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*Introduction to*

**Methanol Bunkering**

*Technical Reference*

July 2020



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# Document Control

## Document History

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# Introduction

## 1. Preface

### *Project Initiation*

At the request of the Methanol Institute (MI) Lloyd's Register Advisory Services were invited to prepare draft Terms of Reference (ToR) for a project covering the practical aspects of methanol bunkering – it having been identified by MI that one of the impediments to shipowners adopting methanol as a marine fuel was a certain amount of uncertainty as to the bunkering procedures that would be necessary for methanol as a low flash point and contact hazardous fuel product.

These ToR were duly prepared November 2019 – identifying, in relation to other related activity being undertaken within both IMO and CEN, that there was a need for a more user orientated approach to methanol bunkering which would be attuned to be directly relevant to those actually involved delivery/receipt processes and structured so as to address their particular roles and responsibilities.

It was proposed that while this guidance should primarily cover bulk, i.e. pipeline, deliveries it should also address 'packaged' deliveries as would be anticipated in the case where methanol is to be trialled onboard. Additionally, it was recognised that from the supply side methanol bunkering may well involve parties who would be unfamiliar with typical ship bunkering practices and constraints – being more usually involved with methanol as a cargo and delivery to tank farm / industrial users.

### *Project Progression*

At the outset MI had provided information and procedures covering the bunkering of both the Stena Germanica and the Methanex tankers. However on reviewing these it was identified that these both covered very specific situations rather than the generalised approach which would be appropriate to the wider uptake of methanol as an alternative to conventional distillate and residual grade fuel oils as covered, for example, by ISO 8217. The Stena Germanica having a purpose built, dedicated, methanol bunkering facility while the Methanex tankers 'bunkered' on the basis of the flag State approved pumping some of the ship's cargo into the bunker tanks by means of a temporary installed elbow connection.

Instead the starting point was taken as the available 'requirements' documentation, the principal ones being:

- 1) IMO: Report of the 6th CCC Sub-Committee Meeting (September 2019), CCC 6/14, Annex 1 – Draft MSC Circular: Interim Guidelines for the Safety of Ships using Methyl/Ethyl Alcohol as Fuel – noting that this draft MSC Circular was to be considered for approval at the MSC 102 meeting May 2020 but which was postponed to a future date which is still to be arranged. Hence until approved by MSC for circulation this agreed draft of the Interim Guidelines remains subject to potential amendments and therefore is not definitive.
- 2) European Committee for Standardization (CEN): CWA 17540:2020 Ships and Marine Technology – Specification for Bunkering of Methanol Fuelled Vessels. This document was finalised and published during the course of the Project.
- 3) Lloyd's Register: Provisional Rules for the Classification of Methanol Fuelled Ships, January 2016

Overall these documents provide the basis of the controlling framework which would be applied to the marine use of methanol in general and hence cover, to varying extents, the related bunkering operation. Although from a detailed technical review of both 1) and 2) there were a number of points identified where it would be considered that these documents could be improved it was nevertheless clear that there would be no role, or basis, for any further 'regulatory' type document to be prepared as part of this Project. The LR Provisional Rules were taken to represent the related requirements from any classification society – not to imply that only those LR Rules would need to be followed in all cases.

An alternative approach considered was the development of descriptive guidance in respect of methanol bunkering – indeed this had been the background idea at the Project Initiation stage. However, on examining this further in the light of the available documentation it was seen that to provide effectively a fairly solid block of text would not really meet the objective of providing a readily accessible and directly usable technical reference for practical use by those actually supplying / loading methanol bunkers.

The CCC Interim Guidelines cited above, 1), and the LR Provisional Rules, 3), both contain aspects which would be required to be checked before, during and, to a lesser extent, after bunkering methanol. Furthermore, a standard approach to virtually all shipboard activities, especially those related to activities with potential for risk to personal health or damage to the ship or wider environment, is for such activities to be covered by documented procedures under the ship's ISM certification. Similarly any methanol supplier would equally be expected to be working under some form of ISO 9000 type quality control system inevitably including written procedures and checklists. While the CEN document cited above, 2), includes a number of Checklists on review it was considered that these were incomplete, particularly in taking into account the range of given methanol bunkering requirements and in a number of other respects could well be improved.

Hence it was seen that a Checklist oriented approach would be most appropriate to delivering the Project objectives. An outline of this proposal was developed and agreed with MI in April 2020.

A fundamental point in the development of the Checklists, which differs from those given by the CEN document and those given by in a number of other instances, is that each should be specific to the that user and that joint completion would only be applied in those specific instances where joint procedures or actions were required to be undertaken. The basis of this approach being that the supplier has no role or authority to check aspects of equipment provision or operational procedures on the ship being bunkered and conversely the ship's personnel have no controlling authority over the supplier.

Going further on this Checklist specific approach it was decided that there would be separate sets of Checklists for each of the possible bulk delivery routes: barge, terminal or truck. Hence avoiding aspects which would not be relevant to a particular delivery method such as the mooring arrangements in the case of a truck delivery. Hence four sets of specific Checklists were developed covering the bulk delivery of methanol as a marine fuel covering the three delivery routes plus the receiving ship. Each set being divided to cover the different phases of that bunkering process:

- a) Preparation at a point in time in advance of the actual delivery – thereby allowing for rectification of any identified deficiencies.
- b) Readiness to bunker. Covering those actions and deployments undertaken just prior to commencing the actual bunkering operation.
- c) The actual delivery / loading process itself including completion.

In the case of the receiving ship the 'Preparation' phase is for each bunkering. However from the supply side it was seen that many of the points to be so covered would be both unnecessary and impractical on a 'per delivery' basis hence that phase was divided into two parts covering the general requirements which should be checked on a periodic basis (i.e. each week / month) and those specific to a particular delivery. Since those aspects which would be specific to a particular bunkering would be related to the actions etc related to the readiness to supply then the decision was taken to present those two aspects within one Checklist, albeit divided into two distinct parts.

These four sets of Checklists are supported by a single 'Supplier – Ship' Checklist covering those particular procedures and actions which need to be undertaken on a joint basis by the two parties. Primarily these relate to matters prior to commencing bunkering however there are also some closure points included.

In drafting these sets of Checklists it was sought to cover all points as given by the IMO, CEN and LR documents – not least on the basis that most, if not all, users of these Checklists would not be readers of those documents. In so doing as far as possible the terminology as given was applied in order to limit the risk of creating confusion as to actual meaning or applicability. Additionally those aspects from the SOLAS and MARPOL Conventions as applicable to bunkering were included as appropriate. Consequently, there may be points included in the Checklists that to those who are not fully familiar with those documents seem unnecessary or over detailed.

In terms of the SOLAS Convention there is the issue of the application of Chapter VI regulation 5-1 covering the requirement for the supplier to provide Material Safety Data Sheets (MSDS). It could be read that since methanol is not one of the types of 'oil' given that the provision of an MSDS with methanol supplied as a fuel to a ship is not required, although it would be if supplied as a cargo. Hence, in following the intent of this requirement, it has been included that the supplier of methanol as a fuel to a ship should provide that MSDS.

In terms of the MARPOL Convention the point that would be highlighted is the inclusion into the Checklists of the requirement that the supplier provide a MARPOL Sample as required by regulation 18.8.1 of Annex VI of that Convention. In this it is to be noted that there are particular risks, both in terms of the low flash point and the health hazard issues, in sampling such a product. However whereas regulation 18.4 exempts both LNG and LPG from this MARPOL Sample requirement that does not extend to other fuels with a flash point below 60°C. Hence it must be read at this time that this MARPOL Sample requirement applies to methanol supplied as a marine fuel except where the local authorities have accepted some other approach to the matter of the physical representation of the fuel as covered by the required BDN.

In addition to covering the bulk deliveries further sets of Checklists were developed covering the delivery of methanol in pre-packaged units. To cover these the IMO defined term 'Portable Tank' was used. Given that it would be expected that such deliveries would generally be by truck then only that delivery option has been covered. Hence there is a second 'Ship' Checklist covering such deliveries together with a corresponding 'Supplier – Ship' Checklist covering that supply type. To note that if such Portable Tank were, once onboard, to be refilled by a supplier then those tanks would need to be considered as 'Independent Tanks' and hence have all the required fittings and instrumentation.

