

Supplementary materials for March 2026

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➤ International Maritime News

I. Maritime cyber incidents jumped 103% in 2025



Source: SAFETY4SEA.

Derived from the Editorial Team from Safety4sea, February 24, 2026 in Cyber Security. Article: Maritime cyber incidents jumped 103% in 2025. <https://safety4sea.com/maritime-cyber-incidents-jumped-103-in-2025/>

CYTUR has released [the 2026 Maritime Cyber Threat White Paper](#), highlighting growing security blind spots emerging from the rapid digital transformation of the maritime industry.

According to the report, compared to 2024, the number of maritime cyber incidents in 2025 surged by 103%, emerging as a critical threat to maritime safety. Distributed Denial of Service (DDoS), ransomware, and malware infections account for the majority of these attacks, with their growth rate more than doubling over the past year.

● Key regional dynamics of maritime cyber threats

➤ The Middle East – Strait of Hormuz and the Persian Gulf

Geopolitical tensions remain high in the Middle East. Recently, GPS spoofing tactics have been frequently discovered against oil tankers. These attacks manipulate the vessel's systems to show the ship as being within a specific country's territorial waters, even when it is actually navigating in international waters. Such tactics are strategically employed to create a pretext for forcibly halting or seizing the vessel.

➤ Asia – Strait of Malacca and the South China Sea

As a global hub for maritime trade, this region is increasingly targeted by “Cyber Pirates.” Unlike traditional pirates who launched indiscriminate attacks, modern perpetrators now hack into shipping company networks to conduct reconnaissance. By identifying which vessels are carrying high-value cargo and determining the exact number of onboard security personnel, they select and strike their targets with surgical precision.

➤ Europe – Baltic Sea and the Black Sea Coast

Driven by the impact of the Russia-Ukraine war and other regional conflicts, widespread electronic interference has become a daily occurrence in this area. Commercial vessels passing through these waters frequently experience sudden GPS outages or find their location data displaced by hundreds of kilometers. These disruptions have become a direct cause of maritime accidents.

➤ Global major hub ports – Rotterdam, Los Angeles, Busan, etc.

Large-scale port terminals are prime targets for ransomware. Attackers encrypt Terminal

Operating Systems (TOS) to completely halt container loading and unloading operations, subsequently demanding exorbitant ransoms. This is because the paralyzation of even a single major port can trigger a severe bottleneck effect across the entire global supply chain.

➤ **Evolution of cyber-attacks in the maritime industry**

Cyber-attacks on the maritime industry are unfolding along two primary axes:

- ①. “Direct attacks”- aimed at seizing physical control of vessels and
- ②. “Supply chain attacks” - designed to paralyze the broader maritime ecosystem.

In particular, as the digitization of ships increases the integration points between satellite communications and OT (Operational Technology) systems, attack patterns that were previously limited to simple data theft are now evolving into destructive forms that disrupt actual navigation or trigger catastrophic physical incidents. For the two types of cyber-attack above, common patterns in shipping attacks and related cases are shown in [Table 1](#) below.

Table 1 Cyber-attacks on maritime vessels and supply chain attacks

Attack axes	Attack Characteristics	Attack Methods	Impacts	Cases
Cyber Attacks Targeting Vessels	Vulnerabilities in Satellite Communication (VSAT) systems	Weak credential management and outdated firmware	Disruption of communication between the vessel and shore-based facilities	Iranian vessels by Lab Dookhtegan in 2025, with two waves happening in March and August, the communications of approximately 180 vessels were paralyzed.
	GPS/GNSS Spoofing attacks	Transmitting forged signals to interfere with navigation equipment	Causing vessels to deviate from planned routes, leading to collisions or groundings	- Grounding of the Meghna Princess in December 2024 - Grounding of the <u>Container</u> MSC Antonia in May 2025 at the Red Sea - Collision between Adalynn and Front Eagle in June 2025
	Direct attacks on Operational Technology (OT) systems	Exploiting outdated operating systems and insufficient network segmentation	Tampering with Electronic Chart Display (ECDIS) or remote takeover of critical systems	GNV ferry Fantastic was infected with a Remote Access Trojan (RAT) in December 2025
Supply Chain Attacks	Targeting shipyards and maritime equipment manufacturers	Infiltrating subcontractors to eventually breach primary shipyards	Theft of core design secrets or encrypting/disrupting production lines	Hacker groups (such as the North Korean APT and RansomHub ransomware group) steal core design secrets
	Attacks on Terminal Operating Systems (TOS)	Paralysis of cargo handling systems and logistics data	Stagnation of container operations, triggering global supply chain bottlenecks	- Large-scale ransomware attacks at major hub ports in Europe and North America - In Feb. 2022, oil port terminals in Western Europe were hit by the BlackCat ransomware
	Attacks launched through software and communication service providers	Planting malware into update servers or management tools	Spreading malicious code to tens of thousands of vessels globally	In Sep. 2019, SolarWinds was hacked, and malicious code was implanted into the Orion system. After customers installed malicious code update programs, hackers took advantage of this opportunity to steal data and monitor other organizations.

● The Impact of Cyber Threats on Offshore Operations and RIN-related Suggestions

[The Royal Institute of Navigation \(RIN\)](#) released a report in January 2026 titled "[Impacts of GNSS Interference on Maritime Safety](#)." The report highlights that the maritime industry's reliance on Global Navigation Satellite Systems (GNSS) has become so widespread and deeply integrated that it requires urgent and careful management. According to the survey, 75% of experts believe that GNSS interference shows no signs of improvement. In regions such as the Baltic Sea, the Red Sea, and the Strait of Hormuz, hundreds or even thousands of vessels are affected daily.

➤ Key areas requiring urgent attention include:

1. Equipment mandated by the Global Maritime Distress and Safety System (GMDSS) and the International Convention for the Safety of Life at Sea (SOLAS) relies primarily on GNSS for positioning and timing. These systems currently possess significant security vulnerabilities.
2. Operating GMDSS and SOLAS equipment within known GNSS interference zones poses severe safety and legal liability risks, as such devices are highly susceptible to malfunction or abnormal operation in these areas.
3. Existing evidence indicates an excessive reliance on GNSS receivers across various electronic systems on modern vessels. Many of these systems, including Radar, VHF/MF/HF radios, NAVTEX, Speed Logs, Marine Chronometers, and Satellite Communication systems, do not actually require GNSS data to perform their primary functions.

➤ Relevant recommendations provided by the RIN report include:

1. Addressing GNSS Spoofing Vulnerabilities in SOLAS-Mandated Equipment

(1) **Current Risks:** Safety systems mandated by the International Maritime Organization (IMO), such as GMDSS, EPIRB, AIS-SART, and MOB (Man Overboard) distress buttons, are currently highly vulnerable to GNSS spoofing attacks. If satellite signals are forged, rescue equipment will fail to operate as designed, leading to search-and-rescue delays, threatening seafarers' lives, and potentially causing environmental damage.

(2) Actionable Countermeasures:

- **Manufacturer Assessments:** Equipment suppliers should immediately assess product vulnerabilities and proactively inform ship operators of the associated risks.
- **Revision of International Standards:** Urge the IMO to collaborate with the International Electrotechnical Commission (IEC) to establish regulations for hardware standards that enhance equipment resilience against interference and spoofing.

2. Integration into the World-Wide Navigation Warning Service (WWNWS)

(1) **Reporting Mechanism:** All NAVAREA Coordinators should categorize GNSS interference as a "New Navigational Hazard" or a "Major Failure of a Radio Navigation Service."

- (2) **Compliance Basis:** In accordance with the joint IMO/IHO/WMO Manual on Maritime Safety Information (MSI), interference incidents should be broadcast immediately via navigational warnings to ensure vessels in affected waters receive timely alerts.

3. Establishing Real-Time Global GNSS Monitoring and Dynamic Mapping

- (1) **Situational Awareness:** Develop a global real-time monitoring system to provide mariners with dynamic data for effective passage planning.
- (2) **Technical Integration:** Utilize the International Hydrographic Organization (IHO)'s new S-100 Data Standards to overlay GNSS interference layers directly onto Electronic Chart Display and Information Systems (ECDIS), enabling visualized management of the navigation environment.

