IMO Carriage of Cargoes & Containers Ninth Session (CCC 9)

Summary Report

Executive Summary

Below are some of the topics discussed at CCC 9, additional details can be found under the relevant subject headings in the document.

A lot of interest is currently centred around the development of various guidelines related to alternative fuels which will greatly help the industry in its decarbonisation objective.

Alternative fuels

- **Interim guidelines for the safety of ships using hydrogen as fuel**
  These guidelines have been further developed. They are goal-based and provide provisions for the arrangement, installation, control and monitoring of machinery, equipment and systems using hydrogen as fuel to minimise the risk to the ship, its crew and the environment. Additional intersessional work will be carried out with the aim to present the progress to CCC 10 (September 2024).

- **Interim guidelines for the safety of ships using low flashpoint oil fuels**
  These guidelines are expected to be finalised in 2024. They provide an international standard for ships using oil-based fossil fuels, synthetic fuels and biofuels with a flashpoint between 52°C and 60°C. A Correspondence Group will continue the discussions and submit a report to CCC 10 (September 2024).

- **Interim guidelines for the safety of ships using ammonia**
  These guidelines have been developed further. They provide an international standard for ships using ammonia as fuel. They are goal-based and will provide provisions for the arrangement, installation, control and monitoring of machinery, equipment and systems using ammonia as fuel to minimise the risk to the ship, its crew and the environment. Additional intersessional work will be carried out with the aim to present the progress to CCC 10 (September 2024).

- **Interim Guidelines for Use of LPG Cargo as Fuel**
  Due to the urgent industry need, IMO has tasked CCC to develop these guidelines. Their purpose is to provide unified specific guidance for ships using liquefied petroleum gas (LPG) cargo as fuel. They are written in a goal-based manner and have been finalised. They are expected to be agreed at MSC 108 in May 2024.

Revision of the *Interim recommendations for carriage of liquefied hydrogen in bulk*

As the size of hydrogen containment systems grow due to ships' need for longer routes, the structural strength requirements of a vacuum vessel becomes a significant challenge. Hence, to facilitate the implementation of large-scale liquid hydrogen cargo enclosures aboard ships, novel containment system designs need to be explored. Notwithstanding many technical and human centred challenges, the *Interim recommendations for carriage of liquefied hydrogen in bulk* have been finalised and will be sent to MSC 108 for approval.

Introduction

CCC 9 took place 20-29 September 2023. This report summarises the discussions which are significant to Lloyd's Register's (LR's) work with our customers.

Decisions of other bodies

Additional Information
LR's Summary Reports for MSC 106 , MSC 107 , MEPC 79 and MEPC 80

CCC notes the decisions taken by MSC, and MEPC.

Since CCC 8, other IMO Committees have made progress on a range of outputs associated with the work of CCC. The list below shows the status of relevant outputs.

Approval of:

- MSC.1/Circ.1666 on *Interim guidelines for the safety of ships using LPG fuels*.
- Draft amendments to the IGF Code, with a view to adoption at MSC 108 (May 2024), together with an MSC circular on the early implementation of the draft amendments to paragraphs 4.2.2 and 8.4.1 to 8.4.3 of the IGF Code.
- The establishment of a Correspondence Group on *Development of a Safety Regulatory Framework to Support the Reduction of GHG Emissions from Ships Using New Technologies and Alternative Fuels* which will be reporting to MSC 108 (May 2024).
- Amendments to the IMSBC Code - resolution MSC.539(107) – with an entry into force date of 1 January 2025.
- A new CCC 10 agenda item on amendments to the *Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo holds* (MSC.1/Circ.1264).
- The development of a draft circular containing recommendations for the carriage of plastic pellets by sea in freight containers to reduce their pollution which will address packaging, notification, and stowage, and is expected to be approved by MEPC 81 in March 2024.

Recently published relevant ISO Standards:

- ISO 20519:2021 (ed.2) - *Ships and marine technology — Specification for bunkering of liquefied natural gas fuelled vessels.*
- ISO 21593:2019 (ed.1) - *Ships and marine technology — Technical requirements for dry-disconnect/connect couplings for bunkering liquefied natural gas.*
- ISO 22547:2021 (ed.1) - *Ships and marine technology — Performance test procedures for high-pressure pumps in LNG fuel gas supply systems (FGSS) for ships.*
- ISO 22548:2021 (ed.1) - *Ships and marine technology — Performance test procedures for LNG fuel gas supply systems (FGSS) for ships.*
- ISO 23430:2019 (ed.1) - *Ships and marine technology — Specification of high manganese austenitic steel thin strips used for LNG tanks on board ships.*

Amendments to the IGF Code and development of guidelines for low-flashpoint fuels and related technologies

CCC has been working on the next phase of development of the *International Code of Safety for Ships Using Gases or Other Low-Flashpoint Fuels* (IGF Code). It is recognised that there is an urgent need to accelerate work on low-flashpoint fuels and to rapidly develop safety provisions for alternative fuels to further promote the decarbonisation of shipping.

