

Container Ship Safety

Revision 1

Our Position

IACS shares the concerns raised by marine insurers (IUMI) and the industry regarding the number of incidents/accidents on board container ships, such as cargo fires, fires in engine room, loss of containers at sea, and the influence of whipping on structural design of the container ships.

IACS has set “*Container Ship Safety*” as a new work area and will work with industry stakeholders to investigate the relevant cases for possible improvement of the regulatory framework to mitigate the risks of such incidents/accidents in the future.

BACKGROUND

The rapid increase in the growth of container shipping by sea stimulates the global business to increase the fleet of container ships both in quantitative and dimensional terms. Despite the improvement in the design of modern container ships and implementation of new statutory instruments aimed at ensuring the safe operation of these ships, statistics show that the consequences of incidents/accidents aboard container ships related to fires and loss of cargo is not decreasing, but even growing.

In 2020 concerns were raised regarding adequateness of fire protection on containerships, in particular regarding cargo fires. The CARGOSAFE FSA study (source Study investigating cost-efficient measures for reducing the risk of cargo fires on container vessels (CARGOSAFE) EMSA, Lisbon) identified 100 casualty reports for severe containership cargo fire for 2008 to 2021 with the highest number of casualties in 2015 and 2016. According to CARGOSAFE the annual frequency of cargo fires shows “a slight increase” since 1997, approximately by a factor of 2. Therefore, it has been suggested that the existing fire detection and fire-fighting systems required by the regulatory framework should be reviewed.

There is another big issue related to safe container shipping that remains actual to date, which is the loss of cargo at sea.

As reported by World Shipping Council (WSC) (source CCC 9/13, CCC 10/11/1) for the combined sixteen-year period from 2008 to 2023, on average, there were 1482 containers lost at sea each year and the average losses for the last three years (2021-2023) were 1,061 containers per year which is less than half of the period 2020-2022. It should be noted that some extreme events stand out, for

instance, four incidents where 4293, 1800, 900 and 750 lost containers were reported, which alone accounts for a third of all lost containers.

The above incidents suggest that operational aspects of container transport should be considered to reduce the risk of excessive rolling and to ensure high container transport safety

An additional issue related to container ship safety is whipping structural response which is regularly observed when ships are sailing in rough seas. Some past accidents suggest that global ship hydroelastic loading may be a contributing factor for the structural failures.

Summary of key issues

1) Fires in cargo area

To tackle the events of the fires onboard of container ships, a road map for amending SOLAS chapter II-2 to address fire-fighting capabilities on board container vessels was agreed by SSE 8 in February 2022 (Identification of hazards, Risk analysis, Risk control options, Cost-benefit assessment, Recommendations for decision-making). EMSA CARGOSAFE FSA study followed this approach and provided the input to SSE for commencing the work on developing SOLAS amendments (SSE 10). IACS provided to IMO a technical evaluation of the risk mitigating measure considered in CARGOSAFE FSA study and highlighted aspects for further consideration, e.g., regarding integration in ship operation, maritime environment, and combination to increase effectiveness. Further, IACS suggested to consider the requirements in IMDG Code, e.g., with respect to quantity limits of dangerous goods (declaration thresholds), segregation requirements of Part 7 and test methods for self-heating cargo.

The factors which may contribute to the consequences of fire incidents may be also related to inadequate training and familiarisation of crew members with installed firefighting systems and firefighting procedures onboard as well as inspection and maintenance of firefighting systems and equipment. More frequent fire drills and proper crew familiarisation based on fire incident contributing factors may reduce the possibility and frequency of fire incidents in cargo areas.

Factors contributing to fires in cargo areas identified during incident investigation should be brought to the attention of companies managing container vessels for integration of additional measures for reducing risks of fire in Safety Management Systems documentation. Implementation of such additional measures, once integrated, could be verified during ISM audits onboard.