It is a basic assumption behind all these Checklists that the supplier has full approval of the relevant authorities ashore to supply methanol as a fuel to ships in the area in which they operate. Similarly all ships so loading methanol have approval from both the flag Administration and Class to use methanol as a fuel. Hence those aspects are not covered in the Checklists themselves.

As noted above the IMO draft Interim Guidelines have still to be adopted by MSC. As such the output document referred to in the Technical Reference document developed cannot be considered definitive since it could be subject to change when considered by MSC for adoption. This consideration is to be undertaken by MSC 102 which was scheduled for May 2020 but which due to the Covid-19 crisis has been postponed to a still to be decided date – which may not be 2020. However it is noted that no commenting papers on that draft output had been received by the closing date for MSC 102 papers and hence it would be expected to be adopted as presented. Once adopted its title will change, 'Draft' being deleted and an identifying MSC reference applied. At which point it would be appropriate to duly update as necessary – potentially also at that time taking on any valid feed-back comments received.

### *Project Deliverables*

The Technical Reference document has been developed giving a brief introduction to methanol as a marine fuel, the definitions and terms used and an outline of the Checklists and their intended manner of application together with the six Checklist Packs each containing the three user relevant Checklists, covering the three phases as outlined above, plus the relevant Supplier/ Ship checklist

# Methanol Bunkering Technical Reference

## 2. Methanol as a Marine Fuel

Methanol, CH<sub>3</sub>OH, is increasingly being seen as one of the candidate fuels to be used in the decarbonisation of shipping. Although currently generally produced by the steam reforming of natural gas, as the simplest of the alcohols it can alternatively be made from various forms of biomass or waste materials, or even from the atmosphere itself, using potentially non-fossil fuel power sources thereby adding to its environmental acceptability. One of the major attractions of methanol as a fuel type is that it has a single molecular structure, irrespective of production route - unlike, for example natural gas or the conventional petroleum derived liquid distillate and residual fuels that each represent mixtures of a range of different hydrocarbon types - hence engines can be more tightly tuned since that 'fuel flexibility' is not required as with those other fuel types. Furthermore, methanol is sulphur free thereby totally avoiding that whole issue. However, there is the toxicity aspect of methanol which, together with its relatively low flash point, 12°C, requires particular attention during storage, handling and use - in addition to material compatibility issues. Data in respect of methanol as a chemical is given in Annex 1 and as a fuel grade product in Annex 2. Currently ISO is in the process of developing a methanol marine fuel grade specification but that is not yet available.

Methanol as a cargo product is covered under Annex II of the MARPOL Convention. As a marine fuel it falls within the definition of the term 'fuel oil' as given in regulation 2 of Annex VI to the MARPOL Convention and hence the relevant requirements of regulation 18 of that Annex are applicable - see Annex 3. Since the flashpoint of methanol is below the general use limit of 60°C given by Chapter II-2 of the SOLAS Convention, it is being considered within the scope of the further development of IMO's International Gas Fuel Code (IGF Code), and to that end there is a draft set of Interim Guidelines which however have at the time of writing - July 2020 see References - have yet to be adopted by IMO's Marine Safety Committee. Additionally, it would be expected that, in the context of methanol being used as an 'oil fuel', as per regulation 1 of MARPOL Annex I, the supplier should also provide a Material Safety Data Sheet (MSDS) - in accordance with Chapter VI regulation 5-1 of SOLAS - additional details in respect of this MSDS requirement are given in Annex 4. Additionally, a number of the ship classification societies have their own Rules covering methanol fuelled ships (see References). Furthermore, as a non-standard, low flash-point marine fuel, port authorities will typically have special requirements associated with the supply of methanol as a fuel to ships.

However, methanol, as a widely traded commercial product, is extensively and safely handled on a routine but controlled basis around the world although at the time of writing, July 2020, there are currently only a few instances where methanol is supplied to ships as a bunker product. Nevertheless the same fundamental bunkering principles still apply - to safely transfer, without spillage, leakage or other hazard, the intended quantity from the supplier to the ship.

Barge and truck operators are familiar with the loading, carriage and discharge of methanol from and to refinery and industrial sites as a cargo. Similarly shore terminals are equally familiar with the loading or discharge of methanol as a bulk product. On the receiver side, ship operators are familiar and well-practised at loading conventional fuel oil (i.e. DM / RM grade) bunkers.

Hence, with methanol as a bunker product, the issue is to adapt those existing capabilities to the handling of relatively small quantities of a low-flashpoint material into the often extensively sub-divided arrangements typical of ships' bunker tank configurations. In order to assist ship-owners / ship-operators and the supply side of that process a number of dedicated bunkering Checklists have been developed and which are made available to all stakeholders by this Technical Reference.

### 3. Definitions and Terms

ARAFFF	Alcohol Resistant Aqueous Film Forming Foam
barge	In order to clearly distinguish between the delivery and receiver entities, as a non-capitalised term this refers to any marine craft used to deliver methanol to a ship – although in many instances this may in fact be a sea-going ship essentially corresponding in ship type to a product tanker
Barge	As a capitalised term this refers to the functional entity as a methanol delivery mode including those persons on board and its role as a business unit
Bunker Delivery Team	All those persons, including the PIC, on the Supplier side involved in the safe delivery of methanol, as a bunker product, to a ship
Bunker Loading Team	All those persons, including the PIC, on the Ship side involved in the safe loading of methanol, as a bunker product, onto the ship
CCTV	Closed circuit television as may be used to remotely monitor aspects of the methanol delivery / loading process which should be monitored from the respective Bunker Control Station
CEN	European Committee for Standardization
ESD	Emergency Shut Down System the arrangement whereby the transfer of methanol from supplier to ship is stopped in case of triggering by means of manual activation or pre-set sensor signal values
draft Interim Guidelines	Draft Interim Guidelines for the Safety of Ships using Methyl/Ethyl Alcohol as Fuel as agreed by the 6 <sup>th</sup> session of the IMO Sub-Committee on Carriage of Cargoes and Containers (CCC) as forwarded the postponed 102 <sup>nd</sup> session of MSC for consideration with a view to approval and issue as an MSC Circular
Fuel oil	As defined by regulation 2.9 of MARPOL Annex VI and hence covers any type and grade of fuel used on board including methanol as well as conventional petroleum derived fuels – distillates or residual grades (DM or RM under ISO 8217) – together with fuels such as natural gas
Holding tank	Dedicated tank(s) for collecting any spills or leakage of methanol including drainage from drip trays. As given by the draft Interim Guidelines 5.3.5, 5.9.2, 5.10 & 8.3.1
IMPCA	International Methanol Producers and Consumers Association
Independent tank	A free-standing tank which is not incorporated into a ship's hull structure and which may be within either a suitable enclosed space or a suitably protected location on the open deck
IMO	International Maritime Organization – the United Nations specialist agency charged with the promotion of a uniform approach to the regulation of international shipping both in terms of safety and environmental protection
ISM Code	International Management Code for the Safe Operation of Ships and Pollution Prevention under SOLAS Convention Chapter IX by which key shipboard procedures are to be documented – subject to auditing and mandatory certification
MARPOL Annex I	Regulations for the Prevention of Pollution by Oil under the MARPOL Convention
MARPOL Annex II	Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk under the MARPOL Convention
MARPOL Annex VI	Regulations for the Prevention of Air Pollution from Ships under the MARPOL Convention



