

IMO'S SUB COMMITTEE ON CARRIAGE OF CARGOES & CONTAINERS (CCC)

10th Session, 16 – 20 September 2024

Session Outcome



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CCC 10

The 10th session of the IMO's Sub-Committee on Carriage of Cargoes and Containers (CCC) was held from September 16 to 20, 2024.

This Brief provides an overview of the significant issues progressed at this session.

Summary

Interim Guidelines for Ships Using Ammonia as Fuel: These guidelines have been finalized and are set for approval at MSC 109 in December 2024. They follow the IGF Code framework, ensuring safe use of ammonia as fuel, excluding gas carriers using ammonia cargo. Although some areas lack detailed requirements, future updates are planned as more experience is gained.

Amendments to the IGC Code for Ammonia Cargo as Fuel: Following MSC 108, amendments were agreed upon to remove the prohibition on toxic cargo use as fuel, enabling ammonia cargo to be used as fuel. These amendments will enter into force on July 1, 2026, with voluntary early adoption from December 2024, pending Flag Administration approval.

Revision of Interim Recommendations for Carriage of Liquefied Hydrogen in Bulk: Work on membrane-type cargo containment systems for hydrogen is expected to progress intersessionally, with a completion target of 2026.

Interim Guidelines for Ships Using Low Flashpoint Oil Fuels: These guidelines are under development to standardize safety measures for ships using low flashpoint oil-based fuels between 52°C and 60°C. The work will continue with finalization aimed for CCC 12 in 2026.

Revision of Recommendations for Entering Enclosed Spaces Aboard Ships: Revision of Resolution A.1050(27) has been completed, which enhances safety procedures for entering enclosed spaces. The revisions include hazard identification, training requirements, and rescue plans, aiming to minimize accidents caused by hazardous atmospheres.

Amendments to the IMSBC and IMDG Codes: CCC 10 reviewed new and existing substances, introducing draft amendments to both codes. Specific focus was given to refining safety guidelines for various bulk cargoes and dangerous goods.

Lashing Software and Cargo Securing: Work progressed to allow the use of lashing software as a supplement to approved stowage and securing plans. A correspondence is established to work on this intersessionally.

SUMMARY OF RELEVANT TOPICS WHICH WERE DISCUSSED AT CCC 10

AMENDMENTS TO THE IGF CODE AND DEVELOPMENT OF GUIDELINES FOR ALTERNATIVE FUELS AND RELATED TECHNOLOGIES (AGENDA ITEM 3)

The ongoing work under this agenda focused on developing new guidelines to support the safe use of alternative fuels. The effort aligns with the maritime industry's push toward decarbonization and adoption of alternative fuel sources, such as ammonia, hydrogen, and low-flashpoint oil fuels.

AMMONIA AS FUEL

During the session, draft interim guidelines on Ammonia as fuel were finalized. A working group was established by the sub-committee to focus on refining the requirements related to ammonia as fuel. This was continuation of the work done at ISWG AF 1 in the previous week (09-13 Sep 2024). These finalized guidelines were agreed to be forwarded to MSC 109 for approval. Key highlights of the discussions while finalizing the guidelines were:

Toxic Area and Space Classification

The discussions placed significant emphasis on classifying and managing toxic areas and spaces onboard ships using ammonia as fuel:

- **Clear Distinction Between Toxic Areas and Spaces:** A critical step in the guidelines was differentiating between **toxic areas** (typically on open-deck) and **toxic spaces** (enclosed or semi-enclosed areas within the ship's structural boundaries). This distinction was essential to managing the risks associated with ammonia exposure in both confined and open environments. The classification helps in determining safety protocols for personnel and equipment, enhancing preparedness in case of ammonia leaks.
- **Prescriptive Safety Distances:** The application of prescriptive distances around potential ammonia release points was introduced, relying on established safety measures from the IGC Code. Some delegates expressed concerns about whether the existing distances were sufficient to mitigate toxicity risks, arguing that the safety boundaries for ammonia should be more substantial due to its hazardous properties. Despite this, the delegates agreed to maintain the deterministic distances, with a view to adjust these as more operational experience is gathered.
- **Gas Dispersion Analysis:** In addition to fixed safety distances, the application of gas dispersion analysis was endorsed to ensure that ammonia concentrations do not reach sensitive areas such as air intakes or accommodation spaces. This analysis serves as an additional layer of safety, particularly when prescriptive distances may not be adequate. A 220 ppm threshold was set, providing a reference level for ammonia concentrations that could be tolerated for short periods, allowing sufficient time for evacuation without the use of personal protective equipment (PPE). Although some delegates questioned the reliability of the gas dispersion analysis due to the lack of a standardized approach, this was deemed essential for maintaining safety in diverse operational contexts.

