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The MASS Code Revolution: What the IMO's New Autonomous Ship Framework Means for the Shipping Industry

Foreword

On 22 May 2026, the International Maritime Organization adopted the first global regulatory framework for Maritime Autonomous Surface Ships. Nearly a decade in the making, the MASS Code is not merely a technical milestone—it is a fundamental redefinition of how ships will be designed, operated, insured, and financed in the decades ahead.

For shipowners, operators, and investors, the implications are profound. The Code establishes that a human master retains overall responsibility even when not physically onboard. Remote Operations Centres will require flag state certification. Classification societies must develop new competencies in software verification and AI systems. And while the Code is initially non-mandatory, the roadmap toward a binding framework by 2032 is now set.

Perhaps most significantly, existing legal conventions—SOLAS, COLREGs, STCW, and UNCLOS—were drafted for a world of crewed vessels. The questions of flag state jurisdiction, liability allocation, and insurance coverage for autonomous operations remain unresolved. This is the new frontier of maritime law.

This article provides a clear, practical analysis of the MASS Code and its implications. As autonomous shipping moves from experimentation to commercial reality, the legal and commercial frameworks that will govern it are being written now. The decisions made in the Experience-Building Phase (2026-2030) will shape the industry for generations.

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Introduction



On 22 May 2026, the International Maritime Organization (IMO) adopted the first global regulatory framework for Maritime Autonomous Surface Ships (MASS)—a milestone nearly a decade in the making . The new International Code of Safety for Maritime Autonomous Surface Ships (MASS Code) establishes a comprehensive, goal-based framework for remotely controlled and autonomous commercial ships, effective from 1 July 2026 .

This is not an immediate green light for unmanned fleets controlled by artificial intelligence. Rather, the IMO has formally recognized that autonomous and remotely controlled ships constitute their own operational category, requiring specific international rules and no longer mere experimental authorizations . This article analyzes the MASS Code's key provisions, its timeline toward mandatory status, and the legal and commercial implications for shipowners, operators, and the insurance and finance sectors.

I.The MASS Code: A Historic Milestone



The adoption of the MASS Code at the 111th session of the Maritime Safety Committee (MSC) in London marks the culmination of nearly a decade of multilateral discussions, legal work, and on-the-water trials . IMO Secretary-General Arsenio Dominguez welcomed the milestone, stating:

"This landmark achievement positions IMO at the forefront of regulating emerging technologies, demonstrating the Organization's ability to anticipate and shape the future of shipping. It represents a major step forward, enabling innovation while ensuring that safety, accountability and the human element remain at the core of maritime operations" .

The Code applies to cargo ships covered under SOLAS Chapter I and will take effect from 1 July 2026 .

The Four Levels of Autonomy

The MASS Code covers the entire spectrum of autonomy, not just the extreme case of fully crewless ships. The IMO recognizes four levels of autonomy : Level 1: Ship with automated processes and decision-making that support the crew, with crew onboard maintaining continuous control. Level 2: Remotely controlled ship with crew onboard who can assume control if necessary. Level 3: Remotely controlled ship without crew onboard, operated entirely from a Remote Operations Centre (ROC). Level 4: Fully autonomous ship capable of independent decision-making without human input Critically, the Code applies to individual autonomous or remote functions, even when crew remain onboard to perform other functions .

II. Key Features of the MASS Code

Goal-Based, Technology-Neutral Approach

The MASS Code adopts a goal-based structure rather than prescribing specific technologies . It defines goals, functional requirements, and related expected performances, allowing the framework to adapt as AI, sensors, and communications technologies evolve . This is a deliberate choice by the IMO to ensure the Code remains relevant as technologies advance.

The Master's Continuing Responsibility

A foundational principle of the Code is that a human master retains overall responsibility for the ship at all times—even if not physically onboard . The master must have the ability to intervene, and Remote Operations Centres (ROCs) are subject to certification by the flag administrations of the MASS they operate .

This is a crucial legal innovation. It ensures accountability remains identifiable, even in fully remote operations.

Risk Assessment and Approval Process

The Code requires risk assessment as part of the approval process for autonomous systems . It introduces new requirements for design, approval, and operation, covering key areas such as :

- Navigation and connectivity
- Remote operations
- Fire safety and search and rescue
- Cybersecurity
- System design and software principles
- Manning, training, and watchkeeping
- Structure, subdivision, stability, and watertight integrity
- Special measures to enhance maritime security

III. From Voluntary to Mandatory: The MASS Code Timeline



The MASS Code is initially a non-mandatory instrument, giving Member States the opportunity to test its use while paving the way for making it mandatory under the SOLAS Convention .