4. Optimizing Universal GNSS Receiver Design and Verification

- (1) **Design Improvements:** The industry should adopt more resilient receiver architectures, specifically strengthening signal verification for safety-critical applications.
- (2) **Anticipated Outcomes:** These measures will significantly reduce the success rate of simple spoofing attacks and mitigate the threats posed by existing interference technologies to navigation systems.

5. Hardware-Level Removal of Unnecessary GNSS Signal Interdependencies

- (1) Hardware manufacturers should remove redundant inter-system connections to prevent the transmission of erroneous timing or positioning data—derived from spoofed GNSS receivers—to other shipborne systems.
- (2) Through system isolation, ensure that the compromise of a single navigation signal does not trigger a collective failure of the vessel's entire suite of electronic equipment.

Other References:

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https://download.cytur.net/Maritime_Cyber_Threat_White_Paper_2026_eng.pdf
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➤ International Maritime Organization Meeting Highlights

I. IMO Sub-Committee on Human element, Training and Watchkeeping (HTW), 12th session (HTW 12)

The 12th session meeting of the HTW sub-committee was held from February 23rd to 27th, 2026.

1. About IMO HTW¹

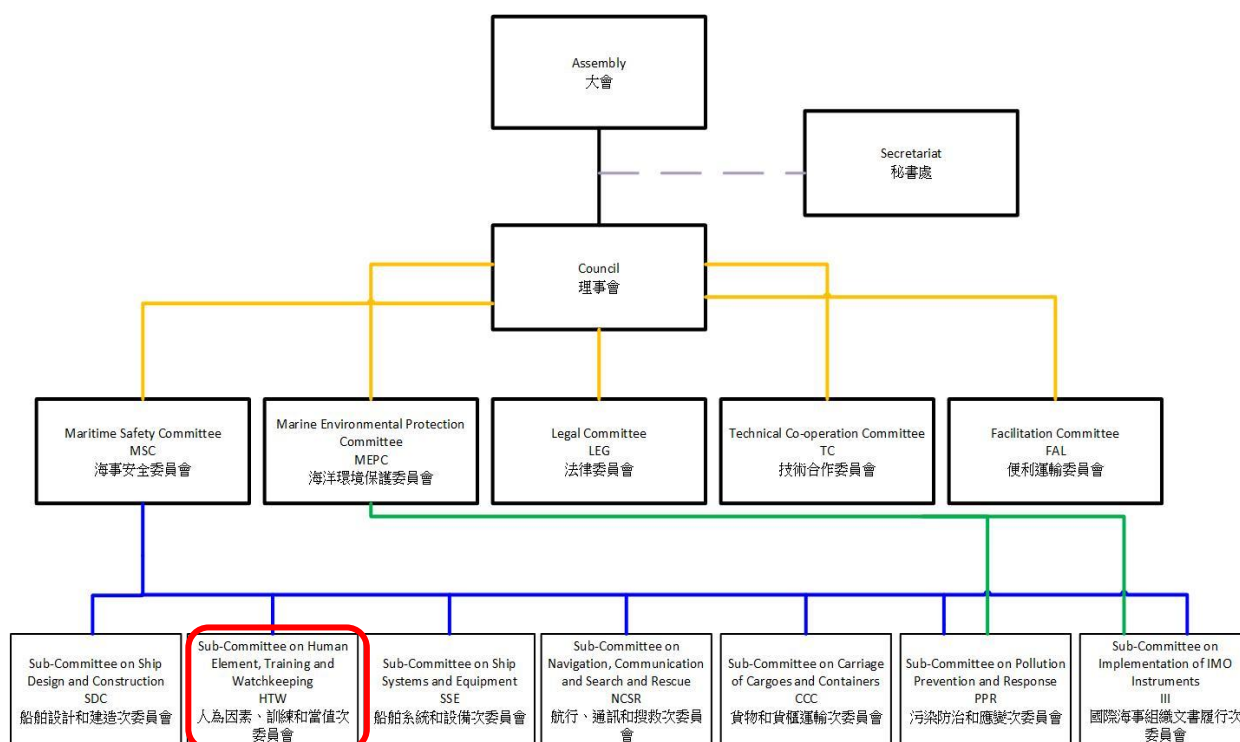


Figure 1 Organization Structure of IMO (HTW) (Source: by CIMCS-NKUST)

The IMO Sub-Committee on Human Element, Training and Watchkeeping (HTW) mainly manages matters related to the human side of shipping, including training and certification; the review, updating, and revision of IMO model courses; and guidance addressing issues such as fatigue.

2. HTW 12 Highlights

- (1) Finalized developing the drafts on *Interim guidelines for the safety of ships using methyl/ethyl alcohol as fuel*, and the *Interim guidelines for the safety of ships using ammonia as fuel*;

¹ IMO. Sub-Committee on Ship Design and Construction (HTW).
<https://www.imo.org/en/mediacentre/meetingsummaries/pages/sdc-default.aspx>

- (2) Continue working on the review of the STCW Convention and Code;
- (3) Launching the work of the Scoping exercise and enhancement of the effectiveness of provisions on fatigue and seafarers' hours of work and rest standard;
- (4) Completed some of the verification work of multiple IMO Model Courses to assist course developers in planning and designing crew training programs.

3. HTW 12 Agenda²

Item No.	Agenda
1	Adoption of the agenda
2	Decisions of other IMO bodies
3	Validated model training courses
4	Role of the human element
5	Reports on unlawful practices associated with certificates of competency
6	Comprehensive review of the 1978 STCW Convention and Code
7	Development of a safety regulatory framework to support the reduction of GHG emissions from ships using new technologies and alternative fuels
8	Scoping exercise and enhancement of the effectiveness of provisions on fatigue and seafarers' hours of work and rest
9	Biennial status report and provisional agenda for HTW 13
10	Election of Chair and Vice-Chair for 2027
11	Any other business
12	Adoption of the agenda

4. HTW 12 Meeting Summaries³

HTW 12 was held from 23 to 27 February 2026, at the IMO Headquarters in London, UK. The meeting is held in person with hybrid participation and livestreamed to the public.

The meeting established 3 working groups: one responsible for the Comprehensive

² IMO. HTW meeting document HTW 12/1/1.

³ DNV. IMO Sub-Committee on Human Element, Training and Watchkeeping (HTW 12). 03 March 2026.
<https://www.dnv.com/news/2026/imo-sub-committee-on-human-element-training-and-watchkeeping-htw-12/>;
 IMO. Sub-Committee on Human Element, Training and Watchkeeping (HTW 12) - Opening remarks.
<https://www.imo.org/en/mediacentre/secretarygeneral/pages/htw12-opening-remarks.aspx>

review of the 1978 STCW Convention and Code (agenda 6), another for the STCW oversight and verification processes (agenda 6), and the other on the Development of training provisions for seafarers on ships using alternative fuels and technologies (agenda 7).

The two Drafting Groups, one on Drafting Group on Model courses (agenda 3) and another on Scoping exercise of fatigue-related provisions (agenda 8)⁴.

Group Type	Main Task
Working Group (WG)	- WG1: responsible for the Comprehensive review of the 1978 STCW Convention and Code (agenda 6) - WG 2: responsible for the STCW oversight and verification processes (agenda 6) - WG 3: working on the Development of training provisions for seafarers on ships using alternative fuels and technologies (agenda 7)
Drafting Group (DG)	- DG 1: working on Drafting Group on Model courses (agenda 3) - DG 2: working on Scoping exercise of fatigue-related provisions (agenda 8)

(1) Validated model training courses (Agenda Item 3)

HTW 12 had validated the following IMO Model Courses:

- ①. 1.21 "Personal Safety and Social Responsibilities";
- ②. 1.37 "Chemical Tanker Cargo and Ballast Handling Simulator";
- ③. 2.06 "Oil Tanker Cargo and Ballast Handling Simulator."

