

Appendix - I

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Methanol Bunkering Guidelines

Introduction:

This Appendix establishes the safety, technical, operational, and environmental requirements governing Methanol bunkering operations within Indian waters. It applies to all approved Methanol bunkering operations, including **ship-to-ship (STS)**, **truck-to-ship (TTS)**, and **shore-to-ship (pipeline)** bunkering conducted at ports, terminals, jetties, anchorages, offshore installations, and other locations authorised by the Directorate General of Maritime Administration (DGMA) or the Competent Authority.

The provisions of this Appendix are applicable to shipowners, ship managers, Masters, bunker suppliers, bunker receivers, bunker barges, bunker tankers, terminal operators, port authorities, trucking companies, Recognised Organisations, and all other stakeholders involved in the planning, approval, conduct, or oversight of Methanol bunkering operations.

The objective of this Appendix is to establish a uniform and risk-based framework to ensure that Methanol bunkering operations are carried out safely, efficiently, and in an environmentally responsible manner, while facilitating the adoption of Methanol as an alternative marine fuel in accordance with national legislation and internationally accepted standards and best practices.

The provisions of this Appendix shall be read in conjunction with the Merchant Shipping Act, 2025, the rules and regulations made thereunder, relevant circulars and guidelines issued by the Directorate General of Maritime Administration (DGMA), applicable regulations of the concerned Port Authority, the Petroleum Explosives Safety Organisation (PESO), environmental legislation, and any other applicable statutory requirements in force from time to time.

This Appendix has been developed in consultation with the relevant Ministries and Government agencies, Port Authorities, Recognised Organisations, industry stakeholders, bunker suppliers, shipowners, and other interested parties to facilitate the safe, efficient, and sustainable development of Methanol bunkering in India.

References to legislation, regulations, codes, standards, and guidelines contained in this Appendix shall be construed as references to their latest applicable editions, amendments, or revisions, unless otherwise specified. In the event of any inconsistency between the provisions of this Appendix and any applicable statutory instrument, the provisions of the relevant legislation shall prevail.

Nothing contained in this Appendix shall relieve any shipowner, operator, Master, bunker supplier, terminal operator, or any other stakeholder from complying with the applicable requirements of national legislation, international conventions, classification society rules, or any additional conditions imposed by the DGMA, the Competent Authority, or the relevant Port Authority.

2. Applicable Standards and Reference Documents

These Guidelines have been developed with reference to the applicable international conventions, mandatory codes, industry standards, technical guidance documents, and national regulations governing the safe storage, handling, transfer, and bunkering of Methanol as a marine fuel. Compliance with the latest applicable editions, amendments, and revisions of these instruments shall be ensured.

The principal reference documents include, but are not limited to, the following:

1. **SOLAS, 1974**, as amended – International Convention for the Safety of Life at Sea.
2. **MARPOL, 1973/78**, as amended – International Convention for the Prevention of Pollution from Ships.
3. **IGF Code** – International Code of Safety for Ships Using Gases or Other Low-Flashpoint Fuels.
4. **IBC Code** – International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk.
5. **ISM Code** – International Management Code for the Safe Operation of Ships and for Pollution Prevention.
6. **STCW Convention and STCW Code**, as amended – International Convention on Standards of Training, Certification and Watchkeeping for Seafarers.
7. **International Safety Guide for Oil Tankers and Terminals (ISGOTT)**, latest edition.
8. **Oil Companies International Marine Forum (OCIMF)**, Guidance and Recommendations.
9. **Chemical Distribution Institute (CDI)**, Guidance and Safety Standards
10. **INTERTANKO Chemical Tanker Committee (CTC)**, Guidance and Best Practices.
11. **ICS Tanker Safety Guide (Chemicals)**, Handling and Management of Chemical Cargoes.
12. **IAPH Methanol Bunkering Technical Reference and Checklists**, including operational guidance, risk assessment methodologies, and bunker safety checklists.
13. **Class Rules and Guidance Notes** issued by Recognised Organisations for ships using Methanol as fuel and Methanol bunkering vessels.
14. **ISO Standards** applicable to marine fuel transfer systems, hoses, couplings, emergency shutdown systems, risk management, and bunkering operations.
15. **ISO 31000** – Risk Management – Guidelines.
16. **ISO 45001** – Occupational Health and Safety Management Systems.
17. **ISO 14001** – Environmental Management Systems.
18. **IEC 60079 Series** – Explosive Atmospheres.
19. **NFPA 30** – Flammable and Combustible Liquids Code.
20. **NFPA 11, NFPA 15**, and other applicable NFPA standards relating to fire protection for flammable liquid installations.
21. **Bureau of Indian Standards (BIS)** specifications and standards applicable to the storage, transfer, handling, transportation, and safety of Methanol and hazardous chemicals.
22. **Merchant Shipping Act, 2025**, the Rules made thereunder, and all relevant Circulars, Orders, and Guidelines issued by the Directorate General of Maritime Administration (DGMA).
23. Applicable environmental legislation, including the **Environment (Protection) Act, 1986**, the **Water (Prevention and Control of Pollution) Act, 1974**, the **Air (Prevention and Control of Pollution) Act, 1981**, and other statutory requirements issued by the Ministry of Environment, Forest and Climate Change (MoEFCC).

24. Relevant requirements of the concerned Port Authority and any additional conditions imposed by the Competent Authority.
25. Any other equivalent international standards, recognised industry practices, or guidance documents accepted by the Directorate General of Maritime Administration (DGMA), where demonstrated to provide an equivalent or higher level of safety.