Draft Interim guidelines for the safety of ships using hydrogen as fuel

The draft interim guidelines have been further developed. They are goal-based and provide provisions for the arrangement, installation, control and monitoring of machinery, equipment and systems using hydrogen as fuel in order to minimise the risk to the ship, its crew and the environment. They are non-mandatory and are intended to be read in conjunction with the IGF Code. They will apply to those ships to which SOLAS Chapter II-1, Part G – *Ships using low flashpoint fuels* applies. The following IGF Code chapters have been further developed:

- Ch 2 General – definitions and abbreviations
- Ch 4 General requirements – Risk assessment
- Ch 5 Ship design and arrangement
- Ch 6 Fuel containment system
- Ch 7 Material and general pipe design
- Ch 8 Bunkering

Hydrogen is notoriously difficult to contain and research around leakages poses many challenging questions. Much discussion is focusing on risks of leaks. Seeing how even small leakages may form hydrogen pockets and coupled with hydrogen's lower explosion limit and that it is impossible to de-energise electrical equipment in time, Emergency Shut-Down (ESD) principles have been removed from the current draft Guidelines. To further progress the development of the Guidelines, a correspondence group has been established with the aim to further develop the following *draft* chapters (subject to amendments):

- Ch 9 Fuel Supply to Consumer
- Ch 10 Power generation including propulsion and other fuel consumers
- Ch 11 Fire Safety
- Ch 12 Explosion prevention
- Ch 13 Ventilation
- Ch 14 Electrical Installations
- Ch 15 Control, Monitoring and Safety Systems

The correspondence group is expected to submit their report and proposed amendments to CCC 10.

For further information on safety and design considerations for liquid hydrogen containment systems, please refer to the LR rules and regulations for the classification of ships using gases or low flashpoint fuels
- Appendix LR3 – Requirements for Ships Using Hydrogen as Fuel (https://www.lr.org/en/knowledge/lloyds-register-rules/rules-and-regulations-for-ships-using-gases-or-low-flashpoint-fuels/).

Safety provisions for ships using low-flashpoint oil fuels

In order to provide an international standard for ships using oil-based fossil fuels, synthetic fuels, or biofuels with a flashpoint between 52°C and 60°, the IMO is developing ***Draft interim guidelines for the safety of ships using low flashpoint oil fuels***. They are applicable to ships which have to comply with SOLAS Chapter II-1 Part G and are to be read in conjunction with the IGF code. It is expected that this work will be completed by the end of 2024.

An intersessional correspondence group developed the guidelines further. New inclusions have addressed the increased fire and explosion hazards by introducing provisions on ambient air temperature control, setting the upper limit to 45 °C, and having ventilation available where the temperature exceeds the limit. This means that the ventilation rate will need to be increased to 30 air changes per hour.

Further discussion will happen intersessionally through a correspondence group around mitigating the risk of leakages of low flashpoint diesel fuels into conventional engine-rooms which will result in dangerous increased concentrations of ignitable fuel vapour (double barrier principle, cooling sea water etc.).

Draft Interim guidelines for ships using ammonia as fuel

The interim guidelines are applicable to ships which have to comply with SOLAS Chapter II-1 Part G and are to be read in conjunction with the IGF Code as they add specific hazards and fuel properties to it. It is expected that this work will be completed between the end of 2024 and by the end of 2025.

Given that ammonia constitutes a different risk profile to LNG, careful consideration of safety provisions that addressed its toxicity and corrosivity were discussed and are now included in the provisional draft text.

A correspondence group will further advance the development of these Guidelines and will be focusing on:

- provisions for holistic risk assessment of the entire fuel system;
- inclusion of semi-refrigerated ammonia and pressurised ammonia systems in the interim guidelines, and the use of pressurised ammonia systems through the alternative design process;
- requirements for machinery in machinery spaces to be gas safe and with the need for ESD arrangements to be considered under the alternative design process;
- safe haven/refuge on board ships using ammonia as fuel in case of ammonia contamination/leaks, taking into account the ship type and number of people on board. In this regard, it may be that the application of the interim guidelines could exclude specific ship types;
- provisions for personnel safety and PPE as a last line of defence; and
- mitigating measures for release of ammonia when considered necessary for safety (e.g. system shut-down scenario), but not emergency situations, - may include ammonia scrubbers and consequentially the disposal of residues should also be considered.

The correspondence group will report its developments to CCC 10.

Interim Guidelines for the Safety of Ships Using Fuel Cell Power Installations (MSC.1/Circ.1647)

These guidelines are applicable to ships which have to comply with SOLAS Chapter II-1 Part G. They were approved in 2022 but don't cover storage of reformed fuels. Fuels which are already covered by either the IGF Code part A or by their own specific Guidelines will need to have this circular applied additionally.

Comments were presented based on the experience gained through the application of the interim guidelines and presented possible amendments:

- Clarification of terminology (e.g. Fuel cell module, Power conditioning system).
- Further elaborating the requirements for an alternative design by introducing the need for a specific risk assessment of fuel cell power installations which will need to be carried out for each onboard installation.
- Provisions for *Fuel cell modules* already supplied in metallic enclosures.
- Better clarity around *Fuel cell spaces and arrangements* and addition of *Fire safety provisions.*
- Addition of a means for monitoring exhaust temperature and flammable gas detection.
- Provision for *Testing of the fuel cell power system.*
- Risks to persons and the environment.

Due to time constraints at CCC 9, it was not possible to consider these amendments. Therefore the work will be undertaken by a correspondence group.

Technical considerations when transposing the Interim guidelines for the safety of ships using methyl/ethyl alcohol as fuel (MSC.1/Circ.1621) into mandatory instruments under the IGF Code

These interim guidelines are applicable to ships which have to comply with SOLAS Chapter II-1 Part G. CCC 8 updated the work plan for the development of the IGF Code and safety provisions on alternative fuels. CCC 9 was not able to discuss the development of mandatory instruments regarding methyl/ethyl alcohols at this session.