Within Model Course 1.21, a new competence has been incorporated: "Contribute to the prevention of and response to bullying and harassment, including sexual harassment, bullying, and sexual assault." This competence requirement has also become an integral component of all new versions of Basic Safety courses.

Regarding the tanker-related courses (1.37 and 2.06), the review process identified

⁴ Refer to IMO HTW meeting document HTW 12/1/2.

overlaps with other Model Courses that should be integrated during future revisions.

Furthermore, additional measures have been proposed to strengthen expert participation in the IMO Model Course review process. Interested parties are encouraged to express their interest to their respective Flag State administrations to support the review mechanism and apply for inclusion in the relevant expert groups.

(2) STCW oversight and verification processes (Agenda Item 6) ⁵

At the HTW session 12th, the sub-committee continued its work on strengthening and integrating the STCW oversight mechanism with the IMO Member State Audit Scheme (IMSAS). Mainly considerate of:

- ①. The specific role of qualified personnel and STCW experts within IMSAS audit teams;
- ②. Enhancing the effectiveness and robustness of the so-called "White List" system, including establishing a connection mechanism for audit findings related to STCW
- ③. Aligning the reporting mechanisms of the STCW framework with those of IMSAS.

This work will be further advanced by a Correspondence Group and is expected to continue through HTW 13, scheduled for 2027.

(3) Comprehensive review of the 1978 STCW Convention and Code (Agenda item 6)

The STCW Convention and Code establish global minimum standards for the training, certification, and watchkeeping of seafarers. HTW 12 continued the comprehensive review of the Convention and Code to address systemic inconsistencies and modernize regulations in line with practical experience and emerging technological advancements.

More than 500 identified gaps were recognized as requiring action during Phase 1. Phase 2 will focus on drafting the necessary amendments. A significant number of proposals were submitted for deliberation prior to this session.

The comprehensive review process officially commenced at this meeting and will continue through an intersessional working group. HTW 12 had established the framework for Phase 2, with core topics including simulator training, updated Search and Rescue (SAR) requirements, non-technical skills, and digital verification mechanisms. Draft amendments to Chapters II (Master and Deck Department) and Chapter III (Engine Department) of the STCW Convention and Code will be developed to address the identified gaps.

⁵ 可參考文件：HTW 12/6/20、HTW 12/INF.13、HTW 12/6/36、HTW 12/6/102。

- ①. Key issues currently under discussion for potential inclusion in the future revisions of the STCW Convention and Code include:
- ②. How can we more clearly define the circumstances under which training courses must be approved by the Administration (Maritime Authority)?
- ③. What proportion of celestial navigation training should still be retained in the modern navigation environment?
- ④. Can the seagoing time be partially replaced by structured simulator training?⁶
- ⑤. Is the current training in the Electronic Chart Display and Information System (ECDIS) sufficient?
- ⑥. How can we ensure that the seafarers possess the necessary knowledge of ballast water management (BWM)?
- ⑦. What new teaching and training methods will be recognized within the STCW framework?
- ⑧. Does leadership training reflect modern concepts, such as cultural sensitivity, mental health issues, and modern communication methods?
- ⑨. Are the requirements of existing competency for shipboard maintenance sufficient?
- ⑩. How to update the competency standards related to "new fuels"?
- ⑪. What digital skills should future sailors possess?

The comprehensive review is scheduled for completion in 2029, with the revised STCW Convention and Code expected to enter into force in 2032.

(4) Development of a safety regulatory framework to support the reduction of GHG emissions from ships using new technologies and alternative fuels (Agenda item 7)

The Maritime Safety Committee (MSC) has conducted a comprehensive safety review of alternative fuels and emerging technologies intended to support maritime greenhouse gas (GHG) emissions reduction. This assessment identified critical safety barriers, institutional constraints, and regulatory gaps within existing IMO instruments that could impede their implementation. To facilitate the secure adoption of these innovations, the MSC has delegated specific recommendations to relevant Sub-Committees for technical deliberation.

⁶ Although each party remain diverse point of view, the current STCW Convention already grants Administrations the authority to approve alternative training arrangements, and several countries have implemented such practices. However, there is a distinct lack of harmonized criteria and consistent safeguards.

Pursuant to its terms of reference, the HTW Sub-Committee is tasked with developing training guidelines for seafarers operating with alternative fuels and new technologies, particularly as interim guidelines for various fuel types are progressively adopted. In parallel, other Sub-Committees are advancing technical standards within their respective mandates. The HTW will ensure its output is aligned with these evolving technical specifications to propose robust training standards. HTW 12 continues to advance the formulation of seafarer training guidelines:

①. **Draft Interim Guidelines on Training for Seafarers on Ships Using Methyl/Ethyl Alcohol as Fuel**

The draft interim guidelines for training seafarers on ships using methyl/ethyl alcohol (methanol/ethanol) as fuel have been finalized and are expected to be submitted to MSC 111 in May 2026 for approval. These guidelines are fundamentally based on training standards for LNG-fueled ships and utilize [STCW.7/Circ.25](#), *Generic Interim Guidelines on Training for Seafarers on Ships Using Alternative Fuels and New Technologies*, as the primary framework.

The objective of these guidelines is to establish training standards for crew members serving on ships subject to [MSC.1/Circ.1621](#), *Interim guidelines for the safety of ships using methyl/ethyl alcohol as fuels*. The document further clarifies the relationship between fuel-specific guidelines and generic guidelines to prevent these interim provisions from being misinterpreted as standalone mandatory standards.

②. **Draft Interim Guidelines on Training for Seafarers on Ships Using Ammonia as Fuel**

The draft interim guidelines for training seafarers on ships using ammonia as fuel have also been finalized for submission to MSC 111. Similar to the methanol/ethanol guidelines, this framework is based on LNG training standards and follows STCW.7/Circ.25. The guidelines aim to establish corresponding training standards for vessels complying with [MSC.1/Circ.1687](#), *Interim guidelines for the safety of ships using ammonia as fuel*.

Given the "one ship, one code" principle currently applied to vessels under the *International Code of Safety for Ship Using Gases or Other Low-flashpoint Fuels* (IGF Code) and the *International Code of the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk* (IGC Code), and HTW 12 has requested the MSC to consider how seafarer training standards should apply to vessels using fuels covered by these interim guidelines. This issue is particularly relevant to gas carriers using ammonia as both cargo and fuel.

Additionally, the technical standards for such vessels—the *Interim guidelines for the use of anhydrous ammonia as cargo fuel*—will also be submitted to MSC 111 for approval. However, at this stage, it remains unclear whether the aforementioned seafarer training guidelines will apply to the crews of these specific vessels.

③. Development of Training Requirements for Other Technologies and Fuels

HTW 12 has approved a work plan extending to 2029 to develop seafarer training requirements, prioritized as follows:

- (I) Hydrogen Fuel Cells
- (II) Liquefied Petroleum Gas (LPG)
- (III) Hydrogen
- (IV) Battery Power
- (V) Wind Propulsion Systems and Wind-Assisted Power

This work plan is a "live document," which will be continuously reviewed and updated during future HTW sessions to reflect actual progress and emerging priorities.

HTW 12 had confirmed that the development of training requirements should, in principle, align with the progress of safety regulations for related fuels or technologies spearheaded by other IMO Sub-Committees. In other words, the establishment of training standards must be predicated on the concrete development of technical safety specifications. As these safety codes are finalized, corresponding training requirements will be integrated into the work plan. Consequently, the overall timeline is highly likely to extend beyond 2029, expanding alongside technological advancements.

Therefore, a Correspondence Group was established to continue the drafting of fuel-specific interim training guidelines for these alternative fuels and new technologies prior to HTW 13 in 2027.

The aforementioned work plan also incorporates necessary amendments identified within the Comprehensive Review of the STCW Convention and Code. The current STCW framework was designed under the assumption that the vast majority of vessels utilize diesel-based fuels (HFO/VLSFO/MGO) as their primary energy source. While reasonable at the time of drafting, this premise is gradually losing its universal applicability as alternative fuels and emerging technologies are commercialized and adopted.