Safe Haven Concept

Incorporation of Safe Haven Provisions: Recognizing the dangers posed by potential ammonia releases, the guidelines incorporated provisions for a safe haven onboard ships. This designated refuge area would allow all crew members to shelter safely in the event of an ammonia leak, isolated from toxic zones. The safe haven concept aims to protect personnel from exposure until the situation is under control.

Control, Monitoring, and Safety Systems

Extensive discussions focused on the development of systems to monitor and control ammonia concentrations, particularly in enclosed spaces and fuel piping systems:

- **Ammonia Detection Thresholds:** Several thresholds for ammonia detection were agreed upon, mainly 25 ppm, 110 ppm and 220 ppm.

- **Automatic Fuel System Shutdown:** The delegates emphasized that automatic shutdown of fuel consumers should not be triggered unless absolutely necessary. The detection of ammonia in secondary enclosures or other non-critical areas should allow operators to take action without the risk of system shutdowns, which could have operational consequences. However, stricter thresholds were applied to more critical areas, such as fuel preparation rooms, to ensure that accidental exposure to high levels of ammonia is avoided.

Ammonia Release Mitigation

The prevention and mitigation of ammonia release during both normal operations and emergencies was a core concern:

- **Controlled vs. Uncontrolled Ammonia Release:** No direct ammonia release is permitted during normal ship operations. In scenarios where a release is foreseeable but necessary, such as for maintenance or system malfunction, ammonia must be processed through treatment systems to minimize the amount released into the atmosphere.
- **Discharge Criteria:** After considerable debate, the working group agreed on a discharge limit of 110 ppm for ammonia released through the mitigation system during foreseeable abnormal situations. Although some participants argued for stricter limits, this compromise was deemed operationally feasible while still maintaining safety.
- **Uncontrolled Releases in Emergencies:** In emergency scenarios such as fuel tank pressure relief valve activation, uncontrolled and untreated releases of ammonia will be allowed. These releases are only permitted in rare, catastrophic situations, with the understanding that under such circumstances, the primary concern will be the immediate safety of the ship and its crew.

Fuel Supply Systems

Ensuring the integrity and safety of ammonia fuel supply systems was another focal point:

- **Automatic Shut-off Valves:** Fuel supply lines leading to fuel preparation rooms are required to have automatically operated shut-off valves situated at the bulkhead inside the fuel preparation room. This safety feature allows the fuel system to be isolated quickly in the event of a leak or other hazard within the room.
- **Purge Systems for Fuel Lines:** When a fuel system shutdown occurs, the entire fuel piping system downstream of the double block and bleed valve must be automatically purged using the ammonia release mitigation system. This is to ensure that residual ammonia does not remain in the fuel lines, which could pose a danger if not properly evacuated.
- **Debate on Mechanical Ventilation:** There was a significant debate about whether mechanical ventilation should be mandated for the secondary enclosure of fuel piping systems. Some delegates argued that since ammonia should not be present in this space under normal conditions, mechanical ventilation would be unnecessary. Ultimately, the decision was made to remove the ventilation requirement but retain gas detection systems to ensure that any potential leaks are identified promptly.

Bunkering Systems

The provisions for ammonia bunkering systems were also extensively discussed:

- **Vapour Return Lines:** Provisions were made to include vapour return lines where appropriate, with particular attention to the expansion ratio of ammonia during bunkering operations. This ensures that any vapour released during refuelling can be safely handled and stored.
- **Bunkering Safety Link (BSL):** In a significant update to best practices, the term Bunkering Safety Link (BSL) was introduced, replacing the older Ship-Shore Link (SSL) to reflect current industry standards in the design and operation of bunkering systems, particularly drawing from lessons learned in LNG refuelling.

