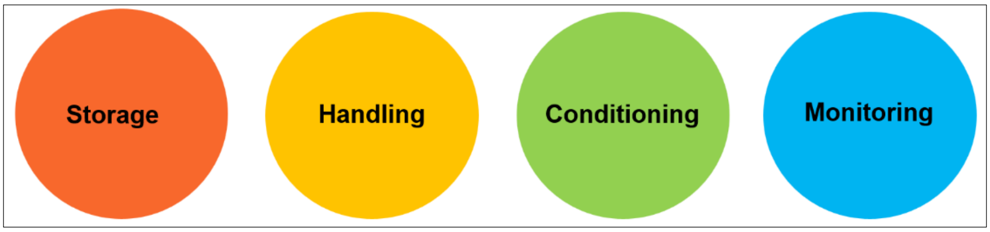

Figure 5: Key aspects of onboard fuel management

a. Storage

The storage of residual fuel grades requires tanks with heating capabilities, whereas this is not necessary for distillate fuel grades. However, due to the inconsistent physical properties of both grades, the storage requirements for each fuel may differ. The fuel-specific attributes, as determined in the fuel laboratory analysis and any accompanying recommendations, should be considered when diligently managing fuel during storage.

However, attributes such as the pour point of the fuel can at times directly conflict with the cargo carriage requirements when fuel tanks are located beneath cargo holds. In bulk carriers, heat damage can occur to cargoes when fuels are maintained at a relatively higher temperature owing to their pour point, requiring diligence in optimising the heating requirements of the fuel in storage.

The inclusion of biofuels, bio-fuel blends and alternative fuels has broadened the marine fuel landscape, which again requires adapting the design and operational requirements to their individual characteristics.

Recommendations:

- *Review the determined parameter values in the fuel analysis lab report to determine the storage requirements.*
- *Adhere to the fuel storage guidance provided in the vessel's SMS, fuel lab analysis report and industry best practices.*

b. Handling

With commercial viability and regulatory compliance as the primary factors determining fuel selection, vessels will typically carry multiple fuel grades in the storage tanks on board. While fuel transfer systems are designed to facilitate the correct transfer of the desired fuel, system vulnerabilities and human error may contribute to the mixing of fuel grades during transfers. Such inadvertent mixing of fuels can potentially lead to operational issues and compliance implications.

Understanding the potential vulnerabilities in the fuel transfer system, both inherent to the system as well as those which could arise through operator interactions, is vital in developing procedural barriers to prevent mixing of fuels.

Recommendations

- *Maintain oversight during fuel transfers, especially during change-over of fuel grades.*
- *Carry out a system vulnerability assessment to ascertain potential weak links in the system.*
- *Carry out a Risk Assessment of the human interface vulnerabilities in fuel transfer and fuel change-over procedures.*

c. Conditioning

Marine fuels, even if determined as 'on-spec' to ISO 8217, must undergo conditioning through the vessel's fuel conditioning system to ensure their suitability for the fuel consumers.

A case in point is that an 'on-spec' fuel may still contain catfines at levels higher than the maximum acceptable values stipulated by machinery manufacturers. It is imperative that the fuel conditioning system, including settling tanks, fuel separators, filters and heat exchangers are maintained to perform at their best efficiency.

i. Settling Tanks

An increased residence time of the fuel in the settling tank facilitates heavier particles to gravitate to the bottom of the tank, from where they can be removed by periodic draining of fuel. As higher temperatures aid better separation of these particles, optimal performance of the heating coils and their temperature controls is crucial.

Recommendations:

- *Plan and optimise fuel transfers to maximise the residence time of fuel in the tank.*
- *Ensure that fuel in the settling tank is maintained at a temperature between 80-85 ℃, or at a temperature recommended for the fuel grade.*
- *Carry out frequent draining to remove settled particles and water potentially collected at the bottom of the tank.*

ii. Purifiers

Fuel purifiers (also known as separators) are the most crucial equipment in the fuel conditioning system. The effectiveness of the purifier in removing heavier particles and entrained water is dependent on its operational performance and influenced further by fuel feed temperature and flow rate.

