

## **Australian Government**

Defence

## AUSTRALIAN NAVAL CLASSIFICATION AUTHORITY MANUAL (VOLUME 2)

## **DIVISION 5: REMOTE AND AUTONOMOUS SYSTEMS**

SECTION 4: LARGE UNCREWED SURFACE VESSELS

**CHAPTER 09: NAVIGATION** 

PART 1: ANC RULES



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**CN Dagg, CSC** Assistant Secretary Australian Naval Classification Authority Department of Defence CANBERRA ACT 2600 May 2024 Edition

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<sup>&</sup>lt;sup>3</sup> https://www.legislation.gov.au/Series/C2004A03712

<sup>&</sup>lt;sup>4</sup> http://drnet/AssociateSecretary/security/policy/Pages/dspf.aspx

## AUSTRALIAN NAVAL CLASSIFICATION RULES

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## AMENDMENTS

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Division 5: Remote and Autonomous Systems (RAS) Rules Section 4: Large Uncrewed Surface Vessel (L-USV) Part 1: ANC Rules

## **Chapter 09: Navigation**

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#### Australian Naval Classification Rules

#### Rule 0. Goal

- 0.1 The Large Uncrewed Surface Vessel (L-USV) shall be designed, constructed, and maintained so that, while at sea, it can be:
- 0.1.1 Be independently navigated;
- 0.1.2 Provide alerts of all navigation hazards, fixed or mobile;
- 0.1.3 Measure and interpret environmental data; and
- 0.1.4 If required by the Operating and Support Intent (OSI), assist other ships, vessels, aircraft, units or persons in distress.
- 0.2 The L-USV's shall be able to manoeuvre to minimise risk of grounding, collision and negative environmental impact.
- 0.3 The navigation systems shall be designed, constructed, operated, and maintained to:
- 0.3.1 Provide high reliability and minimise the risk of incorrect operation in all foreseeable operating conditions, accidents, and emergencies;
- 0.3.2 Maintain uninterrupted Essential Safety Functions after a minimum of one single operational error and/or system/equipment fault; and
- 0.3.3 Maintain uninterrupted Essential Safety Functions regardless of any sensor or processing demands or deficiencies from the L-USV's combat systems; and
- 0.3.4 Include automation features to maximise L-USV performance, efficiency, and minimise End User workload.

#### Rule 1. General

#### Functional Objective

1.1 The purpose of this Rule is to outline the principles and framework of Chapter 09 *Navigation* and its application.

#### Purpose

- 1.2 The ability to be deployed to any area of interest defined in the OSI shall be maintained, and the navigation equipment, sensors fit and End Users, located at the Remote Command Unit (RCU), shall provide:
- 1.2.1 The capability to conduct safe navigation as required by SOLAS, the COLREGS and, where applicable, the HSC Code.
- 1.2.2 Not used.
- 1.2.3 Qualified End Users certified to operate and, if required, maintain the equipment providing Maritime Safety Information (MSI).

#### Scope

- 1.3 Division 2 *Core Design Rules* Chapter 01 *General Requirements* applies to all chapters of the ANC Rules, as applicable to the design, and therefore in order to meet the Chapter 09 *Navigation* goal, the requirements of both this chapter and Division 2 *Core Design Rules* Chapter 01 *General Requirements* shall be met.
- 1.4 Division 3 *Ship Rules* Chapter 09 *Navigation* goal applies to all Naval Vessels greater than 24m length overall that carry persons. Therefore, to meet the Chapter 09 *Navigation* goal, a L-USV that requires embarked persons shall meet the requirements of both this chapter and the requirements of Division 3 *Ship Rules* Chapter 09 *Navigation* as applicable to the design.
- 1.4.1 The Rules listed in this Chapter are based on those in the corresponding Chapter within Division 3 *Ship Rules* and have been adapted for L-USV. When referring to Division 2 or 3, the following terms may be interchanged:
- 1.4.1.1 'Ship' as 'L-USV';
- 1.4.1.2 'Crew', 'Operator', 'OOW' or 'Embarked Person' as 'End User';
- 1.4.1.3 'Primary, Main or Damage Control Station' as 'Remote Command Unit (RCU)';
- 1.4.1.4 'Bridge', 'Operations Room' or 'conning position' as RCU; and
- 1.4.1.5 'Alternate conning position' as secondary RCU workstation.
- 1.5 The Navigation systems of the L-USV shall match its RAS Maturity Level to allow End Users to safely operate the L-USV to achieve missions listed in the OSI.
- 1.6 The ANC Rules excludes training requirements. Chapter 09 *Navigation* assumes all End Users have an appropriate level of competence for the remote operation of the installed systems.