Provisions for Ammonia Piping and Expansion Joints

- **Expansion Joints and Bellows:** The guidelines place strict limits on the use of expansion joints and bellows in ammonia fuel piping systems, restricting their use to engine-mounted systems

where they are part of the engine's safety concept. Although some parties proposed extending their use to other fuel consumers (e.g., boilers, fuel cells), concerns were raised that this could relax safety standards. As a result, the restriction remains in place.

- **Piping Location and Safety:** Ammonia fuel pipes are required to be located at least 800 mm from the ship's side to minimize the risk of external damage. This requirement is crucial in ensuring that critical systems are shielded from potential impacts or accidents.

Finalization of Ammonia Guidelines

- **Goal-Based, High-Level Guidelines:** The finalized ammonia guidelines are structured as goal-based, high-level documents, providing overarching safety frameworks without delving into detailed technical provisions. This approach was taken to expedite the development of the guidelines, given the urgent need for safety frameworks as ammonia-powered ships are currently being designed and built.
- **Concerns from Some Delegations:** While most participants supported the finalization of the guidelines, some voiced concerns that they were not yet mature enough for implementation, particularly regarding the risk of confusion between high-level goals and specific technical requirements. Despite these concerns, the majority consensus was that these guidelines must be implemented urgently to provide guidance for ongoing ship projects. A commitment was made to revisit and refine the guidelines as more operational experience is gathered.

HYDROGEN AS FUEL

Due to time limitations, the hydrogen guidelines could not be fully developed at this session. The ongoing work has been assigned to the Correspondence Group, which will focus on refining and expanding these guidelines for finalization by CCC 11.

LOW-FLASHPOINT OIL FUELS

Discussions regarding the draft guidelines for low-flashpoint oil fuels were postponed due to time constraints. These guidelines will be taken up by the Correspondence Group as part of the updated work plan, and further development is expected at future sessions.

RE-ESTABLISHMENT OF WORKING GROUPS

Intersessional Working Group (ISWG): The Working Group recommended the re-establishment of the ISWG to continue work on safety guidelines for alternative fuels, particularly ammonia and hydrogen. The group will meet during 2025 to finalize the work on hydrogen fuel and further develop guidelines for low-flashpoint oil fuels.

Correspondence Group: The Correspondence Group will also be re-established, with Norway coordinating the group. Its tasks include finalizing the hydrogen guidelines, developing the low-flashpoint oil fuel guidelines, and gathering data on the use of ammonia and methyl/ethyl alcohol as fuel.

REVIEW OF THE IGC CODE (AGENDA ITEM 4)

DRAFT AMENDMENTS TO THE IGC CODE

During the session, draft amendments to the IGC Code were finalized. The amendments were consolidated based on previous documents, including CCC 8/WP.4, CCC 9/WP.4, and CCC 10/4, among others. The amendments are expected to be adopted in a consolidated version of the IGC Code and subsequently enter into force on 1 January 2028, subject to approval by the MSC 109 and adoption by MSC 110.

Application of Amendments to Existing and New Ships

A comprehensive review of the applicability of the IGC Code amendments to new and existing ships was conducted, establishing the following criteria:

- **Design and Construction Changes:** Amendments requiring changes to ship design or construction will apply exclusively to new ships. This ensures that existing ships are not subject to retroactive alterations that could incur significant costs.
- **Operational Changes:** Amendments that affect ship operations will be applied to both new and existing ships, ensuring updated safety measures and operational protocols are in place across the fleet.
- **Editorial Amendments:** Editorial revisions, which clarify existing rules without altering their intent, will be applied to both new and existing ships. Attention was given to ensure current circulars would not be affected unnecessarily by these changes.
- **Pre-2016 Ships:** For ships constructed prior to 2016, Member States retain discretion over whether to implement the amendments. This approach respects national regulations and accommodates ship-specific circumstances.