The Roadmap to 2032:

- 1 July 2026: MASS Code enters into force (non-mandatory)
- December 2026: MSC 112 to develop framework for Experience-Building Phase (EBP)
- 2028: Development of mandatory MASS Code begins
- By 1 July 2030: Expected adoption of first mandatory MASS Code
- 1 January 2032: Expected entry into force of mandatory MASS Code

During the Experience-Building Phase, information on MASS applications will be collected, including operational data, data formats, and access to data for stakeholders . The Code will form the basis for the EBP, during which Member States are encouraged to implement it on a voluntary basis to generate practical experience .

IV. Legal Implications: Gaps in the Existing Framework



The MASS Code is a critical first step, but significant legal challenges remain. Existing international conventions—including SOLAS, COLREGs, STCW, and UNCLOS—were drafted for crewed vessels and do not fully address the realities of autonomous operations .

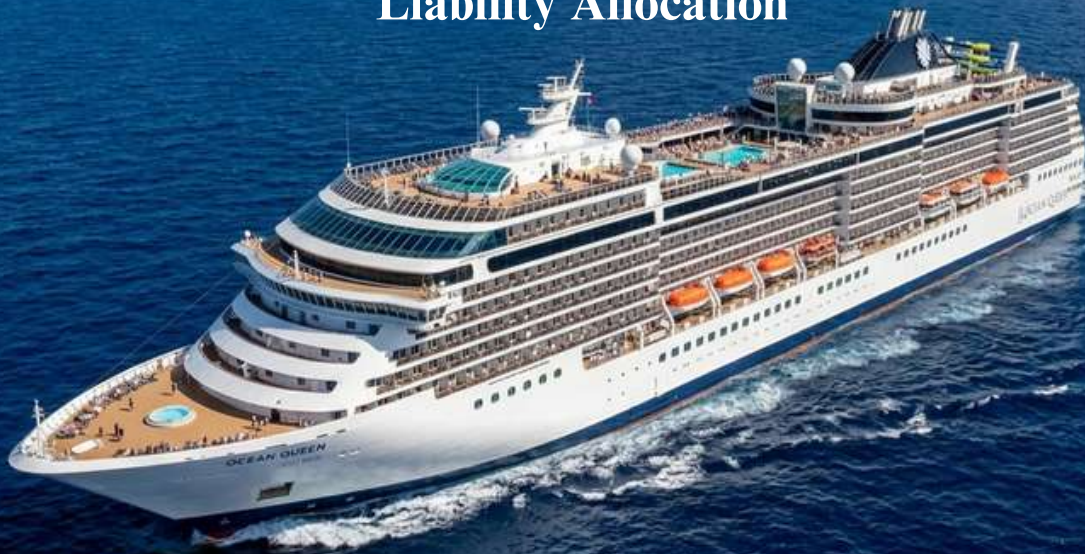
Flag State Jurisdiction and the "Genuine Link"

UNCLOS Article 91 requires a genuine link between a ship and its flag State. The introduction of Level 3 and Level 4 MASS—ships without crew, operated from Remote Operations Centres potentially located outside the flag State's territory—raises profound questions :

- How is the "genuine link" established when the master and crew are not physically onboard?
- Can a flag State exercise effective jurisdiction over a vessel controlled from another country?
- What happens when the ROC is located in a state with different regulatory standards?

As one academic analysis notes, "these circumstances hinder the application of the genuine link required by UNCLOS, generate uncertainty in the attribution of responsibilities and complicate compliance with the flag State's international obligations" .

Liability Allocation



The shift from crewed to autonomous operations fundamentally challenges traditional fault-based liability frameworks .

The COLREGs are human-centric—they assume vessels are operated by individuals capable of interpreting and responding to dynamic maritime conditions . When decision-making is driven by AI rather than human operators, proving negligence becomes far more complex.

Key questions remain unresolved:

- Who is liable when an autonomous system makes an error—the shipowner, the manufacturer, the software developer, or the remote operator?
- Is strict liability a more appropriate framework than fault-based liability for MASS?
- How are limitation of liability rights (under conventions like LLMC 1976) applied when the traditional "master" and "crew" categories are reconfigured?

As one legal analysis observes, "the Yara Birkeland challenges traditional liability norms in maritime law. With no crew onboard, liability for accidents may shift to shipowners, software developers, or remote operators, highlighting the need for updated legal and regulatory frameworks" . The academic literature proposes a move toward strict liability for autonomous vessels, holding manufacturers, operators, and owners accountable irrespective of fault . Lessons may be drawn from other industries, including autonomous vehicles, aviation, and nuclear liability regimes.

