CIMAC
INTERNATIONAL COUNCIL
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01 | 2025

CIMAC Guideline

Frequently Asked Questions (FAQ)
ISO 6583:2024: Methanol as a fuel for marine applications – General requirements and specifications

The first edition of this CIMAC Guideline was approved by the members of the CIMAC WG7 ‘Fuels’ in March 2025.

Contents

1 Introduction

With the publication of the first edition of ISO 6583:2024 - Methanol as a fuel for marine applications – General requirements and specifications, a number of questions will arise in the industry. To support the industry, ISO/TC 28/SC4/WG18 requested CIMAC WG 7 to support the standard through the publication of a Frequently Asked Questions (FAQ). This is the first edition of this FAQ document, and it will be updated as experience is gained and questions received.

Should there be further questions, please do not hesitate to contact CIMAC WG 7 or visit www.cimac.com, where contact information can be found.

2 First edition of a marine-specific methanol standard

2.1 Why is there a need for an international standard for methanol as a marine fuel?

Methanol is a chemical widely traded internationally. Methanol has diverse applications, including as a chemical feedstock, solvent, fuel, or as a constituent in various products. The quality requirements for methanol are established by the International Methanol Producers and Consumers Association (IMPCA). However, some of these requirements are not applicable for methanol used as a fuel for diesel engines or fuel cells, and certain marine-specific aspects are not covered by the IMPCA specifications. Therefore, it was considered necessary to develop an international standard for methanol as a marine fuel.

2.2 Why should this marine-specific standard be used?

ISO 6583:2024 addresses the quality requirements for the use of methanol as a marine fuel. The IMPCA quality standard specification includes requirements not relevant for marine applications.

An international standard for methanol as marine fuel facilitates international trade of the product by ensuring the quality of the product across different countries. Methanol can now be ordered as a marine fuel.

2.3 Is the standard addressing the health and safety aspects of methanol?

ISO 6583:2024 document is a technical standard. As given in the warning as included in that document, methanol is categorised as a low flash point fuel. Also, there are health issues associated with methanol. Consequently, addressing health and safety issues is the responsibility of the individual user of that document as relevant. For health and safety aspects for methanol, reference can, for example, be made to the safety data sheet (SDS) of methanol, which should be available from the producer or supplier.

3 IMPCA related information

3.1 What is IMPCA specification? Why is it referenced in ISO 6583:2024?

IMPCA is the International Methanol Producers and Consumers Association (IMPCA) dedicated to supporting the methanol industry. IMPCA has developed its own quality standard for methanol to ensure it meets the necessary specifications for various applications such as the chemical industry. The IMPCA quality standard is not marine fuel specific.

3.2 Does the new IMPCA version 10-2024 introduce any changes to quality requirements?

IMPCA specifications are regularly reviewed and the latest update, version 10-2024, was published at the time of publication of ISO 6583:2024. This update did not introduce any changes to the IMPCA quality requirements as specified in Table 1 of the IMPCA document but incorporates changes to method IMPCA 001 and Method ASTM E 346. The IMPCA reference specifications as described in version 9-2021 were used as the starting point for the development of ISO 6583:2024.

3.3 Why was the IMPCA standard not converted into an ISO standard?

The IMPCA standard includes quality requirements for the use of methanol as a feedstock to produce different products. However, some of those requirements are not relevant for the use of methanol as marine fuel. ISO 6583:2024 includes only those characteristics important for the use of methanol in marine diesel engines or fuel cells.

3.4 What additional characteristics have been added to ISO 6583:2024 that are not included in the IMPCA reference specifications?

Characteristics included in the ISO 6583:2024 but not given IMPCA reference specifications are:

- Density at 15°C. It replaces specific gravity 20°C/20°C in the IMPCA specification.
- The initial boiling point. It should be reported for all grades as complement to the distillation range at 101,3 kPa.
- Grade MMA requires the lubricity and particle count to be agreed between buyer and seller.