3. Definitions

For the purpose of these Guidelines, unless the context otherwise requires, the following terms shall have the meanings assigned to them below:

- a) Methanol:** A light, colourless, flammable, and toxic liquid alcohol having the chemical formula CH_3OH , also known as methyl alcohol or wood alcohol. Methanol is classified as a low-flashpoint fuel and shall comply with the applicable fuel quality specifications.
- b) Bunkering Operation:** The transfer of Methanol as marine fuel from a bunker supply facility to a receiving vessel, including all associated activities such as pre-transfer checks, connection and disconnection of transfer equipment, fuel transfer, purging, draining, inerting (where applicable), and post-transfer verification.
- c) Methanol Bunker Supplier (MBS):** The organisation or entity approved by the Directorate General of Maritime Administration (DGMA) to supply Methanol as marine fuel to receiving vessels, irrespective of the mode of delivery.
- d) Methanol Bunker Receiving Vessel (MBR):** A ship designed, constructed, or approved to receive and use Methanol as fuel during bunkering operations.
- e) Truck-to-Ship (TTS) Bunkering:** The transfer of Methanol from an approved road tanker to a receiving vessel.
- f) Shore-to-Ship (Pipeline) Bunkering:** The transfer of Methanol from a shore-based storage facility or terminal through a fixed or flexible pipeline system to a receiving vessel.
- g) Ship-to-Ship (STS) Bunkering:** The transfer of Methanol from a bunker vessel, bunker barge, or another approved bunker supply ship to a receiving vessel.
- h) Safety Zone:** A predefined area established around the bunkering operation within which access is controlled and ignition sources, non-essential personnel, and incompatible activities are restricted to minimise risks arising from the accidental release, fire, or other hazardous incidents involving Methanol.
- i) Competent Authority:** The Directorate General of Maritime Administration (DGMA), the relevant Port Authority, or any other authority authorised under applicable legislation to regulate or oversee Methanol bunkering operations.

j) Approved: Approved by the Directorate General of Maritime Administration (DGMA) and, where applicable, by the relevant Port Authority, Petroleum and Natural Gas Regulatory Board (PNGRB), Petroleum and Explosives Safety Organisation (PESO), or any other Competent Authority.

k) STCW Convention: The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, as amended.

l) Indian Waters: Waters under the sovereignty, sovereign rights, or jurisdiction of India, as defined under the applicable maritime legislation.

m) PESO: Petroleum and Explosives Safety Organisation, Government of India.

n) Simultaneous Operations (SIMOPS): The conduct of bunkering operations concurrently with one or more other authorised shipboard, terminal, or port activities, subject to a documented risk assessment and the approval of the Competent Authority.

o) Person in Charge (PIC): The competent person designated by the bunker supplier or the receiving vessel who has overall responsibility and authority for the safe conduct, coordination, and supervision of the bunkering operation on behalf of the respective organisation.

p) Emergency Shutdown (ESD): A system designed to automatically or manually stop the transfer of Methanol and isolate the transfer system in the event of an emergency or unsafe operating condition.

q) Recognised Organisation (RO): An organisation authorised by the Directorate General of Maritime Administration (DGMA) to carry out statutory surveys, audits, inspections, and certification on its behalf.

r) Hazardous Area: An area in which an explosive atmosphere may occur due to the presence of flammable vapours released during Methanol storage, handling, or bunkering operations, requiring the use of suitably certified equipment and controls.

s) Risk Assessment: A systematic process for identifying hazards, evaluating associated risks, and determining appropriate control measures to ensure that Methanol bunkering operations are conducted safely.

4. Application

4.1 These Guidelines shall apply to all Methanol bunkering operations conducted within Indian waters, including operations at ports, terminals, jetties, anchorages, offshore installations, and any other locations authorised by the Directorate General of Maritime Administration (DGMA) or the Competent Authority.

4.2 These Guidelines shall apply to, but are not limited to, the following entities and vessels:

(a) Methanol bunker supply vessels, bunker barges, and bunker tankers;

(b) Methanol bunker receiving vessels, including Indian and foreign-flag vessels receiving Methanol as marine fuel within Indian waters;

- (c) Methanol bunker suppliers registered or approved by the DGMA;
- (d) Road tanker operators and trucking companies engaged in Truck-to-Ship (TTS) Methanol bunkering operations;
- (e) Terminal operators and facility operators engaged in Shore-to-Ship (Pipeline) Methanol bunkering operations;
- (f) Port Authorities and operators responsible for the regulation, coordination, and oversight of Methanol bunkering activities;
- (g) Shipowners, ship managers, Masters, officers, and crew involved in the planning or execution of Methanol bunkering operations;
- (h) Recognised Organisations authorised by the DGMA to conduct audits, inspections, surveys, or certification related to Methanol bunkering; and
- (i) Any other person, organisation, contractor, or service provider whose activities may affect the safety, security, or environmental protection of Methanol bunkering operations.

4.3 Compliance with these Guidelines shall not exempt any person or organisation from complying with the applicable provisions of the Merchant Shipping Act, 2025, the rules made thereunder, relevant Port Authority regulations, PESO requirements, environmental legislation, or any other applicable statutory requirements.

5. Bunker Supplier Registration Process

5.1 Approval from Directorate General of Maritime Administration:

- i. The Directorate General of Shipping (DGS) issued Merchant Shipping Notice (MSN) No. 3 of 2014, which prescribes the procedure for registration of bunker suppliers. For registration as a bunker supplier authorized to supply methanol as marine fuel, the applicant shall, in addition to the requirements specified in the MSN, establish a Quality Management System (QMS) and obtain ISO 9001:2015 certification for the scope of "**Methanol Bunkering**" from a certification body accredited by the National Accreditation Board for Certification Bodies (NABCB). Existing bunker suppliers, as well as new applicants seeking registration with the Directorate General of Maritime Administration (DGMA) for the supply of methanol bunkers, shall comply with the procedures prescribed in the aforesaid MSN.
- ii. The applicant shall conduct a practical demonstration of methanol bunkering operations. Based on the application and supporting documents submitted, the DGMA may authorize the Indian Register of Shipping (IRS) to witness the demonstration and submit a verification report. Upon receipt of a satisfactory verification report with the recommendation of the IRS, the DGMA may issue an **Interim Bunker Supplier Registration Certificate**, which shall be valid for a period of six months.
- iii. The bunker supplier shall apply to the DGMA for an Initial Audit at least thirty (30) days before the expiry of the Interim Bunker Supplier Registration Certificate. The detailed procedure for the Initial Audit

shall be as prescribed in Merchant Shipping Notice No. 3 of 2014. The DGMA may authorize the IRS to conduct the Initial Audit, which shall, inter alia, verify the following:

- a) Compliance with the requirements applicable to methanol bunkering operations carried out after the issuance of the Interim Bunker Supplier Registration Certificate;
- b) Documentary evidence demonstrating that the bunker supplier has successfully carried out methanol bunkering operations for at least two vessels during the validity period of the Interim Certificate; and
- c) Incorporation and implementation of all applicable amendments, circulars, notifications, and other statutory requirements issued by the DGMA or any other competent authority.

iv. Based on the recommendation of the IRS following a satisfactory Initial Audit, the DGMA may issue a **Bunker Supplier Registration Certificate** valid for a period of five (5) years.

v. During the validity of the Bunker Supplier Registration Certificate, the bunker supplier shall undergo Annual Surveillance Audits in accordance with Merchant Shipping Notice No. 3 of 2014. In addition, the bunker supplier registered for methanol bunkering shall provide a practical demonstration of its methanol bunkering facilities and operations during every alternate Annual Surveillance Audit. Failure to satisfactorily demonstrate the facility and operations may result in the DGMA initiating appropriate action, including suspension or withdrawal of the Bunker Supplier Registration Certificate.

5.2 Role of PESO:

The Licensed Bunker Supplier (LBS) shall obtain and maintain all necessary approvals, licences, authorisations and clearances from the **Petroleum and Explosives Safety Organisation (PESO)**, as applicable, for shore-based transportation, storage, handling and transfer of Methanol in connection with bunkering operations. Such approvals shall cover, as applicable, Methanol tank trucks, storage tanks and facilities, pipelines, transfer systems, loading/unloading arrangements and other associated shore-based infrastructure.

The LBS shall ensure that all such facilities, equipment and arrangements comply with the applicable requirements prescribed by PESO and other competent authorities and that the relevant approvals remain valid throughout the period of operation.

Where there is any substantive modification, alteration, expansion or change in the Methanol bunkering facilities, infrastructure, equipment, capacity, transportation arrangements or operating procedures that may affect the safety or risk profile of the facility, the LBS shall obtain revised or fresh approvals from PESO and/or other competent authorities, as applicable, prior to implementing such changes.

6. Regulatory Requirements:

6.1 The Methanol Bunker Supplier (LBS) shall plan and execute Methanol bunkering operations in accordance with the following international standards, codes, guidelines, and best practices, as applicable to the mode of delivery (ship-to-ship, truck-to-ship, or shore-to-ship):

- i. IMO Interim Guidelines for the Safety of Ships Using Methyl/Ethyl Alcohol as Fuel (MSC.1/Circ.1621), as amended, for the design, operation, and bunkering of Methanol-fuelled ships.
- ii. International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IBC Code), as applicable to the carriage and handling of Methanol as a hazardous chemical.
- iii. ISGOTT (International Safety Guide for Oil Tankers and Terminals), including guidance on:
 - a) Ship/shore safety checklists and communications;
 - b) Cargo transfer procedures and operational safety;
 - c) Hazard identification, risk assessment, and emergency response; and
 - d) Emergency Shutdown (ESD) arrangements and linked ship/shore systems, where applicable.
- iv. NFPA 30 – Flammable and Combustible Liquids Code, and other applicable NFPA standards governing the storage, handling, transfer, and fire protection requirements for flammable liquids.
- v. ISO 31000 – Risk Management – Guidelines, and ISO 45001 – Occupational Health and Safety Management Systems, where applicable, for the management of operational and occupational safety risks associated with Methanol bunkering.
- vi. Applicable Indian statutory requirements, the Petroleum and Explosives Safety Organisation (PESO), the Directorate General of Maritime Administration (DGMA), the concerned Port Authority, and any other competent authority.
- vii. Any other internationally or nationally recognized standards, codes, guidelines, or industry best practices, including those published by the Oil Companies International Marine Forum (OCIMF), Chemical Distribution Institute (CDI), INTERTANKO Chemical Tanker Committee (CTC), ICS Tanker Safety Guide (Chemicals), the Methanol Institute, the International Organization for Standardization (ISO), and the International Maritime Organization (IMO), PESO, or any other competent authority.

6.2 The LBS shall ensure that valid insurance coverage is maintained for all Methanol bunkering operations, including transportation, storage, handling, and transfer of Methanol. The insurance shall provide adequate coverage, as required by the concerned Port Authority, Flag Administration, or other competent authority, for liabilities arising from:

- i. Personal injury or loss of life;
- ii. Loss of or damage to property, vessels, cargo, and bunkering equipment;
- iii. Marine and environmental pollution, including costs associated with containment, clean-up, remediation, and restoration;
- iv. Fire, explosion, and other operational hazards associated with Methanol handling; and
- v. Any other liabilities arising from Methanol bunkering operations.

6.3 The LBS shall ensure that all hoses, loading arms, transfer pipelines, couplings, and associated equipment used for Methanol bunkering are designed, inspected, tested, and maintained in accordance with the manufacturer's recommendations, applicable international standards, and the requirements of the competent authority. Pressure testing of flexible transfer hoses shall be carried out at the intervals specified by the manufacturer and, in any case, at intervals not exceeding twelve (12) months, unless otherwise specified by the manufacturer or the competent authority. Such testing shall be witnessed and certified by a

competent person having appropriate technical qualifications and experience in the inspection and pressure testing of flammable liquid transfer systems. Records of all inspections, tests, maintenance, and certifications shall be maintained by the LBS and made available for inspection upon request.