Specific Technical Discussions

- **Pipe Insulation and Stress Corrosion Cracking:** Amendments related to pipe insulation and stress corrosion cracking prevention were finalized, ensuring that materials and protection methods are well-suited to withstand environmental and operational conditions.
- **Cargo Tank Level Alarm Testing:** Final agreement was reached on the amendments for cargo tank level alarm testing, standardizing testing protocols to enhance safety during liquefied gas operations.
- **Piping System Design Pressure:** The amendment addressing piping system design pressure was completed, ensuring that the pressure ratings of pipelines reflect both safety and operational efficiency.

Fracture Mechanics for Type C Tanks

Application of Fracture Mechanics: Fracture mechanics principles were applied to type C tanks, particularly to assess and manage risks related to cracks and structural failures. The final amendments simplify the process, balancing operational safety with practical application. The methodology extends to both new and existing ships, enhancing the safety framework across the industry.

New Design Requirements for Type C Tanks: Changes were made to the design requirements for type C tanks by expanding the guidance provided under paragraph 4.28, focusing on structural integrity. These updates, affecting construction, apply solely to new ships.

Cargo Tank Filling Limits and Restructure of Chapter 15

Revised Cargo Tank Filling Limits: A major restructuring of Chapter 15 clarified the text and clarified the operational requirements related to cargo tank filling limits. This restructuring aimed to reduce complexity and improve clarity for ship operators. The updated limits focus on enhanced safety margins, with operational requirements applicable to both new and existing ships. Some delegations raised concerns about the removal of the operational margin related to liquid draining back into the cargo tanks, but after careful consideration, the new text was adopted.

Emergency Shutdown (ESD) Systems

Updated ESD Cause and Effect Table: The cause and effect table for Emergency Shutdown (ESD) systems was revised to simplify requirements while maintaining safety. The updated table ensures that no additional sensors are necessary, and only minimal adjustments to ESD logic are required. The revised system will apply to both new and existing ships, promoting uniform safety practices across the fleet.

USE OF LPG AND ETHANE CARGO AS FUEL

Inclusion of Ethane: Chapter 16 of the IGC Code was updated to allow the use of LPG and Ethane cargo as fuel. All issues surrounding paragraphs 1.1.1 and 2.1.4 were resolved, allowing for the safe use of ethane alongside other LPG products as fuel.

SPECIAL REQUIREMENTS FOR CO2

CO2 Designation as Toxic: CO2 was classified as toxic under the IGC Code, despite its primary risk as an asphyxiant. This aligns with the practices used in the IBC Code, ensuring consistent safety protocols. As a result, ships carrying CO2 will now be required to install fixed gas detection systems. While some delegations disagreed with the classification of CO2 as toxic, arguing that its asphyxiant properties posed the greater risk, the toxic designation was maintained.

INTERIM GUIDELINES FOR AMMONIA CARGO AS FUEL

Correspondence Group on Ammonia Cargo as Fuel

Terms of reference were established for the development of interim guidelines on the use of ammonia cargo as fuel. These guidelines will align with ongoing work under the IGF Code and take into account documents CCC 10/4/1 and CCC 10/4/7. The aim is to harmonize ammonia fuel guidelines with current safety standards, ensuring that the risks associated with ammonia fuel are properly managed and mitigated.

The group will focus on developing a structured framework for ammonia fuel use, harmonizing these guidelines with related safety provisions, and submitting draft terms to the next session.

REVISION OF THE REVISED GUIDELINES FOR THE PREPARATION OF THE CARGO SECURING MANUAL (MSC.1/CIRC.1353/REV.2) TO INCLUDE A HARMONIZED PERFORMANCE STANDARD FOR LASHING SOFTWARE TO PERMIT LASHING SOFTWARE AS A SUPPLEMENT TO THE CARGO SECURING MANUAL (AGENDA 7)

The revision aimed to update the Cargo Securing Manual (MSC.1/Circ.1353/Rev.2) by incorporating harmonized performance standards for lashing software. This update would allow lashing software to be used as a supplement to the Cargo Securing Manual, providing ship operators with more advanced, accurate tools for managing container securing arrangements.