Methanol	<p>Fuel grade methanol as delivered to a ship for use by that ship as a bunker product fuel – not as a cargo</p> <p>Included within this term are fuel oils delivered to a ship which are blends of methanol and conventional fuel oils (i.e. petroleum derived distillates, ISO 8217 DM grades) where the resulting closed cup flash point of that blend is below 60°C. In reality, due to the effect of even a small quantity low flash point material on the overall flash point, it would be seen that any manufactured methanol blend product would need to be handled as per methanol.</p>
MEPC	IMO's Marine Environment Protection Committee whose responsibilities include the on-going development of the various Annexes under the MARPOL Convention and all controls applied thereunder
MSC	IMO's Marine Safety Committee whose responsibilities include the on-going development of the SOLAS Convention and STCW Convention together with all controls applied thereunder
MSDS	Material Safety Data Sheet (otherwise often referred to as a Safety Data Sheet (SDS)). The requirement for the supplier to provide a MSDS to the Ship is given by SOLAS Chapter VI regulation 5-1. The requirements as to what, as a minimum, is to be covered by that MSDS is given in the MSC resolution MSC.286(86)
PIC	<p>Person-in-Charge – on the methanol delivery side this will be the Barge PIC, Terminal PIC or Truck PIC as applicable.</p> <p>On the methanol loading side that will be the Ship PIC</p> <p>The PIC has overall responsibility for the methanol delivery on the delivery side and methanol loading on the Ship side under respectively the ship's master or the delivery company manager who retain ultimate responsibilities for safety</p>
Portable Tank	<p>As defined by 2.2.8 of the draft Interim Guidelines</p> <p>This is a tank which is delivered prefilled with methanol to a ship which following loading is to be secured on board and connected to the ship's systems</p>
PPE	<p>Personal Protective Equipment</p> <p>These should include at least:</p> <ul style="list-style-type: none"> <li>Safety helmet</li> <li>Eye protection</li> <li>Anti-static safety shoes / boots</li> <li>Alcohol resistant gloves</li> <li>Boilersuit / coverall – of a flame retardant and non-static accumulating material</li> <li>Intrinsically safe methanol vapour detection meter</li> </ul>
Risk Assessment	<p>This is the assessment to be undertaken by the Ship in accordance with the draft Interim Guidelines 4.2 and as typically required by Class Rules.</p> <p>The outcome of this Risk Assessment would have been used for the Ship to have developed its Emergency Response Procedure and its Bunker Loading Procedure.</p> <p>It would be expected that the relevant authority will have required the Supplier to equally undertaken such a Risk Assessment from</p>

	their side and hence to also duly inform the drafting of their operating procedures.
SBC	Safety Dry Break-Away Coupling – the coupling positioned between the ship end of the supply hose and the ship’s receiving manifold which, in the case of excessive relative movement between the supply and the ship, will automatically disconnect in order to avoid excessive strain on the hose and pipework. These coupling have internal valves which in case of disconnection will close thereby minimising the amount of spilt methanol. Additionally the coupling will also act to provide electrical isolation between the supplier and the ship. As given by the draft Interim Guidelines 8.4
Ship	As a capitalised term this refers to the functional entity as ship which is to load as bunkers the delivered methanol as such includes the master, officers and crew and its role as a business unit
STCW Code	Seafarers’ Training, Certification and Watchkeeping (STCW) Code under the STCW Convention covering minimum requirements in those respective areas
Supplier	As a capitalised term this refers to the any of the functional entities which deliver methanol to a ship – hence this term represents a general term referring to the Barge, Terminal or Truck as applicable
Terminal	As a capitalised term this refers to the functional entity as a fixed shore based methanol delivery unit including those persons operating it and its role as a business unit
truck	As a non-capitalised term this refers to a road vehicle used to deliver methanol and as such also includes any tank trailer unit
Truck	As a capitalised term this refers to the functional entity as a road transport vehicle methanol delivery unit including those persons operating it and its role as a business unit
Vapour handling system	The ship’s bunker tank atmosphere (inert gas + methanol vapour) handling system. This may either discharge via a vapour head to the ambient atmosphere or, where so specially provided for, work on a balanced arrangement whereby inert gas / vapour displaced during loading is returned to the supply entity thereby making up the atmosphere in the tank(s) being discharged to the ship. In the latter case there would of course need to be a second connection for that vapour handling between the supply entity and the ship
Vapour processing system	This covers those instances where the vapour handling system is connected to an on board device which either collects or combusts any methanol vapour in the as handled displaced tank atmosphere before the discharge of the remainder to the ambient atmosphere
Zones	In order apply the required level of controls as identified from the Risk Assessments as undertaken as required by both the Supplier and the Ship.  Hazardous Zone – this covers those areas or enclosed spaces where there is a likelihood of methanol vapours being present – draft Interim Guidelines 12.5.2  Safety Zone – those areas outside the Hazardous Zone but in the vicinity of methanol piping / tanks where methanol vapour could be present at diluted concentrations – draft Interim Guidelines 12.5.3  Security Zone – those areas outside the Safety Zone where access should be restricted to only the Bunker Delivery / Loading Team while methanol bunkering operations are being undertaken.

## 4. Methanol Bunkering Checklist Outline

In this Technical Reference the terms barge, terminal and truck are used to cover the three principal modes by which methanol, as a bulk supplied (i.e. pumped through a hose) bunker product, may be delivered to a ship. In such cases the methanol will be loaded by the ship into either bunker tanks, which are integral with the ship's structure, or into free-standing, but permanently fitted, independent tanks which may either be in a protected location on the open deck or within suitable enclosed spaces.

Additionally, since as part of a ship's trial programme methanol may be instead be delivered in relatively small quantities as a packaged material, the draft IMO Interim Guidelines refer to the container used in such cases as a 'Portable Tank', that scenario is also covered. Given the likely transport arrangements, the delivery of a Portable Tank is covered solely as a truck activity. As covered by the relevant Checklist, a Portable Tank after loading on board then needs to be both secured to prevent subsequent movement and connected to the ship's monitoring system. If an on board Portable Tank is to be refilled while retained on board then it would need to be instead considered as an Independent Tank and the appropriate Checklist Pack used.

For both suppliers and users of methanol there is the necessity of having completed their respective Risk Assessments – for a ship as specifically required by both the IMO Interim Guidelines and typically also by the applicable Class Rules. In the case of suppliers such Risk Assessments, would be expected to be required by the local authorities and would be expected to be required to cover at least the delivery of methanol to ships. For users, Ships, that Risk Assessment, will need to cover the full range of methanol related activities of which bunker loading is but one element. In either case the outcomes of those Risk Assessments should then have informed the development of the respective Emergency Response Procedure and Bunker Delivery / Loading Procedure as incorporated into their audited management systems – for a ship as required by the ISM Code.

For each of these four delivery options there is a set of three dedicated checklists, as given below in Section 5, covering in turn the following stages:

1. **Preparation** – General. Given that the barge / terminal / truck would be providing multiple deliveries over a period of time there are certain checks which should be undertaken on a periodic, i.e. weekly, basis, rather than prior to every bunkering.
2. **Pre-delivery** - This activity divides into two parts. The first being the preparations specific to a particular bunkering, which therefore covers the Supplier-Ship interface in that particular instance, undertaken at some time before the delivery. The second part being a ready to delivery element covering those checks undertaken by a Supplier just prior to the actual delivery process.
3. **Delivery** - This covers the physical delivery process from the Supplier side.

A similar approach is followed from the Ship side:

1. **Preparation** - In contrast to the approach taken for the Supplier here there is a specific bunkering operation to be prepared for and therefore all aspects of that preparation phase are covered in a single checklist.
2. **Ready to bunker** - As on the Supplier side, this covers those checks undertaken by the ship just prior to the actual bunker loading.
3. **Loading** - This covers the physical bunker loading process from the receiver, Ship, side.

The Preparation elements are separated off from the Ready to Deliver / Load elements on the basis that by undertaking those checks some time in advance of the bunkering then there is potentially the opportunity for any identified shortcomings to be resolved before the actual bunkering.

The Checklists generally provide for a Yes (Y) or No (N) response – usually the Yes response being the required response to resolve the point in question – with a Remarks column to the side for any relevant observations to be made. In some instances a specific numeric response is also required for the record. For some points a Not Applicable (NA) response option is also provided.

All the above Checklists are specific to either the Supplier (Barge, Terminal or Truck as applicable) or the Ship – on the basis that neither side has any management role or authority over the other. However, there certain aspects which are to be

undertaken on a joint basis and these aspects are covered by the two Supplier and Ship Checklists; one covering bulk supply deliveries the other Portable Tanks.

