Quality, quantity and fraud

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Short delivery and the mass flow meter

For decades the most common complaint in Singapore bunkering was short delivery. The quantity delivered was traditionally measured by sounding the tanks of the bunker tanker before and after delivery and converting the volume to mass with tables of temperature and density. The method left room for manipulation. Air could be blown into the fuel to make it foam and appear larger in volume, soundings could be misread and tables misapplied. A chief engineer who suspected that he had received less than the quantity stated in the delivery note had little means of proving it once the tanker had left.

Singapore addressed the problem with technology. It became the first port to make mass flow meters mandatory, beginning with marine fuel oil deliveries in 2017.[1] Since 1 January 2017 the MPA has required an approved mass flow metering system for every delivery of marine fuel oil. The quantity stated on the bunker delivery note is the quantity measured by the meter on the bunker tanker, witnessed by the cargo officer, the chief engineer and the bunker surveyor if one is engaged.[2] A mass flow meter measures mass directly, so that entrained air and temperature no longer affect the result.

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The requirement was extended to distillates from 1 July 2019. The MPA explained that the measure would "enhance transparency in the bunkering process, improve operational efficiency" and prepare the industry for the expected increase in distillate deliveries under the global sulphur limit of 2020.[3] The technical rules are set out in a Singapore Standard, the code of practice for bunker mass flow metering. It appeared as SS 648:2019 and is now in force in its revised edition, SS 648:2024.[4] The standard is complemented by SS 600:2022, the code of practice for bunkering, which governs procedures and the use of tank gauging when the meter fails. Compliance with it has been mandatory since 1 January 2023.[5]

Tampering, theft and collusion

Fraud adapts to each new control. The Southernpec case of 2019 showed that employees could use magnets to interfere with a mass flow meter. The revised standard on mass flow metering responded with requirements for the integrity and transmission of meter data, which make such interference easier to detect.[6] Each technical control invites an attempt to circumvent it, which is why the regime combines technology with licensing, audits and the threat of revocation.

The largest fraud connected with the bunker market began at the refinery. Between 2007 and 2018 two groups of employees at Shell's facility on Pulau Bukom misappropriated marine gas oil in large quantities. One group took more than 203,000 tonnes worth about S$127 million, the other more than 153,000 tonnes worth about S$100 million. Rogue employees pumped the fuel onto vessels berthed at the Bukom wharf, while accomplices approached ship captains to find buyers. To conceal the theft the group tampered with the bunker meter and bribed marine surveyors. The two leaders received prison sentences of 29 years in 2022 and 25 years and two months in July 2025, while a further former employee received 21 years in March 2026.[7] Chapter II of this part sets the case in the context of the refining industry. The case showed that stolen fuel can enter the bunker supply chain through intermediaries who ask few questions about the origin of cheap product. For a trader or financier, the lesson is the same as in the trade finance frauds of 2020 examined in Chapter II of Part H. Unusually favourable prices and unclear provenance call for scrutiny.

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Collusion is the third form of fraud. A dishonest cargo officer and a dishonest chief engineer can agree that the ship signs for more fuel than it receives, sharing the difference. The ship's owner or charterer pays for fuel that never reached the tanks. Such schemes are difficult to detect because both parties who witness the delivery are involved. Mass flow meters, independent surveyors and digital records make them harder, without excluding them entirely. The MPA's demerit points for inaccurate bunkering records reflect the importance it attaches to the integrity of the documents.