4 Methanol grades

4.1 Why are there three methanol grades in the standard?

Given that there is such a wide range of marine equipment that could use methanol as a fuel, it was seen that this should be reflected in the standard. This marine equipment can range from large bore low or medium speed diesel engines through to high-speed diesel engines or fuel cells. Each of these has its respective merits but also sensitivities which need to be recognised. Hence, the three grades were developed.

A further area is how marine methanol fuel treatment arrangements and components develop over time and the levels of effectiveness which will be attained.

However, as the marine methanol market develops there could be a need for further grades, particularly if a demand for methanol supplied as a mixed product with set proportions of, for example, ethanol develops. This is one of the areas which will be kept under review.

4.2 What are the differences between the three grades and why?

There are currently three grades. The middle grade, the MMB, forms the basis which generally reflects the existing IMPCA specification.

The MMA grade corresponds to the MMB grade with the addition of lubricity and particle count requirements, to cover those devices which would be particularly sensitive to those characteristics, as per agreement between buyer and seller.

The MMC grade provides, in some instances, for a limited widening of the specification requirements (density, impurities, ethanol, water, sulphur and distillation range) for those devices which can handle such fuels.

It should be noted that the sulphur limit is in terms of mg/kg (ppm) rather than % by weight as in the MARPOL Annex VI requirements. Hence, despite the difference in limit between MMA/MMB and MMC, the given limit of MCC, 10 mg/kg (0,001 % by mass) is still one hundredth of the Emission Control Area limit (0,10 % S).

4.3 Why are environmental requirements not included in the standard?

Sustainability aspects are outside the scope of ISO 6583:2024. This technical standard addresses the quality of the product delivered to the ship as marine fuel, regardless of the source or manufacturing process. Therefore, it applies to all types of methanol, including various sustainable forms such as bio-methanol, e-methanol and methanol associated with carbon capture and storage as well as that produced from natural gas.

4.4 Can ISO 6583:2024 be used to determine the feedstock and production process of the methanol?

No. However, further information on identification of source material can be found in Annex A in ISO 6583:2024.

4.5 Can ISO 6583:2024 be used to evaluate the CO_2, the Carbon Intensity Indicator (CII) and Green House Gas (GHG) reduction potentials in view of regulatory requirements?

No, ISO 6583:2024 is a technical standard and does not address the carbon content, the CII or the GHG reduction potential of methanol. Suppliers of renewable methanol are currently obligated to demonstrate its sustainability credentials. Going forward, all fuels are expected to be subject to Life Cycle Analysis and duly assigned a carbon or GHG factor under the regulatory regime or regimes within which they operate.

5 Sampling of methanol

5.1 Where should a methanol sample be drawn from?

ISO 6583:2024 specifies the required characteristics at the point of custody transfer. Ideally that is where the sample should be drawn from. However, as agreed between buyer and seller, a methanol sample can alternatively be drawn, for example, from the storage tank on shore, the line from the storage tank to the bunker tanker/barge loading point, from the tank at on the bunker tanker/barge or at the bunker manifold onboard the receiving ship load point. Safety procedures should be adhered to.

5.2 Are there special requirements for sampling devices and procedures?

Methanol samples can be drawn as “open” or from a “closed” sampling setup based on local requirements.

Open sampling method is usually utilised during sampling from bulk storage and shipment of methanol product.

Closed sampling method is mainly used during the production process of methanol. It is performed in a sealed system, which prevents the sample from coming into direct contact with the atmosphere and therefore prevents any vapour release. The method involves the usage of valves and special sampling containers, which are usually pressurized. These containers are sometimes referred to as sample-bombs.

As agreed between buyer and seller, each may retain a sample of the methanol fuel, which may be used for dispute resolution. As from 1 August 2025, there is no requirement for MARPOL Delivered Sample at bunkering, which means that there is no requirements for a sample to be drawn or retained for statutory purposes. This is due to amendments to MARPOL Annex VI, which enter into force at that time.