2. Fires in engine room

The main and common cause of fires in the engine room of cargo ships are poorly maintained engines/dirty engine room/associated fuel supply equipment and leakage from the low-pressure fuel and lubricating oil pipes.

Factors contributing to fires in engine room areas identified during incident investigation should be brought to the attention of companies managing container vessels for integration of additional measures for reducing risks of fire in Safety Management Systems documentation. Implementation of such additional measures, once integrated, could be verified during ISM audits onboard.

3. Loss of containers at sea

One of the root causes of loss of containers at sea is the deviation of actual loading conditions of the ship from the sample loading conditions mentioned in the stowage and securing plans. Therefore, evaluation of actual loading conditions for compliance with container lashing rules by only using the stowage and securing plans in the approved CSM is cumbersome.

4. Influence of whipping on structural design of container ships

As noted in background, global ship hydroelastic loading/response may be a contributing factor to structural failures. It is therefore essential to gain deeper insight into the physics of whipping.

IACS Position

Based on the information available, the following areas can be identified for IACS to address container ship safety issues:

1. Fires on Container Ships (cargo area and engine room)

In order to solve the fire safety issues on container ships more effectively, accurate and adequate accident data (including details and causes) are prerequisite and essential. IACS will continue the discussion with industry partners to collect and analyse fire accident data covering both cargo areas and engine rooms, with root causes being either failures of systems/equipment or human element/management.

Furthermore, IACS will consider the risk aspects making use of the outcome of the "CARGOSAFE" project and any other relevant research studies. Based on the outcome, further analysis may be carried out to identify appropriate measures to mitigate the fire risks, which could include the development/revision of new/existing requirements/provisions, enhanced training, etc. As the IACS technical evaluation of risk mitigating measures shows, integration in the marine environment and ship operations must be duly considered in order to efficiently and effectively reduce the risk of cargo fires. Moreover, the publications of the Cargo Incident Notification System (CINS) can be of assistance.

Additionally, amendments to the IMDG Code should be considered for addressing the issues of cargo ignition and fire propagation.

In addition, focus campaigns on container ship fire safety during ISM Audits may be considered to identify possibilities for improvement.

IACS will support and proactively contribute to the IMO output on the development of amendments to SOLAS chapter II-2 and the FSS Code concerning detection and control of fires in cargo holds and on the cargo deck of container ships. Additionally, IACS will support the discussion of potential amendments to the IMDG Code.

2. Loss of containers at sea

With the view to providing a means to efficiently evaluate actual stowage and securing of cargo containers, IACS considers that lashing software can be used by the crew as a supplement to the stowage and securing plans included in the approved CSM (Cargo Securing Manual contained in MSC.1/Circ.1353/Rev.2, Ch.4).

Consideration will also be given to planned development of a new instrument on Container Lashing Equipment.

3. Influence of whipping on structural design of the container ships

IACS has identified two items, review the existing publications on global hydroelastic response of ships with a focus on whipping and derive minimum functional requirements for the whipping phenomena. This work has been carried out as part of IACS ongoing project on the influence of whipping on structural design of containerships, and the relevant IACS resolutions will be updated and published in due course.

Summary of Work already carried out by IACS on this Issue to Date

1. Fires in cargo area

IACS has assisted IUMI with the drafting of its submissions to the IMO to progress work in this area. IACS evaluated the CARGOSAFE FSA study with respect to compliances with IMO FSA Guidelines (MSC-MEPC.2/Circ.12/Rev.2) and performed a technical evaluation of the risk mitigating measures considered in this study. Key findings of the latter were submitted to SSE 10. IACS established a project team for supporting the further work in the intersessional correspondence group to SSE 11 and subsequent SSE working groups. IACS proposed a list of risk-prevention-related areas in relation to the IMDG Code for further consideration by the Sub-Committee on carriage of cargoes and container (CCC 10/15/1). IACS has submitted paper CCC 10/15/1 and addressed the issue at the recent meeting of this sub-committee to make sure it gets the attention from this sub-committee.