Their development is expected to continue until late 2025 and they could enter into force by 2028.

Amendments to the IGF Code

The following amendments to the IGF Code have been agreed:

IGF Code paragraph(s)	Brief summary
part A-1 new 7.3.1.3*bis*	These amendments are necessary to align the omitted additional provisions on the relief valves' discharging line given in 5.2.2.4 of the IGC Code and add them in section 7.3 of the IGF Code.
part A-1 new 9.4.2	For ships constructed on or after 1 January 2028, fuel tank inlets from safety relief valve discharge lines, protecting the piping system according to 7.3.1.4, shall be provided with non-return valves in lieu of valves that are automatically operated when the safety system required in 15.2.2 is activated. Safe means for tank isolation during maintenance shall be available in accordance with 18.3, without affecting proper operation of safety relief valves.

part A-1 5.3.3.5.1	For ships constructed on or after 1 January 2028, the bottom of the suction well installed in fuel tanks may protrude into the vertical extent of the minimum distance specified in 5.3.3.5, provided that such wells are as small as practicable, and the protrusion below the inner bottom plating does not exceed 25% of the depth of the double bottom or 350 mm, whichever is less. LR understands that the amendment was to align the IGF requirements with the IGC requirements.
part A-1 7.3.1.4	For ships constructed on or after 1 January 2028, pressure relief valves discharging liquid or gas from the piping system shall discharge into the fuel tanks whenever the tank MARVS pressure is lower than the setting of the pressure relief valves and shall be designed to ensure that the required discharge capacity is met. Alternatively, they may discharge to the vent mast, if means are provided to detect and dispose of any liquid that may flow into the vent system.
part A-1 11.3.2	For ships constructed on or after 1 January 2028, any boundary facing the fuel tank on the open deck which is separated by a minimum distance through a heat analysis to provide protection equivalent to an A-60 class division, shall be considered acceptable. Intermediate structures providing heat protection to the above spaces may also be considered acceptable.
part A-1 11.3.2.1	For oil tankers and chemical tankers constructed on or after 1 January 2028, A-60 insulation, required by SOLAS regulation II-2/9.2.4.2.5, shall be considered to meet the requirements of 11.3.2 provided that the fuel tank is located in the cargo area forward of accommodation spaces, service spaces, control stations, escape routes and machinery spaces. Consideration for the protection of accommodation block sides may be necessary. LR clarification: the last sentence provides effective fire protection for the accommodation block.
part A-1 11.3.2.2	For ships constructed on or after 1 January 2028, fuel tanks shall be segregated from cargo in accordance with the requirements of the International Maritime Dangerous Goods (IMDG) Code where fuel tanks are regarded as bulk packaging. For the purposes of stowage and segregation requirements of the IMDG Code, a fuel tank on the open deck shall be considered as a class 2.1 package.
part A-1 11.3.2.3	For ships constructed on or after 1 January 2028, any boundary of accommodation spaces, service spaces, control stations, escape routes and machinery spaces, facing fuel tanks on open deck, where no source of gas release from the fuel containment system is considered possible, e.g. a type C tank in which tank connections are in a tank connection space, A-60 class shielding is not required.
part A-1 11.3.3.1	For ships constructed on or after 1 January 2028, the minimum distance to the A-60 boundary from the outer surface of the insulation system of a type C tank or the boundary of the tank connection space, if any, is not less than 900mm. For the vacuum insulated type C tank, outer surface of the insulation system means outer surface of the outer shell.

part A-1 12.5.2.4	For ships constructed on or after 1 January 2028, Hazardous area zone 1 includes, but is not limited to, areas on open deck, or semi-enclosed spaces on open deck, above and in the vicinity of the fuel tank vent mast outlet within a vertical cylinder of unlimited height and 6m radius centred upon the centre of the outlet, and within a hemisphere of 6m radius below the outlet. Where due to the size and layout of the vessel it is not possible to maintain the above distances, a reduced zone can be accepted based on a dispersion analysis, based on 50% Low Explosion Limit (LEL) criteria. The zone dimensions cannot be less than those given in 12.5.2.3, and must include a surrounding zone 2 hazardous area meeting the dimensions given in 12.5.3.1.
part A-1 12.5.3.3	In lieu of 12.5.3.1, for ships constructed on or after 1 January 2028, Hazardous area zone 2 includes spaces 4m beyond the cylinder and 4m beyond the hemisphere defined in 12.5.2.4.
part A-1 13.3.5	For ships constructed on or after 1 January 2028, air inlets for hazardous enclosed spaces shall be taken from areas that would be non-hazardous. Air inlets for non-hazardous enclosed spaces shall be taken from non-hazardous areas at least 1.5m away from the boundaries of any hazardous area.
part A-1 13.3.8	For ships constructed on or after 1 January 2028: • where the ventilation ducts serving non-hazardous spaces pass through a hazardous space, the ducts shall be gas-tight and have over-pressure relative to that hazardous space; and • where the ventilation ducts serving hazardous spaces pass through less hazardous spaces, the ducts shall be gas-tight and have under-pressure relative to less hazardous or non-hazardous spaces. Ventilation pipes serving hazardous spaces that pass through non-hazardous spaces, and that are fully welded and designed in accordance with chapter 7 - *Material and General Pipe Design*, are acceptable without the need for under-pressure. This last sentence has a particular impact on passenger ships.