Quality: specifications, testing and contamination

Quality problems are less frequent than quantity disputes but can be far more costly. Marine fuels are sold to the international specification ISO 8217, which sets limits for properties such as viscosity, density, sulphur, water and catalytic fines. Fuel that does not meet the specification, or that contains substances that the specification does not test for, can damage pumps and engines, immobilise a ship and endanger its crew. The MPA tests more than 1,300 bunker samples a year under its Bunker Quality Inspection System and its programme of intensified bunker quality checks.[8]

The most serious quality incident in recent years occurred in 2022. On 14 March 2022 the MPA was notified that ships had received high-sulphur fuel oil containing chlorinated organic compounds. In April the MPA reported that Glencore Singapore and PetroChina International (Singapore) had supplied the affected fuel to about 200 ships, of which about 80 had reported problems with their fuel pumps and engines.[9] The MPA's final report of August 2022 traced the contaminated fuel to a cargo loaded at Khor Fakkan in the United Arab Emirates. Glencore's own laboratory had found concentrations of chlorinated organic compounds of about 2,000 to 15,000 parts per million between 21 and 23 March. Glencore nevertheless continued to supply blended fuel made from the cargo to 24 ships between 22 March and 1 April, while PetroChina had stopped its deliveries by 19 March.[10]

The MPA found no evidence that either company had contaminated the fuel intentionally. Both had tested the fuel against ISO 8217, which did not include chlorinated compounds. The MPA nevertheless held that Glencore had breached its

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licence conditions by failing to ensure that its bunkers were not contaminated after its own tests had revealed the problem. It suspended Glencore's bunker supplier licence for two months from 18 August 2022 and took no action against PetroChina.[11] The MPA added chlorinated organic compounds to its routine tests and, with the Singapore Shipping Association, set up an expert group to define a list of chemicals to be tested and their limits.[12] The episode showed the principle on which the regime rests. A licensed supplier is answerable for what it delivers, even when the defect originated upstream and was not covered by the standard specification.

Digital bunkering and documentary integrity

The latest stage in the fight against fraud is digital. Since 1 April 2025 bunker suppliers in Singapore have provided digital bunkering services and issued electronic bunker delivery notes as the default. The specification is set out in SS 709:2024, published in November 2024. The system covers requisition forms, checklists and delivery notes, validates the data against MARPOL and the standard, submits regulatory information to the MPA automatically and allows banks and shipowners to verify an electronic delivery note through an enquiry system.[13] The MPA estimates that digitalisation saves the industry close to 40,000 man-days a year.

For the financial centre, the enquiry system is the most significant element. A bank that finances a bunker trader against its receivables can check that the delivery note on which an invoice rests corresponds to a delivery recorded with the port authority. The frauds of 2020 showed what happens when banks finance documents that do not correspond to physical goods. Digital delivery notes linked to meter data and to the regulator's records reduce that risk in the bunker segment, although they cannot exclude the duplicate financing of the same receivable by several banks.

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Common misconception

It is sometimes assumed that the mass flow meter has ended quantity disputes in Singapore. The meter has made short delivery much harder and has shifted most disputes from the tank soundings to the integrity of the metering system and its records. Disputes still arise over entrained air, meter malfunction, tampering, the switch to tank gauging when the meter fails and the reconciliation of the meter reading with the ship's own soundings. The meter is the strongest evidence available. It is not conclusive when there are signs that it was manipulated or improperly calibrated.

Notes

1. gCaptain (Reuters), "Singapore extends compulsory use of flow meters to distillate barges", 27 April 2018 (accessed November 2026): Singapore became the first port to mandate mass flow meters for licensed marine fuel oil bunker barges in 2017. ↩
2. MPA, "Mass Flow Meter for Bunkering" (mpa.gov.sg, accessed November 2026): since 1 January 2017 "it is mandatory to use MPA-approved MFM system for all Marine Fuel Oil (MFO) bunker delivery"; the delivered quantity on the bunker delivery note is based on the bunker tanker's MFM system, as witnessed by the cargo officer, the chief engineer and the bunker surveyor (if engaged). ↩
3. gCaptain (Reuters), 27 April 2018 (n above): mass flow meters compulsory for distillate deliveries from 1 July 2019; MPA statement that the system would "enhance transparency in the bunkering process, improve operational efficiency"; Captain M. Segar of the MPA: the measure would "prepare the industry for an expected increase in delivery of distillates". ↩
4. MPA, "Bunkering Standards" (mpa.gov.sg, accessed November 2026): "Singapore Standard Code of Practice for Bunker Mass Flow Metering (SS648:2024)" listed among the key standards; SS 600:2022 aligned with SS 648:2019. ↩