Therefore, a systematic revision of the STCW Convention and Code is an institutional necessity rather than an option. Specifically, within the frameworks of "Standards of Competence" and "Knowledge, Understanding, and Proficiency (KUP)," a failure to adjust the underlying energy-technology assumptions will result in a disconnect between regulations and training practices. According to the current schedule, amendments to the general competencies and KUPs in Chapter II (Master and Deck Department), Chapter III (Engine Department), and Chapter V (Special Training Requirements for Personnel on Certain Types of Ships) are slated for completion in 2028, to be considered as part of the STCW Comprehensive Review process.

(5) The validity of regulations concerning crew fatigue and seafarer working and rest hours (Agenda item 8)

A scoping exercise aimed at strengthening the effectiveness of provisions regarding seafarer fatigue and hours of work and rest has officially commenced. This initiative is deemed essential, as numerous empirical studies and maritime casualty investigations indicate that fatigue remains pervasive within the shipping industry. Key issues identified include the falsification of work and rest hour records, imbalances in workload distribution, and limitations in inspection and enforcement practices. Such phenomena highlight the persistent practical difficulties and systemic challenges encountered in implementing and enforcing fatigue-related regulations.

Following instructions from the MSC committee, HTW 12 has formally launched the scoping exercise to evaluate whether the current regulatory framework remains effective and aligned with operational realities. The work will involve a holistic review of relevant IMO instruments, the STCW Convention and Code, and the Maritime Labour Convention (MLC, 2006), and an assessment of the overall implementation and enforcement of these integrated systems.

At this stage, the relevant documentation required for the subsequent review has been categorized into the following four lists:

- ①. Submissions to the IMO that contribute to the understanding of issues and concerns related to seafarer fatigue and hours of work and rest;
- ②. IMO instruments specifically governing seafarer fatigue and hours of work and rest provisions;
- ③. Instruments from other United Nations agencies, including but not limited to the International Labour Organization (ILO), which directly or indirectly impact IMO regulations on seafarer fatigue and hours of work and rest;
- ④. Other documents of international interest that facilitate a holistic understanding of the subject matter.

The objective of this work extends beyond identifying regulations that may require revision; it also includes examining the practical implementation of existing provisions, such as workload, safe manning levels, methods for recording work and rest hours, and compliance oversight mechanisms. Furthermore, the Sub-Committee noted that conclusions from studies on the effectiveness of the International Safety Management (ISM) Code are of significant reference value, particularly regarding company responsibilities, resource allocation, and safety culture factors influencing fatigue management.

This work will continue through a Correspondence Group during the intersessional period, with the review expected to be completed prior to HTW 13 in February 2027. The goal is to identify and address regulatory gaps in instruments related to seafarer fatigue and hours of work and rest, as well as challenges hindering their effective enforcement. The

overall work is expected to be completed in 2027.

5. Recommendation for HTW 12

(1) Strategic Preparation for Alternative Fuel Training Standards

With the finalized draft of the *Interim Training Guidelines for Methanol/Ethanol and Ammonia-Fueled Ships* at HTW 12 and the scheduled development of training requirements for hydrogen fuel cells, LPG, hydrogen, battery power, and wind-assisted propulsion, it is recommended that the Administration closely monitor the evolution of these standards. An assessment should be conducted to determine whether current seafarer training systems and course frameworks require preemptive adjustments.

As vessels using alternative fuels increasingly enter commercial service, professional competency requirements—particularly in fuel safety, risk identification, and emergency response—will intensify. A collaborative approach involving government, industry, and academia is suggested to outline future training curricula, ensuring seamless alignment with emerging international frameworks.

(2) Monitoring the STCW Comprehensive Review and Simulation Integration

As HTW 12 continues to advance the Comprehensive Review of the STCW Convention and Code, significant institutional adjustments are expected regarding competency standards, the application of simulator training, and emerging risk domains. The Administration is advised to track these regulatory developments and evaluate the necessary adjustments to the domestic seafarer training system.

Specifically, the proposal to substitute a portion of sea-going service with simulator training could fundamentally impact the current training hierarchy and onboard internship structures. It is recommended to proactively gather international best practices and conduct policy analysis to serve as a reference for future institutional realignments.

(3) Evaluating Provisions on Seafarer Fatigue and Work/Rest Hours

HTW 12 has launched a scoping exercise to review the effectiveness of regulations concerning seafarer fatigue and hours of work and rest, encompassing a holistic review of both the STCW and the MLC. Given that this issue involves complex operational factors such as safe manning, workload distribution, and enforcement mechanisms, the Administration should remain engaged with the IMO's deliberations.

Furthermore, it is advisable to collect feedback from the domestic shipping industry to ensure that future international regulatory amendments or policy adjustments strike a balance between maritime operational realities and the protection of seafarer working environments.

6. Next Meeting Schedule

HTW 13 may be held next Spring in 2027.

7. References

- (1) BIMCO, HTW 12: IMO advances seafarer training and launches new fatigue management initiative. <https://www.bimco.org/news-insights/bimco-news/2026/03/03-htw/>
- (2) Det Norske Veritas (DNV), IMO Sub-Committee on Human Element, Training and Watchkeeping (HTW 12). <https://www.dnv.com/news/2026/imo-sub-committee-on-human-element-training-and-watchkeeping-htw-12/>
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- (5) Lloyd's Register (LR), HTW 12 Summary Report. <https://maritime.lr.org/HTW-12-Summary-Report>
- (6) Safety4Sea, IMO HTW 12: Key outcomes. <https://safety4sea.com/imo-htw-12-key-outcomes/>

II. IMO Sub-Committee on Ship Systems and Equipment (SSE), 12th session (SSE 12)

IMO 12th session meeting of the Sub-committee SSE is held from 9th to 13th March 2026 at IMO Headquarters in London.

1. About IMO SSE⁷

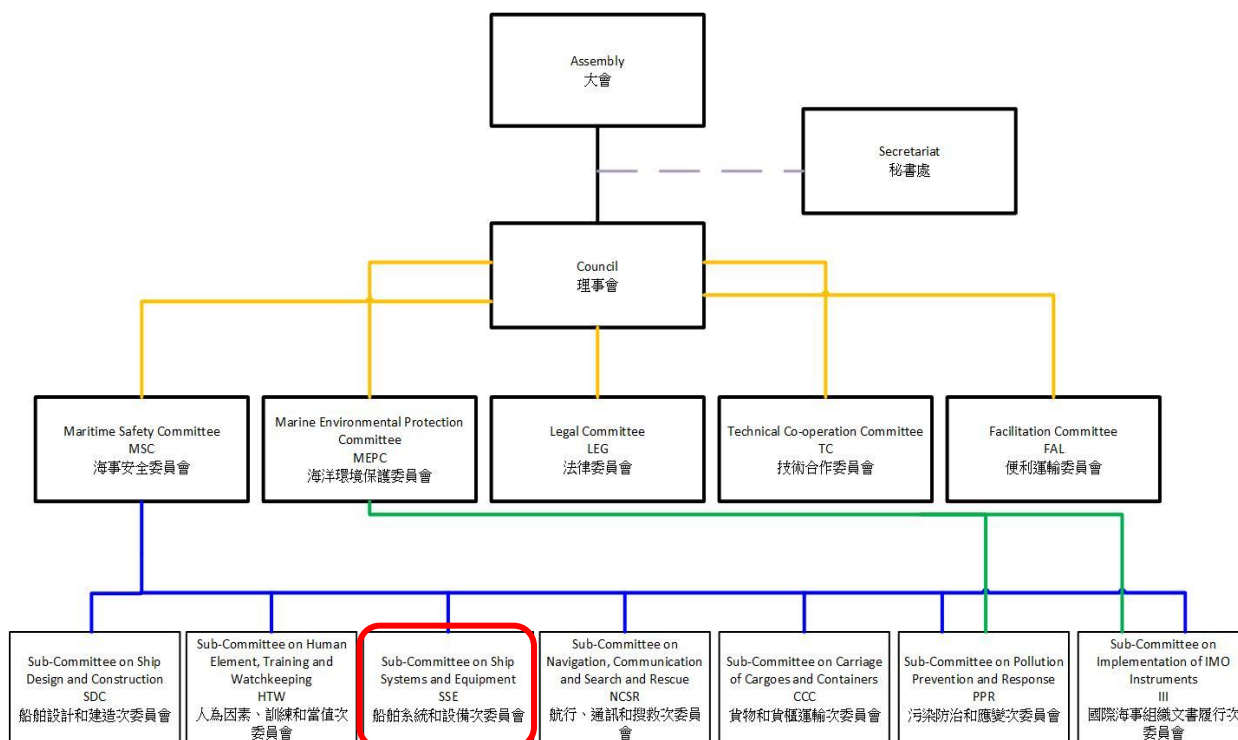


Figure 2 Organization Structure of IMO (SSE) (Source: by CIMCS-NKUST)

SSE is one of the seven sub-committees operating under the purview of the five main committees within the International Maritime Organization (IMO).