These Supplier and Ship Checklists cover the Bunker Safety checks undertaken before commencing the bunkering / transfer operation which itself is divided between the procedural aspects and the joint actions to be undertaken by both parties before the actual bunkering / transfer can commence. Additionally, there is a short Bunker Completion section. In these Supplier and Ship Checklist separate response columns are given for the Supplier PIC and the Ship PIC so that the agreement, or otherwise, of both parties is clearly recorded or to reflect those instances where one party considers a particular point adequately covered whereas the other does not – the remarks column then providing for appropriate comment to be entered.

These Checklists have been prepared on the basis of industry good practice, existing statutory requirements and the following guidance and publications – see References:

- Draft of proposed MSC Circular ‘Interim Guidelines for the Safety of Ships using Methyl/Ethyl Alcohol as Fuel’ – was to be considered for adoption by the postponed MSC 102 which had been scheduled for May 2020
- CEN Workshop Agreement (CWA) ‘Ships and marine technology – Specification for bunkering of methanol fuelled vessels’ – CWA 17540:2020
- Lloyd’s Register Provisional Rules for the Classification of Methanol Fuelled Ships, January 2016 – for a ship classed by another classification society their equivalent requirements would instead apply
- IMO - Recommendations on the Safe Transport of Dangerous Cargoes and Related Activities in Port Areas
- Methanol Institute – Methanol Safe Handling and Safe Berthing Guide – Technical Bulletin

Additionally any national or local / port regulatory requirements applicable at the bunkering port must of course be adhered to as applicable. As regards the ship, any relevant flag State (Administration) requirements in respect of the use of methanol as a marine fuel oil must also be adhered to as applicable.

These July 2020 versions of the Methanol Bunkering Checklists have been compiled on the basis of existing experience and reference documents. However these Checklists are living documents and will be subject to on-going revision in the light of future developments and feedback.

*These Checklists take as a basis the following assumptions:*

- *The methanol supplier has approval as relevant from the appropriate authorities in the country of operation to supply methanol to ships*
- *The methanol supplier uses a delivery system approved by the appropriate authorities for methanol delivery to a ship - together with duly trained delivery personnel with all necessary safety equipment and PPE*
- *Where that supply to a ship will be undertaken by truck or pipeline alongside at berth – the port authority has approved the arrangements at the berth to be used and all other port related matters including port and berth access*
- *Where that supply will be undertaken by barge to a ship alongside at berth or otherwise within a port area – the port authority has approved the arrangements at the berth / location to be used*
- *Where that supply will be undertaken by barge to a ship outside port limits – the national authority has approved the arrangements to be used and the location of that transfer*
- *The receiving ship has the required Statutory and Class approvals to use methanol on board as a fuel oil. These approvals covering not only the ship and machinery aspects but also training (STCW Code) and relevant operating procedures (ISM Code)*
- *The receiving ship has the necessary safety equipment and PPE appropriate to methanol*
- *The crew of the receiving ship have had the required training on the handling and use methanol as a fuel oil for that ship*

Checklists may be completed and retained as either written or electronic records unless there are statutory requirements to the contrary. In the case of electronic records these should be in a form which precludes subsequent amendment.

In the absence of requirements stipulating longer period it would be recommended that completed Checklists be retained by the respective party (Supplier or Ship) for at least 1 year from the date of the bunkering operation to which they relate.

## **5. Methanol Bunkering Checklists & Process Flows**

*These Checklists are generic in nature. It is for individual users, either on the Supplier or Ship sides, to take into account all the factors relevant to their specific circumstances, and on that basis adapt these generic Checklists to cover their own particular requirements.*

### **Checklist:**

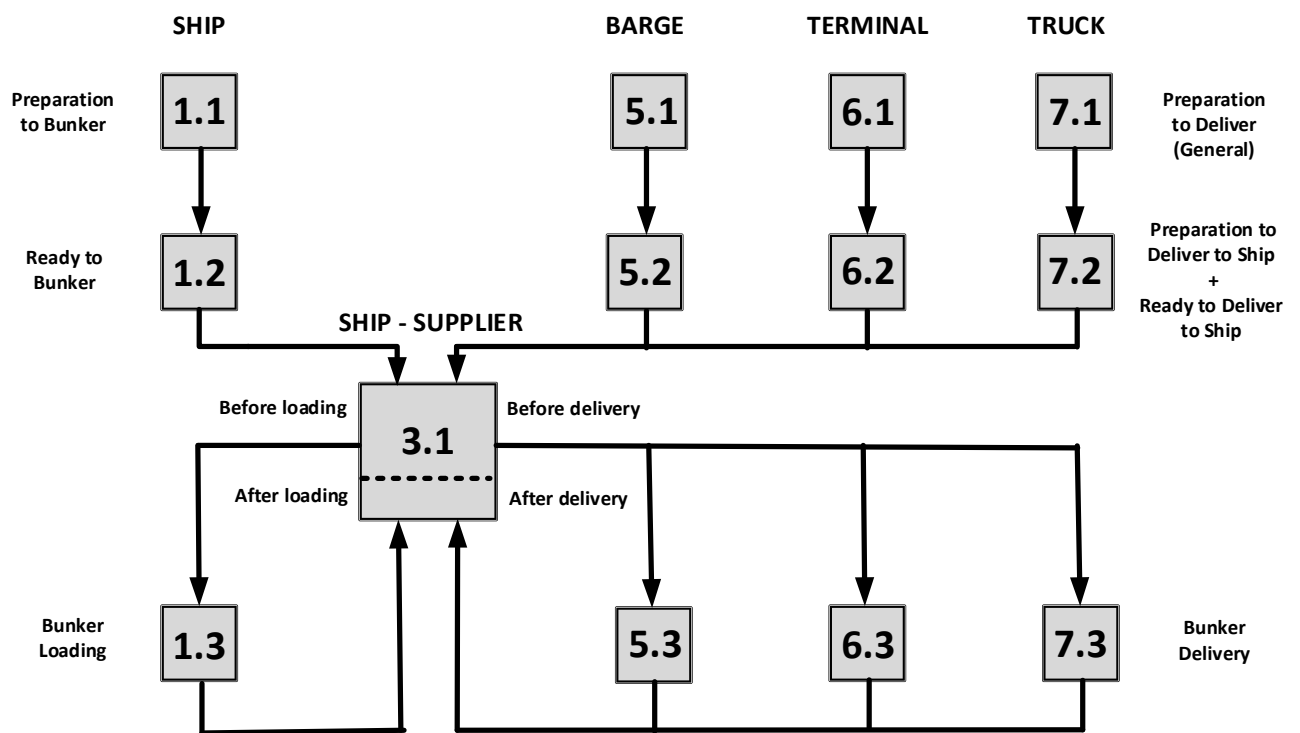
- 1 Ship Bunker Loading – Checklist Pack**
  - .1 Preparation to Bunker**
  - .2 Ready to Bunker**
  - .3 Bunker Loading**
  
- 2 Ship Portable Tank Loading – Checklist Pack**
  - .1 Preparation to Bunker**
  - .2 Ready to Bunker**
  - .3 Bunker Loading**
  
- 3 Barge, Truck, Terminal Supplier to Ship (to be part of checklists pack 1, 5, 6 and 7)**
  - .1 Bunker Safety + Bunker Completion Checklist**
  
- 4 Portable Tank Supplier and Ship – Portable Tank (to be part of checklists pack 2 and 8)**
  - .1 Bunker Safety + Bunker Completion (Portable Tanks) Checklist**
  
- 5 Barge Supplier – Checklist Pack**
  - .1 Preparation to Deliver (general)**
  - .2 Preparation to Deliver to Ship + Ready to Deliver to Ship**
  - .3 Bunker Delivery**
  
- 6 Terminal Supplier – Checklist Pack**
  - .1 Preparation to Deliver (General)**
  - .2 Preparation to Deliver to Ship + Ready to Deliver to Ship**
  - .3 Bunker Delivery**

- 7 **Truck Supplier - Checklist Pack**
  - .1 **Preparation to Deliver (General)**
  - .2 **Preparation to Deliver to Ship + Ready to Deliver to Ship**
  - .3 **Bunker Delivery**

- 8 **Truck Portable Tank Supply – Checklist Pack**
  - .1 **Preparation to Deliver Portable Tank (General)**
  - .2 **Preparation to Deliver Portable Tank to Ship + Ready to Deliver Portable Tank to Ship**
  - .3 **Portable Tank Delivery**