A correspondence group will consider relevant amendments to the IGF Code with respect to allowing the use of finite element (FE) analysis in meeting the requirements of the IGC Code – *Ultimate design condition – Plastic deformation.*

Review of the IGC Code

Safety provisions for the safe use of LPG Cargo as fuel

It is recognised that there are currently numerous LPG carriers being designed and constructed and there area lack of requirements around the use of LPG cargo as fuel. New *Interim Guidelines for use of LPG Cargo as Fuel* have been finalised together with the associated draft MSC circular with a view to approval at MSC 108. They provide specific and unified guidance for ships using liquefied petroleum gas (LPG) cargo as fuel.

In future, it is expected that these provisions will be incorporated into the IGC Code.

A correspondence group continue to further prepare draft amendments to the IGC Code containing safety provisions for gas carriers using LPG cargo as fuel, with the aim to report deliberations to the next CCC session in 2024, with an expected entry into force by 2028.

IGC amendments

The following non-exhaustive list of amendments/clarifications were considered at CCC 9 and the related draft resolution will be sent to MSC 108 for initial approval and subsequent adoption at MSC 109:

- Definitions of: 'essential safety functions', 'gastight', 'Integrated system' and 'Reversionary control'.
- Design basis for type C independent tank amendments (these are the requirements from UI CG 7 Rev.1– *Carriage of products not covered by the code* and UI CG 8 Rev.1- *Permissible stresses in way of supports of type C cargo tanks)*:
  - the minimum design vapour pressure and the dynamic stress range multiplied by a safety factor - which will need to be decided by MSC 108 - is to be such that initial surface flow will not propagate more than half the thickness of the shell during the lifetime of the tank under the dynamic loads which shall take into account the long-term distribution of ship motion in irregular seas, which the ship will experience during its operating life.
  - When products having a relative density exceeding 1.0, which are not covered by the IGC Code, the double amplitude of the primary membrane stress, created by the maximum dynamic pressure differential, does not exceed the allowable double amplitude of the dynamic membrane stress.
  - Requirements for permissible stresses in stiffening rings.
- New piping systems arrangements requirements for vessels operating in fixed locations.
- Every cargo tank, is to have remotely operated valves fitted, as part of the emergency shutdown (ESD).
- All liquid and vapour connections, apart from the safety relief valve inlet and discharge lines and liquid level gauging devices, shall be equipped with remotely controlled ESD valves, located as close to the tank as practicable. A manual valve shall be provided for each liquid connection.
- For cargo manifold connections, in addition to an ESD valve, a manual valve is to also be provided for vapour connections where cargo tank MARVS exceeds 0.07MPa. The manual valves may be inboard or outboard of the ESD valve to suit the ship's design.
- A new formula to calculate the local instantaneous peak pressure in way of the rupture.
- In the event of a failure of a cargo tank installed Pressure Relief Valve (PRV), a safe means of emergency isolation is to be available and procedures shall be provided and included in the cargo operations manual:
  - If an isolation valve is installed, a mechanical locking system is to be used to prevent full or partial isolation so that only one of the cargo tank's installed PRVs can be isolated. If the PRVs are fitted with a remote sensing line, an isolation valve should also be fitted with a mechanical locking system synchronised with the locking system of the isolation of the main PRV.
  - If an isolation valve is installed, safe means to depressurise the trapped cargo between that isolation valve and PRV is to be provided.
- When sizing the vent system, inlet and outlet pipe should be equal to the PRV connection sizes. Isolation valves shall be full bore of the size of the PRV connection, without any internal reduction, restriction or obstruction.
- The pressure losses in the vent line from the tank to the PRV inlet are to be supported by flow calculations. These losses are not to exceed 3% of the valve set pressure at the calculated flow rate. Pilot-operated PRV sensing lines are to be sized with a minimum diameter and maximum length to avoid critical pressure losses which affect the function of the PRV. The sensing line is to be self-draining and without liquid pockets.

