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AUSTRALIAN NAVAL CLASSIFICATION AUTHORITY MANUAL (VOLUME 2)

DIVISION 3: SHIP RULES

CHAPTER 06: FIRE SAFETY

PART 1: ANC RULES

This document is issued for use by Defence and Defence Industry personnel and is effective forthwith.

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1 https://www.legislation.gov.au/Series/C1968A00063

2 https://www.legislation.gov.au/Series/C2004A04868

3 https://www.legislation.gov.au/Series/C2004A03712

4 http://drnet/AssociateSecretary/security/policy/Pages/dspf.aspx

AUSTRALIAN NAVAL CLASSIFICATION RULES

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[5] https://www.defence.gov.au/business-industry/industry-governance/australian-naval-classification-authority/australian-naval-classification-rules

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Division 3: Ship Rules
Part 1: ANC Rules

Chapter 06: Fire Safety

Contents

Australian Naval Classification Rules

Rule 0. Goal

0.1 For effective fire safety, the ship and its arrangements shall be designed, constructed, maintained and operated in such a way that as far as is practicable, fire can be prevented, detected, contained and extinguished whilst maintaining essential safety functions during and after the outbreak of a fire.

Note: Essential Safety Functions are defined in the OSI.

Rule 1. General

Functional Objective

1.1 The purpose of this Rule is to outline the principles and framework of Chapter 06 *Fire Safety* and its application.

Scope

1.2 Division 2 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 06 *Fire Safety* goal, the requirements of both this chapter and Division 2 Chapter 01 *General Requirements* shall be met.

1.3 There is an interface with Chapter 10 *Dangerous Goods*. Chapter 06 *Fire Safety* contains the requirements for Fire Safety which apply to the carriage and use of Dangerous Goods (Class 1-9). Chapter 10 *Dangerous Goods* supplements Chapter 06 *Fire Safety* by providing additional requirements applicable to Class 1 Dangerous Goods.

1.4 The ANC Rules exclude training requirements. Chapter 06 *Fire Safety* assumes all embarked persons have an appropriate level of competence for the operation of the installed systems.

1.4.1 Requirements for effective damage control to support recoverability are not included in this chapter, see Chapter 01 *Integrated Platform Survivability*.

1.4.2 The ANC Rules do not address the risk associated with ships using alternative fuels, such as hydrogen and compressed natural gas as fuel, or vehicles and small craft using such fuels.

Application

1.5 Alternatives to the requirements will be accepted provided that they have been demonstrated to be equivalent to meet the fire safety goal and functional objectives of this Chapter to the satisfaction of the ANC Authority.

1.6 Not used.

1.7 The function of the ship, as defined in the OSI, will determine the applicability of the Part 2 Solutions.

1.8 For naval ships, designed for combat operations, the Part 2 solutions to Chapter 01 *Integrated Platform Survivability* will advise on the appropriate Part 2 solutions to this chapter and may require an enhancement of some of the Solutions in this chapter.

Note: Revised assumptions can be defined in the OSI and at a more detailed level in the Sample OSI, see Part 2 Chapter 06 *Fire Safety* Rule 1.

General Performance Requirements

1.9 The fire safety policies shall be defined which reflect the OSI for the ship and address the Functional Objectives of this Chapter.

1.10 In the event of any conflict in requirement between these Rules and any standards or documents referenced by these Rules, the more stringent specification shall take precedence.

Rule 2. Structural Integrity in case of fire

Functional Objective

2.1 Structural integrity of the ship shall be maintained preventing partial or whole collapse of the ship structures due to strength deterioration by heat.

Performance Requirements

2.2 The hull, superstructure, structurally effective bulkheads, decks, deckhouses and pillars and other critical structures shall be constructed of approved non-combustible materials or fire restricting materials having adequate structural properties or having adequate protection from fire.

2.3 The primary structure of the ship when subjected to fire for a defined period of time and after a fire shall not:

2.3.1 Deform such that it prevents escape, operation of Essential Safety Functions and access for fire-fighting activities;

2.3.2 Threaten or degrade the structural integrity of the vessel through loss of structural member, e.g. bulkhead strut or pillar, in or adjacent to a compartment which has a fire;

2.3.3 Threaten or degrade structure supporting classed fire divisions, and fire resistant divisions for ships not constructed of steel;

2.3.4 Threaten or degrade structure supporting components of columns, stanchions and other structural members required to support lifeboat and life raft stowage, and launching and embarkation areas such that they unable to operate; and

2.3.5 Threaten or degrade structure supporting naval systems or specific compartments as defined by the Naval Vessel Operator (NVO).

2.4 Fittings that preserve external water tight integrity shall remain efficient during and after a fire.

2.5 Minor structure that is essential for escape, operation of Essential Safety Functions or access for fire-fighting activities shall remain effective during or after a fire.