6.4 The LBS shall ensure that a valid Safety Data Sheet (SDS), prepared in accordance with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) and applicable national regulations, is available for each consignment of Methanol supplied. The SDS shall be made readily accessible to all personnel involved in the bunkering operation and to the Methanol Bunker Receiving Vessel (LBR) prior to the commencement of bunkering.

6.5 The Person-in-Charge (PIC) nominated by the LBS and the Person-in-Charge nominated by the Methanol Bunker Receiving Vessel (LBR) shall be jointly responsible for the safe planning, coordination, execution, monitoring, and completion of the Methanol bunkering operation. Both PICs shall ensure compliance with the approved bunkering plan, applicable statutory requirements, and established safety procedures throughout the operation.

6.6 Prior to the commencement of bunkering, the LBS and the LBR shall jointly review and agree upon the bunkering operation in accordance with an approved Methanol Bunkering Management Plan, including the bunkering procedure, communication protocol, emergency response arrangements, risk control measures, transfer rates, emergency shutdown (ESD) arrangements, and the completion of the applicable ship/shore safety checklist.

6.7 The LBS and the LBR shall each nominate a competent Person-in-Charge (PIC) for the bunkering operation. In addition, the concerned Port Authority or Terminal Operator, as applicable, shall designate a Single Point of Contact (SPOC) to facilitate coordination among the LBS, LBR, emergency response agencies, and other stakeholders, and to address operational issues or emergencies arising during the bunkering operation.

6.8 The LBS shall establish and maintain an effective Quality Management System (QMS) to ensure custody control and product integrity of Methanol throughout the entire supply chain, including receipt, storage, transportation, transfer, and delivery to the receiving vessel. The QMS shall provide for traceability, quantity and quality assurance, contamination prevention, and proper documentation at every stage of the supply chain. Where any process affecting product quality or operational safety, including terminal operations, storage, transportation by bunker vessel or tank truck, or transfer operations, is outsourced, such processes shall be identified within the QMS. The LBS shall remain fully responsible for ensuring that outsourced activities are effectively controlled and carried out in compliance with these Guidelines and all applicable statutory requirements.

6.9 The LBS shall establish, implement, and maintain documented procedures for the identification, collection, indexing, storage, protection, retrieval, retention, and disposal of all records and documentary evidence generated in connection with Methanol bunkering operations. Such records shall include, but not be limited to, bunker delivery documentation, Safety Data Sheets (SDS), certificates of quality and quantity, transfer checklists, custody transfer records, inspection and maintenance records, hose testing certificates, training records, incident and near-miss reports, and any other records required under these Guidelines or by the competent authority. All records shall be retained for a minimum period of five (5) years, or such longer period as may be prescribed by the Directorate General of Maritime Administration (DGMA), the

concerned Port Authority, or any other competent authority, and shall be made available for inspection upon request.

6.10 Documentation Requirements

To demonstrate the capability to systematically plan and safely execute Methanol bunkering operations, the Licensed Methanol Bunker Supplier (LBS) shall submit the following documents, as applicable to the mode of delivery, to the concerned Port Authority and other competent authorities, at least 24 hours prior to the commencement of each bunkering operation, unless otherwise specified by the Port Authority.

6.10.1. Bunker Supply Vessel Documentation (Applicable for Ship-to-Ship Bunkering)

- a) Valid Certificate of Registry.
- b) Valid International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk, or other applicable statutory certificate authorizing the carriage of Methanol.
- c) Valid statutory certificates required under the IBC Code, SOLAS Convention, MARPOL Convention, ISM Code, STCW Convention, and other applicable IMO instruments.
- d) Valid Class Certificate issued by a Recognized Organization (RO) or Classification Society authorized by the Flag Administration.
- e) Documentary evidence demonstrating compliance with the IMO Interim Guidelines for the Safety of Ships Using Methyl/Ethyl Alcohol as Fuel (MSC.1/Circ.1621), where applicable.

6.10.2 Road Tanker Documentation (Applicable for Truck-to-Ship Bunkering)

- a) Valid licences and approvals issued by the Petroleum and Explosives Safety Organisation (PESO) for the transportation of Methanol by road tanker.
- b) Valid registration, fitness, and statutory certificates for the road tanker issued by the competent authority.
- c) Valid certificates demonstrating compliance with applicable Bureau of Indian Standards (BIS) specifications and other statutory requirements governing the transportation of hazardous chemicals by road.
- d) Valid driver licence and records of training and competency for the transportation and handling of Methanol and other hazardous chemicals.
- e) Safety Data Sheet (SDS), Transport Emergency (TREM) Card, and emergency response information accompanying each road tanker.

6.10.3 Terminal Operator Documentation (Applicable for Shore-to-Ship Bunkering)

- a) Valid approvals, licences, and authorizations issued by PESO, and other competent authorities for the establishment and operation of the Methanol terminal, storage facilities, loading arms, pipelines, and associated infrastructure, as applicable.
- b) Valid certificates demonstrating compliance with applicable national regulations, recognized engineering standards, and relevant BIS specifications governing the design, operation, inspection, and maintenance of Methanol storage, transfer systems, and pipeline infrastructure.
- c) Approved operating procedures, emergency response plan, fire protection plan, inspection and maintenance records, and integrity management programme for the terminal and associated transfer facilities.

6.11 Safety Requirements

The objective of these requirements is to prevent fire, explosion, toxic exposure, pollution and other accidents during methanol bunkering and to ensure that bunkering operations are carried out safely and in accordance with applicable statutory requirements, international conventions, recognised standards and the vessel's Safety Management System.

