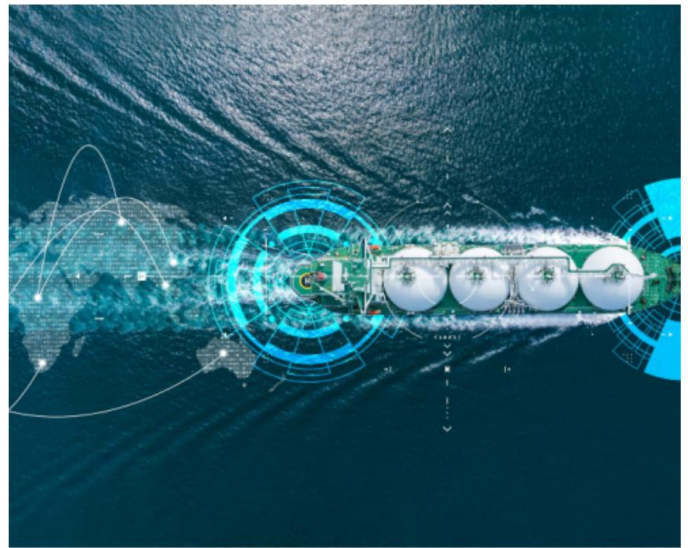


# The MASS Code – Key Principles & Requirements



## Introduction

The International Maritime Organisation (IMO) has adopted the International Code of Safety for Maritime Autonomous Surface Ships (MASS Code) to provide an international framework for the safe operation of ships that use autonomous or remotely operated functions. The MASS Code recognises that existing IMO regulations, such as SOLAS, were developed on the basis that key shipboard duties are carried out by the crew onboard. However, the increasing use of autonomous technologies and remote operations may change how these duties are performed in the future. Consequently, additional guidance is needed on the design and operation of MASS to achieve levels of safety, security and environmental protection equivalent to those expected of a conventional ship.

The Code is intended to supplement existing IMO regulations and provide a framework for the design, approval and operation of MASS. It applies to cargo ships subject to SOLAS Chapter I that have systems and functions enabling autonomous or remote operations, together with any associated Remote Operations Centres (ROC). The provisions of the Code may also be implemented for individual autonomous or remotely operated functions, even where persons remain onboard to perform other functions.

The MASS Code is currently non mandatory and took effect from 1<sup>st</sup> July 2026.

## Operational Concepts and System Design

The Code requires autonomous and remotely operated functions to operate within a defined Operational Envelope (OE) and Operational Design Domain (ODD). These define the capabilities, limitations and operating conditions within which the vessel and its systems are intended to operate. Predefined fallback states and contingency plans are required to support safe operation when normal operating conditions cannot be maintained and these arrangements should be risk assessed and validated.

The Code emphasises system design principles including safety-centred design, reliability, robustness, scalability, adaptability, redundancy, fault tolerance and interoperability. Testing, verification and validation are recognised as fundamental for system integrity. Consideration is also given to software reliability, transparency, controllability and accountability. Connectivity between the vessel and any associated ROC, cybersecurity, data management, data quality and appropriate record keeping, including data logging, are also addressed as part of safe system operations.

## **Human Oversight and Remote Operations**

The MASS Code recognises the role of human oversight and control and includes provisions relating to human-centred design, situational awareness and Human-Machine Interfaces (HMI). Where remote operations are conducted, the Code establishes requirements for ROC, including certification and surveys. It also includes provisions relating to connectivity, remote operators, alert management, watchkeeping, training, familiarisation and competence. Requirements may vary depending on the mode of operation and the extent to which autonomous and remotely operated functions are used.

MASS should be operated by trained, competent and experienced personnel appropriate to the intended mode of operation. A MASS and any associated ROC are required to be sufficiently and effectively manned, with a Minimum Safe Manning Document (MSMD) issued to the satisfaction of the Administration.

## **Safety Management, Certification and Operational Functions**

The MASS Code requires autonomous and remotely operated functions to be addressed within the Company's Safety Management System (SMS). Operational policies and procedures include the allocation of tasks between onboard personnel and any associated ROC, watchkeeping arrangements and actions to be taken during fallback states and emergencies.

The Code establishes a structured approval process supported by risk assessment, testing, verification and validation activities. This includes consideration of the Concept of Operations (ConOps), operational limitations and risk mitigation measures. The Code also establishes survey and certification requirements for both MASS and associated ROC.

The Code further includes provisions relating to maritime security, maintenance, modifications and change management to support the continued operation of autonomous and remotely operated systems. In addition, it addresses navigation, fire protection, search and rescue, carriage of cargoes, anchoring, towing and mooring, and machinery and electrical installations. Together, these provisions support safe operations through appropriate operational policies and procedures.

## **Future Development**

The MASS Code is currently non mandatory and forms part of a wider programme of work being undertaken by IMO. The Code will continue to be developed through the Experience Building Phase (EBP), which is intended to gather operational experience and support the future development of a mandatory MASS Code. Under the current IMO road map, adoption of a mandatory Code is currently targeted for 2030, with entry into force envisaged on 1<sup>st</sup> January 2032, although these timelines remain subject to further review.

Although currently non mandatory, the Code provides an indication of the direction of future regulatory developments. Members considering the implementation of autonomous or remotely operated functions may therefore find it beneficial to understand how these technologies could influence existing arrangements relating to safety management, manning, training, remote operations and contingency planning.

## **Conclusion**

The MASS Code provides a framework for the design, approval and operation of ships incorporating autonomous and remotely operated functions. The Code addresses matters including operational concepts, system design, software principles, connectivity, cybersecurity, human oversight, remote operations, training, safety management, maritime security, planned maintenance, risk assessment and certification. As autonomous technologies continue to develop, the MASS Code provides a common basis for supporting their safe and consistent risk-based application within the maritime industry.

## Resources

International Code of Safety for Marine Autonomous Surface Ships (MASS Code)

## Supportive Information

For further information on this or other Loss Prevention topics please contact the Loss Prevention Department, Steamship Insurance Management Services Ltd. Tel: +44 20 7247 5490 Email: [loss.prevention@simsl.com](mailto:loss.prevention@simsl.com)

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