SSE is responsible for addressing all matters relating to systems and equipment on all types of ships, vessels, craft, and mobile units covered by IMO instruments. This includes life-saving equipment, appliances, and arrangements; and fire detection and fire extinguishing systems.

2. SSE 12 Highlights

- (1) **Finalized the Draft Amendments to SOLAS Regulation II-2/9 "Containment of Fire": Incorporating existing guidelines and clarifying specific regulatory**

⁷ IMO. Sub-Committee on Ship Systems and Equipment (SSE).
<https://www.imo.org/en/mediacentre/meetingsummaries/pages/sse-default.aspx>

requirements.

- (2) **Development of New Ventilation Requirements for Partially Enclosed Lifeboats:** Establishing standards to ensure air quality and safety within these crafts.
- (3) **Advancement of Amendments to SOLAS Chapter III and the International Life-Saving Appliance Code (LSA Code) Chapter IV:** Mandating that newbuilds be equipped with automatically self-righting or canopied reversible liferafts.
- (4) **Strengthening Fire Safety for Container Ships:** Drafting amendments to SOLAS Chapter II-2 and the *International Life-Saving Appliance Code* (FSS Code) to enhance fire detection and control in cargo holds and on-deck cargo areas, including requirements for portable infrared thermal imagers and water mist lances.
- (5) **Updating the 2010 FTP Code:** Progressing draft amendments to the *International Code for Application of Fire Test Procedures* (FTP Code) to address new fire protection systems and materials, including the finalization of non-mandatory testing procedures for plastic piping.
- (6) **Fire Risk Mitigation for new energy vehicles/battery-electric vehicles (BEVs):** Evaluating the adequacy of fire protection, detection, and extinction arrangements in vehicle, special category, and Ro-Ro spaces to reduce risks associated with transporting energy vehicles/BEVs.
- (7) **Established a work plan to develop safety regulations supporting new technologies and alternative fuels** for Greenhouse Gas (GHG) reduction, including the drafting of interim guidelines for ships utilizing battery energy storage systems (BESS).

3. SSE 12 Agenda⁸

Item No.	Agenda
1	Adoption of the agenda
2	Decisions of other IMO bodies
3	New requirements for ventilation of survival craft
4	Revision of the Revised guidelines for the maintenance and inspections of fixed carbon dioxide fire-extinguishing systems (MSC.1/Circ.1318/Rev.1) to clarify the testing and inspection provisions for CO2 cylinders
5	Revision of SOLAS chapter III and the LSA Code
6	Amendments to SOLAS chapter III and chapter IV of the LSA Code to require the carriage of self-righting or canopied reversible liferafts for new ships
7	Development of amendments to paragraph 2.1.2.5 of chapter 5 of the FSS Code on construction requirement for gaskets

⁸ IMO. SSE 12 meeting document SSE 12/1/1 . .

Item No.	Agenda
8	Revision of the 2010 FTP Code to allow for new fire protection systems and materials
9	Review and update SOLAS regulation II-2/9 on containment of fire to incorporate existing guidance and clarify requirements
10	Unified interpretation of provisions of IMO safety, security, environment, facilitation, liability and compensation-related conventions
11	Validated model training courses
12	Development of amendments to SOLAS chapter II-2 and the FSS Code concerning the detection and control of fires in cargo holds and on the cargo deck of containerships
13	Development of provisions to consider prohibiting the use of fire-fighting foams containing fluorinated substances, in addition to PFOS, for fire-fighting on board ships
14	Comprehensive review of the Requirements for maintenance, thorough examination, operational testing, overhaul and repair of lifeboats and rescue boats, launching appliances and release gear (resolution MSC.402(96)) to address challenges with their implementation
15	Amendments to the LSA Code for thermal performance of immersion suits
16	Evaluation of adequacy of fire protection, detection and extinction arrangements in vehicle, special category and ro-ro spaces in order to reduce the fire risk of ships carrying new energy vehicles
17	Development of a safety regulatory framework to support the reduction of GHG emissions from ships using new technologies and alternative fuels
18	Biennial status report and provisional agenda for SSE 13
19	Election of Chair and Vice-Chair for 2027
20	Any other business
21	Report to the Maritime Safety Committee

4. SSE 12 Meeting Summaries⁹

The 12th session of the IMO SSE sub-committee (SSE 12) was held from 9th to 13th March 2026 at the IMO headquarters in London, UK, and was supported by hybrid facilities for remote participation. SSE 12 had established 3 Working Groups, and 1 Drafting Group, each responsible for different tasks.

Group Type	Main Task
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⁹ Lloyd's Register (LR). SSE 12 Summary Report. <https://maritime.lr.org/SSE-12-Summary-Report>.
Det Norske Veritas (DNV). IMO Sub-Committee on Ship Systems and Equipment (SSE 12).
<https://www.dnv.com/news/2026/imo-sub-committee-on-ship-systems-and-equipment-sse-12/>

Working Group(WG)	• WG1: Working Group on Life-Saving Appliances (Agenda items 3, 5, 6, 14, and 20); • WG 2: Working Group on Fire Protection (Agenda items 4, 8, 9, 12, 13, and 16); • WG 3: Working Group on Development of a GHG Safety Framework (Agenda item 17).
Drafting Group (DG)	• DG 1: Drafting Group on Model courses (Agenda item 11)

(1) New requirements for ventilation of partially enclosed lifeboats (PELBs) (Agenda Item 3)

MSC 107 has adopted amendments to the International Life-Saving Appliance Code (LSA Code) that mandate that totally enclosed lifeboats be equipped with a ventilation system. These amendments entered into force on January 1, 2026, and apply to lifeboats installed on or after January 1st, 2029.

SSE 12 had progressed draft amendments to **Chapter IV of the LSA Code** and *the Revised Recommendation on Testing of Life-saving Appliances* ([Resolution MSC.81\(70\)](#)). The proposed addition of **paragraph 4.5.5** aims to extend similar ventilation requirements to **partially enclosed lifeboats**. These lifeboats must possess sufficient ventilation capacity to maintain CO₂ concentrations below **5,000 ppm** when all entrances are closed, taking into account the total number of persons the lifeboat is certified to carry. This requirement must be achieved through one of the following methods:

- ①. Implementation of a forced/mechanical ventilation system, providing a minimum airflow of 5 m³/hour per person for a continuous duration of at least 24 hours; or
- ②. Installation of ventilation openings at both ends of the lifeboat, positioned as high as practicable, with a total cross-sectional area of at least 0.015 m² per person; or
- ③. Adoption of other suitable arrangements to ensure that CO₂ concentrations do not exceed 5,000 ppm.

Furthermore, SSE 12 has instructed the Correspondence Group to develop corresponding amendments to [MSC.1/Circ.1630/Rev.3](#) prior to the convening of SSE 13 in 2027.