Reference: *Methanol Sampling Methods — Procedures for Methanol Cargo Handling on Shore and Ship – 31st October 2014. Can be found via* https://impca.eu/resources/standards-and-best-practices/ .

5.3 Is the material of the sample bottle important?

Yes. Some materials can be degraded by methanol and thereby influence the quality of the methanol sample and also the integrity of the bottle. For a methanol sample, it is recommended that a colourless glass bottle is used. The bottle should have a cap which is both UV-resistant and of a material which will not affect the characteristics of the contained sample.

5.4 Is the labelling of the sample bottle important?

Yes. Independent of the sampling method used (ref. FAQ 5.2), the sample bottles/containers should be appropriately labelled with the correct date and time and the exact location where the sample was taken. For sealed samples, each seal should also have a unique number.

Reference: Methanol Sampling Methods — Procedures for Methanol Cargo Handling on Shore and Ship – 31st October 2014. Can be found via *https://impca.eu/resources/standards-and-best-practices/* .

5.5 Why is it important to minimize the atmospheric exposure of the methanol sample?

Water content is one of the specified characteristics for methanol as a marine fuel within the MMA, MMB and MMC specifications. Therefore, it is important to ensure that the methanol sample is not exposed to conditions which would impact the reliability of the test result.

Methanol rapidly absorbs water from the air, since it is hygroscopic. To minimize the potential for variances in the water concentration in the methanol sample, it is important to limit its exposure to atmospheric moisture.

Additionally, carbon dioxide present in the atmosphere can impact the reliability of the acidity test result.

5.6 How can a methanol fuel sample be dispatched to a lab for fuel quality testing?

Methanol is a low flash point product, and it is therefore considered as Dangerous Goods (DG) for transportation. As a result, the shipping of methanol, even in small volumes of up to 1 litre, is not as simple as the shipping of a traditional residual or distillate fuel sample. Some couriers may not be able to carry methanol samples.

Currently, the most suitable option in many parts of the world appears to be local testing depending on the availability of a laboratory capable of testing methanol.

However, there are dedicated DG couriers that can arrange air transportation of methanol samples provided they are packed and documented according to International Air Transport Association (IATA) / International Civil Aviation Organization (ICAO) standards and regulations. Maximum net quantity per package is one litre. Methanol samples can also be shipped by sea, rail or truck when packed and documented according to relevant regulations.

It is important to note that countries may have different rules and regulations surrounding shipping of methanol. The courier will have to check the packaging requirements on a case-by-case basis, as some countries have stricter regulations concerning the shipment of DG goods. Hence, it is an evolving situation and should be considered on a case-by-case basis.

6 Characteristics and test methods

6.1 What if the methanol does not appear clear?

Methanol, as produced, is a clear and colourless liquid. The standard requires the methanol to be clear. If the methanol is dyed for tax or other purposes in the local area, that should be considered when assessing the Appearance criteria of the standard.

6.2 Why does the standard refer to IMPCA test methods?

In the absence of international or national test methods for some of the controlled characteristics, the available industry test methods are currently used. These are available at www.impca.eu.

6.3 What does “on dry basis” mean?

“On dry basis” means without water.

6.4 When adding the methanol, impurities and water content together, the sum is larger than 100%. What is wrong?

It is not possible to sum-up the different components directly due the analysis approach (Figure 1). The impurities content, present in the methanol, is analysed using a gas chromatograph and the methanol content on dry basis is calculated using Equation 1. The water content is analysed using Karl Fischer titration and hence is additional to the “dry” content.