2. Fires in engine room

IACS-IUMI Correspondence Work Group on Fire Risks in Engine Room due to Leakage from Low-Pressure Fuel & Oil Pipes was established in 2020. The Group aims to suggest amendments to SOLAS regulation II-2/4 and relevant recommendations (MSC.1/Circ.1321 Guidelines for measures to prevent fires in engine rooms) and IACS is planning to submit new output proposal to MSC in due course for inclusion in the Committee's Work Programme with the output being placed on the agenda of the SSE Sub-Committee (involvement of HTW Sub-Committee may need to be considered):

“Revision of SOLAS regulation II-2/4 and relevant recommendations (MSC.1/Circ.1321) to mitigate the risks of fires in the engine room caused by leakages from low-pressure fuel pipes and lubrication oil pipes”.

3. Loss of containers at sea

IACS submitted a paper “Lashing software as a supplement to container stowage and securing plan” to CCC 8 (CCC 8/12) in September 2022 proposing that lashing software should be acceptable as a supplement to the stowing and securing plan included in the approved CSM and lashing software should be approved by the Administration or RO. IACS' proposal received support in principle from CCC 8. Noting the response received at CCC 8, IACS has decided to make a new output proposal to MSC 107 (MSC 107/17/6, June 2023) introducing the supplementary use of lashing software together with the development of harmonized performance standards for the software to allow uniform approvals by the Administrations and recognised organisations that was approved by MSC 107. A new Project Team on container securing / lashing is set up under Hull Panel to further consider the development of new instrument on Container Lashing Equipment. To support the work beginning at CCC 10, IACS co-sponsored a paper (CCC 10/7) with concrete proposals to amend MSC.1/Circ.1353 to include lashing software as a supplement to the Cargo Securing Manual and related draft performance standards and guidelines for the application to containerships.

In this regard, CCC10 resolved that the lashing software ‘may’ and not ‘should’ be accepted as a supplement to container stowage and securing plan. The proposed submitted harmonised performance standards for the software deemed to have been a too advanced submission and was considered as out of scope of the related Sub-Committee agenda output. However, the established Corresponding Group was instructed to identify the issues which need to be included in the performance standards with IACS UR C6, Lashing Software, being considered as a relevant regulatory tool in the related inventory on finalized, current and foreseeable work (annex 1 to document CCC 10/WP.11).

It is important for the safety of the ship and the protection of the cargo and personnel that the cargo is secured properly especially accounting for strength of the supporting structures and securing fittings. Hereto, IACS has developed UR C7, Approval and Certification of Container Securing Systems, to ensure that the entities involved in container stowage and securing are approved and/or certified before their application on board. Working towards this UR development, special consideration was afforded to detecting gaps between the Rules of the member classification societies regarding the approval and certification of container securing systems.

The maintenance of container stowage and securing systems is another subject to which IACS is contributing

via prescription of unified standards and requirements for allowable diminution of these systems. Such requirements are missing not only in the current rules of the majority of the association's members but also in the industry in general. This emphasizes the challenge of developing respective unified requirements. UR C8 is the document currently under development addressing the allowable wear, tear, and corrosion of container Securing Systems.

4. Influence of whipping on structural design of the container ships

A project team has been established under IACS Hull Panel. This team carried out a comprehensive review of literature and current industry practice and evaluated the whipping influence on hull girder strength on several ships of different size. Based on the outcome from the project team, IACS is updating IACS UR S11A "Longitudinal Strength Standard for Container Ships" including "Functional requirements on hull girder ultimate strength assessment with whipping effects".



**Please note if you're reading this paper in hard copy the most recent version is available at iacs.org.uk/about-us/position-papers
For more information, contact IACS Permanent Secretariat on +44 (0)20 7976 0660, permsec@iacs.org.uk. This position paper was first published in January 2023.**