(2) Revision of *the Revised guidelines for the maintenance and inspections of fixed carbon dioxide fire-extinguishing systems* (MSC.1/Circ.1318/Rev.1) (Agenda Item 4)

SSE 12 completed finalizing the draft amendment to [Circular MSC.1/Circ.1318/Rev.1](#)¹⁰,

¹⁰ The 1st revision of the circular, issued in 2010, redefined the hydrostatic testing regime: After 10 years in service, 10%

mainly clarifying the requirements for regular testing of CO2 cylinders, pressure (water pressure) tests, and test dates, to avoid inconsistencies in the implementation of testing and inspection among countries. The revised contents include:

- ①. New annual inspection requirements for all CO2 hoses, and clear labeling regulations for control valves have been added
- ②. Clarification of Minimum Recommended Maintenance
 - Periodic Hydrostatic Testing: Each cylinder must undergo a hydrostatic test at intervals not exceeding 10 years from the date of the previous test.
 - Pressure Relief Valves: Valves located within closed piping sections must undergo operational pressure testing.
 - Component Post-Service Testing: Following any repair, replacement, or modification, all components of fixed CO2 fire-extinguishing systems (such as cylinder valves and control valves) must undergo corresponding testing and inspection.

The amendment is expected to be adopted in the 112th session of the Maritime Safety Committee (MSC 112) in December 2026, and it is recommended that member States apply the relevant guidelines at least 12 months after the circular is issued

(3) Revision of SOLAS chapter III and the LSA Code (Agenda Item 5)

SSE 12 deliberated on the revision of the functional and performance requirements of SOLAS Chapter III using a Goal-Based Standards (GBS) approach, including the prioritization of work items and the timelines required for their completion.

However, due to time constraints, the following work items have not yet been progressed:

- ①. **Review of Phase I "Alarms"**: Incorporating the feedback and comments provided by the Correspondence Group during **Phase II "Proceed to Embarkation"**; and
- ②. **Development of Requirements for Phases IV to VI**: Establishing the necessary functional requirements and expected performance standards for the subsequent Phases: **"Abandoning to safe position," "Waiting for rescue," and "Retrieval from survival craft."**

The uncompleted items will be continuously advanced by the Correspondence Group. Additionally, the meeting agreed to recommend MSC 112 (December 2026) to establish an Intersessional Working Group following SSE 13 to accelerate the progress of these related tasks.

With assessment, the scope of application of the revised SOLAS Chapter III and the LSA

of the total number of cylinders must be tested. At the 20-year and 30-year marks, a 100% test of all cylinders is required. This ensures that every cylinder undergoes testing within each 10-year cycle.

Code is expected to remain unchanged, continuing to apply to cargo ships of 500 gross tonnage and upwards, and to all passenger ships. The earliest estimated date for entry into force will be no sooner than January 1st, 2032.

(4) Requirements for new ships to be equipped with self-righting or canopied reversible liferafts (Agenda Item 6)

SSE 12 continues to advance amendments to SOLAS Chapter III¹¹ and Chapter IV of the LSA Code¹², with the objective of requiring all newly constructed passenger and cargo ships from January 1st, 2032, to be equipped with automatically self-righting or canopied reversible life-rafts. However, liferafts with a carrying capacity of 12 persons or fewer (regardless of whether they are davit-launched) are exempt from this requirement.

Regarding transitional arrangements, a consensus has been reached in principle: following the entry into force of the new regulations, a grace period of 3 years for passenger ships and 5 years for cargo ships will be granted. This is to ensure an adequate supply of liferafts and to provide vessels with sufficient time for installation. These amendments are expected to enter into force no earlier than January 1st, 2032.

(5) Development of amendments to paragraph 2.1.2.5 of Chapter 5 of the FSS Code on construction requirements for gaskets (Agenda Item 7)

SSE 12 had agreed to amend **paragraph 2.1.2.5 of Chapter 5 of the FSS Code ("Fixed Gas Fire-extinguishing Systems")** to exclude gaskets from the requirement that components be manufactured using materials with a melting point higher than 925°C. This amendment will apply to both newbuilds and existing vessels. It is expected to be approved at MSC 112 and subsequently adopted at MSC 113 (2027).

¹¹ Draft Amendments to SOLAS Chapter III (Life-saving Appliances and Arrangements):

- (1) New Application Clause: A new provision has been added to clearly establish the baseline as "ships constructed on or after [date]," reflecting that these new requirements apply strictly to newbuilds.
- (2) Retention of the "Replacement" Concept: The concept of "replaced on or after [date]" has been retained to ensure that existing vessels are not mandated to meet the new requirements when simply replacing their existing liferafts.

¹² Draft Amendments to LSA Code Chapter IV (Survival Craft)

- (1) Amendment to Section 4.2.5 "Stability of Inflatable Liferafts": Automatically self-righting or canopied reversible liferafts are now specifically excluded from the scope of application of paragraphs 4.2.5.2 and 4.2.6.2.
- (2) Addition of Section 4.2-1 "Additional Requirements for Automatically Self-righting and Canopied Reversible Liferafts": This new section covers:
 - I. Stable and safe operational performance.
 - II. Self-draining arrangements.
 - III. Automatically self-righting capability.
 - IV. Requirement for a canopy structure on both sides of the main body.
 - V. Configuration requirements ensuring easy access to liferaft equipment.

(6) Revision of the 2010 FTP Code (Agenda Item 8)

SSE 12 reviewed the 2010 FTP Code¹³ and its associated fire test procedures to incorporate applications for new fire protection systems and materials. The meeting agreed upon the following:

- ①. SOLAS Regulation II-2/9.3.1 is not the appropriate regulatory location to address the application of plastic piping.
- ②. The unified interpretation of SOLAS Regulation II-2/9.3.1 contained in Circular [MSC.1/Circ.1120](#) has fulfilled its purpose and will be revoked upon the adoption of the revised FTP Code.

Furthermore, SSE 12 had completed the development of the following draft amendments:

- ①. The FTP Code will be amended to include new testing procedures for plastic piping in Annex 1, Part 6, with a footnote reference to paragraph 2.2 of *the Guidelines for the Use of Plastic Pipes on Ships* ([Resolution A.753\(18\)](#)).
However, as the FTP Code is a non-mandatory instrument and SOLAS does not yet regulate the application of plastic piping, separate amendments to the SOLAS Convention would be required to make these requirements mandatory.
- ②. Amendments to **Annex 1, Part 3** of the FTP Code were drafted to include testing procedures, application rules, and performance standards for “H-class divisions,” “Horizontal A-class hatches,” and “Multipurpose penetrations/transits.”

Ongoing work will be advanced by the Correspondence Group and is expected to be further discussed at SSE 13 in March 2027, while the relevant amendments are expected to come into effect on January 1st, 2032.

(7) To review and update SOLAS Regulation II-2/9 on “Containment of Fire” (Agenda Item 9)

SSE 12 continued to advance the review and revision of SOLAS Regulation II-2/9 to incorporate existing guidelines and clarify related requirements. This session reached the following agreements:

- ①. **Deferred Reference to MSC.1/Circ.917:** It was determined that referencing **MSC.1/Circ.917** (*Guidelines on Fire Safety Construction in Accommodation Areas*) in **SOLAS Regulation II-2/9.2.2.2.3** is currently inappropriate, as the circular requires further review and updating. This initiative must be progressed through a separate new output proposal.
- ②. **Regulatory Consistency for Dumb Waiters:** A draft amendment was agreed upon to harmonize regulations for “dumb waiters” across all ship types.

¹³ The International Code for Application of Fire Test Procedures, 2010 (2010 FTP Code) prescribes the test methods to be utilized by laboratories for the testing and evaluation of various products—including bulkheads, ceilings, doors, surface materials, and penetrations—to verify their compliance with the fire safety requirements of the SOLAS Convention.