6.12 Bunkering Station Requirements

- (a) The bunkering station shall be located in the open air or in a mechanically ventilated space and shall be arranged to minimise the possibility of methanol vapour accumulation reaching accommodation spaces, machinery spaces, enclosed spaces or other potential sources of ignition.
- (b) The bunkering station shall be suitably arranged to prevent accidental release of methanol from spreading to adjacent areas and shall provide safe access and escape routes for personnel.

6.13 Fire Protection and Fire fighting

- (a) The bunkering station on both the receiving vessel and the bunker tanker/barge shall be provided with suitable fixed or portable firefighting arrangements capable of effectively extinguishing methanol fires. Where foam is used, it shall be of a type demonstrated to be suitable for alcohol-based fuels. Dry chemical powder and/or other suitable extinguishing media shall be available as supplementary means, as required by the applicable fire-safety requirements and risk assessment.
- (b) At least one portable dry chemical powder extinguisher, or equivalent extinguishing appliance suitable for methanol fires, shall be readily available at the bunkering station.
- (c) A fire hose connected to the fire main and ready for immediate use shall be provided at the bunkering station, unless an equivalent fixed water-spray or other approved fire-extinguishing system is provided.
- (d) Fire detection and alarm arrangements shall be provided for spaces containing methanol fuel system components, in accordance with the applicable requirements of the **FSS Code**, **IGF Code**, and the vessel's approved fire-control plan. Detection arrangements shall take into account the characteristics of methanol fires, including the possibility of a low-visibility flame.

6.14 Spill Containment and Pollution Response

(a) The bunkering manifold on the bunker tanker/barge and, where applicable, the receiving vessel shall be fitted with a suitable drip tray or spill pan capable of containing leakage from the transfer connection. Where provided, drainage shall lead to an appropriate holding or containment tank and shall not discharge directly overboard.

(b) Suitable spill-response equipment shall be readily available at the bunkering station, including scupper plugs, suitable absorbent materials, portable pumps, absorbent pads and booms, methanol-resistant protective clothing, non-sparking shovels and scoops, mops, suitable containers and other equipment identified by the shipboard risk assessment and emergency response procedures.

(c) A gutter plate, coaming or equivalent containment arrangement shall be provided to prevent any accidental methanol spill from spreading beyond the bunkering area.

(d) Spill response shall be carried out in accordance with a documented shipboard emergency response procedure specifically addressing methanol releases and shall be integrated, where applicable, with the vessel's existing pollution emergency plan.

(e) Any significant methanol spill shall be reported to and dealt with in coordination with the competent authorities in accordance with the applicable pollution-response requirements. For spills occurring in Indian waters, the applicable requirements of the Indian Coast Guard, port authority and State Pollution Control Board shall be followed.

6.15 Emergency Shutdown System and Ship-Shore/Ship-to-Ship Link

(a) The methanol transfer system shall be connected to an Emergency Shutdown (ESD) system on both the delivering and receiving sides.

(b) For ship-to-ship bunkering, the ESD systems of the bunker tanker/barge and receiving vessel shall be interconnected through a suitable ship-to-ship link or equivalent approved communication system to ensure coordinated shutdown upon activation by either party. For shore-to-ship transfer, an equivalent ship-shore link shall be provided.

(c) The ESD system shall be capable of automatic activation, as appropriate, upon detection of fire, methanol leakage or vapour concentration above the predetermined alarm level, receiving-tank high-level/overflow condition, abnormal transfer pressure, failure of critical transfer equipment or other conditions identified by the risk assessment. The system shall also permit manual activation from designated locations by either party.

(d) The bunker tanker/barge and receiving vessel shall be provided with an Emergency Release System (ERS), where required by the approved design and risk assessment, incorporating suitable Emergency Release Couplings (ERCs) in the liquid and, where applicable, vapour-return connections. The system shall be designed to separate safely at a predetermined load and to minimise release of methanol following disconnection.

(e) Bunkering shall not commence, or shall be suspended if already in progress, unless at least two independent and effective means of communication are continuously available between the delivering and receiving parties.

(f) The ERS shall be located and arranged so as to permit safe operation and emergency disconnection, including in the event that the receiving vessel is required to make an emergency departure. Where the ESD systems are interconnected, the shutdown sequence shall be agreed between the parties and documented in the pre-bunkering checklist.

An ESD function test shall be carried out before commencement of each bunkering operation, unless an approved equivalent testing arrangement is provided. The agreed ESD sequence and test results shall be recorded.

ESD activation criteria shall include, as applicable:

- receiving tank high-level/overflow alarm;
- excessive tank pressure;
- methanol liquid or vapour leakage;
- fire detection;
- loss of required ventilation;
- abnormal transfer pressure or flow;
- excessive movement of the vessels;
- failure of the transfer hose, arm or associated equipment;
- manual activation by either party; and
- loss of essential power or other critical system failure.

(g) All personnel engaged in methanol bunkering shall wear suitable PPE in accordance with the applicable statutory requirements, recognised industry standards, Safety Management System and risk assessment. PPE shall be appropriate to the task and the hazardous, safety or monitoring zone in which the personnel are working.

(h) Emergency showers and eyewash stations shall be readily accessible from the bunkering station. The vessel/facility's emergency and medical response procedures shall include specific first-aid measures for methanol exposure through ingestion, inhalation, skin contact and eye contact, based on the applicable Safety Data Sheet (SDS).

6.16 Methanol Vapour and Liquid Leak Detection

(a) Fixed methanol vapour detection systems shall be provided at the bunkering station and at other locations identified by the risk assessment as having the potential for accumulation of methanol vapour.

(b) The detection system shall provide an alarm at a concentration sufficiently below the Lower Explosive Limit (LEL) of methanol in air to provide adequate time for corrective action and safe shutdown. The alarm set points shall be established in accordance with the applicable statutory requirements, approved design and risk assessment.

(c) Personnel directly involved in methanol bunkering shall carry suitable personal gas-detection equipment capable of detecting methanol vapour, where required by the risk assessment. Occupational exposure limits shall be controlled in accordance with applicable occupational-health requirements and the current SDS for the methanol supplied.