Note: Examples of minor structure are raised floor plating in Category A machinery spaces, staircases, and access ladders.

2.6 Where required by the OSI, significant structural loading, from an extreme load or damage event, coincident with a fire shall be considered.

Rule 3. Risk of Ignition

Functional Objective

3.1 The ignition of combustible materials or flammable liquids, gasses and vapours shall be prevented.

Performance Requirements

3.2 The following performance requirements shall be satisfied:

3.2.1 Means shall be provided to control leaks of flammable liquids and gases;

3.2.2 Means shall be provided to limit the accumulation of flammable gases and vapours;

3.2.3 The ignitability of combustible materials shall be restricted;

3.2.4 Ignition sources shall be restricted;

3.2.5 Ignition sources shall be separated from combustible materials, flammable liquids and gases; and

3.2.6 Flammable liquids and gases shall be stored in dedicated spaces.

Note: Additional requirements for machinery and electrical installations that present a risk of ignition are identified in Division 2 Chapter 01 *General Requirements* Rule 07 *Hazardous Areas*.

3.3 Flammable gas concentrations shall be limited to a level below their explosion limit, e.g. hydrogen from batteries.

3.4 Except as otherwise agreed, flammable liquids used shall not be of low flash point.

3.5 A margin between the maximum ambient temperature of a space, consistent with the OSI, and the minimum flash point of oil fuel or other flammable liquids contained in piping in a space, shall be maintained.

Rule 4. Fire Growth Potential

Functional Objective

4.1 The fire growth potential shall be limited in every space of the ship.

Performance Requirements

4.2 The following performance requirements shall be met:

4.2.1 Means of control for the air supply to a space or group of spaces shall be readily accessible from outside the spaces concerned;

4.2.2 Means of control for flammable liquids in a space or group of spaces shall be readily accessible from outside the spaces concerned;

4.2.3 The use of combustible materials shall be restricted. Exposed surfaces in normally occupied locations and access routes shall have low flame spread characteristics;

4.2.4 Storage of flammable liquids within high risk spaces shall be restricted to the minimum;

4.2.5 Storage of flammable gases shall be appropriately located and restricted to the minimum; and

4.2.6 Pressure systems for flammable liquids and gasses shall be designed to minimise any potential effect from fire.

Rule 5. Smoke Generation and Toxicity

Functional Objective

5.1 The hazard to life shall be reduced in spaces where persons work, live and may have regular access, from smoke and toxic products generated during a fire from spaces that contain the fire or adjacent to the fire.

Performance Requirements

5.2 Smoke and toxic products released from materials exposed to the effects of elevated temperatures and/or fire shall be limited and demonstrated to be in accordance with an acceptable standard. These materials include, but are not limited to, the following:

5.2.1 Paints, Varnishes and other finishes used on exposed interior surfaces shall not be capable of producing excessive quantities of smoke and toxic products;

5.2.2 Primary deck coverings and floor finishes;

5.2.3 Combustible Insulation Materials;

5.2.4 Electric and fibre optic cabling;

5.2.5 Other materials which may release smoke and toxic products when exposed to the effects of elevated temperatures and/or fire, including:

5.2.5.1 Non-combustible Insulation Materials;

5.2.5.2 Soft Furnishings, textiles and mattresses;

5.2.5.3 Non-metallic piping;

5.2.5.4 Non-metallic armour; and

5.2.5.5 Wooden materials.

Note: The above does not include hull construction material

Rule 6. Control of Smoke Spread

Functional Objective

6.1 The spread of smoke in the ship, and the removal of smoke out of the ship, shall be controlled in order to minimise the hazards from smoke.

Performance Requirements

6.2 A means for controlling the spread of smoke shall be provided within:

6.2.1 Main fire zones, ventilation zones and smoke zones;

6.2.2 Machinery spaces;

6.2.3 Special category spaces of high fire risk;

6.2.4 Control stations manned in an emergency;

6.2.5 Concealed spaces behind ceilings, panelling or linings; and

6.2.6 Muster stations and Evacuations stations.

6.3 Smoke clearance shall be provided for each smoke zone. Fixed smoke clearance shall be provided for areas nominated by the ANC Authority.

6.4 Control stations that may be manned in an emergency situation, shall have arrangements that, in the event of fire, ensure that ventilation, visibility, freedom from smoke and the functions of the control station can be maintained, unless these functions can be accomplished at an alternative location, suitable for occupation for the duration of the incident.

6.5 Means shall be provided to control toxic by-products from firefighting systems.

Rule 7. Detection and Alarm

Functional Objective

7.1 A fire in the space of origin shall be detected and an alarm shall be provided to enable safe escape and fire-fighting activity.

Performance Requirements

7.2 An effective means of detecting and locating fires and alerting the Bridge, continuously manned control station and fire teams shall be provided.