Key Discussions

- **Proposals from Germany and IACS:** The session considered proposals submitted by Germany and IACS (document CCC 10/7), which sought to revise MSC.1/Circ.1353/Rev.2 to allow lashing software to supplement the container stowage and securing arrangement plan. The software aims to evaluate actual loading conditions more precisely, ensuring that container loads are adequately secured based on real-time data. Additional considerations were included from Australia et al. (document CCC 10/11/5), which highlighted issues that should be factored into the development of lashing software standards. It was also suggested that these standards be aligned with measures being discussed under other agenda items, particularly those related to container loss at sea (Agenda Item 11).
- **Concerns and Clarifications:** The discussions in the plenary raised concerns over the mandatory nature of using lashing software. Several delegations noted that while the software could be beneficial, its effectiveness depends on the accuracy of input variables such as container weights and centres of gravity. The potential for inaccuracies in these areas has historically been a contributing factor in container-related incidents. Further technical discussions were needed regarding the standardization and compatibility of the software, ensuring it can be used consistently across different systems and that its performance is reliable under varying conditions.

- **Safety and Operational Considerations:** The use of lashing software as a supplement to the Cargo Securing Manual was seen as a positive step toward improving container securing practices. However, it was emphasized that this should not diminish the importance of physical inspections and verification by the ship's master or cargo officer. The software should not replace the actual verification of lashing arrangements before a ship's departure but should assist in decision-making.

Decisions

- **Revised Wording for Supplementary Use of Lashing Software:** It was agreed that the wording in paragraph 4.3.3 of MSC.1/Circ.1353/Rev.2 would be changed from "*should be used as a supplement*" to "*may be accepted as a supplement.*" This provides more flexibility for using lashing software while ensuring it is not mandated as the sole method for securing containers.
- **Draft Performance Standards for Lashing Software:** The Sub-Committee endorsed the development of draft performance standards and guidelines for lashing software. These standards will ensure that the software can be consistently approved and used across different vessels, enhancing the safety and efficiency of container securing operations.
- **Concerns on Lashing Software Standards:** Various concerns were raised in plenary regarding the standardization, compatibility, and harmonization of calculation methods for lashing software. The Correspondence Group will discuss these concerns and provide recommendations for the next session.

REVISION OF THE REVISED RECOMMENDATIONS FOR ENTERING ENCLOSED SPACES ABOARD SHIPS (RESOLUTION A.1050(27)) (AGENDA 8)

The session undertook a review of the draft Revised Recommendations for Entering Enclosed Spaces Aboard Ships, as outlined in annex 1 of document CCC 10/8. The objective was to ensure the revision addressed the safety of personnel entering or working in enclosed spaces that may pose risks due to oxygen-deficient, flammable, or toxic atmospheres.

Key Provisions in the Revised Recommendations

Several key provisions were highlighted in the draft Revised Recommendations:

- **Hazard Identification and Risk Assessment:** The revised guidelines stress the need for conducting a preliminary hazard assessment and risk evaluation before any enclosed space entry. This assessment should be based on cargo types, previous uses of the space, and any structural conditions that could affect safety.
- **Safety Management for Enclosed Spaces:** The safety strategy involves developing a ship-specific enclosed space register, which lists enclosed spaces, connected spaces, and the associated risks. This register is to be used as part of the ship's safety management system (SMS), ensuring a structured approach to managing these hazardous spaces.
- **Rescue Equipment and Training:** Provisions were made for rescue equipment, such as breathing apparatus and resuscitation gear, to be available and regularly tested. Training for personnel on enclosed space rescue and first aid techniques was emphasized, ensuring readiness in emergencies.

Consequential Amendments

Consequential amendments to relevant IMO instruments were necessary due to the changes in the recommendations. These include footnotes and references in SOLAS regulations, the ISM Code, and other relevant IMO instruments that require updating to reflect the revised guidelines for entering enclosed spaces.

Elimination of the example of Enclosed Space Register and Oxygen Depletion List

- **Deletion of the Enclosed Space Register (Appendix 3):** The decision was made to remove the example of an Enclosed Space Register from the recommendations (appendix 3). This was based

on feedback that the example may not apply universally and that individual ships should be encouraged to develop their own registers tailored to their specific operations and spaces.

- **Oxygen Depletion List (Appendix 6):** Similarly, the list of solid bulk cargoes that may cause oxygen depletion, as per the IMSBC Code (appendix 6), was deleted. The rationale was that the list was already covered by relevant IMO documents, such as the IMSBC Code, and including it in the recommendations could lead to redundancy or potential conflicts with the updated provisions in the Code.