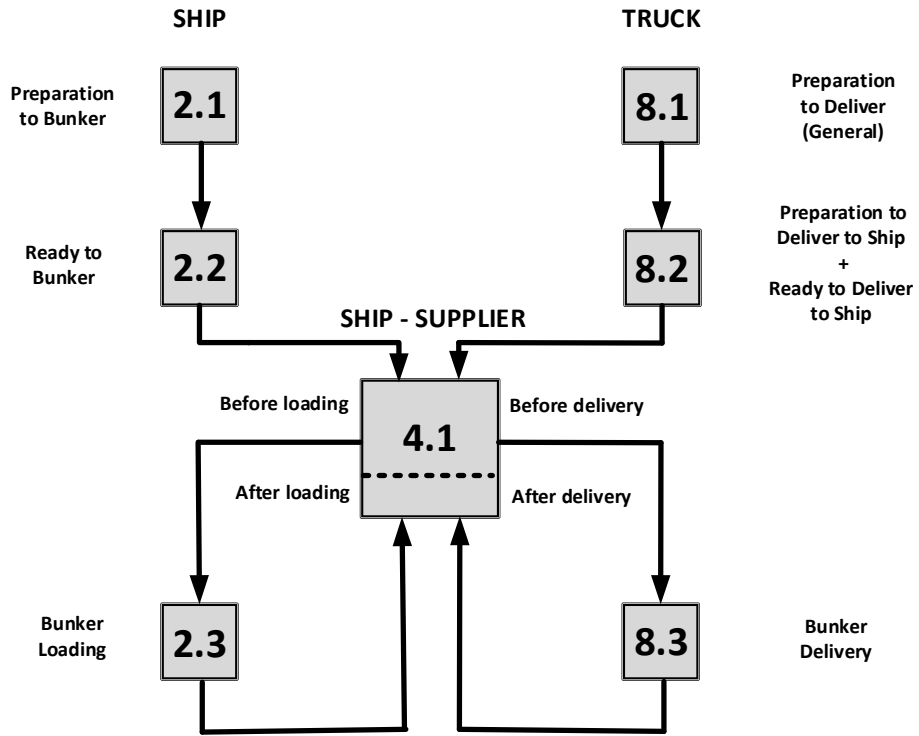
**Figure 1: Checklist Process Flow – Bulk Deliveries**

Checklist reference shown for each delivery mode and process stage



**Figure 2: Checklist Process Flow – Portable Tank Deliveries**

Checklist reference shown for each delivery mode and process stage



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## **Annex 1**

Methanol Characteristics

July 2020





# METHANOL TECHNICAL DATA SHEET

FOR PRODUCED METHANOL



<b>CHEMICAL FORMULA:</b>	<b>CH<sub>3</sub>OH</b>
<b>CAS No:</b>	<b>67-56-1</b>
<b>SYNONYMS:</b>	<b>METHYL ALCOHOL, WOOD ALCOHOL</b>
<b>DESCRIPTION:</b>	<i>METHANOL IS A CLEAR, COLORLESS LIQUID THAT IS SOLUABLE IN WATER AND IS BIODEGRADABLE.</i>

<b>APPLICATIONS:</b>	<ul style="list-style-type: none"> <li>• <b>CHEMICAL FEEDSTOCK</b> - <i>FORMALDEHYDE, ACETIC ACID, MTBE, DME, BIODIESEL, OLEFINS.</i></li> <li>• <b>FUEL &amp; FUEL ADDITIVE</b> - <i>VEHICLES, SHIPS, COOKING, HEATING</i></li> <li>• <b>HYDROGEN CARRIER FOR METHANOL FUEL CELLS</b></li> <li>• <b>WINDSHIELD WASHER FLUID</b></li> <li>• <b>WASTEWATER DENITRIFICATION</b></li> </ul>
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## TYPICAL PROPERTIES:

Molecular Weight:	32.04 g/mol
Purity:	99.85 %wt min
Water (impurity)	0.100 %wt max
Acetone (impurity)	30mg/kg max
Ethanol (impurity)	50 mg/kg max
Chloride (impurity) as Cl <sup>-</sup>	0.5 mg/kg max

Specific Gravity (20/20°C)	0.7910 - 0.7930
Freezing Point:	-97.8°C / -144°F
Boiling Point:	64.6°C / 148°F
Flash Point (closed cup, 1 atm):	12°C / 54°F
Explosive limits in air	6% - 36%
Solubility: Methanol in Water/ Water in Methanol	100% / 100%

## PRODUCTION SPECIFICATIONS:

Methanol is typically produced to meet the methanol specifications of the International Methanol Producers and Consumers Association (IMPCA), which reviews and updates the specifications approximately every two years. For the current IMPCA methanol specifications, refer to the IMPCA website at <http://www.impca.eu/IMPCA/Technical/IMPCA-Documents>

## HAZARDS & PRECAUTIONS:

<b>FLAMMABLE</b> 	Methanol is flammable and burns with a clear blue flame that is smokeless and difficult to see in daylight. Keep away from sources of ignition including heat, sparks, flames, and hot surfaces. Keep containers tightly closed when not in use. Containers should be stored in well-ventilated and cool areas.
<b>HEALTH</b> 	Methanol can be toxic if swallowed, inhaled, or contacts the skin, although skin absorption is a slower process than ingestion or inhalation. Avoid breathing vapors or mist. When handling methanol, wear chemical-resistant gloves and appropriate PPE. Depending on the activity, respiratory protection may be required. If swallowed, immediately seek medical attention.

**For detailed PPE and safe handling and storage requirements, refer to the Methanol Institute's Methanol Safe Handling Manual and to the manufacturer's or supplier's Safety Data Sheet for methanol.**

*The Methanol Institute believes the information herein to be accurate. However, the Methanol Institute assumes no liability whatsoever with respect to the accuracy and completeness of the information, procedures, recommendations and data presented in this Technical Data Sheet and disclaim all liability arising out of the use of such information, procedures, recommendations and data. All users of this Technical Data Sheet must still use their own independent judgment and discretion in ensuring that they handle methanol safely. This Technical Data Sheet is not a substitute for applicable laws and regulations, nor does it alter the obligation of the user to comply fully with federal, state, and local laws.*

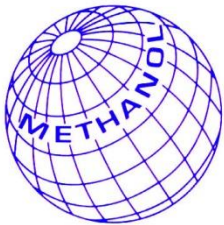
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## Annex 2

IMPCA Methanol Specification

July 2020





# **IMPCA METHANOL REFERENCE SPECIFICATIONS**

*a.i.s.b.l. International Methanol Producers & Consumers Association i.v.z.w.  
Avenue de Tervueren 270 Tervurenlaan - 1150 Brussels - Belgium  
Phone: + 32 (0)2 741 86 83 – Fax: + 32 (0)2 741 86 84 – e-mail: [info@impca.be](mailto:info@impca.be) – [www.impca.be](http://www.impca.be) - VAT: BE 434 211 194*

# IMPCA REFERENCE SPECIFICATIONS

TEST		UNIT	METHOD	LIMITS
1	Appearance		IMPCA 003-98	Clear and free of suspended matter
2	Purity on dry basis	% W/W	IMPCA 001-14	Min 99.85
3	Acetone	mg/kg	IMPCA 001-14	Max 30
4	Ethanol	mg/kg	IMPCA 001-14	Max 50
5	Colour	Pt-Co	ASTM D1209-11	Max 5
6	Water	% W/W	ASTM E1064-12	Max 0.100
7	Distillation Range at 760 mm Hg	°C	ASTM D1078-11	Max 1.0 to include 64.6° +/- 0.1°
8	Specific Gravity 20°/20°		ASTM D4052-11	0.7910-0.7930
9	Potassium Permanganate Time test at 15 °C	minutes	ASTM D1363-11	Min 60
10	Chloride as Cl <sup>-</sup>	mg/kg	IMPCA 002-98	Max 0.5
11	Sulphur	mg/kg	ASTM D 3961-98	Max 0.5
	Note 1, page 3	mg/kg	ASTM D 5453-12	Max 0.5
12	Hydrocarbons		ASTM D 1722-09	Pass test
13	Carbonisable Substances (Sulfuric Acid Wash Test)	Pt-Co	ASTM E 346-08	Max 30
14	Acidity as Acetic acid	mg/kg	ASTM D 1613-12	Max 30
15	Iron in solution	mg/kg	ASTM E 394-09	Max 0.10
16	Non Volatile Matter	mg/1000ml	ASTM D 1353-13	Max 8
17	TMA	Note 2, page 3	optional (see notes for recommended methods)	
18	AROMATIC	Note 2, page 3	optional (see notes for recommended methods)	

**Notes:**

**1. Sulphur**

Whilst the scope of ASTM D 5453 is stated to be for various fuels containing 1.0 to 8000 mg/kg total sulphur, IMPCA consider this method to be suitable for the determination of total sulphur in methanol provided that the laboratory performing the analysis has demonstrated that it can achieve a Limit of Detection < 0.5mg/kg with the apparatus available to it.