Recommendations:

- *When required and available, have more than one purifier in operation to facilitate better separation.*
- *Maintain the lowest possible feed rate in the purifiers, just sufficient to meet the fuel demand.*
- *Maintain the recommended temperature of the fuel at the purifier.*
- *Maintain the purifiers in accordance with the manufacturer's recommendations to ensure optimal operational performance.*
- *Perform periodic efficiency tests by initiating lab analysis of fuel samples before and after the purifier.*

iii. Heat Exchangers

The efficiency of heat exchangers and associated control instrumentation plays a significant role in aiding the conditioning of the fuel.

In the settling tank(s), the efficiency of the heating coils has an impact on the time taken by the transferred fuel to attain the desired temperature, and consequently, the residence time of the fuel in the tank to produce optimal conditions for effective separation. Similarly, the efficiency of the fuel pre-heater in continually achieving the desired temperature has an impact on the effectiveness of the purifier in separating the heavier particles from the fuel.

Recommendations:

- *Carry out functional tests of temperature control equipment and calibration of temperature sensors/transmitters.*
- *Inspect and clean settling tanks and heating coils from build-up of sludge.*
- *Inspect and clean fuel purifier pre-heaters.*
- *Test heat exchangers for leaks.*

iv. Fuel Filters

Fine mesh filters (10-25 microns) in the fuel conditioning system serve as the final barrier in preventing undesired particles from reaching the engines.

Auto-backflush fuel filters are set to backflush at set intervals and on a set pressure differential across the filter. Frequent backflushing would be indicative of the filter getting overloaded, suggesting that upstream operational measures are not being fully effective and require further optimisation.

Recommendations:

- *Inspect fuel filters regularly to ensure their integrity in service.*
- *Clean fuel filters frequently to remove any accumulated catfines on the filter mesh.*
- *Ensure the fuel filters and replacement components are of the correct specification.*

d. Monitoring

As fuel is consumed, it is vital to monitor the associated machinery, enabling timely identification of signs that may result in catastrophic damage. Early recognition of such warning indicators allows engineers to make informed decisions and implement appropriate measures to minimise potential damage.

For marine machinery with centralised control rooms, parameter monitoring and condition monitoring complement each other in enabling detection of abnormalities.

i. Parameter Monitoring

On modern vessels built with sophisticated automation and controls, certain safety functions are embedded to protect the machinery. However, engineers maintaining engine room watchkeeping duties should diligently observe machinery parameters and take timely action when any abnormalities are noted.

For instance, abrasive wear in a cylinder can manifest itself initially through an increase in cylinder liner wall temperature, while a drop in compression pressure would indicate damage to the piston rings and/or liner. Understanding parameter deviations, coupled with early intervention, can prevent potential damage, emphasising the responsibility of the watchkeeper in maintaining a competent engineering watch.

ii. Condition Monitoring

When a machinery parameter only needs to be monitored intermittently, utilising condition monitoring tools is advantageous in avoiding captive monitoring asset costs.

Considering the scenario of abrasive wear, an increase in cylinder wall temperature would be indicative, but not conclusive of abrasive wear. Condition monitoring kits capable of analysing unburned cylinder oil from the main engine is an effective way to determine the occurrence of abrasive wear in real time.

While Planned Maintenance System (PMS) schedules should be aligned with the maker's recommended intervals, integrating condition monitoring within the scheduled intervals can provide real time assurance of equipment/component health during its operation.

Members are urged to maintain diligence and apply industry best practices across all stages of the bunker value chain, which is fundamental to supporting safe vessel operations and avoiding disputes between stakeholders in an increasingly complex marine fuel environment.

Resources

ISO 8217:2024
MARPOL Annex VI
MEPC.182(59)
ISO 13739
CIMAC guidance

Supportive Information

For further information on this or other Loss Prevention topics please contact the Loss Prevention Department, Steamship Insurance Management Services Ltd.
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