#### **Performance Requirements**

1.7 The L-USV's navigation systems shall be operated and maintained throughout the life of the L-USV as defined by the OSI.

#### Rule 2. Bridge Working Environment

2.1 The L-USV shall comply with Division 3 *Ship Rules* Chapter 09 *Navigation* Rule 2 *Bridge Working Environment* as amended in Table 1.1 below:

Rule Number	Amendment
2.3	The RCU, associated compartments, and systems installed in the RCU, shall be provided with lighting and illumination systems that enables End Users to perform all L-USV missions by day and night, ensuring that lighting systems required shall be designed such that they do not impair safe navigation of the L-USV or Mission Critical Functions.
2.7	Noise levels within the RCU are to be sufficiently low as to enable End Users carrying out navigation duties to concentrate for long periods of time and comfortably hold conversations with other End Users for the sustained conduct of safe navigation.
2.10	Not used.
2.11	Not used.
2.12	Not used.

#### Table 1.1: Division 3 Chapter 09 Rule 2 Amendments

Rule Number	Amendment
2.13	Not used.
2.14.3	Not used.

#### Rule 3. Bridge Workstation

3.1 The L-USV shall comply with Division 3 *Ship Rules* Chapter 09 *Navigation* Rule 3 *Bridge Workstation* as amended in Table 1.2 below:

Rule Number	Amendment
3.1	The design and arrangement of the RCU shall ensure that the End Users are enabled to perform expeditious, continuous and effective information processing and decision making for maintaining a proper lookout and the conduct of safe navigation of the L-USV.
3.3	The RCU systems shall allow the End User to have proper field of vision of the L-USV to maintain visual awareness to permit its safe navigation and where appropriate the monitoring of:
3.3.1	Launch of Small Craft, Small USV, or other embarked mission system;
3.3.2	Not used.

#### Table 1.2: Division 3 Chapter 09 Rule 3 Amendments

## Rule 4. Alternate Conning Position

4.1 The L-USV shall comply with Division 3 *Ship Rules* Chapter 09 *Navigation* Rule 4 *Alternate Conning Position* as amended in Table 1.3 below:

#### Table 1.3: Division 3 Chapter 09 Rule 4 Amendments

Rule Number	Amendment
4.1	Where required by the OSI, the RCU shall have an alternate workstation that enables End Users not situated on the primary RCU workstation to perform expeditious, continuous and effective information processing and decision making for maintaining a proper lookout and the conduct of safe navigation.
4.9	Not used.

#### Rule 5. Not Used

# Rule 6. Navigation Safety - Geospatial, Temporal and Environmental Awareness

6.1 The L-USV shall comply with Division 3 *Ship Rules* Chapter 09 *Navigation* Rule 6 *Navigation Safety - Geospatial, Temporal and Environmental Awareness* as amended in Table 1.4 below:

#### Table 1.4: Division 3 Chapter 09 Rule 6 Amendments

Rule Number	Amendment
6.6	Where required by the OSI, the navigation display system at the RCU shall be capable of the display and application of Additional Military Layers (AML) to enhance situational awareness.
6.7	Navigational systems shall interoperate with the navigational systems of organic small USV and embarked mission systems, and their Situational Awareness systems.

## Rule 7. Operation and Control Systems

7.1 The L-USV shall comply with Division 3 *Ship Rules* Chapter 09 *Navigation* Rule 7 *Operation and Control Systems* as amended in Table 1.5 below:

#### Table 1.5: Division 3 Chapter 09 Rule 7 Amendments

Rule Number	Amendment
7.1	A L-USV shall be provided with appropriate means to control propulsion and manoeuvring, navigation, and other systems from the RCU and, if required by the OSI an alternate position, for the conduct of safe navigation, collision avoidance and operational evolutions.
7.2	The End User shall when operating the L-USV
7.5	If required by the OSI, the End User shall have means to communicate with other ships or aircraft by day and night.
7.6	If required by the OSI, the End User shall have means to alert other platforms that the L-USV is in distress.
7.7	Not used.
7.8	End Users shall have means to communicate with other End Users in the RCU.