(d) Liquid leakage at the transfer interface shall be continuously monitored by personnel. CCTV or other remote monitoring arrangements should be provided where practicable to enhance surveillance of the manifold and transfer connection.

(e) Detection of methanol leakage or vapour concentration above the specified alarm level shall initiate the actions specified in the bunkering emergency procedure, including, where applicable, activation of the ESD system, cessation of transfer, isolation of the source and evacuation of personnel from the affected area.

6.17 Reports of Maritime Traffic Impact Assessment (MTIA) and Quantitative Risk Assessment (QRA)

(a) The Licensed Methanol Bunker Supplier (LBS), in consultation with the concerned Port Authority and Terminal Operator, as applicable, shall prepare a Maritime Traffic Impact Assessment (MTIA) and a Quantitative Risk Assessment (QRA) prior to the commencement of Methanol bunkering operations at a new location or whenever significant changes are made to the bunkering facilities, operational procedures, traffic patterns, or other risk parameters. The MTIA and QRA shall be periodically reviewed and updated, as necessary, based on operational experience, incident investigations, technological developments, and changes to the assumptions or input parameters. The assessments shall identify and evaluate all risks to personnel, vessels, port infrastructure, property, and the marine environment associated with the proposed Methanol bunkering operation and prescribe appropriate risk mitigation measures.

(b) The QRA shall determine the appropriate safety distances, hazard exclusion zones, and operational control measures based on credible accident scenarios associated with Methanol bunkering. The assessment shall consider, as applicable, Methanol leakage or spills, pool fires, jet fires, flash fires, vapour cloud formation, vapour cloud explosions (where credible), toxic vapour exposure, environmental contamination, and escalation to adjacent facilities or vessels. Site-specific environmental and meteorological conditions, vessel traffic, proximity to occupied areas, and emergency response capabilities shall be taken into account. The results of the consequence analysis, including fire effects, thermal radiation, explosion overpressure (where applicable), toxic exposure, and environmental impacts, shall be used to establish the required safety zones and operational restrictions.

(c) The MTIA and QRA shall be carried out in accordance with internationally recognized risk assessment methodologies and the applicable guidance contained in the IMO Interim Guidelines for the Safety of Ships Using Methyl/Ethyl Alcohol as Fuel (MSC.1/Circ.1621), the IBC Code, ISGOTT, and other relevant guidance issued by the Directorate General of Maritime Administration (DGMA), the Petroleum and Explosives Safety Organisation (PESO), the concerned Port Authority, or other competent authorities. The studies shall be undertaken by competent persons or organizations having demonstrable expertise in port operations, hazardous chemical handling, and quantitative risk assessment.

6.18 Methanol Bunkering Management Plan

The Licensed Methanol Bunker Supplier (LBS) shall prepare, implement, and maintain a comprehensive Methanol Bunkering Management Plan (MBMP) in consultation with the concerned Port Authority, Terminal Operator (where applicable), and other stakeholders. The MBMP shall establish the procedures, responsibilities, risk control measures, and emergency arrangements for the safe planning and execution of Methanol bunkering operations during the pre-bunkering, bunkering, and post-bunkering phases. The plan shall be developed in accordance with the IMO Interim Guidelines for the Safety of Ships Using Methyl/Ethyl Alcohol as Fuel (MSC.1/Circ.1621), the IBC Code, ISGOTT, applicable Classification Society requirements, and the applicable requirements of DGMA, PESO, and the concerned Port Authority.

The MBMP shall, as a minimum, include the following:

- a) A description of the proposed bunkering operation, including the mode of delivery (ship-to-ship, truck-to-ship, or shore-to-ship), the proposed bunkering location, equipment to be used, operational procedures, and the defined operational envelope, including limiting weather, sea state, current, visibility, and wind conditions. The plan shall also specify the conditions under which bunkering operations shall be suspended or terminated, including cyclones, severe weather, lightning, earthquakes, or other natural or operational emergencies.
- b) The quantity, grade, specification, and quality requirements of the Methanol to be supplied, together with the applicable fuel quality verification procedures.
- c) A comprehensive risk assessment identifying hazards associated with Methanol bunkering, together with preventive, mitigation, and emergency response measures.
- d) Detailed operating procedures covering pre-transfer inspections, ship/shore safety checks, communication protocols, transfer procedures, emergency shutdown (ESD), completion of transfer, draining, purging (where applicable), disconnection, and post-transfer verification.
- e) A compatibility assessment procedure and checklist to verify the compatibility of the bunker supply facility and the receiving vessel, including transfer equipment, connections, communication systems, transfer rates, emergency shutdown arrangements, and operational limitations.
- f) Valid inspection, testing, calibration, and certification records for all bunkering equipment, including transfer hoses or loading arms, pumps, valves, flow meters, emergency shutdown systems, leak detection systems, gas and vapour detection systems, fire detection and alarm systems, communication equipment, pressure and temperature monitoring instruments, and other safety-critical equipment, as applicable to the mode of delivery.
- g) Training, familiarization, competency requirements, emergency drills, and records of qualifications and certifications for all personnel involved in Methanol bunkering operations.
- h) Procedures governing the selection, availability, inspection, maintenance, and mandatory use of appropriate Personal Protective Equipment (PPE) suitable for Methanol handling, including chemical-

resistant clothing, gloves, eye and face protection, respiratory protection where required, and emergency decontamination arrangements.

i) Procedures to ensure the availability and operational readiness of intrinsically safe electrical equipment and lighting, explosion-protected communication devices, and other hazardous-area equipment within the designated bunkering safety zone.

j) A comprehensive emergency response and contingency plan addressing Methanol leakage, spills, toxic exposure, fire, explosion, medical emergencies, environmental pollution, equipment failure, emergency shutdown, evacuation, and coordination with the Port Authority, terminal operator, emergency services, and other relevant agencies.

k) Procedures for documenting all bunkering activities, including pre-bunkering meetings, safety checklists, permits to work, transfer records, custody transfer documentation, quantity and quality records, incidents, near misses, emergency drills, and simultaneous operations (SIMOPS) conducted within or adjacent to the designated bunkering area.

l) Procedures for post-bunkering inspection, reconciliation of transferred quantities, management of residual Methanol, disposal of waste generated during bunkering, and reporting of any abnormal events, non-conformities, or incidents.