- ③. **Update to Fire Integrity Tables (Tables 9.1 to 9.8):** The notes for the tables regarding the "**Fire Integrity of Bulkheads and Decks**" in SOLAS Regulation II-2/9 will be updated and reformatted to prevent confusion with existing SOLAS footnotes.
- ④. **Revision of Definitions (SOLAS Regulation II-2/3):** Adjustments to the definitions of "**accommodation spaces**" and "**service spaces**" were agreed upon to ensure greater clarity.
- ⑤. Phase out the Unified Interpretations that are no longer applicable: Circulars MSC.1/Circ.1203 (Unified Interpretation of SOLAS Regulation II-2/9.3.1) and MSC.1/Circ.1120 (Unified Interpretations of SOLAS Regulations II-2/9.4.1.1.8 and 9.7.3.1.2) have fulfilled their intended purposes and will be superseded and no longer applicable once the current revisions are finalized.

SSE 12 has agreed to the draft amendments, which integrate these existing guidelines directly into the SOLAS Convention. This ensures global consistency in implementation and establishes a single, definitive basis for compliance. The draft amendments for SOLAS Regulations II-2/3 and II-2/9 have been finalized and are expected to be approved at MSC 112, with formal adoption to follow at MSC 113.

(8) Draft Amendments to SOLAS Chapter II-2 and the FSS Code: Enhancing Fire Detection and Control for Container Ships (Agenda Item 12)

Recent fire incidents in container ship cargo holds have highlighted ongoing technical challenges in locating, controlling, and extinguishing fires, as well as operational issues such as mis-declared cargo. This session continued to advance draft amendments to SOLAS Chapter II-2 and the FSS Code to strengthen fire detection and control capabilities in both cargo holds and weather deck cargo areas.

①. New SOLAS Regulation II-2/7.11

SSE 12 finalized draft amendments to **SOLAS Regulation II-2/7 ("Detection and alarm")**, focusing on improving fire localization and confirmation for ships designed to carry containers on or above the weather deck. Key requirements include:

- **Portable Infrared Thermal Imagers: Mandatory provision, including specific requirements for quantity, storage, testing, and functional performance.**
- **Standards: Reference to relevant international or recognized standards.**
- **Application:** These requirements are expected to apply to ships constructed on or after **January 1st, 2032**.

②. Draft Amendments to SOLAS Regulation II-2/10.7.3.1 (Water Mist Lances)

Progress was made on the draft amendments to **SOLAS Regulation II-2/10.7.3.1**, specifically updating the carriage requirements for **water mist lances**:

- **Flexible Application:** The amendments to Regulation 7.3 introduce flexibility, allowing ships constructed between **January 1st, 2016, and January 1st, 2032**, to comply with the newer standards.
- **Mandatory Design:** For ships constructed on or after **January 1st, 2032**, it is explicitly mandated that all provided water mist lances must be of the **self-penetrating type**.

③. Draft Guidelines for Water Mist Lances

Draft guidelines have been formulated for the design, performance, testing, and approval of water mist lances intended for ships carrying containers on or above the weather deck. These guidelines address:

- **Extended Reach:** Requirements for extended operating distances.
- **Technical Specifications:** Definitions and core technical criteria, including corrosion resistance, operational methods, and extinguishing effectiveness.
- **Safety & Logistics:** Measures to reduce risks to firefighting personnel, along with requirements for operating manuals and transportability.

(9) Draft regulations prohibiting the use of fire-fighting foams containing fluorine substances (PFAS) on ships (Agenda Item 13)

MSC 107 has adopted amendments to **SOLAS Chapter II-2** and the *1994 and 2000 International Code of Safety for High Speed Craft (HSC Codes)* prohibiting the use of firefighting foams containing **perfluorooctane sulfonic acid (PFOS)**. This regulation entered into force on **January 1st, 2026**, requiring existing ships to comply by the date of the first survey after this effective date.

SSE 12 deliberated on a proposal submitted by EU Member States to amend **SOLAS Chapter II-2** and the **HSC Codes** to include all **per- and polyfluoroalkyl substances (PFAS)** in the list of prohibited fire-extinguishing media.

This proposal is based on the recently adopted [EU Regulation 2025/1988](#), which bans the use or discharge of PFAS-containing firefighting foams by ships navigating in EU waters, while providing a **10-year transition period** for vessels already equipped with such foams prior to the regulation's effective date.

SSE 12 raised the concern regarding a comprehensive ban on PFAS, specifically concerning potential impacts on the supply chain for **fluorine-free foams**. Other delegations suggested considering a more restricted scope of prohibition, focusing only on substances already regulated under the European **Persistent Organic Pollutants (POP)** framework (namely **PFOS, PFOA, and PFHxS**). The meeting agreed to continue deliberating this issue through a **Correspondence Group**.

(10) Comprehensive review of the Requirements for maintenance, thorough examination, operational testing, overhaul and repair of lifeboats and rescue boats, launching appliances and release gear (MSC.402(96))

(Agenda Item 14)

SSE 12 had previously conducted an inventory and deliberation on issues regarding the consistent implementation of [Resolution MSC.402\(96\)](#), reaching an agreement in principle on the definitions for "make," "type," "model," and "series."

During this session, the Sub-Committee agreed to amend **paragraph 7.1.1 of Resolution MSC.402(96)** to incorporate references to "type," "model," and "series." Furthermore, once [ISO 23678:2022](#)—the standard for service personnel involved in the maintenance, thorough examination, operational testing, overhaul, and repair of lifeboats, rescue boats, launching appliances, and release gear—is updated to include these four definitions, consideration will be given to incorporating them into paragraph 7.1.1 of Resolution MSC.402(96) via a footnote.

The amended Resolution MSC.402(96) is expected to apply to all passenger ships engaged in international voyages and cargo ships of **500 gross tonnage and upwards**. The anticipated entry into force date is **January 1st, 2032**.

(11) Amendments to the LSA Code regarding the thermal performance of immersion suits (Agenda Item 15)

IMO first began deliberating on this matter as early as 2008; however, at the time, it was agreed to postpone any amendments until necessary practical research was completed. This research included establishing appropriate criteria for determining **thermal resistance** and finalizing and validating testing methodologies.

During this session, the Sub-Committee reviewed draft amendments to **Resolution MSC.81(70)** (*Revised Recommendation on Testing of Life-Saving Appliances*) and corresponding draft amendments to [MSC.1/Circ.1628/Rev.4](#) (*Revised Standardized Life-Saving Appliance Evaluation and Test Report Forms (Personal Life-Saving Appliances)*). However, as the revisions to **ISO 15027 Part 2** and **Part 3** have not yet been completed, the progress of these amendments remains pending.

The following points of consensus have been reached in principle:

- ①. **Adoption of Clo Values:** The **clo value** (used to measure the thermal insulation provided by an immersion suit in cold-water environments) will be adopted as the acceptance criterion for immersion suit performance evaluation.
- ②. **No Amendments to the LSA Code:** Under this current agenda item, no amendments will be made to the **LSA Code**.

Further advancement of this work is scheduled to continue at **SSE 13**.

(12) Fire risks of vessels transporting new energy vehicles (Agenda Item 16)

SSE 12 has revised the draft action plan to enhance the fire safety of ships carrying **New Energy Vehicles (NEVs)**. This involves a holistic assessment of fire protection, fire detection, and fire extinction arrangements in vehicle spaces, special category spaces, and

Ro-Ro spaces. The scope includes reviewing scientific research and accident reports to identify potential hazards and regulatory gaps. According to the revised action plan, the corresponding **SOLAS amendments** are expected to enter into force on **January 1st, 2032**.

In updating the work plan, it was noted that while fire safety regulations for ships carrying NEVs (such as **Battery Electric Vehicles, BEVs**) apply to various vessel types—including car carriers, ro-ro ships, and Ro-Pax vessels—priority should be given to the ship type with a higher frequency of reported incidents: **Pure Car and Truck Carriers (PCTCs)**.

Consequently, the work plan incorporates the following key milestones (Figure 3):

- ①. **2028 (MSC 114)**: Priority approval of **Interim Guidelines** on fire safety specifically for car carriers.
- ②. **2028 (MSC 114)**: Expected approval of Interim Guidelines for video-based monitoring and detection systems for ships carrying NEVs.
- ③. **2029 (SSE 15)**: Evaluation of whether the interim guidelines and SOLAS amendments developed for car carriers should be extended to other types of Ro-Ro ships.
- ④. **2030 (MSC 116)**: Expected adoption of the draft SOLAS amendments, with an entry-into-force date of **January 1st, 2032**.