- To ensure stable PRV operation, the blow-down is not to be less than the sum of the inlet pressure loss and 0.02 MARVS at the rated capacity. This limitation normally does not apply to pilot operated PRV fitted with a remote sensing line if confirmed by the PRV manufacturer.
- Abnormal flow of inert gas in leak detection systems shall trigger audible and visible alarms:
  - on the navigation bridge;
  - at the relevant control station(s) where continuous monitoring of the gas levels is recorded; and
  - at the gas detector readout location.
- Electronic devices which are not intrinsically safe including radars if located in the hazardous areas, are to be housed in gastight enclosures.
- When isolating valves are fitted in the water spray system to maintain the required water supply in the case that the system is fed from the emergency fire pump, the operation of the isolating valves is to be located outside the cargo area and, for valves that are normally closed, located adjacent to the accommodation spaces and readily accessible and operable in the event of fire in the protected areas.
- Electric motor rooms located outside cargo areas are to comply with requirements for separation of gas safe and gas hazardous areas and be designed in accordance with accepted standards (eg. IEC 60092:502:1999)
- Where fans are required by chapter 12 *Artificial Ventilation in the Cargo Area*, full required ventilation capacity for each space is to be available after failure of any single fan, or spare parts are to be provided for at least one entire fan comprising of a motor, starter spares and complete rotating element including shaft and bearings of each type. Full ventilation capacity is to be restored before use of the space for operational purposes.
- In addition to the current provisions in 12.2.2, hold spaces and cofferdams which are to be accessed must be provided with ventilation capacity of not less than two air changes per hour, subject to meeting the requirements of 18.8 - *Entry into enclosed spaces.*
- Both the high liquid level alarm and the additional sensor required by 13.3.2 are to be independent from other liquid level indicators, and the emergency shutdown valve may be used for this purpose. The location of the sensors are to be capable of being verified before commissioning, at the first full cargo loading, during or after the initial survey and after each renewal survey.
- The override system may be used at sea to prevent false alarms or shutdowns. When level alarms are overridden, operation of cargo pumps and the opening of manifold ESD valves is to be inhibited except when high-level alarm testing is carried out.
- Crankcases fitted with gas detection that can run on gas shall be arranged to alarm before 100% LFL.
- Where a permanent inert gas connection is required between the inert gas line and the gas fuel line, the connection shall be equipped with a set of double block and bleed valves to prevent backflow of gas fuel into the inert gas line. In addition, a closable non-return valve shall be installed between the double block and bleed arrangement and the gas fuel system.
- Fuel supply equipment is to be included in all safety actions/shutdowns required by any of the cargo system related safety systems, as far as fuel supply is not safe, while the respective action is ongoing.
- Amendments for gas detection requirements on Otto cycle engines.
- If acceptable to the Administration, the use of cargoes identified as toxic products in column "f" which are required to be carried in type 2G/2PG ships in column "c" in the table of chapter 19, may be used as fuel, providing that the same level of safety as natural gas (methane) is ensured.
- The design of the ESD system must avoid the potential generation of surge pressures within cargo transfer pipe work, which is to be designed to clearly indicate when it is inhibited or switched off. Inhibition of these systems is to be allowed only to recover from incidents and/or abnormal conditions which triggered the ESD-system. The inhibition will be carried out under the supervision of the ship's Master in accordance with approved procedures and as specified in the ship's cargo manual. The resetting of the ESD system shall also be recorded in the ship's log. The ESD system is to be fail-safe. If any single part of the system fails, ESD must be initiated.

- Clarification and simplification of *Table 18-1 ESD functional arrangements.*
- Tests show that **high manganese austenitic steel** could be suitable for ammonia service and therefore the following circulars will be amended:
  - MSC.1/Circ.1599/Rev.2 - Revised guidelines on the application of high manganese austenitic steel for cryogenic service,
  - MSC.1/Circ.1622 Guidelines for the acceptance of alternative metallic materials for cryogenic service in ships carrying liquefied gases in bulk and ships using gases or other low-flashpoint fuels and
  - MSC.1/Circ.1648 - Amendments to the Guidelines for the Acceptance of Alternative Metallic Materials for Cryogenic Service in Ships Carrying Liquefied Gases in Bulk and Ships Using Gases or Other Low-Flashpoint Fuels.

  Post-weld stress relief heat treatment should be waived for the use of this material with ammonia on ships that have to comply with IGC Code.
- Amendments to CO_2 special requirements and classification in the IGC Code.

Additional work which will need to be considered by a correspondence group includes:

- Amendments on tank filling limits requirements (IGC Code 15.4 and 15.5) as further clarification is needed around the principles to be used when designing interconnection pipes that capture isolated vapour pockets.
- Since the designation of CO_2 as a toxic product has implications on the design requirements, e.g. bow and stern loading, further discussion will be needed to be conducted intersessionally.
- Investigation into whether a three-generation IGC Code should be implemented by identifying the applicability of the new amendments to new and/or existing ships.

Amendments to the IMSBC Code

The IMSBC Code is regularly reviewed to take into account new requirements for existing substances or new substances.

The 07-23 amendments (MSC.539(107)) will enter into force on 1 January 2025, and are available for voluntary application by flag Administrations from 1 January 2024.

The amendments include but are not limited to:

- Cargo information: the shipper will provide the master or their representative with appropriate information on the cargo. Such information (refer to MSC/Circ.663) shall be confirmed in writing.
- Amendments to the individual schedule for "ALUMINA HYDRATE".
- Deletion of the individual schedule for "fish meal (fish scrap), stabilized UN 2216 Anti-oxidant treated".
- A new bulk cargo Shipping Name "CELESTINE CONCENTRATE".
- New individual schedules:
  - Baryte, flotation chemical grade
  - Brown fused alumina
  - Crushed granodiorite fines
  - Direct reduced iron (d)
  - Dunite
  - Dunite fines
  - Electric arc furnace dust, pelletised
  - Fish meal (fish scrap), stabilised Anti-oxidant treated.
  - Ground granulated blast furnace slag powder

- Magnesite fines
- Potassium nitrate
- Sodium nitrate
- Sodium nitrate and potassium nitrate mixture

CCC 9 agreed to further discuss the following proposals at E&T 40 (Spring 2024) with a view to providing advice to CCC 10 on:

- New individual schedule for **untreated incinerator bottom ash (U-IBA)** as a group A and B cargo
- New individual schedule for **iron ore briquettes** for inclusion in the IMSBC Code as a group C cargo
- New individual schedule for **asphalt granulates** as group C cargo
- New individual schedule for **pea protein concentrate pellets** (non-hazardous) as a group C cargo
- New individual schedule for **petroleum coke (calcined or uncalcined)** as a group C cargo
- New individual schedule for **wheat gluten pellets** as a group C cargo
- New individual schedule for **Phosphate rock fines (uncalcined)** as a group A
- New individual schedule for **Zinc slag (coarse)** as a group C cargo