6.19 Bunkering Compatibility Checklist / Report

The Licensed Methanol Bunker Supplier (LBS) shall prepare and submit a Methanol Bunkering Compatibility Checklist/Report confirming the compatibility of the bunkering systems, equipment, procedures, communication, and emergency arrangements between the LBS and the Methanol Bunker Receiving Vessel (LBR), or the receiving facility, as applicable to the mode of delivery (ship-to-ship, truck-to-ship, or shore-to-ship).

The Checklist/Report shall, as a minimum, confirm:

- a) Compatibility of transfer equipment, connections, and operating parameters.
- b) Availability and functionality of communication and emergency shutdown (ESD), where applicable.
- c) Agreement on the quantity and specification of Methanol to be supplied.
- d) Completion of the pre-bunkering safety checks and compliance with applicable statutory and Port Authority requirements.
- e) Confirmation that designated Persons-in-Charge (PICs) have conducted the pre-transfer meeting and agreed on the bunkering and emergency procedures.

6.20 Joint Bunkering Plan

The LBS and the Methanol Bunker Receiving Vessel (LBR) shall jointly prepare and endorse a Joint Bunkering Plan prior to commencement of bunkering. The Plan shall define the agreed operational

procedures, responsibilities, communication protocols, emergency response arrangements, and safety measures applicable to the selected mode of delivery (ship-to-ship, truck-to-ship, or shore-to-ship), including connection, transfer, and disconnection procedures.

6.21. Operational Safety Measures

During Methanol bunkering, the LBS and LBR shall continuously monitor transfer operations to ensure safe operating pressures, transfer rates, tank levels, and system integrity. Appropriate measures shall be implemented to prevent overfilling, leakage, spills, vapour release, fire, and explosion hazards. The Joint Bunkering Plan shall include procedures for vapour management (where applicable), emergency shutdown (ESD), spill containment, and immediate response to abnormal operating conditions.

6.22 Truck-to-Ship Bunkering

For truck-to-ship bunkering, the LBS shall submit a Traffic Management Plan indicating the designated route for Methanol tank trucks, parking and staging arrangements, vehicle movement controls, emergency access routes, and safety measures for truck manoeuvring within the port or terminal.

6.23 Shore-to-Ship Bunkering

For shore-to-ship bunkering, the Terminal Operator shall confirm that the Methanol storage tanks, transfer pipelines, loading arms or hoses, emergency shutdown systems, fire protection systems, and associated safety equipment have been inspected, tested, and are fully operational prior to commencement of bunkering.

6.24 Operational Requirements

(a) Safety Zone:

A safety zone shall be established around the Methanol bunkering operation to control ignition sources and restrict unauthorized access. The extent of the safety zone shall be determined based on the approved Quantitative Risk Assessment (QRA) and agreed upon by the LBS, the Methanol Bunker Receiving Vessel (LBR), and the concerned Port Authority. The size and configuration of the safety zone shall be appropriate to the mode of delivery (ship-to-ship, truck-to-ship, or shore-to-ship) and the identified hazardous areas. If any unauthorized vessel, vehicle, or person enters the safety zone, the bunkering operation shall be suspended until the safety of the operation is restored.

(b) Security Zone:

The LBS and the LBR shall establish and maintain an appropriate security zone around the bunkering operation in accordance with the ISPS Code, Port Authority requirements, and the approved security arrangements. The security zone shall be monitored throughout the operation to prevent unauthorized access and activities that could compromise safety or security. The security zone shall normally extend beyond the safety zone and shall be communicated to all relevant stakeholders, including adjacent terminals, vessels, and the Port Authority, prior to the commencement of bunkering.

(c) Vessel Traffic Services (VTS):

Where Vessel Traffic Services (VTS) are in operation, the bunker supply vessel shall participate in the local VTS and maintain continuous watch on the designated VHF channels throughout the bunkering operation, in accordance with the requirements of the Port Authority.

(d) Traffic Management (Truck-to-Ship):

For truck-to-ship bunkering, the LBS shall implement an approved Traffic Management Plan specifying designated routes, vehicle movement controls, speed limits, parking and staging areas, emergency access routes, and any escort requirements, as prescribed by the concerned Port Authority.

(e) Monitoring of Methanol Transfer

For ship-to-ship and shore-to-ship bunkering, the LBS and the LBR shall continuously monitor the transfer operation, including transfer pressure, flow rate, tank levels, and the integrity of the transfer system. Emergency Shutdown (ESD) arrangements, where provided, shall be operational and tested prior to commencement of bunkering.

(f) Bunkering Operations

The LBS shall conduct bunkering operations in accordance with the approved Methanol Bunkering Management Plan and the Joint Bunkering Plan. A pre-bunkering safety checklist shall be completed within 4 hours prior to commencement of bunkering and made available for inspection.

(g) Pre-Transfer Agreement

The following shall be agreed upon and recorded by the LBS and the LBR prior to commencement of bunkering:

- a) Quantity and specification of Methanol to be transferred.
- b) Maximum transfer pressure.
- c) Maximum transfer rate.

(f) Simultaneous Operations (SIMOPS)

Simultaneous operations shall only be permitted where supported by a documented risk assessment, approved by the Port Authority, and specified in the Joint Bunkering Plan. Operations that may introduce ignition sources or otherwise compromise the safety of Methanol bunkering shall not be undertaken during the transfer.