7.3 Fixed fire detection and fire alarm system installations shall be suitable for the nature of the space, fire growth potential and potential generation of smoke and gases.

7.4 Manually operated call points shall be placed effectively to ensure a readily accessible means of notification.

7.5 The fire alarm is to activate the general alarm if not responded to within a defined timescale.

7.6 Fixed fire detection and fire alarm system installations shall be approved in accordance with a recognised standard, tested after installation, and periodically in accordance with a recognised procedure. Software shall be approved and tested in accordance with Division 2 Chapter 03 *Software Systems*.

Rule 8. Containment of Fire

Functional Objective

8.1 A fire shall be contained in the space of origin.

Performance Requirements

8.2 The ship shall be subdivided by thermal and structural boundaries or equivalent.

8.2.1 Fire containment at boundaries shall have due regard to the fire risk of the space, function of the space, and function of adjacent spaces.

8.2.2 The fire integrity of the boundary shall be maintained at openings and penetrations.

8.2.3 Active or passive containment arrangements shall be provided.

8.3 Fire boundaries, openings and penetrations shall be demonstrated in accordance with a recognised standard.

Rule 9. Fire Fighting

Functional Objective

9.1 Suppression, containment and quick extinction of fires shall be effective within the space of origin.

Performance Requirements

9.2 For all foreseeable fire hazards there shall be defined effective and proportionate means of extinguishing each such fire.

9.3 Fixed fire-extinguishing systems shall be installed, having due regard to the risk of ignition, fire growth potential, casualty potential, and operational importance of the protected spaces.

9.4 Fire-fighting systems and appliances shall be readily available throughout the ship.

9.5 Fire extinguishing systems shall be suitable for application at the initiation of a fire and for all stages through to the maximum potential escalation.

9.6 Automatic activation of fire-fighting systems should have due regard for the function of the space, manning and or equipment protected.

9.7 Controls for fire-fighting systems shall be operable from a safe location.

9.8 Selection of fire-fighting media shall have due regard for the fire risk and the function of the space and or equipment protected.

9.9 Selection of fire-fighting media shall have due regard to potential environmental impact, toxicity of the agent and its fire breakdown products and potential short and long term effects on space recovery.

9.10 Means of purging spaces with a gaseous fire-fighting system shall be provided, operable outside the space.

9.11 Means of redundancy shall be provided to mitigate the failure of fixed fire-fighting systems.

9.12 Fire extinguishing systems and appliances shall be demonstrated in accordance with a recognised standard and shall be tested periodically.

Rule 10. Not Used

Rule 11. Not Used

Rule 12. Provision of Operational Information

Functional Objective

12.1 Information shall be provided to address operational effectiveness of the installed fire safety arrangements.

Performance Requirements

12.2 To operate, maintain and monitor the effectiveness of the fire safety arrangements, the following information and instructions shall be provided:

12.2.1 Information for the operation including: operating locations, performance capability, limitations and restrictions of all fire protection systems, firefighting systems and appliances;

12.2.2 Information for the maintenance of all fire protection systems, fire-fighting systems and appliances, incorporated into the ships maintenance plan;

12.2.3 Information for the safe testing of fire protection systems, fire-fighting systems and appliances, including recommended test schedules which are to be incorporated in the ship's maintenance plan; and

12.2.4 Information and instructions for proper ship and handling operations of dangerous goods carried in relation to fire safety.

Rule 13. Special Requirements for Carriage of Dangerous Goods

Functional Objective

13.1 Ships carrying Dangerous Goods shall be consistent with the fire safety goal and other functional objectives of this Chapter.

Note: Chapter 10 *Dangerous Goods* supplements this Chapter with additional fire safety requirements for the carriage of Class I Dangerous Goods.

Performance Requirements

13.2 For ships carrying dangerous goods as defined in the OSI, the following performance requirements shall be met in addition to other requirements of these Rules:

13.2.1 Ignition sources shall be separated from dangerous goods storage and handling areas;

13.2.2 Spaces where dangerous goods will be stored, handled and maintained shall be ventilated with due regard to the risks of the space and adjacent spaces;

13.2.3 Spaces containing dangerous goods shall have fire and atmosphere detection systems with due regard to the risks of the space and adjacent spaces;

13.2.4 Spaces containing dangerous goods shall be separated with due regard to the fire risk of the space and adjacent spaces;

13.2.5 Fire protection systems and firefighting appliances shall be provided to protect the ship from the fire hazards associated with carriage of dangerous goods;

13.2.6 Drainage systems shall be arranged to safely manage firefighting water and to ensure the effluent is safely managed; and

13.2.7 Appropriate Personal Protective Equipment (PPE) shall be provided for the hazards associated with firefighting on a ship carrying dangerous goods.