It was agreed that further discussion on the following points will be conducted by E&T 40 (Spring 2024) in preparation for the 08-25 IMSBC Code amendments and the report will be submitted to CCC 10 for consideration:

- Deletion of additional requirements for self-contained breathing apparatuses (SCBAs) from some individual schedules:
  - **Aluminium ferrosilicon powder** UN 1395 & **aluminium silicon powder**, uncoated UN 1398
  - **Aluminium smelting by-products or aluminium remelting by-products** UN 3170;
- Re-classifying schedules for **castor beans** or **castor meal** or **castor pomace** or **castor flake** UN 2969 as MHB (TX and/or CR) according to its inherent toxicological properties and to delete hazard class 9. Furthermore, amend their BCSN to **castor beans** given that the IMSBC Code permits the transport of unprocessed castor beans in bulk only;
- Amendments to the individual schedule for **iron ore pellets**;
- Amendments to MSC.1/Circ.1264 - Recommendations on the safe use of pesticides in ships applicable to the fumigation of cargo holds;
- Amendments to the schedule for **direct reduced iron (a) briquettes, hot-moulded**;
- A possible new draft CCC circular submitted by E&T 40 to CCC 10 about the schedule for fish meal in the IMSBC Code which could maintain its hazard classification in class 9, and not be considered as MHB (SH) and modify the actual conditions of the transport in bulk of fish meal using the antioxidant tocopherol; and
- To evaluate the proposal to start issuing an annual CCC circular and a dedicated website, which updates the list of solid bulk cargoes not listed in the IMSBC Code, but shipped based on provisional assessments (tripartite agreements).

Amendments to the IMDG Code

This is a standard agenda item for CCC as the IMDG Code is regularly reviewed to take into account new requirements for existing substances, or add new substances. The Editorial & Technical (E&T) Group meets intersessionally to review proposed amendments to the Code and reports to CCC.

CCC 8 continued the development of the Code for the next set of draft amendments (42-24) intersessionally.

E&T 38, prepared the draft amendment 42-24 to the IMDG Code and worked on the identification of any

editorial mistakes in amendment 41-22 which will enter into force on 1 January 2024 under resolution MSC.501(105).

The 42-24 proposed amendments will be finalised by E&T 39 (October 2023) for adoption at MSC 108. The expert group will consider the following - but not limited to - proposed amendments:

- Amendments to the list of currently assigned **organic peroxides in packaging** (2.5.3.2.4);
- The following new entries or amendments to them: UN 3556, UN 3557, UN 3558 and consequential, draft amendments to SP961 and SP962 and a new draft SP9xx for **sodium ion batteries;**
- Draft amendments to 5.5.4 *Devices containing dangerous goods, which are in use or intended for use during transport* of the IMDG Code;
- A new paragraph 5.4.4.2 to the IMDG Code, reading "A certificate exempting a substance, material or article from the provisions of the IMDG Code and referred to in a special provision assigned to an individual entry in the Dangerous Goods List shall be submitted together with the cargo information required by SOLAS regulation VI/2";
- Amendments to the stowage category from E to D in the Dangerous Goods List for UN 3129, UN 3130 and UN 3148, and to require "stowage protected from sources of ignition";
- An amendment to SP964;
- Deletion of MSC/Circ.506/Rev.1 *Container packing certificates/vehicle packing declarations;*
- Additional requirements of a new special provision (provisionally named SP9xa) under the Dangerous Goods List item UN 1361 PG II;
- Amendments for some substances, replacing TP1 with TP2 in column 14 of chapter 3.2 of the Dangerous Goods List;
- Changes to special provision UN 1362;
- Amendments to paragraph 7.2.6.1 of the IMDG Code to make it clearer that substances of the same class may be stowed together;
- Amendments to chapter 7.4 and chapter 7.6 of the IMDG Code on stowage and segregation of lithium battery energy storage cabinets;
- Stowage plan clarifications, especially concerning whether the stowage plan can replace a dangerous goods manifest (Amendment to 5.4.3.1); and
- Amendments to the shipping conditions of seed cakes in the IMDG Code.

Other proposals which will require future developments and will likely be re considered at the next sub-committee session CCC 10 in 2024:

- Regulation of stabilised substances as the regulation of polymerising substances is currently under review at the intermodal level in the UN TDG Sub-Committee. As a consequence, there could be amendments to the UN Model Regulations, which would need to be incorporated in the IMDG Code.
- As a direct consequence of the 42-24 proposed amendments, it was agreed to also amend the MSC.1/Circ.1588/Rev.2 *Revised Emergency Response Procedures for Ships Carrying Dangerous Goods (EmS) Guide*. Specific details will be discussed at E&T 39.

Review of Transport Provisions for Vehicles

To address the hazards arising from the shipment of vehicles in the provisions of the IMDG Code, a correspondence group has been established which will further develop provisions for the transport of vehicles and report to CCC 10.

Their objective will be to:

- Conduct root cause analysis of previous incidents and identified risks and hazards, develop recommendations for the IMDG Code provisions concerning the transport of vehicles:
  - vehicles transported in CTUs;
  - vehicles transported in vehicle, special category and ro-ro spaces; and
  - provisions for electric and hybrid vehicles.
- Further consider general amendments and consider distinguishing the requirements between an "in use vehicle" and other "used vehicle".