(g) Simultaneous Bunkering

Simultaneous bunkering of conventional fuels or other hazardous substances with Methanol shall not be permitted unless specifically authorized by the Port Authority based on a documented risk assessment and appropriate risk control measures.

(h) Familiarization

Prior to commencement of bunkering, the LBR shall be familiar with the operating procedures, communication protocols, emergency shutdown arrangements, and emergency response procedures established by the LBS.

(i) Electrical Equipment

Electrical equipment and lighting located within the designated hazardous area shall be suitable for hazardous locations and shall comply with the applicable explosion-protection requirements. Non-certified electrical equipment shall not be energized within the hazardous area during bunkering.

(j) Spark-Producing Equipment

Equipment or activities capable of generating sparks, excessive heat, or ignition sources, including hot work, shall not be permitted within the designated safety zone during Methanol bunkering unless specifically authorized under an approved Permit-to-Work system.

(k) Personnel Awareness

Appropriate warning notices shall be displayed and all personnel, including crew, terminal personnel, contractors, and visitors, shall be informed that Methanol bunkering is in progress. Access to the designated safety zone shall be restricted to authorized personnel only.

(l) Emergency Communication

Where an emergency affecting the LBS facilities arises, the LBS shall immediately notify the LBR, the Port Authority, and other relevant emergency response agencies through the agreed communication channels.

(m) Emergency Response

In the event of an emergency requiring suspension or termination of bunkering, the Master of the vessel, Harbour Master, or other competent authority shall determine the appropriate operational response, including movement or evacuation of the vessel, where necessary.

(n) Pre-Bunkering Verification

Prior to each Methanol bunkering operation, the following shall be verified and recorded:

- i) Communication systems and Emergency Shutdown (ESD) arrangements, where applicable.
- ii) Operational readiness of transfer valves, pumps, hoses/loading arms, and associated equipment.
- iii) Availability of emergency response services, including fire-fighting and medical assistance.
- iv) Visual inspection of transfer manifolds, hoses/loading arms, couplings, valves, piping, spill containment arrangements, and associated equipment.

v) Availability and readiness of spill response equipment, fire-fighting systems, appropriate extinguishing media (including alcohol-resistant foam), emergency eyewash and safety shower facilities, drip trays, and suitable absorbent materials.

(o). Technical Requirements

All bunkering systems, transfer equipment, instrumentation, safety devices, and associated installations shall be designed, operated, inspected, tested, and maintained in accordance with the manufacturer's recommendations, applicable Classification Society Rules, relevant IMO instruments, recognized international standards, and the requirements of DGMA, PNGRB, PESO, and the concerned Port Authority.

(p) Notifications

The LBS shall comply with the following notification requirements:

i) **Pre-Notification:** Notify the concerned Port Authority at least 24 hours prior to the planned bunkering operation, providing details of the location, time, delivery mode, quantity of Methanol, and emergency contact information.

ii) **Operational Notifications:** Notify the Port Authority of the commencement, suspension (if any), and completion of the bunkering operation through the prescribed communication channel.

iii) **Incident Reporting:** Immediately report any accident, spill, fire, equipment failure, pollution incident, injury, or other abnormal occurrence to the Port Authority and other competent authorities in accordance with applicable statutory reporting requirements.

7. Bunker Delivery Note (BDN)

The Licensed Methanol Bunker Supplier (LBS) shall issue a Bunker Delivery Note (BDN) for every consignment of Methanol supplied to a receiving vessel. The BDN shall comply with applicable statutory requirements and include the supplier's and receiving vessel's details, date and place of delivery, quantity, and specification of Methanol supplied. A copy of each BDN shall be retained by the LBS for a minimum period of three (3) years and made available for inspection upon request.

8. Requirements for Crew Members and Personnel

a) **Ship-to-Ship:** Personnel of the LBS and LBR engaged in Methanol bunkering shall be trained and competent in accordance with the STCW Convention and Code, MSC.1/Circ.1621, the vessel's Safety Management System (SMS), and other applicable statutory requirements.

b) **Truck-to-Ship:** Drivers transporting Methanol shall possess valid licences and training in accordance with PESO, the Central Motor Vehicles Rules, 1989, and other applicable regulations for the transportation and handling of hazardous chemicals.

c) **Shore-to-Ship:** Terminal personnel shall be trained and competent in the operation of Methanol storage and transfer systems, emergency shutdown procedures, fire protection, spill response, and emergency management, in accordance with applicable PESO, and Port Authority requirements.

d) Training and Drills: The LBS shall ensure periodic training, competency assessment, and emergency drills for all personnel involved in Methanol bunkering and maintain the corresponding records for inspection.

9. Enforcement

The Directorate General of Maritime Administration (DGMA) shall enforce the provisions of this Circular in coordination with the concerned Port Authority, PESO, and other competent authorities. Any Licensed Methanol Bunker Supplier (LBS), vessel, trucking company, or terminal operator found to be in non-compliance shall be liable to appropriate regulatory action under the applicable laws.

Approval of Methanol bunkering operations shall be based on a documented risk assessment. The Port Authority, DGMA, and PESO shall, as applicable, consider:

- a) Approval of the risk acceptance criteria and QRA.
- b) Governance of Methanol bunkering operations within the port.
- c) Accreditation/approval of Licensed Methanol Bunker Suppliers (LBS).
- d) Suitability of approved bunkering locations.
- e) Restrictions on simultaneous operations (SIMOPS).
- f) Shore-side emergency response and contingency arrangements.
- g) Traffic management and navigational safety measures.
- h) Any additional safety, environmental, or operational requirements deemed necessary by the competent authority.

9. Amendments

This Circular shall be subject to periodic review and revision by the Directorate General of Maritime Administration (DGMA), as necessary, to incorporate technological advancements, amendments to applicable international conventions, national laws and regulations, and evolving industry best practices relating to Methanol bunkering operations.