The Unresolved Issue of Passenger Ships

The MASS Code applies to cargo ships only. Extension to passenger ships has been postponed, "as safety and liability issues are far more complex" . This reflects the heightened stakes in passenger transportation—where risk to life is far greater—and signals that passenger autonomy may require additional, more stringent provisions.

V. Implications for Shipowners, Operators, and Investors



First-Mover Advantage

The adoption of the MASS Code finally introduces a stable regulatory framework within which shipowners, investors, shipyards, classification societies, and insurers can plan investments and develop new technologies .

While the Code is non-mandatory initially, forward-thinking operators should consider early adoption for several reasons:

- Regulatory certainty: The framework is now defined, even if subject to future refinement.
- Competitive differentiation: Early adopters of autonomous technologies may gain operational cost advantages.
- Experience building: Participation in the EBP will influence the shape of the mandatory Code.

The Role of Classification Societies

Classification societies will need to acquire skills very different from traditional ones, especially in the verification of software, AI systems, and remote control functions . ROCs themselves will be subject to certification by flag administrations.

Insurance, Risk Transfer, Seafarers and the Human Element

The insurance industry is still adapting to the MASS reality. As Marasco Marine's January 2026 assessment noted, the Poseidon Principles for Marine Insurance are applying climate alignment disclosure requirements to underwriters . MASS will add another layer of complexity—insurers must assess not only physical vessel risk but also cyber risk, software integrity, and the liability of remote operators.

The Code does not envisage the rapid disappearance of seafarers. Instead, it points to a growing importance of skills in the management of automated systems and future shore-based operations centres . The maritime workforce will need to evolve, developing competencies in remote operations, data analysis, and cybersecurity.

The IMO has also approved new sets of interim guidelines for training seafarers on ships using alternative fuels and technologies, reflecting the need to develop new skills while addressing the specific risks of each fuel type .

VI. 2026 Developments: Alternative Fuels and Training

The MASS Code adoption was not the only major outcome of MSC 111. The Committee also:

1. Approved interim guidelines for the use of ammonia cargo as fuel, to support the safe design, construction, and operation of ships carrying and using ammonia as fuel .
2. Approved two new sets of interim guidelines for training seafarers on ships using alternative fuels and technologies, reflecting the need to develop new skills while addressing the specific risks of each fuel type .
3. Advanced the safety regulatory framework for alternative fuels, including work on battery power, wind propulsion, nuclear power, ammonia, hydrogen, methyl and ethyl alcohols, and onboard carbon capture and storage (OCCS) .

These developments highlight the IMO's comprehensive approach to maritime decarbonization—autonomous technology is seen as one part of a broader transformation encompassing fuels, training, and ship design.



VII. Conclusion: The New Era of Maritime Autonomy

The adoption of the MASS Code in May 2026 represents a watershed moment. For the first time, autonomous and remotely controlled ships have obtained legal recognition within the international regulatory system . They are no longer just a technological project—they are a new operational category destined to influence the design, management, ownership, and insurance of ships for decades to come .

Key takeaways for maritime stakeholders:

1. The Code is effective from 1 July 2026—even as a non-mandatory instrument, it represents the definitive international standard.
2. The master retains responsibility, even when operating remotely—ensuring accountability remains identifiable.
3. Significant legal challenges remain, particularly regarding flag State jurisdiction, liability allocation, and the applicability of existing international conventions like SOLAS, COLREGs, and STCW.
4. The Experience-Building Phase (2026-2030) will be critical in shaping the mandatory Code, and early adopters will have a voice in this process.
5. Classification societies, insurers, and seafarers must all adapt to the new autonomy landscape.

The autonomous ship has, finally, obtained its regulatory charter. The question is not whether autonomous shipping will arrive—only when, and how prepared the industry will be when it does.

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About us

Amir Akeanos Strategies is a boutique legal and strategic consultancy dedicated to facilitating the maritime industry's transition to net-zero operations. Our practice is built on a dual foundation: deep expertise in global decarbonization law (IMO, EU, and national regulations) and an unwavering focus on the Persian Gulf region.

The Persian Gulf presents unique legal, operational, and environmental challenges, particularly as regional economies—including those under Vision 2030—diversify and expand their logistics capacity. We provide tailored legal counsel on the enforcement of environmental protection and conservation mandates, ensuring our clients not only comply with international and regional conservation efforts but also strategically position themselves for the next era of green maritime commerce.

We enable shipowners, operators, port authorities, and energy stakeholders in the Persian Gulf to transform regulatory obligations into competitive advantages, ensuring a thriving maritime economy alongside a protected ocean environment.

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