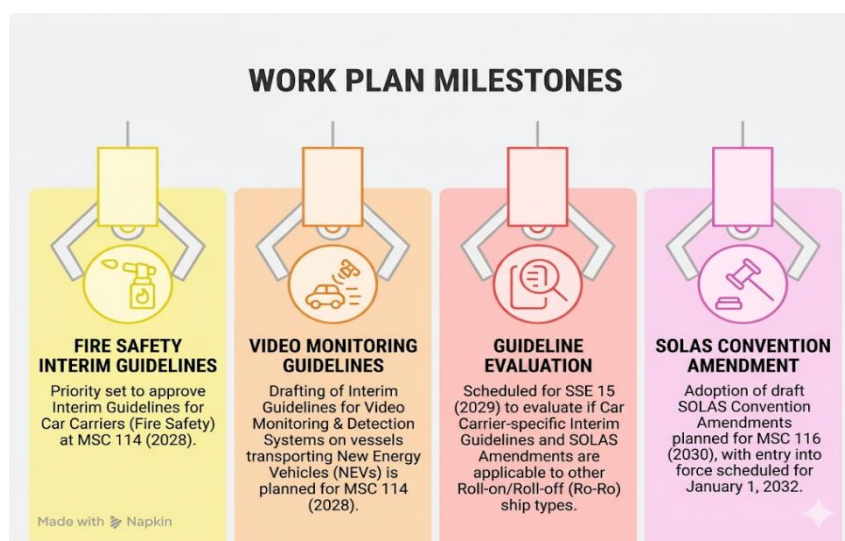


Figure 3 SSE 12 Work Plan Milestones

In addition, a complete set of draft interim guidelines regarding the installation of **Video Monitoring Systems (VMS)** will be submitted to **SSE 13**. Simultaneously, the IMO Secretariat will establish a liaison with the **United Nations Economic Commission for Europe (UNECE) Working Party 29 (WP.29)** to build a collaborative framework. This partnership aims to advance the development of vehicle-side requirements, such as **Battery Management Systems (BMS)**, to ensure integrated safety standards between the automotive and maritime sectors.

(13) Development of a safety regulatory framework to support the reduction of GHG emissions from ships using new technologies and alternative fuels

(Agenda Item 17)

MSC 110 has assigned specific tasks to various sub-committees to discuss and develop a work plan—including timelines, mandates, and priorities—for a safety regulatory framework supporting the adoption of new technologies and alternative fuels for GHG reduction.

The SSE Sub-Committee has been tasked with addressing the safety issues and developing work plans for the following alternative fuels and emerging technologies:

- ①. Methyl/ethyl alcohol fuels;
- ②. Fischer-Tropsch (FT);
- ③. Lithium-Ion Batteries;
- ④. Supercapacitor Energy Storage technology;
- ⑤. Swappable traction lithium-ion battery containers;
- ⑥. Advanced Waste Heat Recovery (WHR).

SSE 12 confirmed that priority should be given to developing **Interim Safety Guidelines for ships utilizing Battery Energy Storage Systems (BESS)**. These guidelines are intended to cover all types of BESS, not limited to lithium-ion batteries, and will employ a **goal-based approach** to maintain flexibility for future technological developments. It was also agreed that work related to BESS would be transferred to the **Sub-Committee on Ship Design and Construction (SDC)** for further action.

The draft work plan established during this session includes the following key milestones:

- ①. **SSE 13 (2027)**: Develop or identify appropriate standards under the **FSS Code** for the certification of water-based and gas fire-extinguishing systems used for alcohol fires. These are expected to be approved at MSC 115 (2028) and adopted at MSC 116 (2029).
- ②. **SSE 14 (2028)**: Draft amendments to **SOLAS Chapter II-2, Part B**, and, if necessary, **revise [MSC.1/Circ.1321](#)** (*Guidelines for measures to prevent fires in engine-rooms and cargo pump-rooms*) to incorporate safety requirements for FT diesel. (Note: The auto-ignition temperature of **FT diesel** is approximately 208°C, which is lower than the maximum surface temperature permitted under SOLAS.) These are expected to be **approved at MSC 116 (2029)** and **adopted at MSC 117 (2030)**.
- ③. **SSE 15 (2029)**: Develop Interim Safety Guidelines for Advanced Waste Heat Recovery Systems. These guidelines must at least address the flammability and toxicity risks posed by the system's circulating media, taking their flashpoints into account. **Approval is expected at MSC 118 (2030)**.

5. Recommendation for SSE 12

- **Fire Safety for Container Ships: Transition to Performance-Based Verification**

SSE 12 has finalized draft SOLAS **amendments regarding fire detection and extinguishing for container ships** (e.g., **infrared thermal imagers and water mist lances**), shifting the regulatory focus toward enhancing **"early identification and localized control."**

It is recommended that the Administration proactively monitor technical standards and operational requirements for this equipment. Specifically, as verification models shift from traditional structural safety **to operational and performance-oriented modes**, future inspections (including **Port State Control (PSC)**) will prioritize functional testing and crew proficiency over mere equipment presence. The Authorities should develop preliminary testing guidelines and audit standards while strengthening the expertise of recognized organizations (ROs) and surveyors to ensure consistent and effective enforcement.

- **Regulatory Framework for Alternative Fuels: Shifting to Goal-Based Standards**

Given that SSE 12 has initiated **safety regulatory frameworks for alternative fuels and new technologies** (such as **BESS, methanol/ethanol, and F-T diesel**) using a **Goal-Based Standards (GBS) approach**, the Administration should prepare for this fundamental shift in oversight. Current regulatory systems must be evaluated for their capacity to review novel ship designs and alternative arrangements.

As green-energy vessels are phased in, the regulatory focus will move from **"compliance with prescriptive rules"** to **"demonstrating equivalent safety."** It is suggested that Formal Safety Assessment (FSA) and alternative design review mechanisms be gradually established through inter-departmental and industry-academic collaboration to ensure regulatory capacity keeps pace with industrial innovation.

- **Regulatory Consolidation: From Circulars to Mandatory Provisions**

The completion of amendments to **SOLAS Regulation II-2/9 at SSE 12**—which integrates existing Unified Interpretations (UIs) into mandatory text and phases out various circulars—signals a clear trend toward **"regulatory consolidation and codification."**

The competent authorities should review the current domestic legal framework and technical guidelines to determine if there is excessive reliance on non-mandatory circulars or informal interpretations. As the main body of the Convention becomes the primary legal basis, it is recommended that a comprehensive regulatory mapping and inventory be conducted. This involves updating the **"Regulations for the Inspection of Ships"** and related subsidiary legislation to ensure domestic laws are synchronized with international standards, thereby mitigating compliance risks under PSC.

6. Next Meeting Schedule

SSE 13 may be held from March 15th to 19th of 2027.

7. References

- (1) Bureau Veritas (BV), Ship Systems and Equipment Sub-Committee 12th (SSE 12) Summary Report, Class & Statutory. <https://marine-offshore.bureauveritas.com/newsroom/ship-systems-and-equipment-sub-committee-12th-sse-12-summary-report>
- (2) Det Norske Veritas (DNV), IMO Sub-Committee on Ship Systems and Equipment (SSE 12). <https://www.dnv.com/news/2026/imo-sub-committee-on-ship-systems-and-equipment-sse-12/>
- (3) Lloyd's Register (LR), SSE 12 Summary Report. <https://maritime.lr.org/SSE-12-Summary-Report>
- (4) Safety4Sea, IMO SSE 12: Key outcomes. <https://safety4sea.com/imo-sse-12-key-outcomes/>
- (5) InterManager, Summary report on IMO Sub-Committee meeting SSE 12. <https://www.intermanager.org/2026/03/imo-sub-committee-ship-systems-equipment-meeting-sse-12-9-13-march-2026-168863/>