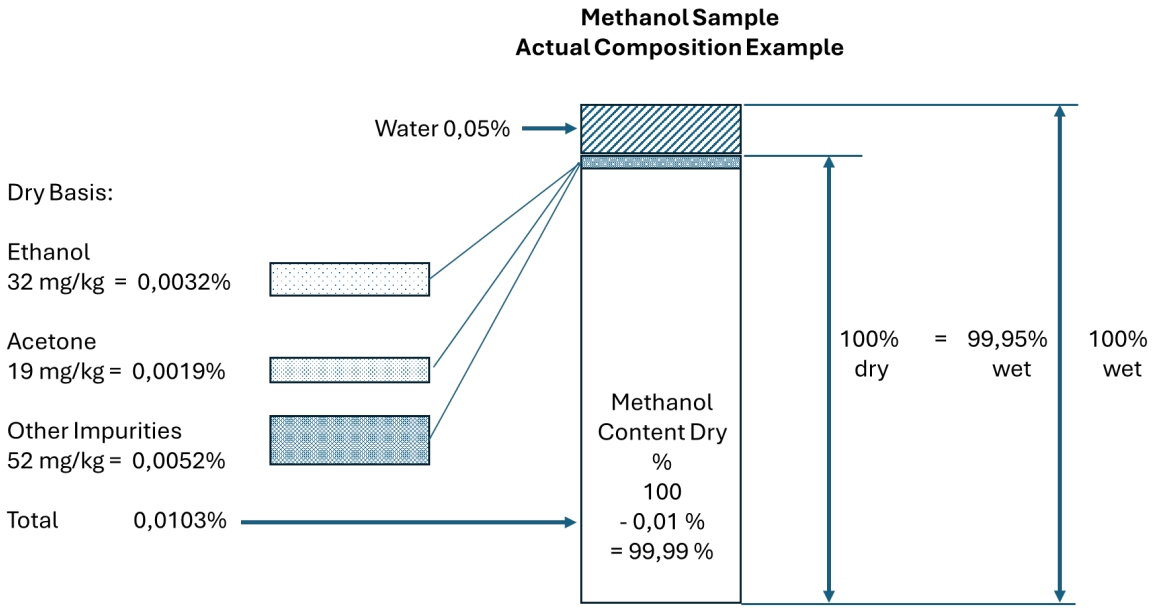

Figure 1 Schematic illustration of a methanol sample containing 0,05% water and 0,0103 % impurities on dry basis.

$$Methanol_{dry} = 100 - Sum\ of\ Impurities_{dry} \left[\%\frac{m}{m}\right] \qquad \textbf{Equation 1}$$

6.5 Are acetone and ethanol contents included in the impurities content?

Yes, they are part of the impurities content (Equation 2). There are also other molecular species that are part of impurities content. Information about the analysis method IMPCA 001 can be found in IMPCA Methanol Specifications Reference, Version 10, 2024.

$$\boldsymbol{Sum\ of\ Impurities_{dry}} =$$

$$\boldsymbol{Ethanol_{dry} + Acetone_{dry} + Other\ impurities\ measured\ by\ IMPCA\ 001_{dry}} \left[\%\frac{m}{m}\right] \qquad \textbf{Equation 2}$$

6.6 Why is distillation range included?

A key issue with methanol as a low density, low specific energy fuel, is to avoid admixture with other fuels or chemicals of higher values as highlighted in Annex D of ISO 6583:2024.

Currently there may be only a limited demand that justifies dedicated methanol storage or bunkering facilities. Consequently, tanks, piping systems and bunker tankers/barges may be used for other purposes. For example, a tank may be used for methanol or distillate fuel, similarly a tanker may operate as a methanol bunker supplier or as a chemical tanker. In either instance, or in the case of flushing shore-side distribution pipelines, it is necessary that any such admixture be avoided. Hence, the distillation range is included as a specified characteristic.

The MMA and MMB grades at 99,85% purity are essentially single compound materials with a defined boiling point. Any significant admixture of other products will cause there to be a range in the resulting boiling beyond the 1°C specified and hence alert to such inclusion without the need to target specific species – as in the impurities test.

6.7 At what temperature is the latent heat of vaporisation of water defined at in B.1 Net Specific Energy equation?

The latent heat of vaporisation of water, 2,449 MJ/kg refers to equation J.1 Net specific energy in ISO 8217:2024. Equation J.1 is based on the work in the technical report ISO/TR 18455 *Petroleum products — Calculation of specific energy of residual fuels from physical and compositional properties — Basic data* from 1999/2000. In ISO/TR 18455 the latent heat of vaporisation is defined at 20°C.