Rule 14. Carriage of Low Flash Point Fuels

Functional Objective

14.1 Safe storage of low flash point fuel shall be provided where this is required by the OSI.

Performance Requirements

14.2 Small quantities of low flash point fuel shall be stored in independent containers or tanks and shall be readily jettisonable overboard.

14.3 Large quantities of low flashpoint fuel, and small quantities for which paragraph 14.2 cannot be met, shall be stored in independent tanks. Tanks shall be located in spaces where there are no other sources of fire risk.

14.4 Spaces containing independent tanks shall be treated as High Fire Risk Spaces and:

14.4.1 Shall be fitted with vapour detection;

14.4.2 Shall be adequately ventilated, with ventilation led to a safe location;

14.4.3 Shall be fitted with a fixed fire detection and extinguishing system;

14.4.4 All systems are to eliminate, or minimise So Far As Reasonably Practicable (SFARP), the risk of ignition, including by electromagnetic radiation.

Note: Division 2 Chapter 01 *General Requirements* Rule 7 *Hazardous Areas* requirements.

14.5 Tanks shall be adequately ventilated and the vent led to a safe location.

14.6 Means shall be provided to prevent the uncontrolled release of tank contents into the space containing the tank or adjacent spaces.

14.7 Tanks shall be arranged to prevent the contents being raised to a temperature above the auto-ignition point.

14.8 Means shall be provided to control the overflow from tanks.

14.9 Means to allow for safe fuelling, refuelling and defueling of equipment shall be provided consistent with the OSI and in accordance with ANC Rules requirements.

Rule 15. Special Requirements for Vehicle, Well dock, Ro-ro spaces and Small craft bays

Functional Objective

15.1 Ships with vehicle, well dock, ro-ro spaces and small craft bays shall be consistent with the fire safety goal and other functional objectives of this chapter.

Note: Chapter 10 *Dangerous Goods* supplements this Chapter with additional fire safety requirements for the carriage of Class I Dangerous Goods.

Performance Requirements

15.2 For ships fitted with vehicle, well dock and ro-ro spaces and small craft bays, the following performance requirements shall be met:

15.2.1 Ignition sources shall be separated from vehicle, well dock, ro-ro spaces and small craft bays;

15.2.2 Spaces where vehicles and small craft will be stored, handled and maintained shall be ventilated with due regard to the risks of the space and adjacent spaces;

15.2.3 Spaces containing vehicles and small craft shall have fire and atmosphere detection systems with due regard to the risks of the space and adjacent spaces;

15.2.4 Spaces containing vehicles and small craft shall be separated with due regard to the fire risk of the space and adjacent spaces;

15.2.5 Fire protection systems and firefighting appliances shall be provided to protect the ship from the fire hazards associated with vehicle and small craft operation and handling;

15.2.6 Drainage systems shall be arranged to safely manage firefighting water and to ensure the effluent is safely managed;

15.2.7 Fuelling, defueling and maintenance facilities shall provide the necessary measures to protect the ship from the fire hazards associated with vehicle and small craft operations;

15.2.8 Additional safety measures shall be provided for vehicles and small craft using fuel with a low flash point in accordance with Rule 14 *Carriage of Low Flash Point Fuels*; and

15.2.9 The surrounding structure shall protect the ship from the fire hazards associated with vehicle and small craft operations.

Rule 16. Special Requirements for Aircraft Facilities

Functional Objectives

16.1 Ships with aircraft facilities shall be consistent with the fire safety goal and other functional objectives of this Chapter.

Note: Chapter 10 *Dangerous Goods* supplements this Chapter with additional fire safety requirements for the carriage of Class I Dangerous Goods.

Note: Chapter 11 *Aviation Systems* supplements this Chapter with additional fire safety requirements for aircraft facilities.

Performance Requirements

16.2 For ships fitted with aircraft facilities, the following performance requirements shall be met:

16.2.1 Ignition sources shall be separated from aircraft facilities;

16.2.2 Spaces where aircraft will be stored, handled and maintained shall be ventilated with due regard to the risks of the space and adjacent spaces;

16.2.3 Spaces containing aircraft shall have fire and atmosphere detection systems with due regard to the risks of the space and adjacent spaces;

16.2.4 Spaces containing aircraft shall be separated with due regard to the fire risk of the space and adjacent spaces;

16.2.5 Fire protection systems and firefighting appliances shall be provided to protect the ship from the fire hazards associated with aircraft operation and handling;

16.2.6 Drainage systems shall be arranged to safely manage firefighting water and to ensure the effluent is safely managed;

16.2.7 Fuelling, defueling and maintenance facilities shall provide the necessary measures to protect the ship from the fire hazards associated with aircraft operations;

16.2.8 Additional safety measures shall be provided for aircraft using fuel with a low flash point in accordance with Rule 14 *Carriage of Low Flash Point Fuels*; and

16.2.9 The surrounding structure shall protect the ship from the fire hazards associated with aircraft operations.