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5. MPA, "Bunkering Standards" (n above): SS 600:2022 *Code of Practice for Bunkering* supersedes SS 600:2014 and is used to determine quantities when mass flow metering fails; compliance mandatory from 1 January 2023 for bunker suppliers, bunker craft operators, bunker surveying companies and bunker surveyors. ↩
6. MPA, "Digital Bunkering" (mpa.gov.sg, accessed November 2026): SS 648, *Code of Practice for Bunker Mass Flow Metering*, revised to include data integrity and transmission requirements. ↩
7. Mothership, "Ex-Shell employee jailed 21 years for role in fuel heist" (mothership.sg, March 2026, accessed November 2026): Richard Goh Chee Keong sentenced to 21 years on 30 March 2026; Abdul Latif Ibrahim sentenced to 25 years and two months in July 2025 for a group that took over 153,000 tonnes worth S$100 million; Juandi Pungot sentenced to 29 years in 2022 for a group that took over 203,000 tonnes worth S$127 million; scheme dating from 2007, parallel operations until the arrests in 2018; marine gas oil. *The Star* (Malaysia), "Two ex-Shell employees who led fuel heist conspiracy get more than 23 years' jail each", 2 August 2024 (accessed November 2026): gas oil pumped onto vessels berthed at the Pulau Bukom wharf; ship captains approached to arrange sales; tampering with the bunker meter and camera angles; bribes to marine surveyors. Wikipedia, "Pulau Bukom" (accessed November 2026): over 350,000 tonnes worth over S$200 million between 2007 and 2018. ↩
8. MPA, "MPA completes its investigations into bunker fuel contamination in Singapore port" (media release, 3 August 2022): over 1,300 bunker samples tested annually under the Bunker Quality Inspection System (BQIS) and the Intensified Bunker Quality Checks (IBQC) to verify compliance with ISO 8217. ↩
9. MPA, "Update on MPA's Preliminary Findings on Reported Bunker Fuel Contamination in Singapore Port" (media release, 13 April 2022): MPA notified on 14 March 2022; Glencore Singapore Pte Ltd and PetroChina International (Singapore) Pte Ltd had supplied the affected fuel to about 200 ships, of which about 80 reported issues with their fuel pumps and engines. ↩

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10. MPA, media release of 3 August 2022 (n above): contaminated HSFO traced by forensic fingerprinting to a tanker loaded at Khor Fakkan; Glencore's laboratory reported COC concentrations of about 2,000 to 15,000 ppm on 21–23 March 2022; Glencore supplied blended bunkers from the contaminated fuel to 24 vessels between 22 March and 1 April 2022, of which at least three reported issues; PetroChina stopped deliveries by 19 March 2022. ↩
11. MPA, media release of 3 August 2022 (n above): no evidence that Glencore or PetroChina had intentionally contaminated the HSFO; both had tested the fuel against ISO 8217; Glencore breached its licence by failing to ensure that its bunkers were not contaminated; Bunkering Licence (Bunker Supplier) suspended for two months with effect from 18 August 2022; no action against PetroChina. ↩
12. MPA, media release of 3 August 2022 (n above): COC testing added under BQIS and IBQC; MPA and the Singapore Shipping Association to co-chair an expert group, with participation of HSA, CIMAC and IBIA, to establish a list of chemicals and concentration limits; information to be shared with ISO in its review of ISO 8217. ↩
13. MPA, "Digital Bunkering" (mpa.gov.sg, accessed November 2026): from 1 April 2025 bunker suppliers provide digital bunkering services and issue e-BDNs as the default; SS 709:2024 *Specification for Digital Bunkering Supply Chain Documentation* published in November 2024; trials from November 2023; e-BDN record enquiry system for banks and vessel owners; six whitelisted solution providers; savings of "close to 40,000 man-days annually". ↩

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