**2. TMA and Aromatics**

In case some specific consumers or producers wish to have more specific information on **TMA** (which can be considered as an impurity generating bad smell) and/or **Aromatics** (in case the previous cargos have been Aromatics).

IMPCA recommends to use the following methods :

TMA	TMA test	ASTM E 346-08
Aromatics	UV test	IMPCA 004-15

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## **Annex 3**

Bunker Delivery Note and MARPOL  
Sample

July 2020



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## Introduction

Regulation 14.5 of MARPOL Annex VI requires that the sulphur content, even where effectively zero as in the case of methanol, of a fuel oil supplied to a ship is to be documented by the supplier. Additionally, under regulation 18 of that Annex, except for certain gas fuels, that documentation is to be given by means of a bunker delivery note – which is to contain at least the information as given in Appendix V of that Annex. Furthermore, for a liquid fuel oil such as methanol regulation 18.8.1, as it stands at present, also requires that the bunker delivery note be accompanied by a representative sample – usually referred to as the MARPOL Sample.

However, the IMO Guidelines covering the drawing of the MARPOL Sample at the time of delivery, MEPC.182(59) are written on the basis of sampling conventional, petroleum derived distillate or residual fuel oils. In the case of the actual physical sampling of methanol and the preparation and process actions to be taken reference should be made to relevant industry guidance – see for example the IMPCA Methanol Sampling Methods as listed in the References.

## Bunker Delivery Note

In reality the statutory side of the bunker delivery note is usually combined with the commercial aspects such as timings and contractual issues so that there is a single document covering all aspects.

On the MARPOL Annex VI side the following information is to be provided by the supplier on the bunker delivery note:

- Name and IMO Number of receiving ship
- Port
- Date of commencement of delivery
- Name, address and telephone number of marine fuel supplier
- Product name
- Quantity in metric tonnes
- Density at 15°C (kg/m<sup>3</sup>)
- Sulphur content (% m/m)

In addition, the following is required:

A declaration signed and certified by the fuel oil supplier's representative that the fuel oil supplied is in conformity with regulation 18.3 of MARPOL Annex VI and that the sulphur content of the fuel oil supplied does not exceed:

the limit value given by regulation 14.1 of the Annex;

the limit value given by regulation 14.4 of the Annex; or

the purchaser's specified limit value of \_\_\_\_\_ (% m/m), as completed by the fuel oil supplier's representative and on the basis of the purchaser's notification that the fuel oil is intended to be used:

- .1 in combination with an equivalent means of compliance in accordance with regulation 4 of the Annex; or
- .2 is subject to a relevant exemption for a ship to conduct trials for sulphur oxides emission reduction and control technology research in accordance with regulation 3.2 of the Annex.

This declaration is to be completed by the fuel oil supplier's representative by marking the applicable box(es) with a cross (x).

Given that the effectively zero sulphur content of methanol it should be expected that the supplier will complete the sulphur entry on the bunker delivery note as 'less than 0.03%' since that is the reporting limit for the sulphur test method cited – ISO 8754:2003.

Methanol has the distinction that it can be manufactured from either a petroleum source – the usual route at present, by the steam reforming of natural gas – or from non-petroleum sources. Given that there is a difference in the application of regulation 18.3 between fuel oils derived from petroleum or non-petroleum sources then it would be informative if the bunker delivery note also gave the source material / production process by which that particular fuel oil had been produced. However, IMO has yet to consider this point even in principle and therefore at this time this is not mandated.

A further point would be where methanol has been derived from a non-petroleum source is the question of whether, under the IMO Fuel Oil Data Collection scheme (regulation 22A of MARPOL Annex VI), non-fossil carbon should be quantified separately from fossil (i.e. petroleum sourced) carbon. This too is a point that IMO has yet to consider hence at this time when making the required annual return under that scheme the standard Carbon Factor ( $C_F$ ) value for methanol, 1.375 tonne  $CO_2$  / tonne fuel, would need to be applied and that fuel oil entered in the same way as with all other, petroleum derived, fuel oils used over the period in question.

### **MARPOL Sample**

As regards the MARPOL Sample, as required by regulation 18.8.1 to be provided by the supplier, there are as at present no special provisions given in respect of liquid fuel oils with a flash point below 60°C flash point such as methanol. However, the default sampling procedures by which that sample is to be obtained would be seen as not appropriate for methanol – both on account its flash point but also from the point of toxicity. Hence it would be expected that the methanol supplier should have arranged with the local authority overseeing the fuel oil supplier registration scheme under regulation 18.9 of MARPOL Annex VI suitable alternative sampling procedures involving the use of a closed sampling device by which the operator does not come into contact with the sampled material at any stage in the process – that is the assumption under the applicable sections of the Checklists provided by this Technical Reference document. In this respect those responsible for methanol sampling should be duly guided by the referenced IMPCA document as to how that sampling should be physically undertaken.

In those cases where methanol is delivered in Portable Tanks then the supplier should have arranged with the local authority overseeing the fuel oil supplier registration scheme as to how the MARPOL Sample issue is to be covered.



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## Annex 4

Methanol Material Safety Data Sheet  
(MSDS) Example

July 2020



## MSDS as Required by SOLAS

SOLAS Chapter VI regulation 5-1 reads:

*Regulation 5-1 – Material safety data sheets*

*Ships carrying oil or oil fuel, as defined in regulation 1 of Annex 1 of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto, shall be provided with material safety data sheets, based on the recommendations developed by the Organization, prior to the loading of such oil as cargo in bulk or bunkering of oil fuel.*

The recommendations therein cited are given by the MSC Resolution MSC.286(86) the operative text of which reads

### ANNEX I

**RECOMMENDATIONS FOR MATERIAL SAFETY DATA SHEETS (MSDS) FOR MARINE USE SUITABLE TO MEET THE PARTICULAR NEEDS OF THE MARINE INDUSTRY CONTAINING, SAFETY, HANDLING, AND ENVIRONMENTAL INFORMATION TO BE SUPPLIED TO A SHIP PRIOR TO THE LOADING OF MARPOL ANNEX I TYPE OIL AS CARO IN BULK AND THE BUNKERING OF OIL FUEL**

Section	Heading	Content
1	<b>Identification of the substance or mixture and of the supplier</b>	<ul style="list-style-type: none"><li>Name of the category – see guidance in annex 2 for MARPOL Annex I type oil cargoes and oil fuels.</li><li>The name of the substances</li><li>Trade name of the substances</li><li>Description on Bill of Lading (B/L), Bunker Delivery Note or other shipping document.</li><li>Other means of identification.</li><li>Supplier's details (including name, address, telephone number, etc)</li><li>Emergency telephone number.</li></ul>
2	<b>Hazards identification</b>	<ul style="list-style-type: none"><li>GHS* classification of the substance/mixture and any regional information.</li><li>Other hazards which do not result in classification (e.g. hydrogen sulphide) or are not covered by the GHS. See Guidelines in annex 2.</li></ul>
3	<b>Composition/Information on ingredients</b>	<ul style="list-style-type: none"><li>Common name, synonyms, etc</li><li>Impurities and stabilizing additives which are themselves classified and which contribute to the classification of the substances.</li><li>The chemical identity and concentration or concentration ranges of all ingredients which are hazardous within the meaning of GHS and are present above their cut-off levels. Cut-off level for reproductive toxicity, carcinogenicity and category 1 mutagenicity is 0.1%. Cut-off level for all other hazard classes is 1%. See guidelines in annex 2</li></ul>
4	<b>First aid measures</b>	<ul style="list-style-type: none"><li>Description of necessary measures, subdivided according to the different routes of exposure, i.e. inhalation, skin and eye contact and ingestion.</li><li>Most important symptoms/effects, acute and delayed.</li><li>Indication of immediate medical attention and special treatment, if necessary.</li></ul>

\* Globally Harmonized System of Classification and Labelling of Chemicals (GHS), United Nations (2007 edition, as revised).