Finalization of the Draft Recommendations

The draft Revised Recommendations for Entering Enclosed Spaces Aboard Ships was finalized and is set for submission to MSC 110 for approval. The document incorporates all the accepted changes from the current session and the comments from prior discussions.

UNIFIED INTERPRETATION OF PROVISIONS OF IMO SAFETY, SECURITY, AND ENVIRONMENT-RELATED CONVENTIONS (AGENDA 10)

The Sub-Committee considered proposals related to the unified interpretation (UI) of provisions in IMO conventions concerning safety, security, and environmental protection.

Key Discussions

- **Outcome of MSC 108 on the Approval Process of Unified Interpretations:** The session considered the outcomes from MSC 108 regarding the approval process for unified interpretations, based on document CCC 10/10/2. This document provided insight into how proposed interpretations should be handled and approved within the IMO framework.
- **Draft Unified Interpretation of Paragraph 5.7.1 of the IGF Code:** A proposal was submitted by IACS and SGMF (document CCC 10/10) for the unified interpretation of paragraph 5.7.1 of the IGF Code. This interpretation aimed to ensure uniform implementation of the IGF Code, particularly concerning safeguards in fuel containment systems. The Sub-Committee acknowledged that the proposal might require an amendment to the IGF Code itself and agreed to forward the outcome to MSC 110 for further consideration.
- **Draft Unified Interpretation of SOLAS Regulation II-1/2.29:** The Sub-Committee recalled that MSC 108 had raised questions regarding the definition and scope of low-flashpoint fuels under SOLAS regulation II-1/2.29, particularly whether the IGF Code applies to gases or liquid fuels with low flashpoints. The session reviewed the proposal by IACS (document CCC 10/10/3), which aimed to clarify how SOLAS regulations II-1/56 and II-1/57 should apply to ships using gas as fuel. While the Sub-Committee appreciated the clarification effort, it was decided that further consideration was needed, and this issue would be forwarded to MSC 109.
- **Clarification of Terms in the IGC and IGF Codes:** The session also addressed concerns about overlapping regulations between the IGC Code (for gas carriers) and the IGF Code (for ships using gas as fuel). The discussions aimed to avoid confusion, especially in cases where both codes might apply. The Sub-Committee noted the need for clarity on terms such as "cargo systems" in the IGC Code and "fuel supply systems" in the IGF Code.

REVISION OF THE INTERIM RECOMMENDATIONS FOR CARRIAGE OF LIQUEFIED HYDROGEN IN BULK (AGENDA 14)

The MSC 108 adopted the "Revised Interim Recommendations for Carriage of Liquefied Hydrogen in Bulk," which was formalized under resolution MSC.565(108). Subsequently, it was agreed that the target completion year for the revision of these recommendations would be extended to 2026, and the item was included in the provisional agenda of this session.

Key Discussions

- **Membrane-Type Cargo Containment System:** The delegation from the Republic of Korea proposed an amendment to the revised interim recommendations to include a membrane-type cargo containment system for liquefied hydrogen in their paper CCC 10/14. This system is designed to address the growing demand for hydrogen. The Sub-Committee agreed on the importance of establishing a liquefied hydrogen carrier capable of transporting large volumes of hydrogen to meet the expected demand increase.
- **Safety and Risk Considerations:** Discussions highlighted the need for specific guidelines for generating, maintaining, and monitoring the vacuum in insulation spaces. This was considered essential for ensuring safety, particularly regarding the risk posed by hydrogen leakage into the inter-barrier space of membrane-type cargo containment systems. However, concerns were raised regarding the potential introduction of a "single point of failure" if the vacuum system fails. This prompted discussions on the necessity of additional backup systems to mitigate such risks.

Decisions

- **Joint Submission to CCC 11:** It was agreed that interested Member States and international organizations would work together to prepare a submission for the next session (CCC 11) in 2025. The submission will include a draft revision of resolution MSC.565(108), reflecting the proposed amendments and the need for additional safety protocols.

Further Considerations: The need for further review was acknowledged, especially regarding the incorporation of supplementary safety measures, such as the management of risks associated with hydrogen leakage in membrane-type containment systems. These discussions will continue in future

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