Consideration of the carriage of plastic pellets

The development of a draft circular containing recommendations for the carriage of plastic pellets by sea in freight containers to reduce their pollution which will address packaging, notification, and stowage is being developed by the PPR sub-committee and is expected to be approved by MEPC 81 in March 2024. CCC 9 reviewed the current draft text and noted that further work is still needed, with the introduction of mandatory measures (new chapter in MARPOL Annex 3) and especially around what types of packaging should be required.

Revision of the Interim recommendations for carriage of liquefied hydrogen in bulk (MSC.420(97))

With the rapid development of the global hydrogen industry, there is a promising outlook for the carriage of liquid hydrogen. The interim recommendations for the transportation of liquefied hydrogen in bulk (MSC.420(97)), have been developed for the research into and demonstration of safe long-distance overseas carriage of liquefied hydrogen in bulk. Currently the recommendations stipulate the use of vacuum insulation within the liquid hydrogen containment system. However, as the size of the containment system grows, the structural strength requirements of a vacuum vessel becomes a significant challenge. Hence, to facilitate the implementation of large-scale liquid hydrogen cargo enclosures aboard ships, a proposal introduces a novel containment system design without the use of vacuum insulation.

In general, a cargo containment system for liquid hydrogen will be designed to have an inner shell to hold the cryogenic cargo, enclosed within an outer shell. The inner insulation space (i.e., the annular space) is generally equipped with vacuum insulation. The outer shell may also be externally insulated with materials such as polyurethane foam for additional insulation. In the novel containment system proposed, the inner insulation space is proposed to be insulated with materials such as polyurethane foam and filled with hydrogen gas to prevent condensation on the inner shell. The outer vessel will also be equipped with external insulation using polyurethane foam to prevent condensation of air around the outer shell.

The Interim Recommendations specifies the safety requirements for such new types of cargo containment systems.

The draft revised Interim recommendations for carriage of liquefied hydrogen in bulk have been finalised and they will be submitted to MSC 108 for approval. Their structure is as follows:

- Part A: General (applicable to ships with any type of cargo containment system);
- Part B: Cargo containment systems of independent cargo tanks using vacuum insulation; and
- Part C: Cargo containment systems of independent cargo tanks using insulation materials and hydrogen gas in the inner insulation spaces.

For further information on safety and design considerations for liquid hydrogen containment systems, please refer to the LR's guidance notes for liquid hydrogen systems (https://www.lr.org/en/knowledge/lloyds-register-rules/guidance-notes/guidance-notes-for-liquid-hydrogen-systems/).

Revision of the Revised recommendations for entering enclosed spaces aboard ships (resolution A.1050(27))

It has been observed that accidents and hazards related to enclosed spaces remain an issue within the industry and that the majority of these accidents happen in the vicinity of the openings. After an accident, there is a high probability not only those individuals involved will lose their lives but also the ones that will come to the rescue without taking the necessary precautions might too.

CCC 9 looked at a comprehensive revision of Resolution A.1050(27) - *Revised Recommendations for Entering Enclosed Spaces Aboard Ships* with a target end date of 2024. The progress achieved at this session covered the following areas:

- New definitions:
  - Connected space
  - Adjacent space
  - Trapped Hazardous Atmosphere
  - Competent person
  - Enclosed space register
- *Safety Management for Entry into Enclosed Spaces*. This section contains the recommendations that companies should follow for best and safest practice. As an example, the company should ensure that adequate time has been allowed for any planned enclosed space activity, and that undue time pressure, either explicit or implied, is avoided as this has been found to be a causal factor of many enclosed space accidents.
- *Identification of the Hazards and Assessment of Risk.* This section covers the recommended steps necessary to identify hazards and conduct risk assessments.
- *Authorisation of Entry*. No person should open or enter an enclosed space unless authorised by the Master or a responsible person nominated by the Master and only when the appropriate safety procedures laid down for the particular ship have been followed. Entry into enclosed spaces should be carefully reviewed and planned.
- *General Precautions*. Suggestions on how to best safeguard shore personnel that come on board regularly.
- *Testing the Atmosphere*. This section covers the gas detection equipment and processes to test the atmosphere.
- Precautions During Entry. This section collects general recommendations about frequency of atmosphere testing, equipment to be carried by persons entering onboard, ventilation, emergency events.
- *Additional Precautions for Entry into a Space where the Atmosphere is known or Suspected to be Unsafe.* This section highlights the preparation work which might be necessary before entering unsafe areas.
- *Hazards Related to Specific Types of Ships or Cargo*. The section lays a list of common cargoes (Dangerous goods in packaged form, Liquid bulk, Solid bulk) and explains how unsafe an atmosphere can be generated and steps to mitigate risks.
- *Action to be Taken in the Event of an Emergency*. This new section covers the advisable steps to follow in emergency situations and can be of great help in drastically decreasing the accidents related to entry into enclosed spaces.

- Examples. The revision of Resolution A.1050(27) also includes:
  - example of an enclosed space entry permit
  - example of an enclosed space warning signs
  - example of a simplified ship space diagram to be placed at the ships access point
  - example of an enclosed space register
  - example of an enclosed space contingency plan

Further work is still needed, therefore a correspondence group was established with the goal to further develop the Revision of Resolution A.1050(27) in particular focusing on:

- Recommendations about the depletion of oxygen and gas emissions in enclosed spaces.
- Considering whether the list of oxygen-depleting solid bulk cargoes should also be included.