Section	Heading	Content
5	<b>Fire-fighting measures</b>	<ul style="list-style-type: none"> <li>• Suitable extinguishing media.</li> <li>• Specific hazards arising from the chemical (e.g., nature of any hazardous combustion products).</li> <li>• Special protective equipment and precautions for fire-fighters</li> </ul>
6	<b>Accidental release measures</b>	<ul style="list-style-type: none"> <li>• Personal precautions, protective equipment and emergency procedures.</li> <li>• Environmental precautions.</li> <li>• Methods and materials for containment and clean-up.</li> </ul>
7	<b>Handling and storage</b>	<ul style="list-style-type: none"> <li>• Precautions for safe handling</li> <li>• Conditions for safe storage, including any incompatibilities.</li> </ul>
8	<b>Exposure controls/ personal protection</b>	<ul style="list-style-type: none"> <li>• Control parameters (e.g., occupational exposure limit values).</li> <li>• Appropriate technical precautions.</li> <li>• Individual protection measures, such as personal protective equipment.</li> </ul>
9	<b>Physical and chemical properties</b>	<ul style="list-style-type: none"> <li>• See Guidelines in annex 2.</li> </ul>
10	<b>Stability and reactivity</b>	<ul style="list-style-type: none"> <li>• Chemical stability.</li> <li>• Possibility of hazardous reactions.</li> <li>• Conditions to avoid (e.g., static discharge).</li> </ul>
11	<b>Toxicological information</b>	<ul style="list-style-type: none"> <li>• Concise but complete and comprehensible description of the various toxicological (health) effects and the available data used to identify those effects, including: <ul style="list-style-type: none"> <li>○ Information on the likely routes of exposure (inhalation, ingestion, skin and eye contact);</li> <li>○ Symptoms related to the physical, chemical and toxicological characteristics;</li> <li>○ Delayed and immediate effects and also chronic effects from short- and long-term exposure.</li> </ul> </li> <li>• Numerical measures of toxicity (such as acute toxicity estimates).</li> <li>• See Guidelines in annex 2.</li> </ul>
12	<b>Ecological information</b>	<ul style="list-style-type: none"> <li>• Ecotoxicity (aquatic and terrestrial, where available).</li> <li>• Persistence and degradability.</li> <li>• Bioaccumulation potential.</li> <li>• Mobility in soil.</li> <li>• Other adverse effects.</li> <li>• See Guidelines in annex 2.</li> </ul>
13	<b>Disposal considerations</b>	<ul style="list-style-type: none"> <li>• Description of waste residues and information on their safe handling and methods of disposal, in line with MARPOL requirements.</li> </ul>
14	<b>Transport information</b>	<ul style="list-style-type: none"> <li>• UN number, where applicable.</li> <li>• UN Proper shipping name, where applicable.</li> <li>• Transport Hazard class(es), where applicable</li> <li>• Special precautions which a user needs to be aware of or needs to comply with in connection with transport (e.g., heating and carriage temperatures).</li> <li>• Note that this product is being carried under the scope of MARPOL Annex I.</li> </ul>
15	<b>Regulatory information</b>	<ul style="list-style-type: none"> <li>• Safety, health and environmental regulations specific for the product in question.</li> </ul>
16	<b>Other information including information on preparation and revision of the MSDS</b>	<ul style="list-style-type: none"> <li>• Version No.</li> <li>• Date of issue.</li> <li>• Issuing source.</li> </ul>

## ANNEX 2

### GUIDELINES FOR THE COMPLETION OF MSDS FOR THE MARPOL ANNEX I TYPE OIL AS CARGO IN BULK AND OIL FUEL

#### 1 Categories of liquids

The following categories subdivide the full scope of substances covered by Annex I of MARPOL 73/78 and set in groups specific products for general identification purposes.

- .1 crude oils;
- .2 fuel and residual oils, including ship's bunkers\*;
- .3 unfinished distillates, hydraulic oils and lubricating oils;
- .4 gas oils, including ship's bunkers\*\*;
- .5 kerosenes;
- .6 naphthas and condensates;
- .7 gasoline blending stocks;
- .8 gasoline and spirits; and
- .9 asphalt solutions.

#### 2 Properties and information

In addition to properties and information specified in annex 1, the following properties and information should be reported:

- .1 for the following provide appropriate hazards identification in section 2, composition/information on ingredients in section 3, and toxicological information in section 11 of the MSDS:
  - .1 Benzene - if present  $\geq 0.1\%$  by weight (even if naturally occurring ingredient of the material);
  - .2 Hydrogen sulphide - if present at any concentration, in liquid and vapour phases, or if possible to accumulate in a tank's vapour space; and
  - .3 Total Sulphur - if present  $\geq 0.5\%$  by weight, identify in section 3 and warn of potential for hydrogen sulphide evolution in sections 2 and 11;

\* Refer to standard ISO 8217:2005, Petroleum products . Fuels (class F) . Specifications of marine fuels, table 2.

\*\* Refer to standard ISO 8217:2005, Petroleum products . Fuels (class F) . Specifications of marine fuels, table 1.

- .2 for physical and chemical properties in section 9 of the MSDS:
  - .1 appearance (physical state, colour, etc.);
  - .2 odour;
  - .3 pour point;
  - .4 boiling range;
  - .5 flashpoint;
  - .6 upper/lower flammability or explosive limits;
  - .7 vapour pressure (Reid vapour pressure (RVP) when appropriate);
  - .8 vapour density;
  - .9 density;
  - .10 auto-ignition temperature; and
  - .11 kinematic viscosity; and
- .3 for ecological information in section 12 of the MSDS: Persistent or non-persistent oil as per the International Oil Pollution Compensation (IOPC) Fund definition\* .

\* International Oil Pollution Compensation (IOPC) Fund definition: "A non-persistent oil is oil, which, at the time of shipment, consists of hydrocarbon fractions, (a) at least 50% of which, by volume, distils at a temperature of 340°C (645°F) and (b) at least 95% of which, by volume, distils at a temperature of 370°C (700°F) when tested by the ASTM Method D-86/78 or any subsequent revision thereof".

## Methanol MSDS Examples – Industry Sources

[Atlantic Methanol MSDS](#)

[Johnson Matthey MSDS](#)

[Methanex MSDS](#)

[MGC MSDS](#)

[MHTL MSDS](#)

[Sipchem MSDS](#)

[OCI MSDS](#)

[Petronas MSDS](#)

[QAFAC MSDS](#)

[SABIC MSDS](#)

[SCC MSDS](#)

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## References

July 2020



IMO	Report of the 6 <sup>th</sup> CCC Sub-Committee Meeting, CCC 6/14, Annex 1 – Draft MSC Circular: Interim Guidelines for the Safety of Ships using Methyl/Ethyl Alcohol as Fuel *
European Committee for Standardization (CEN)	CWA 17540:2020 Ships and Marine Technology – Specification for Bunkering of Methanol Fuelled Vessels
Lloyd’s Register	Provisional Rules for the Classification of Methanol Fuelled Ships, January 2016
IMO	Recommendations on the Safe Transport of Dangerous Cargoes and Related Activities in Port Areas
Methanol Institute	Methanol Safe Handling and Safe Berthing, Technical Bulletin
IMPCA	Methanol Reference Specifications: 2015
IMPCA	Methanol Sampling Methods: 2014
IMO	Air Pollution and Energy Efficiency Study Series – 5 Methanol as a Marine Fuel

\* Note this draft MSC Circular was to be considered for approval at the MSC 102 meeting May 2020 but which was postponed to a future date which, at the time of writing, is yet to be decided. Until approved by MSC the existing draft of the Interim Guidelines as referenced is subject to potential amendments and therefore is not definitive.