#### Rule 8. Resilience and Continuous Availability

8.1 The L-USV shall comply with Division 3 *Ship Rules* Chapter 09 *Navigation* Rule 8 *Resilience and Continuous Availability.* 

#### Rule 9. Integrated Bridge

9.1 The L-USV shall comply with Division 3 *Ship Rules* Chapter 09 *Navigation* Rule 9 *Integrated Bridge*.

#### Rule 10. Data Communication

10.1 The L-USV shall comply with Division 3 *Ship Rules* Chapter 09 *Navigation* Rule 10 *Data Communication* as amended in Table 1.6 below:

#### Table 1.6: Division 3 Chapter 09 Rule 10 Amendments

Rule Number	Amendment
10.5.2	Be capable of providing (at the End User's discretion) to similarly fitted ships, aircraft and shore stations the L-USV's identity, position, course, speed, navigational status and other safety related information;

#### Rule 11. Collision Avoidance

11.1 The L-USV shall comply with Division 3 *Ship Rules* Chapter 09 *Navigation* Rule 11 *Collision Avoidance* as amended in Table 1.7 below:

#### Table 1.7: Division 3 Chapter 09 Rule 11 Amendments

Rule Number	Amendment
11.8	The End User shall be provided with information pertaining to the manoeuvring characteristics of the L-USV to assist in the avoidance of collision and groundings. The content of this information shall contain as a minimum:

#### Rule 12. Controllability

12.1 The L-USV shall comply with Division 3 *Ship Rules* Chapter 09 *Navigation* Rule 12 *Controllability*.

#### Rule 13. Remote Monitoring

#### **Functional Objective**

13.1 The L-USV shall have Remote Monitoring capabilities to allow effective navigation in all foreseeable conditions within the OSI.

#### Scope

13.2 This rule is applicable for L-USV with a Remote Monitoring level of RM1 or greater.

#### **Performance Requirements**

- 13.3 L-USV systems with a Remote Monitoring level of RM1 or greater shall be able to monitor the essential Navigation and controllability systems.
- 13.4 L-USV systems with a Remote Monitoring level of RM2 or greater shall be able to monitor the navigation and controllability systems so far as reasonable to achieve the OSI.

#### Rule 14. Remote Control

#### **Functional Objective**

14.1 The L-USV shall have Remote Control capabilities to allow effective navigation in all foreseeable conditions within the OSI.

#### Scope

14.2 This rule is applicable for L-USV with a Remote Control level of RC1 or greater.

#### **Performance Requirements**

- 14.3 L-USV systems with a Remote-Control level of RC1 shall be able to control essential navigation and propulsion systems as per the OSI.
- 14.4 L-USV systems with a Remote-Control level of RC2 or greater shall be able to control engineering systems required for safe manoeuvring IAW with OSI.

- 14.5 L-USV systems with a Remote-Control level of RC3 or greater shall have the capability to control systems essential to maintaining safe navigation to achieve the system OSI.
- 14.6 L-USV systems with a Remote-Control level of RC4 shall be able to control all navigational systems typically operated by onboard operators.

#### Rule 15. Autonomy

#### **Functional Objective**

15.1 The L-USV shall have autonomy control and decision-making capabilities to ensure effective navigation in all foreseeable conditions within the OSI.

#### Scope

15.2 This rule is applicable for L-USV with an Autonomy level of A1 or greater.

#### **Performance Requirements**

- 15.3 L-USV systems with an Autonomy level of A1 shall be able to control essential navigation and propulsion systems as per the OSI.
- 15.4 L-USV systems with an Autonomy level of A2 or greater shall be able to control engineering systems required for safe manoeuvring IAW with OSI.
- 15.5 L-USV systems with an Autonomy level of A3 or greater shall have the capability to control systems essential to maintaining operations to achieve the system OSI.
- 15.6 L-USV systems with an Autonomy level of A4 shall be able to control all engineering systems typically operated by onboard operators.