6.8 Why are impurities below 1000 mg/kg not included in Net Specific Energy calculation?

The influence of impurities below 1000 mg/kg (0,1%) in methanol will only have negligible impact on the calculated Net Specific Energy value. For example, if the 120 mg/kg of ethanol is included as given in Table B.1 of the standard, it would have a net effect on the overall calculated value of only 0,0032 MJ/kg. This is below the two decimal place precision used.

6.9 What does “Report” mean in Table 1 of the standard?

In the Table 1, “Report“ means there is a requirement to report the specific parameter to inform the buyer in advance to enhance fuel management, however the reported result is not a specification limit.

6.10 Why is lubricity part of the MMA?

The lubricity of methanol is poor compared to that of distillates, for example as covered by ISO 8217. There is a range of different equipment used in the marine industry. Some of these may be more sensitive to the low lubricity of the methanol than others. The lubricity can be improved by using additives.

The lubricity characteristic is part of the MMA grade, and the value should be agreed between seller and buyer if necessary. In other equipment, the lubricity challenge has been solved by using specific lubricants and or by using suitable materials and coatings.

6.11 How is lubricity tested and why is there not a limit value specified for the MMA grade?

In its general uses to date, methanol lubricity has not been a particular issue. However, it is now used in applications such as fuel injection systems where there is the potential for direct metal-to-metal contact or sliding. The poor lubricity of methanol has prompted the development of a suitable test – IP PM FK. The Energy Institute (formerly the Institute of Petroleum (IP)) has over the years been instrumental in developing many of the fuel test methods now routinely used in the industry. ‘PM’ is indicating that at the time of publication of ISO 6583:2024, the test was at the ‘proposed method’ stage. ‘FK’ is the particular test identifier.

The IP PM FK test uses the same high-frequency reciprocating rig (HFRR) approach as included in ISO 8217 for the petroleum distillate fuel grade. However, in the case of methanol the actual test equipment is modified so it can be used with such a low, 11°C, flash point material.

As a PM, the test procedure has been provisionally agreed. Consequently, the test method is at the stage where it is now necessary to determine what the test repeatability and reproducibility margins should be from testing across a number of laboratories. It will also be from such real-world usage of the method that it will then be possible to consider, as mentioned in Annex C of ISO 6583:2024, at what value a lubricity limit should be set.

6.12 Why is particle count part of the MMA?

Even though methanol as delivered shall be homogeneous, clear, and free of suspended matter, there could be particles picked up by the methanol during the production, transport and bunkering processes. Onboard treatment may not be fully effective in removing smaller size particles. Some types of the equipment used for methanol operation may be more sensitive to particles due to small clearances in the equipment.

Hence the reason to include the particle count in the standard is to protect that more sensitive equipment. It can also provide the basis and data for the development of onboard treatment systems. A maximum limit for particle count should be agreed between seller and buyer if deemed necessary.

6.13 How is the particle count assessed and why is there not a limit value specified for the MMA grade?

As with lubricity, this is a new area of concern. At the time of the publication of ISO 6583:2024, the Energy Institute was in the process of developing a method: IP PM FI. For the same reasons as stated in FAQ 6.10 concerning proposed methods (PM), it was not possible to specify a limit value for particle count.

Although a methanol fuel sample may appear, as required by the standard, to be visually free of any suspended material, the human eye has limitations on the size of material it can detect. The light obscuration approach of the IP PM FI test method can by use of a laser light source, give a quantified result.

6.14 Will the standard be updated if needed?

ISO procedures require a review of each standard every five years. However, if there is an industry-need it is possible to revise earlier. If service experience of using methanol as a marine fuel shows that additional requirements would be appropriate, or some current ones unnecessary, at least in certain cases, then those could either be added, removed or amended. Additional grades could also potentially be created if found appropriate.

Imprint

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