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## **Annex 4**

Methanol Material Safety Data Sheet  
(MSDS) Example

July 2020



## MSDS as Required by SOLAS

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3	<b>Composition/Information on ingredients</b>	<ul style="list-style-type: none"><li>Common name, synonyms, etc</li><li>Impurities and stabilizing additives which are themselves classified and which contribute to the classification of the substances.</li><li>The chemical identity and concentration or concentration ranges of all ingredients which are hazardous within the meaning of GHS and are present above their cut-off levels. Cut-off level for reproductive toxicity, carcinogenicity and category 1 mutagenicity is 0.1%. Cut-off level for all other hazard classes is 1%. See guidelines in annex 2</li></ul>
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6	<b>Accidental release measures</b>	<ul style="list-style-type: none"> <li>• Personal precautions, protective equipment and emergency procedures.</li> <li>• Environmental precautions.</li> <li>• Methods and materials for containment and clean-up.</li> </ul>
7	<b>Handling and storage</b>	<ul style="list-style-type: none"> <li>• Precautions for safe handling</li> <li>• Conditions for safe storage, including any incompatibilities.</li> </ul>
8	<b>Exposure controls/ personal protection</b>	<ul style="list-style-type: none"> <li>• Control parameters (e.g., occupational exposure limit values).</li> <li>• Appropriate technical precautions.</li> <li>• Individual protection measures, such as personal protective equipment.</li> </ul>
9	<b>Physical and chemical properties</b>	<ul style="list-style-type: none"> <li>• See Guidelines in annex 2.</li> </ul>
10	<b>Stability and reactivity</b>	<ul style="list-style-type: none"> <li>• Chemical stability.</li> <li>• Possibility of hazardous reactions.</li> <li>• Conditions to avoid (e.g., static discharge).</li> </ul>
11	<b>Toxicological information</b>	<ul style="list-style-type: none"> <li>• Concise but complete and comprehensible description of the various toxicological (health) effects and the available data used to identify those effects, including: <ul style="list-style-type: none"> <li>○ Information on the likely routes of exposure (inhalation, ingestion, skin and eye contact);</li> <li>○ Symptoms related to the physical, chemical and toxicological characteristics;</li> <li>○ Delayed and immediate effects and also chronic effects from short- and long-term exposure.</li> </ul> </li> <li>• Numerical measures of toxicity (such as acute toxicity estimates).</li> <li>• See Guidelines in annex 2.</li> </ul>
12	<b>Ecological information</b>	<ul style="list-style-type: none"> <li>• Ecotoxicity (aquatic and terrestrial, where available).</li> <li>• Persistence and degradability.</li> <li>• Bioaccumulation potential.</li> <li>• Mobility in soil.</li> <li>• Other adverse effects.</li> <li>• See Guidelines in annex 2.</li> </ul>
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14	<b>Transport information</b>	<ul style="list-style-type: none"> <li>• UN number, where applicable.</li> <li>• UN Proper shipping name, where applicable.</li> <li>• Transport Hazard class(es), where applicable</li> <li>• Special precautions which a user needs to be aware of or needs to comply with in connection with transport (e.g., heating and carriage temperatures).</li> <li>• Note that this product is being carried under the scope of MARPOL Annex I.</li> </ul>
15	<b>Regulatory information</b>	<ul style="list-style-type: none"> <li>• Safety, health and environmental regulations specific for the product in question.</li> </ul>
16	<b>Other information including information on preparation and revision of the MSDS</b>	<ul style="list-style-type: none"> <li>• Version No.</li> <li>• Date of issue.</li> <li>• Issuing source.</li> </ul>

## ANNEX 2

### GUIDELINES FOR THE COMPLETION OF MSDS FOR THE MARPOL ANNEX I TYPE OIL AS CARGO IN BULK AND OIL FUEL

#### 1 Categories of liquids

The following categories subdivide the full scope of substances covered by Annex I of MARPOL 73/78 and set in groups specific products for general identification purposes.

- .1 crude oils;
- .2 fuel and residual oils, including ship's bunkers\*;
- .3 unfinished distillates, hydraulic oils and lubricating oils;
- .4 gas oils, including ship's bunkers\*\*;
- .5 kerosenes;
- .6 naphthas and condensates;
- .7 gasoline blending stocks;
- .8 gasoline and spirits; and
- .9 asphalt solutions.

#### 2 Properties and information

In addition to properties and information specified in annex 1, the following properties and information should be reported:

- .1 for the following provide appropriate hazards identification in section 2, composition/information on ingredients in section 3, and toxicological information in section 11 of the MSDS:
  - .1 Benzene - if present  $\geq 0.1\%$  by weight (even if naturally occurring ingredient of the material);
  - .2 Hydrogen sulphide - if present at any concentration, in liquid and vapour phases, or if possible to accumulate in a tank's vapour space; and
  - .3 Total Sulphur - if present  $\geq 0.5\%$  by weight, identify in section 3 and warn of potential for hydrogen sulphide evolution in sections 2 and 11;

\* Refer to standard ISO 8217:2005, Petroleum products . Fuels (class F) . Specifications of marine fuels, table 2.

\*\* Refer to standard ISO 8217:2005, Petroleum products . Fuels (class F) . Specifications of marine fuels, table 1.

- .2 for physical and chemical properties in section 9 of the MSDS:
  - .1 appearance (physical state, colour, etc.);
  - .2 odour;
  - .3 pour point;
  - .4 boiling range;
  - .5 flashpoint;
  - .6 upper/lower flammability or explosive limits;
  - .7 vapour pressure (Reid vapour pressure (RVP) when appropriate);
  - .8 vapour density;
  - .9 density;
  - .10 auto-ignition temperature; and
  - .11 kinematic viscosity; and
- .3 for ecological information in section 12 of the MSDS: Persistent or non-persistent oil as per the International Oil Pollution Compensation (IOPC) Fund definition\* .

\* International Oil Pollution Compensation (IOPC) Fund definition: "A non-persistent oil is oil, which, at the time of shipment, consists of hydrocarbon fractions, (a) at least 50% of which, by volume, distils at a temperature of 340°C (645°F) and (b) at least 95% of which, by volume, distils at a temperature of 370°C (700°F) when tested by the ASTM Method D-86/78 or any subsequent revision thereof".

## Methanol MSDS Examples – Industry Sources

[Atlantic Methanol MSDS](#)

[Johnson Matthey MSDS](#)

[Methanex MSDS](#)

[MGC MSDS](#)

[MHTL MSDS](#)

[Sipchem MSDS](#)

[OCI MSDS](#)

[Petronas MSDS](#)

[QAFAC MSDS](#)

[SABIC MSDS](#)

[SCC MSDS](#)

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## References

July 2020



IMO	Report of the 6 <sup>th</sup> CCC Sub-Committee Meeting, CCC 6/14, Annex 1 – Draft MSC Circular: Interim Guidelines for the Safety of Ships using Methyl/Ethyl Alcohol as Fuel *
European Committee for Standardization (CEN)	CWA 17540:2020 Ships and Marine Technology – Specification for Bunkering of Methanol Fuelled Vessels
Lloyd’s Register	Provisional Rules for the Classification of Methanol Fuelled Ships, January 2016
IMO	Recommendations on the Safe Transport of Dangerous Cargoes and Related Activities in Port Areas
Methanol Institute	Methanol Safe Handling and Safe Berthing, Technical Bulletin
IMPCA	Methanol Reference Specifications: 2015
IMPCA	Methanol Sampling Methods: 2014
IMO	Air Pollution and Energy Efficiency Study Series – 5 Methanol as a Marine Fuel

\* Note this draft MSC Circular was to be considered for approval at the MSC 102 meeting May 2020 but which was postponed to a future date which, at the time of writing, is yet to be decided. Until approved by MSC the existing draft of the Interim Guidelines as referenced is subject to potential amendments and therefore is not definitive.