Unified interpretation of provisions of IMO safety, security, and environment-related conventions

The following Unified Interpretations have been considered:

- A UI for the **IGC Code** that offers interpretations of:
  - "any envisaged leakage of liquid cargo" found in paragraph 4.6.2.1 of the IGC Code and paragraphs 4.7.1 and 4.7.4.1 of the 1983 IGC Code which should be interpreted as a leakage, which may have resulted from a failure of the primary barrier in normal operation, resulting in filling of the inter-barrier space until a static equilibrium state is reached between the tank space and the inter-barrier space.
  - "capable of being periodically checked" found in paragraph 4.6.2.4 of the IGC Code and paragraph 4.7.7 of the 1983 IGC Code means that the design arrangement of the containment system and the secondary barrier should be such that the effectiveness of the secondary barrier may be reliably confirmed during operation by a suitable test and/or inspection programme specified in the approved "inspection and survey plan".
  - "full secondary liquid-tight barrier" found in paragraph 4.4.1 of the IGC Code should be interpreted as a secondary barrier forming a liquid tight secondary containment capable of containing any envisaged leakage from the tank through its primary barrier.
  - "Complete secondary barrier" found in table 4.5 of the IGC Code and paragraph 4.7.3 of the 1983 IGC Code should also be interpreted as a secondary barrier forming a liquid tight secondary containment capable of containing any envisaged leakage from the tank through its primary barrier.
  - "effectiveness" found in paragraph 4.6.2.4 of the IGC Code and paragraph 4.7.7 of the 1983 IGC Code should mean the ability of the barrier to prevent passage of cargo in ways and quantities likely to cause unsafe cold spots to the ship structure. The effectiveness of the secondary barrier should be verified by an approved method described in the "inspection/survey plan".

Discussions at CCC 9 indicated that the current UI proposal will need further work and should be re-submitted to the next sub-committee session in 2024.

- A UI for the **IGC Code** that offers interpretations:
  - For paragraphs 8.1 and 16.3.4 of the IGC Code regarding separation between fuel gas and cargo containment vent systems.

- For paragraphs 17.1 and 17.4 of the IGC Code regarding refrigeration systems for the carriage of certain products.
- For paragraph 4.23.3.1 of the IGC Code which provides the permissible stresses in way of supports and stiffener rings of type C cargo tanks as well as other highly loaded locations not fully covered by prescriptive requirements.
- For "finite element analysis of type C cargo tanks" of paragraph 4.23.3.1 of the IGC Code which also applies to the stiffening rings of the type C tanks.
- For paragraph 4.23.3.2 of the IGC Code on "buckling assessment of type C cargo tanks"
- For paragraphs 4.23.1.1, 4.23.1.2, 4.23.2.5 and 4.23.4 of the IGC Code concerning safety factors and the maximum allowable cumulative fatigue damage ratio on the fatigue assessment of a type C tank needs further clarification.
- For paragraph 5.12.4 of the IGC Code regarding corrosion of cargo piping in the presence of a salt-laden atmosphere on an exposed deck.

and

- Draft amendments to MSC.1/Circ.1625 on unified interpretation of paragraph 5.12.3.1 of the IGC Code where external thermal insulation to protect personnel could be removed in those cases where permanent walkways - "flying passage" or "catwalk" – guarantee a safe distance between the pipes and the personnel. Additionally, it is clarified that the term "cargo piping systems", in paragraph 5.12.3.1 of the IGC Code, includes process pressure vessels.

Due to time constraints, these interpretations will be considered by a correspondence group which will report decisions to CCC 10.

Any other business

Estimate of containers lost at sea – 2023 update

Every year, updated estimates around the number of containers lost at sea are released.

According to the presented research, “in 2022, 661 containers were lost at sea. This represents less than one thousandth of 1% (0.00048%) of the roughly 250 million packed and empty containers currently shipped each year, with cargo transported valued at more than $7 trillion”. Over a 15 year period, “on average a total of 1,566 containers are lost at sea each year. The average losses for the last three years were 2,301 containers per year”.

A number of initiatives are currently being developed to increase safety even further:

- MARIN Top Tier Study.
- Revision of IMO's Guidelines for the implementation of inspection programmes for cargo transport units, including containers (This was approved at MSC 105).
- Mandatory reporting of containers lost at sea.

Update on the Boxtech global container database

The Global Container Database (BoxTech) was conceived to improve safety in the container supply chain, after recent developments and deployment progress, notable improvements are:

- Smart container flags: indicating the level of safety certification of the device, particularly helpful for

carriers operating LNG-powered vessels.
- Containers can now be marked sold, lost or scrapped.
- Introduction of additional tank container characteristics which help terminals and planners.
- Automatic data upload now possible through API and Secure File Transfer Protocol (SFTP).

Report on activities related to the Global ACEP Database

Prior to the creation of the Global ACEP Database, authorities and industry stakeholders had no means to check the validity of an Approved Continuous Examination Programme (ACEP) and no way of knowing whether the container owner/operator to whom it was initially delivered continued to meet the requirements of the programme. This lack of transparency gave rise to safety and compliance concerns that the Global ACEP Database helps overcome.

It is noticed that Administrations are still underutilising this service which is free of charge and extremely useful.

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